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Perceptions of Teacher-trainees Towards using YouTube Videos to improve Conceptual Understanding of the Reactivity of Alkali Metals in Natural Sciences at a Rural University in South Africa

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ABSTRACT

YouTube videos are frequently used in educational settings to improve students' academic performance. This study investigated the impact of YouTube on acceptance and usability using the Technology Acceptance Model (TAM) at a rural university in South Africa. The focus of the research was to understand the perspectives of teacher candidates regarding the significance of YouTube in enhancing their understanding of laboratory safety and alkali metal reactivity. YouTube videos have been found to be essential for comprehending scientific experiments due to their visual components, detailed explanations, user-friendly interfaces, interactivity, and ability to simplify complex ideas. They complement traditional teaching methods, encourage social interaction, and stimulate curiosity and innovation across different age groups. The survey involved 32 teacher candidates enrolled in a Natural Science class, with five questionnaires not returned. The survey's reliability was confirmed with a Cronbach alpha value of 0.710 during testing. Descriptive statistics were utilized to analyse the data, determining the mean and variability. The research indicates that future educators highly prefer using YouTube to learn about Natural Science experiments and are open to integrating technology for educational purposes. Therefore, the research may improve the understanding of theoretical scientific procedures by encouraging educators to advocate for the use of digital resources in education, ultimately enhancing academic achievements. The findings of this research will enhance understanding of the importance of utilizing YouTube to support student learning. Educators can leverage this information to develop effective strategies for enhancing student learning by understanding what drives students to use YouTube for educational purposes.

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INTRODUCTION

The higher education sector has been undergoing digitalization for some time, and the Covid-19 pandemic has further accelerated this shift. Many universities are realizing that the technological revolution in education requires significant modifications to their curriculum, essential skills, and assessment methods. The move toward online education as the new norm has been hastened by the disruptions caused by the pandemic. Teaching methods have rapidly evolved from traditional classrooms

to online platforms, personalized virtual teaching, and webinars to seminars.[1] According to Zaidi, et.al, the frequent use of the internet, especially social media platforms, offers various opportunities to enhance the quality of education for university students.[2] College students mainly prefer MySpace, Facebook, and YouTube as their top three websites. Integrating YouTube videos into education is crucial for meeting the learning needs of young students. As highlighted by Aguilera-Hermida, online or remote learning requires students and teachers to be located in different places and to have a means of receiving instruction.[3] Additionally, technology can aid in connecting students and teachers, as well as in the development of learning methods. Different settings can significantly impact academic achievements. While some students may find technology user-friendly, not all users are eager to embrace it. A study found varying attitudes among teacher trainees regarding the effectiveness of using YouTube to enhance the comprehension of Natural Sciences in rural South African universities.[4]

The researcher identified a lack of literature in the South African context on the perceptions of student-teacher trainees regarding the use of YouTube videos to improve the conceptual understanding of the reactivity of alkali metals in Natural Sciences. Thus, the study aims to comprehend the perceptions of student and teacher trainees regarding the use of YouTube videos to enhance conceptual understanding of the reactivity of alkali metals in Natural Sciences at a rural university in South Africa. *The research question* underlying the study is:

- *What are the perceptions of student-teacher trainees towards using YouTube videos to improve conceptual understanding of the reactivity of alkali metals in Natural Sciences?*

LITERATURE REVIEW

Use of YouTube as a learning tool in universities

In a study by Ndihokubwayo, Uwamahoro, and Ndayambaje, it was found that student performance improved in different subjects when using YouTube videos instead of traditional lecture methods.[5] YouTube videos have been found to be a creative educational tool that can captivate students in physics, changing it from a dull subject to an interesting one, as seen in the mentioned videos. Another research found that in guided inquiry laboratory instruction, students demonstrated heightened motivation to learn and enhanced comprehension of optics and light concepts using embedded educational videos. The primary goals of using YouTube videos in the classroom are to guide students' attention, initiate discussions, and provide real-world applications for concepts. Watching these films has been discovered to increase student engagement and promote in-depth learning. Patalinghug and Mark argue that the significance of technology-enhanced learning is unquestionable.[6] The use of Technology-Enhanced Learning (TEL) in educational settings is not a recent trend; it has been linked to increased student motivation, self-regulation, self-assessment, and cognitive development. Furthermore, it was believed that integrating technology into educational environments would improve student satisfaction. More and more online educational resources like websites and video-sharing platforms are being integrated into educational environments. These teaching techniques can be used in the classroom to improve student learning.

