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UNLOCKING ENGLISH PROFICIENCY: YOUTUBE'S IMPACT ON SPEAKING SKILLS AMONG INDONESIAN UNIVERSITY STUDENTS

Akhmad Habibi¹, Mailizar Mailizar^{2*}, Lalu Nurul Yaqin³, Turki Mesfer Alqahtani⁴, Mukhlash Abrar¹, Budianto Hamuddin⁵, Failasofah Failasofah¹

¹Universitas Jambi (Indonesia)

²Universitas Syiah Kuala (Indonesia)

³Universiti Brunei Darussalam (Brunei Darussalam)

⁴Jazan University (Saudi Arabia)

⁵Universitas Lancang Kuning (Indonesia)

akhmad.habibi@unja.ac.id,

*Corresponding author: mailizar@usk.ac.id
lalu.yaqin@ubd.edu.bn, turki.mf.h@gmail.com mukhlash.abrar@unja.ac.id, budihamuddin@unilak.ac.id,
failasofah.fkip@unja.ac.id

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Abstract

This study examines the factors affecting the intention to use and actual use of YouTube in improving English-speaking skills in Indonesia. To meet the aims, we extended the theory of technology acceptance model (TAM); two external factors, subjective norms, and perceived enjoyment, to support the TAM variables (perceived ease of use, perceived usefulness, attitude, intention to use, and actual use). Data were collected through a survey with 526 measurable responses from Indonesian preservice English teachers in three Indonesian universities. The data were analyzed through partial least square structural equation modeling (PLS-SEM), measurement, and structural model. The findings informed that all hypothesized relationships were accepted and confirmed. The strongest relationship emerged between intention to use and actual use. Meanwhile, the weakest correlation was between subjective norms and perceived ease of use. The study facilitates recommendations for future researchers, language educators, and all related parties.

Keywords - English-speaking skills, PLS-SEM, Preservice English teachers, TAM, YouTube.

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1. Introduction

Education is currently dominated by cutting-edge digital devices such as smartphones, iPads, and YouTube videos. Teachers, curriculum designers, and experts in EFL areas are aware of the compelling

need for technology use in teaching and evaluation techniques at all levels of education to adapt to this tremendous wave of change in educational technology (Ríos-Vázquez & Romero-Tena, 2022). Following the COVID-19 epidemic, proponents of this transition have been more insistent in their demands, causing a global shift in the teaching-learning paradigm toward online learning (Almahasees, Mohsen & Amin, 2021; Haider & Al-Salman, 2020). Technology in education is now essential due to the new realities of technology's rapid development. More audio-visual learning resources are now available due to the expansion of Internet-supported digital technologies, with YouTube videos dominating the market (Keskin, 2018).

Since its acquisition by Google in 2006, YouTube has been regarded as the most popular online video platform for providing information, resources, entertainment, and communication (Hong, Chen & Ye, 2020). Global YouTube monthly viewers are projected to keep higher and can be integrated into education. Studies have already identified numerous benefits of using YouTube in education, such as enabling worldwide access to informative and amusing videos in real-time (Al-Sabaawi, Dahlan, Alshaher & Shehzad, 2022; Shim, Kim, Ko, Kim & Park, 2022; Trang, 2022). In EFL, YouTube can captivate and encourage students to be excited and willing to view various videos and practice pronunciation and speaking like native speakers (Ávila-Cabrera & Corral-Esteban, 2021; Azuka & Ikemefula, 2022; Al-Sabaawi et al., 2022; Shim et al., 2022). You Tube also benefits learning through efficiencies in terms of financial cost-saving (Ávila-Cabrera & Corral-Esteban, 2021; Azuka & Ikemefula, 2022; Al-Sabaawi et al., 2022; Shim et al., 2022; Trang, 2022). YouTube videos are free, and there is no limit to how many times they can be viewed online. We emphasized the advantages and observed that YouTube is a global portal that can be viewed anywhere. YouTube is reported to increase students' confidence in English speaking, lower their anxiety to learn faster and help retain attention (Albahlal, 2019). Many researchers have reached similar conclusions regarding the effectiveness of YouTube videos in enhancing speaking skills (Donny & Adnan, 2022; Muslem, Sahardin, Heriansyah, Fata, Djalaluddin & Hankinson, 2022; Saed, Haider, Al-Salman & Hussein, 2021).

