Research Article

YouTube in Research Course Learning: Undergraduates' Perspectives from a Quantitative Study

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Abstract

YouTube is a video-sharing site that allows users to watch and share video clips. Past studies have found that online videos, such as YouTube, have been widely used in learning in the classroom and are also commonly used in courses in addition to podcasts, wikis, and blogs. YouTube is also used to encourage self-learning and repetition, and is an educational instrument that improves learning innovatively and creatively. However, many educators would prefer to use technology in their teaching strategy. Educators can no longer remain in a comfort zone with traditional teaching methods, but instead, equip themselves with the latest knowledge and skills. This research explores the influence of system, interaction, and content factors on students' satisfaction with YouTube and their subject performance. Using a systematic sampling, the data were collected using a survey approach from the final-year undergraduate students at Universiti Teknologi MARA (UiTM), Negeri Sembilan. The structural equation modeling technique examined the research model based on the final data of 212 undergraduate students. The results indicate that system, interaction, and content factors statistically affect students' satisfaction. On the other hand, system and content factors significantly influence subject performance. The results of this study show that YouTube videos can stimulate creativity, student interest, satisfaction, and motivation. As implications, universities must plan and formulate targeted training and development programs for educators to ensure they remain relevant in fast-changing educational settings.

Keywords: YouTube, Learning Satisfaction, Subject Performance, Technology, Quantitative

INTRODUCTION

The use of information and communication technology (ICT) in education in the 21st century is a phenomenon that has been around for a while. The development of ICT greatly influences today's culture and provides a new shift in pedagogical techniques (Al-Rahmi et al., 2020). Conventional learning that takes the form of chalk and talk and depends entirely on the teacher and whiteboard is less suitable for today's net generation (Carrión-Martínez et al., 2020). The use of technology in education needs to be improved, especially in the delivery of information in the current learning system to students at public universities by educators. This need is important to align with the current era's progress, namely the digital era, where students tend to think more creatively and innovatively. Media technology is one of the intermediary mediums between educators and students to convey information. This media technology can

be an effective teaching tool for lecturers at public universities to improve the quality of learning and student performance (Budiastuti et al., 2023; Ghafar et al., 2023).

Video streaming is one of the tools that technology uses to obtain information in the form of video. Streaming video is also a tool that is often used in the education system and is also known as a creative alternative for creating a more positive and effective teaching and learning environment (Noetel et al., 2021). According to Yoon et al. (2021), streaming video in the teaching and learning process provides many benefits and advantages because it encourages active, collaborative involvement and interaction between lecturers and students. This method can reduce the burden on educators and help educators plan teaching materials more quickly and efficiently (Yoon et al., 2021).

Video streaming media, such as YouTube, are famous and influential as a medium of teaching and learning (Shoufan & Mohamed, 2022). The YouTube application is a video-sharing site where users are allowed to watch and share video clips. The study of Tadbier and Shoufan (2021) showed that online videos such as YouTube have been used in classroom learning in addition to podcasts, wikis, and blogs. YouTube provides educational materials, is practical, and can be used by all groups. It can be accessed anywhere and at any time, provides various information, and, most importantly, can be accessed for free. YouTube will make students focus more on the material presented through exciting and interactive videos. Amos (2021) found the advantages of YouTube videos in self-learning activities. Learning is an effort to train various abilities that belong to humans, such as observing, considering, remembering, imagining, feeling, and thinking. By doing it repetitively, the ability will develop (Musfeld et al., 2023). Past theories emphasize the importance of repetition in learning (Waluyo & Bucol, 2021). Stimulus relationships and responses will increase if used often and decrease or even disappear if rarely used (Ferguson et al., 2024). Therefore, it takes a lot of practice, repetition, and habituation. YouTube supports learning repetition since it can be viewed again, rewind the video, and permanently stored and viewed. The educators should be able to master the skills of using ICT to facilitate the teaching and learning process. Therefore, to help educators apply technology, activities such as courses and workshops related to technology must be actively conducted to improve skills and knowledge (Noetel et al., 2021; Samuri et al., 2016).

