The Use of Interactive Videos in Undergraduate Courses: Lecturers' Acceptance Level

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Abstract
The use of technology is not new in education and it has been growing and evolving rapidly to support both teaching and learning. Video is one of the most famous educational technology tools. In recent years, interactive features have been added to engage the students rather than watching the videos passively. These videos are known as interactive videos. Interactive videos optimize active learning and improve students' performance. This study involved lecturers from the six faculties of a private university in Malaysia, who participated voluntarily. Their task was to create interactive videos within the university's Learning Management System (LMS). The research employed an instrument adapted from the Technology Acceptance Model (TAM) survey, originally developed by Davis (1989) and later refined for a study on interactive video technology by Pauli (2019). The instrument's reliability for internal consistency was determined using Cronbach's alpha, indicating high reliability for all four constructs and overall high internal consistency. The findings demonstrate a positive acceptance level for the use of interactive videos in teaching, irrespective of gender differences in cognitive processing. Among the four constructs, Attitudes toward Using Interactive Video had the highest mean. This study provides empirical evidence that lecturers are willing to adopt and utilize interactive videos in their teaching practices. Despite the novelty of interactive videos for many lecturers, the positive acceptance level persists, indicating that interactive videos can be widely introduced in higher education contexts to enhance engagement and interaction in teaching and learning.

Keywords: Educational Technology, Interactive Video, Technology Acceptance, Technology Acceptance Model (TAM)

Introduction

The use of technology is not new in education and it has been growing and evolving rapidly to support both teaching and learning. It has now become an integral part of higher education worldwide, including in Malaysia (Azmuddin, Mohd Nor & Hamat, 2020). With technology tools, students can have better access to information, as well as enhanced learning from opportunities to deepen their knowledge.

Video is one of the most famous educational technology tools. The usage of video has been evolving like other technology tools. Earlier, videos were presented by projectors in the classroom and today it is common to search for a video on the internet, at any time and anywhere. In recent years, interactive features were added to engage the students rather than only expecting them to watch the videos passively (Wachtler et al., 2016). These videos are known as interactive videos.

Gedera and Zalipour (2018, p. 363) defined interactive videos as "*videos that embed interactive learning moments in which deep learning can occur for students*." The incorporation of interactive learning moments into videos gives students a sense of control and puts them in charge of their learning. This echoes the view of Zhang, Zhou, Briggs, and Nunamaker (2006), who opined that "*interactive video technology increases learner-content interactivity, thus potentially motivating students and improving learning effectiveness*" (p. 17). The results of their research indicated that students in the e-learning environment that provided interactive video achieved significantly better learning performance and a higher level of learning satisfaction, as compared to those who were provided non-interactive video.

Interactive videos have a positive impact on students' learning. By adding interactivity, students are more engaged, challenged and committed to the learning process. Geri, Winer, and Zaks (2017) showed that interactive videos significantly improved the completion percentage and expanded the attention span of students. It is a crucial element to create self-regulating learning environments for students (Delen, 2014). In the research carried out by Papadopoulou and Palaigeorgiou (2016), lecturers recognized the value and benefits of interactive videos in teaching and learning. They pointed out that through interactive videos, they can stimulate students' thinking and discussion and engage students actively.

To ensure that interactive videos for teaching and learning are used effectively, it is extremely important to study the factors that potentially facilitate/affect the use of interactive videos by both lecturers and students. For instance, the integration of technology has the potential to be very stressful for those who possess limited knowledge of the use of computers and technology (Merrill, 2015).

Research conducted by Spotts, Bowman and Mertz (1997) on the use of instructional technologies among university faculty found that the frequency of use among female lecturers was slightly higher than that among males. On the other hand, a study conducted among school teachers in India by Islahi and Nasrin (2019) indicated that there was no significant difference between the attitudes of male and female teachers towards the use of information technology for teaching and learning. This finding echoes the findings obtained by Gebhardt, Thomson, Ainley and Hillman (2019). Meanwhile, a study on the adoption of technology amongst academic staff in a Canadian university that was conducted by Zhou and Xu (2007) found that males reported having more experience in using technology for teaching and a higher level of comfort using technology.

By understanding the potential factors, it can guide the processes of utilizing interactive videos in teaching and learning. Charness and Boot (2016) highlighted that *technology acceptance* is significant in influencing one's determination in using it. Therefore, this study aimed to investigate the lecturers' acceptance level of using interactive videos for teaching.