One instance is YouTube, which is currently one of the most utilized online platforms, particularly advantageous for educational and tutorial purposes. Additionally, a growing number of students are utilizing YouTube for assistance with their academics, acknowledging its importance in enhancing their

[1] Víctor J. García-Morales, Aurora Garrido-Moreno, and Rodrigo Martín-Rojas, "The Transformation of Higher Education After the COVID Disruption: Emerging Challenges in an Online Learning Scenario," *Frontiers in Psychology* 12 (February 11, 2021), https://doi.org/10.3389/fpsyg.2021.616059.

[2] Azurawati Zaidi et al., "University Studentsâ Perceptions of YouTube Usage in (ESL) Classrooms," *International Journal of Academic Research in Business and Social Sciences* 8, no. 1 (February 21, 2018), https://doi.org/10.6007/IJARBSS/v8-i1/3826.

[3] Patricia A. Aguilera-Hermida, "College Students' Use and Acceptance of Emergency Online Learning Due to COVID-19," *International Journal of Educational Research Open* 1 (2020): 100011, https://doi.org/10.1016/j.ijedro.2020.100011.

[4] Ahmad Fauzi et al., "Exploring Students' Acceptance of Google Classroom during the Covid-19 Pandemic by Using the Technology Acceptance Model in West Sumatera Universities," *Electronic Journal of E-Learning* 19, no. 4 (August 11, 2021): pp233-240, https://doi.org/10.34190/ejel.19.4.2348.

[5] Kizito Ndihokubwayo, Jean Uwamahoro, and Irénée Ndayambaje, "Effectiveness of PhET Simulations and YouTube Videos to Improve the Learning of Optics in Rwandan Secondary Schools," *African Journal of Research in Mathematics, Science and Technology Education* 24, no. 2 (May 3, 2020): 253–65, https://doi.org/10.1080/18117295.2020.1818042.

[6] Haidee F Patalinghug and Patalinghug Mark, "YouTube as a Web-Based Instructional Tool in Higher Education in Technology Enabled Learning during the Covid-19 Pandemic," *Jurnal Pendidikan Progresif* 12, no. 3 (2022): 1115–26.

comprehension of educational topics. Mohammed and Ogar elaborate on how YouTube serves as a web-based educational resource that facilitates quick learning for students and enhances their study habits by incorporating visuals and videos. The educational content on YouTube motivated students to gain expertise.[7] Because of the growth of digital learning in higher education, students heavily depend on YouTube channels and other technological resources. Students found inspiration from YouTube. Madzimure argues that YouTube can improve students' skills in traditional lecture learning.[8] Zaidi et al. argue that integrating YouTube videos into education is essential to meet the needs of younger students and enhance their motivation.[9] Namubiru et.al., suggest that students in higher education are increasingly seeking valuable learning opportunities with emerging technologies like YouTube, a trend expected to continue rising.[10]

Perceptions of students towards YouTube videos in Natural Sciences

The importance of video media in enhancing science education for elementary school children is emphasized by Panjaitan, et.al., and Maziriri et al.[11] Beautemps and Bresges argue that digital platforms with educational videos provide a compelling method of learning for younger individuals, offering convenient and customizable access to diverse content.[12] Educational videos are particularly well-suited for scientific content due to their ability to provide simplified explanations and visual demonstrations. YouTube stands out as the leading global platform for user-generated video content, with 500 hours of video being uploaded every minute. The effectiveness of PhET simulations and YouTube videos for improving optics learning highlights the need for varied multimedia tools in the instructional process, as expressed by Ndihokubwayo et al.[13] Research by Otchie, et.al., reveals that teachers believe YouTube videos are more engaging and beneficial for STEM education. The use of YouTube STEM videos may inspire students, especially those in disadvantaged schools with limited science resources, to pursue science courses.[14]

Hasanah has suggested that creating innovative and adaptable tools for teaching abstract science ideas can enhance students' critical thinking abilities. In summary, developing and utilizing interactive multimedia based on scientific inquiry is possible for science education.[15] A study conducted by Breslyn and Green showed that students significantly increased their individual use of YouTube videos for science education during the pandemic.[16] However, most educators either maintained their level of video usage or experienced a decrease in utilizing video for online teaching during the pandemic. After the pandemic, students expressed their intention to continue using science videos for education, hoping that teachers will also embrace this approach. The research by Velho, Mendes, and Azevedo suggests that

[7] Ibrahim Abba Mohammed and Sylvanus Innocent Ogar, "Exploring the Potential of YouTube Videos towards Enhancing Achievement and Retention of Undergraduate Students in Environmental Education," *European Journal of Interactive Multimedia and Education* 4, no. 1 (April 12, 2023): e02302, https://doi.org/10.30935/ejimed/13190.