However, some lecturers are not confident in approaching their students with educational technology because they may fear that technology will negatively impact examination results (Ramirez, 2021). Enakrire (2024) and Howard et al. (2021) also added that the lack of qualified lecturers due to poor training in educational technology has become one of the obstacles to implementing technology in educational institutions. It is not uncommon for educators to use learning videos on YouTube as material to teach their students (Sharma & Srivastava, 2020). Previous studies have shown several problems with using YouTube videos as learning media. First, there is a lack of supporting media devices available. The availability of facilities is the main difficulty experienced by educators (Okoye et al., 2023). The limited range of Wi-Fi will hamper educators. If the router is far from the device, educators experience difficulties streaming YouTube videos. Thus, the main objective of this study is to identify the influence of the system, interaction, and content factors of YouTube and its effect on undergraduate students' satisfaction and research subject performance.

LITERATURE REVIEW

Information Systems Success Model

Over the years, many theories of technology acceptance with different predictor factors have been built to measure user agreement to indicate the success or failure of an information system. Many researchers have developed and used the information system success model by DeLone and McLean (1992). DeLone

and McLean (1992) produced the model based on the theory of User Information Satisfaction (UIS) introduced by Bailey and Pearson (1983) with slight modifications. By synthesizing various studies on system success, DeLone and McLean (1992) organized various dimensions of success proposed by researchers into six variables, namely: system quality, information quality, user, user satisfaction, individual impact, and organizational impact. Successful implementation of an information system can be seen from the qualitative characteristics of the quality system, the quality of the output in the form of information produced, consumption of output seen from the user, user response to that information seen from user satisfaction, influence on organizational performance, or organizational impact. The success model of information systems was accounted for in seven factors (DeLone & McLean, 1992). They added a service quality variable (service quality), replacing the impact variable individual and organizational impacts into benefits net (net benefits), as well as adding variables interest in using (intention to use) as an alternative from user variables (use) so that factors information system success according to Delone and Mclean (2003).

YouTube as an Effective Learning Medium

YouTube was founded in February 2005 by three former employees of PayPal, namely Chad Hurley, Steve Chen, and Jawed Karim (Cunningham et al., 2016). Generally, the videos on YouTube are film clips, TV shows, and videos made by users. The development of YouTube, one of the most popular social media sites, is an opportunity for education. Education has a vital role in developing quality human resources. YouTube social media has a positive and negative impact on learning. As for the positive impact of using YouTube as a learning medium, it can motivate students to be more creative, get information in the form of various videos as tutorials, and be able to deepen the material that has been taught (Johansson, 2021). Through YouTube, students can understand the material taught in depth because YouTube can be an example of the actual form of the material learned. Through YouTube, students can also learn independently, so they do not depend too much on the learning material (Shoufan & Mohamed, 2022). Students can also find and watch a lot of information about the material that will be taught or that has been taught.

Some of the benefits of using YouTube in the field of education are: 1) a teaching strategy to obtain references in the teaching and learning process, 2) a good instructional resource, and 3) a source of teaching motivation that can involve students and support a modern learning style (Johansson, 2021; Kohler & Dietrich, 2021; Shoufan & Mohamed, 2022). In line with the advancement of technology in education, educational programs are directed at the mastery of technology-based knowledge and skills. Using YouTube media makes students enthusiastic, happy, and focused on learning (Zhou et al., 2020). YouTube creates an exciting learning process that is easy and not limited by time and space, making it easier for students to learn (Yoon et al., 2021). Based on YouTube it provides services for uploading, downloading, and sharing videos. YouTube provides a variety of technical things, such as how to use applications on a computer and various practical ways to do things that are initially complicated and impractical. YouTube always provides the latest news and information, which can be seen because it is audiovisual and more accurate (Kohler & Dietrich, 2021). YouTube not only provides one type of content but also covers a variety of content in the form of event information, education, technical matters, and much more. Incorporating YouTube into research education is a simple and user-friendly way to improve collaboration and students' understanding. According to Alobaid (2020), YouTube will stimulate active learning and provide additional knowledge beyond the expected ability (Shoufan & Mohamed, 2022). YouTube can explain theory by involving students in innovative learning methods. Instructors can use this technology for sharing information and creating a learning community. Amos (2021) states that YouTube is an alternative, timely learning resource for educators and students. Integrating specific videos

from YouTube can develop students' appreciative abilities and provide a learning experience limited to the subject matter and the technology used (Tadbier & Shoufan, 2021).