Literature Review

Interactive Video

Interactive video is a form of digital video that supports user interaction. It is also called "hypervideo" - a video that embeds interactive learning moments in which deep learning can occur for students (Palaigeorgiou et al., 2018). Instead of watching videos passively, users are able to click within the video for an action to occur. These clickable areas, or "hotspots" require students to perform an interactive action when clicked, such as answering questions and quizzes, showing prompts, and reflective pauses. These create moments where the students have to pause and think critically about the video content and learning activities (Schoeffmann et al., 2015).

Interactive videos have many educational benefits. Through interactive videos, students are allowed to learn independently and follow their path and pace (Schoeffmann et al., 2015). In return, this makes differentiation can be done more easily and fosters personalized learning. As supported by Delen (2014) interactive videos can become a platform for self-regulating learning environments and reduced levels of embarrassment or anxiety allow learners to be comfortable enough to learn new content.

In addition, Dimou et al. (2009) highlighted that interactive videos use a non-linear structure with several calls for action that motivate students to pay full attention to the learning material. They are able to have a quick review of any part of the video as many times as it is necessary. In general, interactive video learning environments use a variety of interaction types, such as embedded questions, annotations, shared user notes and comments, captions, user traces, hyperlinks, summarization and classroom video analytics (Kazanidis et al., 2018).

Technology Acceptance

Technology acceptance can be defined as "a user's willingness to employ technology for the tasks it is designed to support" (Teo, 2011, p.1). It is considered a prerequisite for learners to adopt information technology to promote learning (Hsieh et al., 2017). Understanding how personal attitude contributes to behavioural intention on technology use is important to gain a deeper understanding of what influences an individual in adopting technology. For example, identifying and understanding the forces that shape users' acceptance, resistance or rejection when users interact with technology can be avoided or minimized. Substantial studies were carried out to investigate the users' acceptance of different types of technology such as mobile technology, social media, and MOOCs (Taherdoost, 2018).

To explain the associations between technology acceptance and behavioural intention, several models and frameworks have been developed to examine users' technology acceptance. One of the most influential models is the Technology Acceptance Model (TAM), first proposed by Davis (1989) based on the Theory of Reasoned Action (TRA) by Fishbein and Ajzen in 1975.

According to TAM, there are two primary factors influencing an individual's intention to use new technology (Charness & Boot, 2016):

(a) **Perceived Usefulness** - the degree to which a person believes that using a particular technology would enhance the performance.
(b) **Perceived Ease of Use** - the degree to which a person believes that using a particular technology would be free from effort.

TAM has been recognized as a powerful predictive model that can be used in several contexts and is widely used to explain users' intention to use technology. For instance, Yuen and Ma (2008) explored teachers' acceptance of e-learning by using TAM. Nevertheless, some researchers criticized that TAM is too simple and leaves out other variables (Alomary & Woollard, 2015). In the study carried out by Pauli (2019), TAM was adapted and validated, particularly on interactive videos.

Research Framework, Questions and Hypotheses

Conceptual Framework

The conceptual framework of this study is based on the Technology Acceptance Model (TAM) by Davis (1989). This model suggests that the acceptability of an information system is determined by two main factors: (a) perceived usefulness and (b) perceived ease of use. TAM postulates that the use of an information system is determined by the behavioural intention, but on the other hand, the behavioural intention is determined by the person's attitude towards the use of the system and also by his perception of its utility.

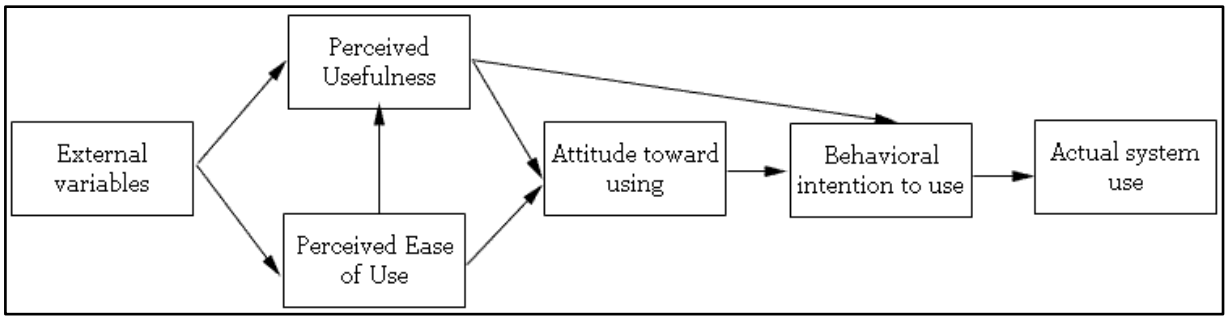

Figure 1. TAM by Davis (1989)