[8] Jeremiah Madzimure, "Investigatation of YouTube as an Online Platform Used during Remote Learning Forced by COVID-19," *EUREKA: Social and Humanities*, no. 1 (January 28, 2022): 43–49, https://doi.org/10.21303/2504-5571.2022.002268.

[9] Zaidi et al., "University Studentsâ□□ Perceptions of YouTube Usage in (ESL) Classrooms."

[10] Proscovia Namubiru Ssentamu et al., "Enhancing Student Interactions in Online Learning: A Case of Using YouTube in a Distance Learning Module in a Higher Education Institution in Uganda," *Higher Education Research* 5, no. 4 (2020): 103, https://doi.org/10.11648/j.her.20200504.11.

[11] Muktar Bahruddin Panjaitan et al., "Improving Students' Learning Outcomes in Natural Science Subject for Third Grade of Elementary School Through Video Media," *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini* 7, no. 3 (June 17, 2023): 3253–66, https://doi.org/10.31004/obsesi.v7i3.4632.Eugine Tafadzwa Maziriri, Parson Gapa, and Tinashe Chuchu, "Student Perceptions Towards the Use of YouTube as An Educational Tool for Learning and Tutorials," *International Journal of Instruction* 13, no. 2 (April 1, 2020): 119–38, https://doi.org/10.29333/iji.2020.1329a.

[12] Jacob Beautemps and André Bresges, "What Comprises a Successful Educational Science YouTube Video? A Five-Thousand User Survey on Viewing Behaviors and Self-Perceived Importance of Various Variables Controlled by Content Creators," *Frontiers in Communication* 5 (April 1, 2021), https://doi.org/10.3389/fcomm.2020.600595.

[13] Ndihokubwayo, Uwamahoro, and Ndayambaje, "Effectiveness of PhET Simulations and YouTube Videos to Improve the Learning of Optics in Rwandan Secondary Schools."

[14] Wilson O Otchie et al., "Can YouTube Videos Facilitate Teaching and Learning of STEM Subjects in High Schools," *Bulletin of the Technical Committee on Learning Technology* 20, no. 1 (2020): 3–8.

[15] Uswatun Hasanah, "Exploring the Need for Using Science Learning Multimedia to Improve Critical Thinking Elementary School Students: Teacher Perception," *International Journal of Instruction* 16, no. 1 (January 1, 2023): 417–40, https://doi.org/10.29333/iji.2023.16123a.

[16] Wayne Breslyn and Amy E. Green, "Learning Science with YouTube Videos and the Impacts of Covid-19," *Disciplinary and Interdisciplinary Science Education Research* 4, no. 1 (December 11, 2022): 13, https://doi.org/10.1186/s43031-022-00051-4.

science communication on YouTube mainly focuses on categorization, content description, and the video's perspective on scientific topics.[17] The research also examines how nine different factors, both related to content and unrelated, impact the popularity of science videos on YouTube, measured by the number of views per day since the video was uploaded. Furthermore, immersive virtual reality technologies like YouTube are now seen as valuable educational resources, especially for incorporating nature interactions like observing wildlife into science education. Despite the increased interest in the screen setup leading to more favourable opinions of wolves, this link was not present in the head-mounted display setup.

THEORETICAL FRAMEWORK

Technology Acceptance Model by Fred Davis, 1989 (TAM)

The design of a system has a significant impact on how people accept and use technology. This is explained by the three-stage Technology Acceptance Model (TAM), which starts with cognitive reactions such as perceived usefulness and ease of use. These reactions lead to emotional responses and ultimately influence the way people use technology. The TAM model shows that behavioural intention, perceived usefulness, and ease of use are important factors in predicting behaviour. When people believe that using a technology will yield positive results and that it won't be difficult to use, they are more likely to use it. The perceived usefulness of technology directly affects its actual usage, highlighting the importance of this factor in predicting behaviour. Essentially, if users find an app easy to use, they are more likely to see its benefits and, therefore, adopt the technology.[18]