The YouTube application has been used by researchers in research subjects to ease student understanding, especially on critical topics such as writing research proposals, viva presentation guides, sampling techniques, goodness of fit, and statistical analysis. Research is a systematic effort to get answers to questions. Two things that arise from the meaning are the systematic process and answers to questions. This means that the research process is organized, follows a sequence, and is guided by a question, which is a problem to be solved. In research subjects such as ADS555, ADS651, and ADS511 taught at the Faculty of Administrative Science and Policy Studies, UiTM, the students need to perform an analysis procedure to summarize the data collected so that researchers can easily understand the relationship and how the relationship exists between variables. Thus, they will use SPSS data analysis to describe and draw conclusions from the data. In analyzing data with SPSS, several statistical techniques can be used, such as difference tests, correlation, regression, and others.

To ease the process of understanding the subject's content, the instructors have used YouTube. This media's usage allows repetition, which is not applicable in face-to-face teaching interaction. Repetition is one of the methods that is often used in the learning process. This method involves repeating specific material or information to reinforce understanding and improve student retention (Musfeld et al., 2023). Repetition can help students strengthen their understanding of the material being taught. Students can deepen their understanding and remember the information by repeating the same material several times. Repetition also helps students identify and correct mistakes to improve their understanding of the material (Ferguson et al., 2024). Moreover, YouTube videos are easy to share with users of other applications, such as Facebook and Twitter, or sent via email. In this way, social media sites can maximize the capacity of user video sharing. In addition, the advantage of the YouTube website is that it can be registered and used for free for life. There are no registration fees or other fees charged. Figure 1 shows the YouTube interfaces used for research courses.
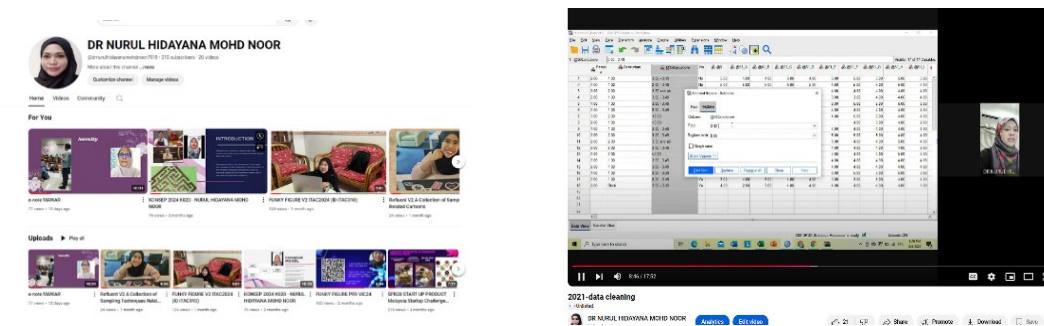

Figure 1: The interfaces of YouTube used for research courses

YouTube Elements and its Impact on Learning Satisfaction and Subject Performance

YouTube's popularity as an educational resource is mainly due to its diversity. The platform features content in various languages, formats, and difficulty levels, allowing users to find the content that best suits them (Johansson, 2021). For students who have difficulty learning in class, YouTube presents an alternative explanation that is more accessible (Kohler & Dietrich, 2021). For example, interactive SPSS

videos often help students who feel that conventional teaching methods are not working for them. System performance, including response speed and time, can affect user interaction, satisfaction, and learning performance (Singh et al., 2024; Purnama et al., 2022). Poor or slow performance can cause frustration and reduce the effectiveness of the interaction. The reliability of the system is also important. Systems that often experience disruption or damage can disrupt interactions and reduce user productivity (Kelly et al., 2023). YouTube features videos in a variety of ways. Users can search for videos using keywords, browse categories, and view trending videos through the YouTube home page. As a channel owner, you can choose a thumbnail for your video that is considered the most interesting to attract viewers' attention. YouTube also has a video recommendation feature, where videos are suggested to be played for users based on the videos they have watched before (Munaro et al., 2021). This feature is driven by YouTube's algorithm that uses data from several factors, including video watch time, video reporting, user interaction, and others (Yoon et al., 2021). The YouTube algorithm contains a set of rules created to recommend content to YouTube users. The goal is straightforward for users to find shows that suit their interests so they feel at home on YouTube (Munaro et al., 2021).