This study investigated the acceptance level of lecturers in using interactive videos for teaching. Figure 2 outlines the conceptual framework of this study. Lecturers are important stakeholders in teaching and learning. The success of interactive video implementation depends on the lecturers' acceptance level which influences the use of interactive videos in their teaching process.

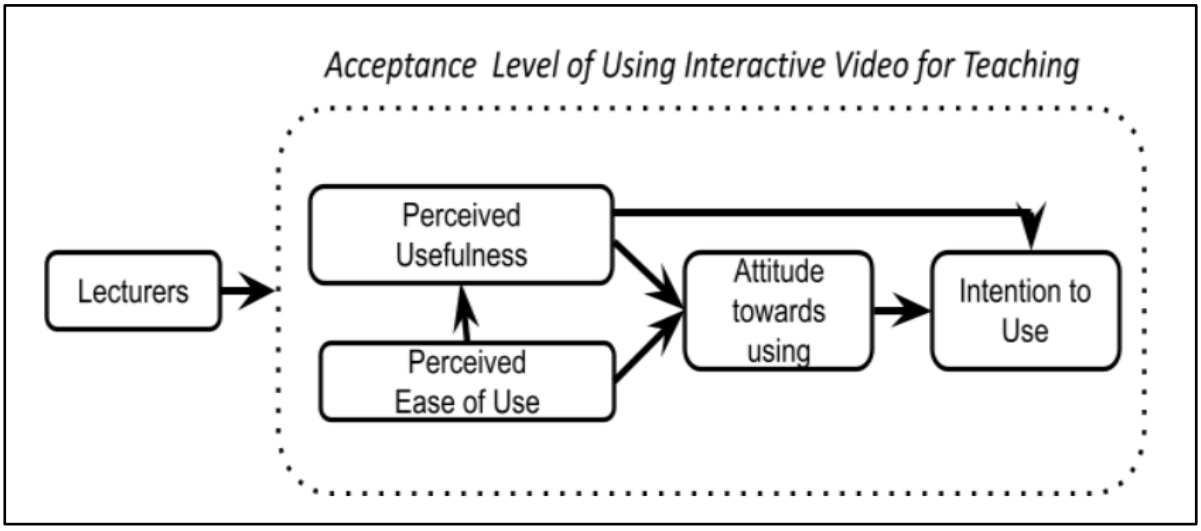

Figure 2. Conceptual Framework

Research Questions and Research Hypotheses

(a) What is the lecturers' level of acceptance of using interactive videos for teaching?

(b) What is the relationship between lecturers' Perceived Ease of Use (PEOU) and their Perceived Usefulness (PU) and Attitude towards Using (ATU) interactive videos?

H_1: Lecturers' Perceived Ease of Use (PEOU) positively affects their Perceived Usefulness (PU) of interactive videos.

H_2: Lecturers' Perceived Ease of Use (PEOU) positively affects their Attitude towards Using (ATU) of interactive videos.

(c) What is the relationship between the lecturers' Perceived Usefulness (PU) and their Attitude towards Using (ATU) and the Intention to Use (ITU) of interactive videos?

H_3: Lecturers' Perceived Usefulness (PU) positively affects their Attitude towards Using (ATU) of interactive videos.

H_4: Lecturers' Perceived Usefulness (PU) positively affects their Intention to Use (ITU) of interactive videos.

(d) What is the relationship between the lecturers' Attitude towards Using (ATU) and their Intention to Use (ITU) of interactive videos?

H_5: Lecturers' Attitude towards Using (ATU) positively affects their Intention to Use (ITU) of interactive videos.

Methodology

Participants

In this study, lecturers from the six faculties in one private university were invited to create interactive videos in the university's Learning Management System (LMS). Participation was voluntary. In total, 97 lecturers participated in two hands-on training workshops (four hours per workshop). Out of 97 participants, 73 responded to the questionnaire (Response rate = 75%).