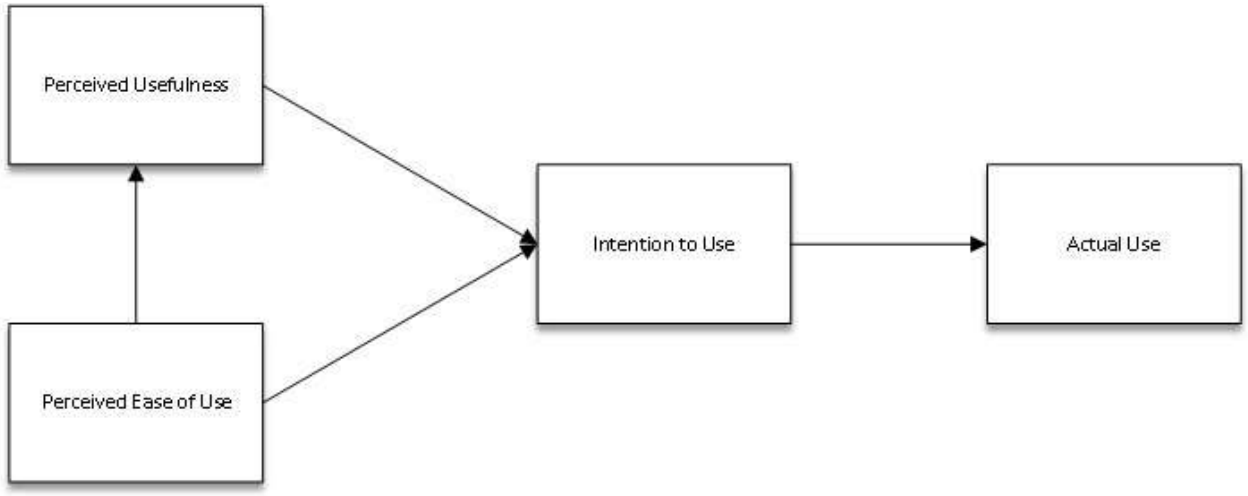

Figure 1. Technology Acceptance Model (Davis, 1989)

According to Doğan, there has been an increase in the inclination of secondary school students to use YouTube for educational purposes.[19] Chintalapati and Daruri argue that YouTube serves as a platform for individuals to share their own User Generated Content (UGC) for others to utilize, making it a content community.[20] Despite being widely enjoyed for entertainment; YouTube has also become a valuable educational tool and is being viewed as a replacement for written content on various websites and blogs. However, there is currently no way to measure users' intentions to use YouTube for learning

[17] Raphaela Martins Velho, Amanda Merian Freitas Mendes, and Caio Lucidius Naberezny Azevedo, "Communicating Science With YouTube Videos: How Nine Factors Relate to and Affect Video Views," *Frontiers in Communication* 5 (September 25, 2020), https://doi.org/10.3389/fcomm.2020.567606.

[18] Andrina Granić and Nikola Marangunić, "Technology Acceptance Model in Educational Context: A Systematic Literature Review," *British Journal of Educational Technology* 50, no. 5 (September 9, 2019): 2572–93, https://doi.org/10.1111/bjet.12864.

[19] Fatih Doğan, "Scale Development and Validation Study on the Using YouTube as a Learning Environment in Secondary Education According to the Technology Acceptance Model," *African Educational Research Journal* 11, no. 1 (January 9, 2023): 1–20, https://doi.org/10.30918/AERJ.111.22.061.

[20] Nagapavan Chintalapati and Venkata Srinivas Kumar Daruri, "Examining the Use of YouTube as a Learning Resource in Higher Education: Scale Development and Validation of TAM Model," *Telematics and Informatics* 34, no. 6 (September 2017): 853–60, https://doi.org/10.1016/j.tele.2016.08.008.

purposes, nor is there an established model to understand the factors influencing this intention. In the research by Yaacob and Md Saad, they support the Technology Acceptance Model (TAM) by demonstrating a link between students' acceptance of YouTube for learning and factors such as ease of use, usefulness, and social influence.[21] The study also found that the subscription status did not affect the relationship between the factors and students' acceptance. Therefore, this research suggests that students are willing to use YouTube for educational purposes, regardless of whether they are subscribed to a channel or not.

The research by Elareshi, et.al., indicates that users' willingness to engage in eLearning is greatly impacted by their perceptions of success and ease of use, leading to the incorporation of platforms like YouTube in educational environments, notably in Jordan.[22] Survey respondents showed a readiness to adopt and accept new technology in their academic endeavours.[23] The study concentrated on analyzing eight hypotheses concerning important factors like perceived ease of use (PEU) and perceived usefulness (PU), along with attitudes (AT), facilitating conditions (FC), and behavioural intention (BI) having an impact. The results showed important statistical connections between the variables examined. Significantly, PU had a big impact on FC, while FC had a strong effect on PEU. PEU played a key role in shaping AT and BI by influencing PU. Furthermore, PU successfully forecasted both AT and BI, with AT playing a crucial role in predicting BI. The analysis of the path coefficient shows that FC and PEU are highly correlated. The relationship between AT and BI is the weakest when compared to the other theories.