An intuitive user interface is one of the key factors in determining the effectiveness of YouTube applications for learning (Noor, 2023). Tao et al. (2022) developed a taxonomy to evaluate learning applications with user interface aspects. An application with an easy-to-use interface can increase comfort and efficiency in use, allowing students to focus on the content they are learning without being distracted by technical problems (Kelly et al., 2023). Effective navigation allows users to move quickly through various parts of the application (Sablić et al., 2021). In the context of YouTube, this means the ability to find, store, and organize efficiently. Bad navigation design can result in frustration and reduce user engagement. With the increasing use of mobile devices, responsive design that can adapt to various screen sizes is becoming increasingly important. YouTube applications must be optimized for mobile devices, tablets, and desktops to ensure broad accessibility.

The interaction system in learning applications includes various features that enable active interaction between users and content (Kelly et al., 2023; Zolkipli et al., 2023). These features can increase user engagement and understanding of the studied material (Noor, 2023). Noetel et al. (2021) show that interactive features such as quizzes, discussions, and assignments can increase student engagement. These features allow students to actively participate in the learning process, not just as passive listeners (Mayer, 2021; Mohamad et al., 2022). For example, the YouTube quiz can help students test their understanding of the material they have just learned. Effective user interface design is essential in facilitating human-computer interaction. An intuitive, easy-to-navigate, responsive interface will increase efficiency and user satisfaction (Tao et al., 2022).

Various learning styles should be considered when producing teaching videos. Three types of learning styles are visual, auditory, and kinesthetic. Educators should ensure that teaching videos meet aspects of these different learning styles to facilitate student understanding (Mayer, 2021). Clear voice and explanations are important in teaching videos because they facilitate understanding and help students focus their attention (Noetel et al., 2021). They should use a good microphone and ensure the explanations are sufficient to produce quality teaching videos. Video editing is important to ensure that the quality of the teaching videos is better. Educators can use software such as Adobe Premiere Pro or iMovie to edit videos. The use of special effects can also improve the quality of teaching videos. Before uploading teaching videos, they should ensure that the quality of the video meets the set standards (Sablić et al., 2021). Video quality verification will ensure that the teaching videos produced are effective in learning. According to Debra (2010), to ensure active learning, it is recommended that educators produce videos no longer than 15 to 20 minutes and, at the same time, use strategies to keep students engaged with the information presented. Kay and Kletskin (2012) stated that the length of the video clips developed should

be kept to a minimum to address limited attention span issues. The minimum duration is 3 minutes, and the maximum is 15 minutes. Figure 2 portrays the conceptual model of the study.
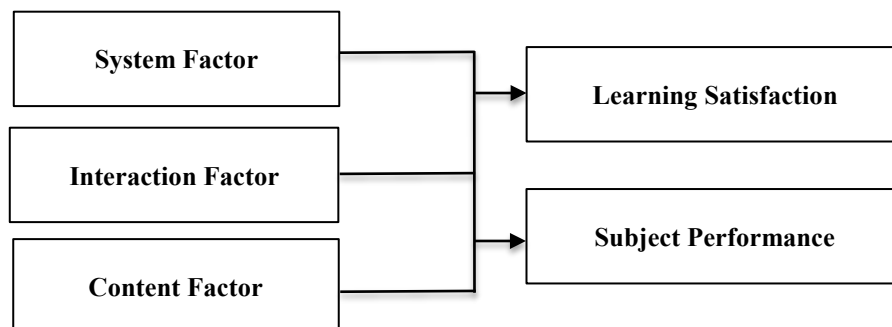