Over the past two decades, YouTube has matured into a robust and significant social media platform. YouTube videos can aid teaching and learning, particularly English as a foreign language (EFL). Its material can aid in developing EFL students' language abilities in various contexts and settings (Albahiri & Alhaj, 2020; Kristiani & Pradnyadewi, 2021; Nasution, 2019; Sari, Dardjito & Azizah, 2020). Researchers all over the world have conducted studies on YouTube in EFL areas, such as Jordan (Saed et al., 2021), Afghanistan (Noori, Orfan, Akramy & Hashemi, 2022), Taiwan (Chien, Huang & Huang, 2020), South Korea (Im, 2022), and Kazakhstan (Toleuzhan, Sarzhanova, Romanenko, Uteubayeva & Karbozova, 2023). Few studies were conducted on factors affecting the use of YouTube to improve English-speaking skills as a vitally important productive skill for efficient communication, especially in developing countries like Indonesia. Therefore, this study aimed to fill the gaps by exploring the factors influencing YouTube to improve English-speaking skills. The present study addresses the following question:

A) What factors significantly affect how English teachers-in-training use YouTube videos to improve their speaking skills?

2. Literature Review

2.1. Technology Acceptance Model (TAM)

The TAM, seen in Figure 1, was derived by Davis (1989) from the theory of reasoned action (TRA) (Ajzen & Fishbein, 1977) to illustrate technology acceptance behavior. Venkatesh and Davis (2000) suggested that understanding the antecedents of the key TAM components is necessary to explain user acceptance and use. In addition, without external factors, TAM provides only general information on user opinions of a system and does not provide particular knowledge that might better drive system development. TAM with defined external factors predicts technology adoption and explains why a specific system may not be accepted, allowing researchers and practitioners to pursue suitable remedial measures (Venkatesh & Davis, 2000). This study extends TAM as a foundational theory to build a model for factors

impacting YouTube in the context of English as a foreign language (EFL), particularly English-speaking skills.

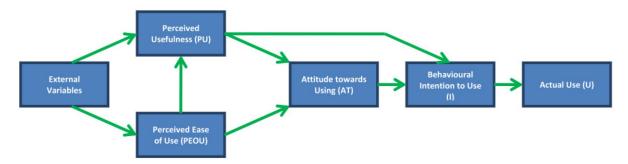


Figure 1. Technology acceptance model (Davis, 1989)

2.2. Research Model and Hypotheses Development

The continuous development and implementation of new technology advancements in the age of social media have led to the creation of various theoretical models to explain their adoption. TAM, introduced in 1989, is one of the most widely used models to understand users' intentions to use certain technologies (Davis, 1989). To develop a comprehensive theoretical model for the use of social media in higher education, the TAM was utilized as the basis for this research model (Imşek & Ateş, 2022). The TAM was expanded to include two external factors, subjective norms, and perceived enjoyment, to support the core TAM variables (perceived ease of use, perceived usefulness, attitude, intention to use, and actual use) for YouTube use in EFL, developing speaking skills.

2.2.1. Subjective Norm (SN)

Subjective norm (SN) denotes the view of how significant others in their social surroundings want or expect them to act in a particular manner (Teo, Tan, Cheah, Ooi & Yew, 2012). In this study, SN illustrates the extent to which learners perceive pressure from their peers regarding the use of YouTube to improve their English-speaking skills. Prior studies have demonstrated that SN has significant roles in affecting PU and PEU (Aji, Berakon & Riza, 2020; Izuagbe, Ifijeh, Izuagbe-Roland, Olawoyin & Ogiamien, 2019; Lei, Clemente, Liu & Bell, 2022; Tran, Nguyen & Tang, 2022). Izuagbe et al. (2019) reported the importance of SN in influencing PU as social media in university libraries. Aji et al. (2020) elaborated on the significant intervention of SN on PU and PEU regarding the use of e-money. Further, Hanif and Imran (2022) reported the role of SN in affecting PU of social media use. Based on the backgrounds, we proposed two hypotheses for the current study; SN has a significant positive correlation with PU (H1) and PEU (H2).