A study conducted by Habes, et.al., found that the use of social media significantly influences perceived usefulness, leading to the acceptance of educational YouTube channels. [24]Moreover, these educational YouTube channels play a crucial role in improving the academic performance of students in Jordan. Ultimately, demographic factors indirectly impact the academic success of students, demonstrating the benefits of YouTube channels for learners in Jordan. Therefore, it can be inferred that YouTube has a significant influence on the academic achievements of students in Jordan. Additionally, demographic factors play a crucial role in both YouTube usage and academic performance. It is suggested that whether the impacts are positive or negative depends on the intended usage and extent. The researchers also discussed the limitations of the study. Liu & Luo argue that due to the COVID-19 pandemic, college students are increasingly using YouTube as a supplementary tool for learning. An online survey involving 302 YouTube students used a combination of TAM and TTF models to examine user behaviour.[25] Analyzing the data through a structural equation model revealed that perceived ease of use, perceived usefulness, user satisfaction, and YouTube self-efficacy significantly influenced behavioural intention. However, the intention of behaviour was not significantly predicted by the fit of task technology and richness of content. Furthermore, perceived ease of use and YouTube self-efficacy did not prove to be significant predictors of perceived usefulness. Discussions revolve around the impact of combining TAM and TTF with content richness and the YouTube self-efficacy model.

Mady and Baadel recommend that students take advantage of YouTube for their academic pursuits to enhance their overall knowledge and highlight the positive impact of using YouTube videos in educational settings on students' performance.[26] According to Maziriri, Gapa and Chuchu, YouTube is recognized as a cost-effective and flexible educational resource.[27] These videos are seen as an effective

[21] Zulnaidi Yaacob and Nor Hasliza Md Saad, "Acceptance of YouTube as a Learning Platform during the Covid-19 Pandemic: The Moderating Effect of Subscription Status," *TEM Journal*, November 27, 2020, 1732–39, https://doi.org/10.18421/TEM94-54.
[22] Mokhtar Elareshi et al., "SEM-ANN-Based Approach to Understanding Students' Academic-Performance Adoption of YouTube for Learning during Covid," *Heliyon* 8, no. 4 (2022).
[23] Deo Kharisma Andriyanto and Zuliati Rohmah, "YouTube in the Eyes of Pre-Service Teachers: Technology Acceptance Model (TAM)," *Sains Insani* 8, no. 2 (November 30, 2023): 310–18, https://doi.org/10.33102/sainsinsani.vol8no2.596.
[24] Mohammed Habes et al., "The Influence of YouTube Videos on ELA During the COVID-19 Outbreaks in Jordan," in *2020 Sixth International Conference on E-Learning (Econf)* (IEEE, 2020), 133–38, https://doi.org/10.1109/econf51404.2020.9385501.
[25] Dawei Liu and Jinlin Luo, "College Learning From Classrooms to the Internet: Adoption of the YouTube as Supplementary Tool in COVID-19 Pandemic Environment," *Education and Urban Society* 54, no. 7 (September 14, 2022): 848–70, https://doi.org/10.1177/00131245211062516.
[26] Mohamed Ahmed Mady and Said Baadel, "Technology-Enabled Learning (TEL): YouTube as a Ubiquitous Learning Aid," *Journal of Information & Knowledge Management* 19, no. 01 (March 11, 2020): 2040007, https://doi.org/10.1142/S0219649220400079.
[27] Maziriri, Gapa, and Chuchu, "Student Perceptions Towards the Use of YouTube as An Educational Tool for Learning and Tutorials."

method for promoting understanding and are used in various educational environments, such as schools and science communication initiatives aimed at increasing awareness of climate change.

METHODOLOGY

The study used a quantitative approach and employed purposive sampling to select participants who were taking the Natural Science course at a rural university in South Africa. An experiment on the reactivity of alkali metals was conducted, and a questionnaire was distributed along with the experiment (Figure 1). Thirty-two questionnaires, rated on a 5-point Likert scale, were sent to students via email with clear instructions and a guarantee of data confidentiality. Participation was voluntary and anonymous. Twenty-seven completed questionnaires were returned. The study's reliability was assessed using Cronbach's alpha, which yielded a value of 0.710, calculated using the Statistical Package for Social Sciences (SPSS) after the questionnaire items were approved by two experts in the relevant field. Descriptive statistics were then used to calculate the mean scores and standard deviations of the survey items.

YouTube video showing the reactivity of alkali metals

The link was provided in their worksheet: https://m.youtube.com/watch?v=jI__JY7pqOM.