Figure 2: Conceptual Model

METHODOLOGY

This study uses a survey method to collect data. The instruments are adapted from a study by Harper et al. (2023). The researcher has gathered the subject performance instrument through a course grade. Respondents were undergraduate students from the Faculty of Administrative Science and Policy Studies, UiTM, taking research subjects (ADS651, ADS555, and ADS511). The study determined the sample size based on Krejcie and Morgan's (1970) Sample Size Determination Table. Academics adopt this sample size determination table, which makes it easier for researchers to determine the sample size. Based on the population of 480 respondents, two hundred and fourteen undergraduate students were selected using systematic random sampling techniques. Systematic sampling is a technique for creating a random probability sample in which each piece of data is selected at regular intervals to be included in the sample. For example, if a researcher wants to create a systematic sample of 214 students with an enrolled population of 480, we will select every second person from the list of all students.

The researchers used Structural Equation Model (SEM) analysis with AMOS software to test the research model. Reliability is the consistency of measurement results that are repeated both using the same and different measuring instruments. Cronbach's Alpha test is conducted to see if survey questions measured through Likert scales are reliable. Corresponding to Nunnally (1978), the reliability of the questionnaire has also been assumed (α value > 0.70), and the alpha value for the variables meets the acceptable range (see Table 1). Next, suggestions by Kline (2005) are pursued to verify the data's normality. The primary purpose of normality testing is to ensure that the data is consistent and to identify model error problems that are appropriate for data analysis. The attained values for skewness and kurtosis were within ±3 and ±10, respectively. Therefore, the data were distributed normally. Table 1 summarises the instruments used in this study.

FINDINGS AND DISCUSSION

Demographic Profile

In this study, 150 (70.8%) respondents were females, and 62 (29.2%) were males. Regarding age group, most respondents are between 21 to 23 years old (n=200, 94.3%). Of 212 students, 89 (42%) respondents scored an A for the ADS651 course. This is followed by +A (n=45, 21.2%), -A (n=46, 21.7%), +B (n=10, 4.7%), B (n=15,7.1%), and -B (n=7, 3.3%).

Table 1: Measurement of the Variables, Normality, and Reliability Results

Variables	Items	Skewness	Kurtosis	α
System Factor	S1. YouTube performs reliably.	-1.510	0.420	0.846
	S2. YouTube is easy to use for learning purposes.			
	S3. YouTube is well-organized for learning purposes.			
Interaction Factor	I1. I interact with the content provider(s) when watching their videos.	-0.250	-0.447	0.811
	I2. When watching their videos, I feel close to the content provider(s).			
	I3. I relate to other users who watch the same topic content.			
Content Factor	C1. The content for learning from YouTube is presented on the screen.	-0.309	-0.820	0.828
	C2. Learning resources from YouTube provide enough information about the topics I am interested in.			
	C3. Learning resources from YouTube cover a wide range of information.			
Subject Performance	P1. The score attained for the subject.	0.290	1.265	NA
Learning Satisfaction	LS1. Regarding my recent use of YouTube for learning purposes, I am satisfied.	-0.371	0.386	0.845
	LS2. I am pleased with my recent use of YouTube for learning purposes.			
	LS3. Regarding my recent use of YouTube for learning purposes, I am content.			

Confirmatory Factor Analysis (CFA)

In SEM, several fitness indices describe the model's fit, as obtained from the statistics. To determine the model fit, the value for Comparative Fit Index (CFI), Goodness Fit Index (GFI), and Tucker Lewis Index (TLI) is expected to be ≥ 0.90 (Hair et al., 2019). The size of the expected RMSEA value ≤ 0.05. The value of chi-square ($\chi2/df$) ≤3 It is considered acceptable (Hair et al., 2019). For this study, various indicators of the confirmatory model were acceptable ($\chi2/df$ = 2.118, GFI = 0.910, TLI = 0.920, CFI =0.900, and RMSEA = 0.037).

Convergent and Discriminant Validity

To identify the convergent validity, the researcher needs to ensure that the Composite Reliability (CR) value is ≥ 0.60 and the Average of Variance Extracted (AVE) values are≥ 0.50 (Hair et al., 2019). Based on Table 2, the factor loading for each study item was more than 0.60, and AVE and CR were within the appropriate range. The study then assesses the discriminant validity by looking at the diagonal value. Agreeing with Fornell and Larcker (1981), a diagonal value is said to have discriminant validity when it is ≥ 0.85. From Table 3, the discriminant validity succeeded as the values were more than 0.85.