2.2.2. Perceived Enjoyment (PE)

Perceived enjoyment (PE) is the amount to which the action of utilizing a certain system is perceived to be enjoyable in and of itself, independent of any performance implications ensuing from system use (Venkatesh & Davis, 2000). In this study, PE refers to the extent to which preservice English teachers consider the use of YouTube for English speaking can improve their skills. Prior studies also demonstrated that PE substantially influences technological uptake, especially PEU and PU (Holdack, Lurie-Stoyanov & Fromme, 2022; Huang, Teo & Scherer, 2022; Monica & Japarianto, 2022; Nguyen & Llosa, 2023). For example, Monica and Japarianto (Monica & Japarianto, 2022), who did a study on digital payment acceptance, disclosed the role of PE on PEU. Additionally, Huang et al. (2022) revealed the importance of PE on PEU in the context of using the internet for learning. In their recent study, Nguyen and Llosa (2023) informed the significant role of PE in predicting the economic benefits (perceived usefulness) of a collaborative consumption platform PE. Another study (Holdack et al., 2022) also reported a strong relationship between PE and PU for AR wearable acceptance. Specifically, using YouTube as an English-speaking learning platform might be entertaining for Indonesian preservice

English teachers, improving the application's utility and simplicity. Two hypotheses were submitted regarding the role of PE on PEU (H3) and PU (H4).

2.2.3. Perceived Ease of Use (PEU)

Perceived ease of use (PEU) relates to the extent to which a person believes that utilizing a specific system would be effortless (Davis, 1989). In this study, PEU refers to the extent to which the learner perceives that utilizing YouTube for English-speaking learning activities would be effortless. PEU positively influences PU and AT, as reported by prior studies (Gurban & Almogren, 2022; Lei et al., 2022). Lei et al. (2022) studied telepresence robots in higher education, and informed the relationship between PEU and PU. During Covid-19, PU and AT were predicted by PEU for e-learning use in universities (Gurban & Almogren, 2022). If YouTube is perceived as a user-friendly tool for acquiring English-speaking skills, it would positively impact students' speaking performance and expose greater levels of welcoming AT toward its use in the future. Two hypotheses were included in this study: PEU has a significant positive correlation with PU (H5) and AT (H6).

2.2.4. Perceived Usefulness (PU)

Perceived usefulness (PU) is the extent to which a person believes utilizing a particular system would improve their job performance (Davis, 1989). In the context of this study, PU refers to the belief that the use of YouTube improves English-speaking skills. Previous studies demonstrated that PU had a favorable effect on AT and IU (Fussell & Truong, 2022; Gurban & Almogren, 2022; Lei et al., 2022). Prior study has also demonstrated that PU has a beneficial effect on AT and IU for e-learning acceptance during distance learning in higher education (Gurban & Almogren, 2022). Fussel and Truong (2022) in their study of extended TAM regarding the acceptance of virtual reality, disclosed the strong relationship between AT and behavioral intention. In brief, when Indonesian preservice English teachers suggest YouTube as a valuable tool for increasing their English-speaking skills, they will demonstrate more favorable AT and IU in their English learning; PU has a significant positive correlation with AT (H7) and IU (H8).

2.2.5. Attitudes (AT)

Attitude (AT) is the degree to which a user enjoys or dislikes using a particular technology (Davis, 1989). In this study, AT refers to the student's favorable or unfavorable feelings toward using YouTube for English-speaking learning. Extensive research has demonstrated that attitude has a substantial positive effect on IU (Fussell & Truong, 2022; Gurban & Almogren, 2022; Huang et al., 2023). Huang, Li, Lee, Browning and Yu (2023) disclosed the role of AT in predicting behavioral intention to use virtual reality. When the respondents of this study say something positive about using YouTube for English-speaking learning, it will influence their future usage intentions. Therefore, we propose a hypothesis: AT has a significant positive correlation with IU (H10).