Table 1. Reactions of alkali metals with water

Alkali Metal	**Lithium**	**Sodium**	**Potassium**
Symbol	Li	Na	K
Atomic number	1	11	39
Reactivity	Reacts slowly and fizzy	Reacts quickly	Reacts violently and an explosion occurs

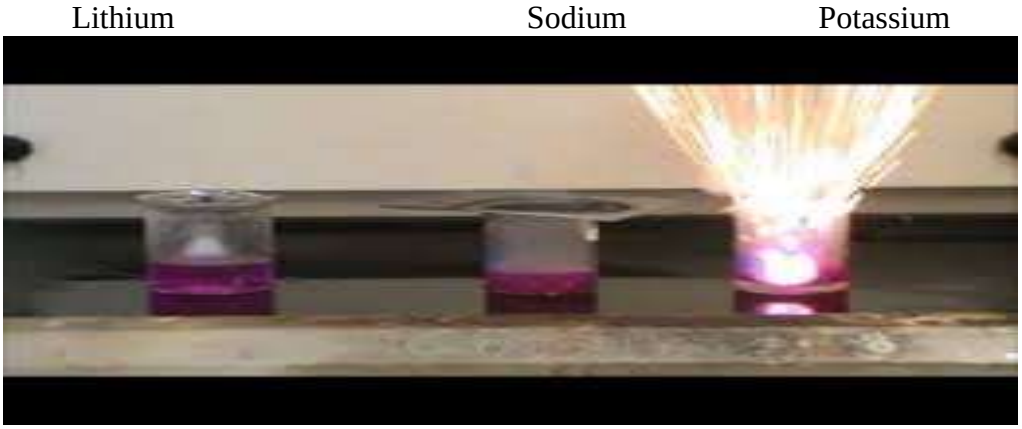

Figure 1: YouTube video showing the reactivity of alkali metals
https://m.youtube.com/watch?v=jI__JY7pqOM

Group 1 metals are characterized by being reactive metals with low boiling points, and the reactivity increases down the group.[28]

[28] Thomas X. Gentner and Robert E. Mulvey, "Alkali-Metal Mediation: Diversity of Applications in Main-Group Organometallic Chemistry," *Angewandte Chemie International Edition* 60, no. 17 (April 19, 2021): 9247–62, https://doi.org/10.1002/anie.202010963.

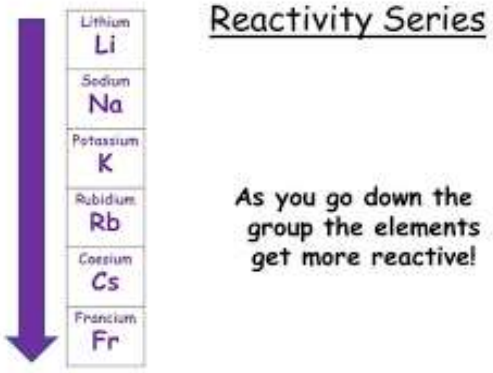

Figure 2: Reactivity of alkali metals

Table 3: Cronbach's Alpha value

Statistics of Reliability	
Cronbach's Alpha	N of Items
,710	8

The reliability of the survey questions, which showed good internal consistency, was assessed using a reliability test (Cronbach's alpha = 0.710) (Table 1). According to Goni, et.al., and Nawi, et.al., a Cronbach's alpha of 0.7 or above is considered acceptable.[29] The researchers calculated Cronbach's alpha for each of the eight questions presented in Table 3.

Table 3b: Cronbach's Alpha values for 8 questions

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Question1	30,4074	4,481	,119	,733
Question2	30,1852	3,926	,377	,687
Question3	30,2593	4,276	,216	,717
Question4	30,2222	3,641	,573	,644
Question5	30,1481	3,823	,420	,677
Question6	30,2593	3,430	,600	,633
Question7	30,1481	3,593	,557	,646
Question8	30,0000	3,923	,343	,695

Table 4: Demographics of teacher trainees

[29] Mohammed Dauda Goni et al., "Development and Validation of Knowledge, Attitude and Practice Questionnaire for Prevention of Respiratory Tract Infections among Malaysian Hajj Pilgrims," *BMC Public Health* 20 (2020): 1–10; Farahiyah Akmal Mat Nawi et al., "A Review On The Internal Consistency Of A Scale: The Empirical Example Of The Influence Of Human Capital Investment On Malcom Baldridge Quality Principles In Tvet Institutions," *Asian People Journal (APJ)* 3, no. 1 (April 30, 2020): 19–29, https://doi.org/10.37231/apj.2020.3.1.121.