Structural Model Analyses

After careful examination, it was discovered that system factor (β =0.342, p<0.001) and content factor (β =0.329, p<0.001) significantly influence subject performance. However, the interaction factor does not influence subject performance (β =0.018, p>0.05). Second, system factor (β =0.240, p<0.001), interaction factor (β =0.321, p<0.001), and content factor (β =0.470, p<0.001) significantly influence learning satisfaction.

Table 2: Factor Loading, AVE, and CR

Variable	Items	Item Loadings	AVE	CR
System Factor	S1	0.824	0.630	0.843
	S2	0.747		
	S3	0.774		
Interaction Factor	I1	0.761	0.610	0.870
	I2	0.771		
	I3	0.735		
Content Factor	C1	0.754	0.608	0.889
	C2	0.743		
	C3	0.831		
Subject Performance	P1	0.808	0.689	0.865
Learning Satisfaction	LS1	0.761	0.675	0.842
	LS2	0.759		
	LS3	0.771		

Table 3: Discrimination Validity

No.		1	2	3	4	5
1	System Factor	**0.793**				
2	Interaction Factor	0.602	**0.781**			
3	Content Factor	0.556	0.572	**0.779**		
4	Subject Performance	0.690	0.590	0.543	**0.830**	
5	Learning Satisfaction	0.533	0.620	0.662	0.678	**0.821**

Note. Values on the diagonal show the square root of AVE

Table 4: Structural Model Results

Path		β	p-value
System Factor ➡	Subject Performance	0.342	***
Interaction Factor ➡	Subject Performance	0.018	0.110
Content Factor ➡	Subject Performance	0.329	***
System Factor ➡	Learning Satisfaction	0.240	***
Interaction Factor ➡	Learning Satisfaction	0.321	***
Content Factor ➡	Learning Satisfaction	0.470	***

The results indicate that system, interaction, and content factors statistically affect students' learning satisfaction. On the other hand, only system and content factors significantly influence subject performance. This research is expected to be used as material for further educational research. The results of this study show that YouTube videos can stimulate creativity, student interest, satisfaction, and motivation. The use of YouTube has proven to be accepted and responded to well by students, and it can impact the learning of research subjects and academic performance. YouTube improves learning performance because it allows repetition. Every time the student repeats something, the brain remembers that information or skill, making it easier to access in the future (Musfeld et al., 2023). SPSS, for instance, requires training-based repetition, where information or skills are repeated through repeated training or practice. This technique is very effective for learning SPSS or research technical skills.

Theoretically, the researcher hopes that the results of this research can help increase the reader's insight, especially those who work as educators, to realize the benefits of using YouTube as a learning medium for the development of knowledge. Videos take advantage of visual and auditory elements, satisfying the natural human tendency toward visual learning (Alobaid, 2020; Binowo et al., 2024). This improves

comprehension and retention, making complex concepts more accessible. It ensures that a consistent message is delivered each time it is viewed. An animated YouTube video tells an exciting story through visuals, animated text, and background sound, which educators can employ. These YouTube video ideas sometimes include digital drawings, sketches, or cartoons.

Based on research findings, several suggestions can be proposed to increase the effectiveness of efforts to increase the usage of YouTube. The first is developing concrete guidelines for integrating educational technology into the curriculum. Second, routine and continuous training for educators must be organized, including technical and pedagogical skills in using educational technology (Ramirez, 2021; Hassan et al., 2014). Then, encouraging collaboration between educators to share experiences and best practices. Among the training requirements needed to improve the level of skills in the use of ICT are the skills of reading and writing simple computer programs, using computer programs and documentation, creating interactive YouTube videos, and using applications such as Google Slides, Google Docs, and Google sheets that can be used for teaching and learning purposes (Howard et al., 2021). This application can be shared online through Google Drive. As educator, they should be competent in using information and communication technology in the teaching and learning system.