Table 1. Demographic Profile of Respondents (n = 73)

Variables		Number (n)	Percentage
Gender	Male	22	30%
	Female	51	70%
Used **videos** for teaching before this	Yes	69	94.5%
	No	4	5.5%
Used **interactive videos** for teaching before this	Yes	18	24.7%
	No	55	75.5%
Used **H5P** to develop interactive videos for teaching before this	Yes	0	0%
	No	73	100%

Interactive Video

HTML-5-Package (H5P) was used to create interactive videos. H5P is a free open-source software for the development of interactive HTML5 content and can be embedded on any website that is compatible with an H5P plugin (Moodle, 2021).

By using H5P, these are the interactive features that can be embedded in a video:

(a) Quiz interaction (Questions)
(b) Simple interaction (Text, Image, Table)
(c) Adaptivity (Go To) interaction

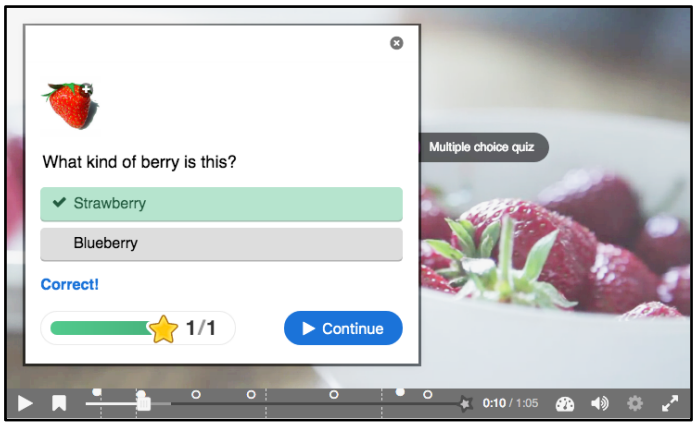

Figure 3. An Example of Quiz Interaction in an Interactive Video Created by Using H5P

Research Instrument: Modified Technology Acceptance Model Tool

In this study, the Modified Technology Acceptance Model Tool (Modified TAM Tool) was used for data collection. This instrument was adapted from the Technology Acceptance Model (TAM) survey, originally developed by Davis (1989) and further edited for a study on interactive video technology by Pauli (2019). For this study, the items of the questionnaire were administered using Google Form, an online Google Workspace app.

The Modified TAM questionnaire consists of 22 items on a five-point Likert scale; 1 for Strongly Disagree, 2 for Disagree, 3 for Neutral, 4 for Agree and 5 for Strongly Agree. The overall reliability of the instrument was reported to be excellent with a Cronbach's alpha coefficient of 0.95. Altogether there are four constructs, namely, Perceived Usefulness (six items), Perceived Ease of Use (six items), Attitude towards Using (five items) and Intention

to Use (five items). The Cronbach's alpha for the constructs were reported as 0.89, 0.90, 0.87 and 0.89 respectively.

In this study, the Modified TAM questionnaire was further adapted. Its reliability for internal consistency was determined by using Cronbach's alpha. All constructs were reported highly reliable and a high level of internal consistency was obtained for the overall instrument (α = 0.865), as shown in Table 2.

Table 2. Reliability Analysis: The Modified TAM Questionnaire

	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Perceived Usefulness (PU)	.946	.950	6
Perceived Ease of Use (PEOU)	.916	.919	6
Attitude towards Using (ATU) Interactive Video	.931	.934	5
Intention to Use (ITU) Interactive Video	.955	.956	5
Overall (All four constructs)	.865	.868	22

Data Collection and Analysis

All of the participants were informed of the objectives of the study and what they were expected to do, through an online consent form. This information included the purpose of the study, a brief description, assurance of anonymity and how the data would be used. Upon completion of the training workshop, the online Modified TAM questionnaire was administered. Data were then analysed using IBM SPSS Statistics 26 software.

Findings

Lecturers' Acceptance Level of the Use of Interactive Videos for Teaching - Overall

The descriptive analysis shown in Table 3 revealed that the mean of ATU Interactive Video is the highest among the other variables (mean = 4.4111), followed by PU (mean = 4.393), ITU Interactive Video (mean = 4.359) and PEOU (mean = 4.095), as shown in Table 3. Overall, the lecturers' acceptance level of the use of interactive video for teaching is high (mean = 4.329).