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	10	37,0	37,0	37,0
	Female	17	63,0	63,0	100,0
	Total	27	100,0	100,0	

The study included a total of 27 participants. 27 out of the 32 students enrolled in Natural Sciences finished the surveys and returned them. Ten males (37%) and seventeen females (63%).

PRESENTATION OF FINDINGS

Table 5: Calculating the Average mean

Statistics

		Gender	Question1	Question3	Question5	Question7	Question8	Question6	Question4	Question2	Agegroup
N	Valid	27	27	27	27	27	27	27	27	27	27
	Missing	0	0	0	0	0	0	0	0	0	0
Mean		1,63	4,1111	4,2593	4,3704	4,3704	4,5185	4,2593	4,2963	4,3333	1,2222
Std. Deviation		,492	,42366	,44658	,49210	,49210	,50918	,52569	,46532	,48038	,42366

To determine the eight items' average mean:

$$\frac{(\text{Mean Q1}+\text{MeanQ2}+\text{MeanQ3}+\text{MeanQ4}+\text{MeanQ5}+\text{MeanQ6}+\text{MeanQ7}+\text{MeanQ8})}{8}$$

$$= \frac{4,1111+4,3333+4,2593+4,2963+4,3704+4,2593+4,3704+4,5185}{8}$$

Average Mean = **3,7685**

Table 6. Summary and analysis of mean for the questions.

Question	**Mean**	**Decision**
Question 1	4,1111	High Perception
Question 2	4,3333	High Perception
Question 3	4,2593	High Perception
Question 4	4,2963	High Perception
Question 5	4,3704	High Perception
Question 6	4,2593	High Perception
Question 7	4,3704	High Perception

Question 8	4,5185	High Perception

***Question 1 item*: *The videos were helpful in understanding the reactivity of alkali metals in Natural Sciences*.**

Based on Table 6 data, the average value is 4,111, surpassing the mean average of 3,7685, indicating that aspiring teachers find YouTube videos beneficial for studying Natural Science experiments. Kohler and Dietrich argue that exploring the material and experimenting independently can improve understanding of scientific concepts and spark a lasting interest in learning.[30]

***Question 2 item*: *It is easy to open the YouTube video link for the experiment*.**

The general impression is good because the high average of 4.3333 (Table 6) surpasses the usual mean of 3.7685. The trainee teachers easily reached the YouTube video link. Beautemps and Bresges contend that teachers can efficiently share YouTube video links with their students to facilitate easier access and integration into the learning process.[31] This approach increases engagement, promotes self-directed learning, and provides students with extra materials beyond the usual classroom resources.

Question 3 item*:*I will definitely use YouTube in my class after graduation.

According to Table 6 data, with a mean value of 4.2593 compared to the average of 3.7685, it indicates that teacher trainees view YouTube videos positively and plan to use them in their future classes. Nacak, Bağlama, and Demir also support this claim, YouTube became an important tool for lifelong learning, enabling people to explore different subjects and broaden their knowledge throughout their lives.[32] Embrace curiosity, stay open-minded, and take advantage of the many opportunities for personal growth and enrichment that YouTube offers.

Question 4 item*: *I have used YouTube in other modules.

The perception level is increased with a mean value of 4,2963 (Table 6), exceeding the average mean of 3,7685. The teacher trainees firmly believe that they have included YouTube videos in previous modules. The diverse range of subjects covered on YouTube showcases its adaptability as a platform for ongoing learning and personal growth.[33]

Question 5 item*: *I often watch YouTube videos for music and movies.

Based on Table 6, the average value is 4,3704, higher than the mean average of 3,7685, demonstrating a favourable perception. The perception of teacher trainees is positive, as they frequently utilize YouTube to watch music and movies. According to Pires, Masanet, and Scolari, YouTube provides a dynamic and engaging platform for teens to discover and enjoy music, movies, and entertainment content.[34] With the right guidance, teenagers can make use of YouTube for entertainment, learning, and self-discovery.

Question 6 item*: *YouTube reinforces what has been taught in class.

Shoufan and Mohamed and Fadhil Abbas and Ali Qassim state that students can improve their learning by supplementing lectures and engaging with educational content in different ways,[35] as indicated by a high perception rating of 4.2593 (Table 6) compared to the average of 3.7685. YouTube plays a crucial

[30] Sarah Kohler and Tabea Clara Dietrich, "Potentials and Limitations of Educational Videos on YouTube for Science Communication," *Frontiers in Communication* 6 (May 20, 2021), https://doi.org/10.3389/fcomm.2021.581302.