Quality teaching videos can help students learn (Enakrire, 2024). Several improvements can be made in producing quality teaching videos, such as the formation of concept maps, the preparation of scripts and brief notes, the use of graphics and images, various learning styles, clear voice and explanations, video editing, and video quality verification (Noetel et al., 2021). With these improvements, the teaching videos produced can positively impact the learning process. Introducing hands-on activities and exploration in teaching videos is also important because everyone has a different learning style. Providing opportunities for hands-on and interactive activities can help understand concepts better. Applying 3D animation and graphic technology can also help explain complex concepts more visually and quickly. Complementing the content with expert commentary is also important because it can add credibility and trust to teaching videos.

In addition, introducing integrated themes in teaching videos can help convey information and a more comprehensive understanding of several related aspects. Using examples and case studies in real situations can also help nudge teaching clarity and height with examples of real situations. This allows for long-term retention of information. Applying visual arts in delivery is also very important. Combining fine and visual arts in teaching videos can add consistency and clarity in terms of content and structure (Mayer, 2021). Increasing interaction and engagement through what questions asked can also build more activity and engagement by introducing questions that involve the audience (Munaro et al., 2021). This can encourage them to engage with teaching videos more effectively.

Optimizing the use of color and lighting on the screen is important to ensure that the appearance and content of teaching videos can be found quickly and effectively (Mayer, 2021). Finally, adding access buttons or markers to teaching videos can make it easier for users to get and refer to important information from teaching videos in the future. By using all these suggestions, teaching videos can more effectively convey information and understanding to the audience. Lecturers should learn or attend the training since learning videos are produced using several applications and software support, such as cameras, laptops, paint applications, and recorders, which require specific skills and knowledge. Creating content for videos takes effort and dedication; it starts with defining the goals and knowing the audience. Then, outline the main points and details of the script. More importantly, keep it short since good timing can significantly impact making the video viral and attractive.

Moreover, higher learning institutions must formulate strategies and policies to ensure equal access to devices and the Internet (Sablić et al., 2021). Universities are also encouraged to fully utilize digital learning platforms that are user-friendly, inclusive, and accessible to various levels of ability. The universities also need to support more in-depth, advanced research on the impact of various types of educational technology on digital literacy and academic results (Yoon et al., 2021). The lecturers also need to periodically evaluate the implementation of educational technology in the curriculum to ensure that the goal is achieved (Enakrire, 2024). Adopting these suggestions is hoped to create an educational environment that supports the development of digital literacy among students and prepares them with relevant and needed skills in the ever-growing digital era.

CONCLUSION

YouTube is a video-sharing website that is most interesting today. YouTube users are spread all over the world and are of various age groups. YouTube has become an alternative to watching other than television. YouTube has great potential to be used as a learning medium. When educators upload a learning video on YouTube, the video is not only used as a learning medium between educators and students. However, it can also be used by all YouTube users. Using YouTube as a learning medium allows educators to create an enjoyable, pleasant, and interactive learning atmosphere. This research explores the influence of system, interaction, and content factors on students' satisfaction with YouTube and their subject performance. From a practical aspect, this study not only contributes from an academic perspective but can also provide benefits and add knowledge to higher learning institutions and universities regarding effective teaching practices. The discussion of the findings of this study would be more comprehensive if the following points were considered for future studies. First, more studies should be conducted to confirm the relationships further. This is because the scope of this study only focused on one faculty member, and the number of respondents selected was also relatively small. Such studies can be expanded to other faculties or universities to provide a higher degree of consistency. Future studies can also consider other factors contributing to learning satisfaction and student performance. Examples are demographic factors, motivation, individual personality, or knowledge.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

Nur Batrisyia Nordin: Conceptualization, Original draft preparation. **Hasnatulsyakhira Abdullah Hadi & Afief El Ashfahany**: Data curation, Writing-Original draft preparation. **Nurin Farzana Mohamad Fadzil**: Visualization, Investigation. **Nurul Hidayana Mohd Noor**: Writing- Reviewing and Editing.

DECLARATION OF GENERATIVE AI

The authors declare that no generative AI was used in the writing of the manuscript.

DATA AVAILABILITY STATEMENT

Data available on request from the authors.

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