Table 3. Descriptive Statistics: The Lecturers' Level of Acceptance of Using Interactive Videos for Teaching

Constructs	Acceptance Level (n = 73)	
	Mean	SD
Perceived Usefulness (PU)	4.393	.6717
Perceived Ease of Use (PEOU)	4.095	.6278
Attitude towards Using (ATU) Interactive Video	4.411	.6027
Intention to Use (ITU) Interactive Video	4.359	.6625
Overall (All four constructs)	4.329	.5687

Lecturers' Acceptance Level of the Use of Interactive Videos for Teaching - By Gender

Both male and females show high acceptance level for all four constructs. Among the four constructs, the highest mean was obtained by males for PU (4.464), followed by ITU (4.436) and ATU (4.427). The lowest mean was obtained for PEOU (4.123).

In comparison, the highest mean was obtained by females for ATU (4.404), followed by PU (4.363) and ITU (4.310). The lowest mean obtained by females was the same as that for males, that is for PEOU, at 4.082.

Table 4. Descriptive Statistics: by Gender

Gender	Male (n=22)		Female (n=51)	
	Mean	SD	Mean	SD
Perceived Usefulness (PU)	4.464	.5645	4.363	.7161
Perceived Ease of Use (PEOU)	4.123	.5740	4.082	.6547
Attitude towards Using (ATU) Interactive Video	4.427	.5496	4.404	.6293
Intention to Use (ITU) Interactive Video	4.436	.6666	4.325	.6645
Overall (All four constructs)	4.373	.5709	4.310	.5725

Lecturers' Acceptance Level of the Use of Interactive Videos for Teaching - By Video Usage Experience

In terms of experience in using videos for teaching and learning, results shown in Table 5 indicate that lecturers who have used videos for teaching before reported a higher level of acceptance as compared to those who have not.

Table 5. Descriptive Statistics: by Video Usage Experience

Video Usage Experience	Have used videos for teaching before			
	Yes (n=69)		No (n=4)	
	Mean	SD	Mean	SD
Perceived Usefulness (PU)	4.365	.6786	4.875	.2500
Perceived Ease of Use (PEOU)	4.107	.6374	3.875	.4272
Attitude towards Using (ATU) Interactive Video	4.377	.6025	5.000	.0000
Intention to Use (ITU) Interactive Video	4.330	.6694	4.850	.1915
Overall (All four constructs)	4.336	.5377	4.075	.7632

Lecturers' Acceptance Level of the Use of Interactive Videos for Teaching - By Interactive Video Usage Experience

Analyses of data by experience in using interactive videos as shown in Table 6 indicate that lecturers who have used interactive videos for teaching before reported higher means for the overall level of acceptance, as compared to lecturers who have not.

Table 6. Descriptive Statistics: by Interactive Video Usage Experience

Interactive Video Usage Experience	Have used interactive videos for teaching before			
	Yes (n=18)		No (n=55)	
	Mean	SD	Mean	SD
Perceived Usefulness (PU)	4.367	.7364	4.402	.6562
Perceived Ease of Use (PEOU)	4.078	.6975	4.100	.6101
Attitude towards Using (ATU) Interactive Video	4.444	.5338	4.400	.6278
Intention to Use (ITU) Interactive Video	4.489	.6480	4.316	.6674
Overall (All four constructs)	4.528	.3893	4.255	.5786

Hypotheses Testing

Using Spearman's Rho correlation, the relationship between constructs within this study based on the TAM were presented in Table 7 and the hypotheses testing were summarised in Table 8.

The correlation coefficient between all constructs was positive, showing that there is an association between the constructs, which was consistent with the original TAM and published research (Pauli, 2019). Among the associations, the highest correlation was found between ATU Interactive Video and ITU Interactive Video (r = .877).