[31] Beautemps and Bresges, "What Comprises a Successful Educational Science YouTube Video? A Five-Thousand User Survey on Viewing Behaviors and Self-Perceived Importance of Various Variables Controlled by Content Creators."

[32] Ayşegül Nacak, Başak Bağlama, and Burak Demir, "Teacher Candidate Views on the Use of YouTube for Educational Purposes," *Online Journal of Communication and Media Technologies* 10, no. 2 (March 13, 2020), https://doi.org/10.29333/ojcmt/7827.

[33] Maziriri, Gapa, and Chuchu, "Student Perceptions Towards the Use of YouTube as An Educational Tool for Learning and Tutorials."

[34] Fernanda Pires, Maria-Jose Masanet, and Carlos A. Scolari, "What Are Teens Doing with YouTube? Practices, Uses and Metaphors of the Most Popular Audio-Visual Platform," *Information, Communication & Society* 24, no. 9 (July 4, 2021): 1175–91, https://doi.org/10.1080/1369118X.2019.1672766.

[35] Abdulhadi Shoufan and Fatma Mohamed, "YouTube and Education: A Scoping Review," *IEEE Access* 10 (2022): 125576–99, https://doi.org/10.1109/ACCESS.2022.3225419; Nawal Fadhil Abbas and Tabarek Ali Qassim, "Investigating the Effectiveness of YouTube as a Learning Tool among EFL Students at Baghdad University," *Arab World English Journal (AWEJ)* , August 20, 2020, https://doi.org/10.31235/osf.io/myqde.

role in reinforcing lecture material and promoting ongoing learning, with teacher trainees believing it enhances the concepts taught during their classes.

Question 7 item*: *YouTube videos have clear images.

Because the average of 4,3704 (Table 6) is higher than the mean of 3,7685, it indicates a heightened level of perception. Aspiring teachers believe that YouTube videos featuring clear visuals support learning, engagement, and enjoyment, leading to improved effectiveness and value of the video. Neumann and Herodotou propose that creators can enhance viewer engagement and impact in educational or instructional settings by integrating high-quality visuals into YouTube videos.[36]

Question 8 item*: *The sound quality of many YouTube videos is good.

According to the information in Table 6, the mean value of 4.5185 is higher than the average mean of 3.7685, indicating that teacher trainees view the sound quality of many YouTube videos as outstanding. Utz and Wolfers argue that good sound quality enhances the viewing experience and enhances the credibility of the content,[37] while Boy, Bucher, and Christ contend that video type significantly influences knowledge transmission and para-social effects.[38] One key finding from the audience research is that there is a strong connection between where the videos direct the viewers' focus, how the viewers distribute their attention, and the outcomes of knowledge assessments.

DISCUSSION

The teacher trainees were enthusiastic about integrating YouTube into their learning because they valued all eight items highly. The study revealed that the videos helped in understanding experiments in the field of Natural Sciences. Marsudi, Lestari, and Hidayati propose that students can improve their conceptual understanding and problem-solving abilities through contextual learning that involves cognitive conflict.[39] Maziriri et al. found a connection between "perceived ease of use" and factors such as behavioural intention, motivation, and perceived usefulness of technology.[40] The teacher candidates intend to use YouTube for additional modules while working, utilizing the TAM. Jang and Chiang state that learners are more likely to continue learning if they perceive the platform as user-friendly and beneficial. Prospective teachers are advised to use YouTube to watch multiple videos.[41] Generation Z students are spending long hours watching music and movies on their smartphones online. Teacher participants in this study have a positive perception of this concept. Bohloko, et.al., suggest that YouTube serves as a useful tool for reviewing material covered in the classroom.[42] The prospective teachers mentioned that the YouTube videos featured clear sound and stunning visuals. Habes et al., suggest that animation, live videos, sound effects, and visual effects are successful in enhancing student engagement and holding their attention in YouTube videos.[43]

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RECOMMENDATIONS

The study recommends that the Teaching and Learning Committee of the institution under study ensures that instructors assign tasks involving the use of YouTube videos to enhance the learning experience in science experiments. This recommendation can be applied to other courses offered by the same institution.

CONCLUSION

This study has investigated the impact of YouTube on acceptance and usability using the TAM. The study found that the YouTube video effectively helped students understand the abstract concept of alkali metals' reactivity. The researchers used the TAM combined with a survey methodology. The findings have demonstrated that the perceived ease of using YouTube has a significant positive impact on its perceived usefulness and the intention to learn. These findings enhance understanding of using YouTube to improve student education. Teachers can use this tool to develop effective strategies for enhancing student learning by integrating educational resources available on YouTube.

Conflict of interest

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