Table 7. Spearman's Rho Correlation Statistics

Spearman's rho		Perceived Usefulness (PU)	Perceived Ease of Use (PEOU)	Attitude towards Using (ATU) Interactive Video	Intention to Use (ITU) Interactive Video
Perceived Usefulness (PU)	Correlation Coefficient	1.000	.565**	.721**	.786**
	Sig. (1-tailed)	.	.000	.000	.000
	N	73	73	73	73
Perceived Ease of Use (PEOU)	Correlation Coefficient	.565**	1.000	.488**	.493*
	Sig. (1-tailed)	.000	.	.000	.000
	N	73	73	73	73
Attitude towards Using (ATU) Interactive Video	Correlation Coefficient	.721**	.488*	1.000	.877**
	Sig. (1-tailed)	.000	.000	.	.000
	N	73	73	73	73
Intention to Use (ITU) Interactive Video	Correlation Coefficient	.786*	.493**	.877**	1.000
	Sig. (1-tailed)	.000	.000	.000	.
	N	73	73	73	73

***Correlation is significant at the 0.01 level (1-tailed)*

Table 8. Summary of Hypotheses Testing

Hypotheses	*r*	p	Relationship	Hypothesis Accepted
H_1: Lecturers' PEOU positively affects their PU of interactive videos.	.565**	.000	Strong positive	Yes
H_2: Lecturers' PEOU positively affects their ATU of interactive videos.	.488**	.000	Strong positive	Yes
H_3: Lecturers' PU positively affects their ATU of interactive videos.	.721**	.000	Very strong positive	Yes
H_4: Lecturers' PU positively affects their ITU of interactive videos.	.786**	.000	Very strong positive	Yes
H_5: Lecturers' Attitude towards Using (ATU) positively affects their Intention to Use (ITU) of interactive videos.	.877**	.000	Very strong positive	Yes

***Correlation is significant at the 0.01 level (1-tailed)*

Discussion

Educational technologies have been integrated into teaching and learning practices and interactive video is one of the famous educational technology tools. To reach the full potential of interactive videos in teaching and learning, it must be recognised and accepted by the key stakeholders, especially the instructors.

From the findings, it shows the acceptance level of the use of interactive videos for teaching is highly positive for both male and female lecturers, despite males and females using cognitively different schematic processing (He and Freema, 2019). This is aligned with the study conducted by Baturay et al. (2017) that gender is not a factor that will positively affect the attitude towards the use of technology. On top of that, this provides a piece of empirical evidence that lecturers are willing to accept and use interactive videos in their teaching. Alharbi and Drew (2014), pointed out that instructors play an important role in implementing technology innovation in the classroom. With this positive indicator, it suggests that interactive videos could be introduced and used widely in higher education contexts as they could transform learning by enhancing engagement and interaction in teaching and learning (Tuma, 2021).

An interesting point to be highlighted is that interactive video is new to the majority of the lecturers whereby more than 75% of them have not used interactive video for teaching before. Nevertheless, the acceptance level of the use of interactive videos for teaching is highly positive regardless of their interactive video usage experience. Training workshops were given to all participants to create interactive videos could be the possible reason for this as Njuguna (2020) stated that training factors have a role in boosting learners' belief in their capacity. It enhances the learners' knowledge, skills and attitudes (Rodriguez & Walter, 2017). In return, they have a positive attitude towards using the interactive video and show a high tendency to use it.

On the other, all five hypotheses were proven to have statistically significant positive correlations. These findings are similar to the findings obtained by Pauli (2019) that all variables showed statistically significant positive correlations. Overall, the findings from this

study are consistent with the original TAM and published research. This has confirmed that the TAM is applicable for the use of interactive videos in a local higher education context.

Conclusion and Recommendation

Interactive video offers many educational benefits and can be easily developed using software such as H5P and can then be embedded in the LMS without additional installation from the user's end. Nevertheless, it has yet to be applied widely in higher educational institutions. Barriers must be recognised to integrate interactive video into teaching. According to TAM, for users to use a technology, they must first perceive it as useful and ease of use, which in turn will impact their attitude towards using it.

This study reveals that lecturers exhibit a high level of acceptance towards the use of interactive videos in teaching, regardless of gender or prior experience with interactive video usage. This finding provides valuable insights for higher education providers, emphasizing the importance of implementing interactive videos to enhance educational experiences. There is an urgent need to incorporate interactive technology into higher education, as it is currently underutilized in educational activities (Tuma, 2021). Furthermore, this study confirms the applicability of TAM in the context of using interactive videos in higher education.

For future research, an experimental approach could be employed to examine external factors that influence the acceptance level, such as the training provided and the tools used to create interactive videos. Additionally, this research can be extended to include another key stakeholder: the students. Understanding students' perspectives on interactive videos will further inform strategies to enhance engagement and interaction in higher education.

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