2.2.6. Intention to Use (IU)

Lastly, based on the TAM, IU was included, defined as the intention of Indonesian preservice English teachers to use YouTube to improve their speaking skills. Some studies revealed a significant correlation between IU and AU for using certain technologies (Ramírez-Correa, Arenas-Gaitán & Rondán-Cataluña, 2015; Sukendro, Habibi, Khaeruddin, Indrayana, Syahruddin, Makadada et al., 2020). Sukendro et al. (2020) informed that a strong correlation emerged between IU and AU perceived by sports science students regarding the use of e-learning during Covid-19. One hypothesis is included to understand the role of IU in affecting AU (H10) in this study.

3. Method

We employed a survey in which the instrumentation procedure begins with the adjustment and development of survey items. The items include seven latent variables (subjective norms, perceived

enjoyment, perceived usefulness, perceived ease of use, attitudes, intention to use, and actual use). The instrument was adapted from previous studies of TAM (Abdullah & Ward, 2016; Agudo-Peregrina, Hernández-García & Pascual-Miguel, 2014; Davis, Bagozzi & Warshaw, 1989; McCord, 2006), supplemented with subjective norms (Schepers & Wetzels, 2007) and perceived enjoyment (Teo & Noyes, 2011). We utilized a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The document was translated from English to Indonesian and vice versa, a back-translation procedure (Behr, 2017).

Through face validity, the questionnaire's suitability in the context of preservice English teachers was evaluated based on their clarity and simplicity; seven preservice English teachers evaluated the items through a group discussion (Connell, Carlton, Grundy, Taylor-Buck, Keetharuth, Ricketts et al., 2018). Besides, we also discussed the questionnaire with four experts, two English education professors and two educational technology professors to understand the relevance of the items in accordance with the contexts and setting of the research. Six items were eliminated and five items were revised based on the suggestions of the preservice teachers and experts for reasons such as lack of clarity, bias, and out-of-context statements.

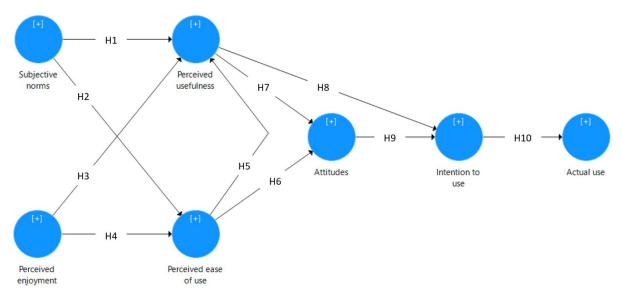


Figure 2. Proposed model; factors affecting YouTube use to improve English-speaking skills.

3.1. Pilot Study

A pilot study was conducted to guarantee that the survey items represent the variables designed by the framework. It is an initial protocol for a survey in a larger study (Hazzi & Maaldaon, 2015). For this purpose, we distributed the survey instrument to 70 preservice English teachers learning in one Indonesian university. The characteristics of the pilot study's respondents were comparable to the targeted main respondents. From the distribution, 67 data were valid, while three were incomplete. We computed the pilot study data through the assessment of Cronbach alpha in SPSS 23. All alpha values exceeded 0.700, confirming the assurance of the variables' reliability (Brown, 2002; Habibi, Riady, Al-Adwan & Albelbisi, 2022)

3.2. Sampling

The study population is preservice English teachers in Indonesian universities who use YouTube to improve English-speaking skills during learning in undergraduate programs. The target population is Indonesian preservice English teachers in three higher education institutions. As we used PLS-SEM for the data analysis, small sample sizes (< 100) can be implemented (Becker, Cheah, Gholamzade, Ringle & Sarstedt, 2023). The current research, however, addressed the survey to a relatively big sample. Stratified sampling was implemented based on the institutions of the respondents. The questionnaire was shared

with 550 Indonesian preservice English teachers; 526 responses were cleaned and included (95.7% response rate), shown in Table 1. Twenty-four responses were eliminated due to issues of missing data and parallel data (Acock, 2005). Data sorting was done through Microsoft Excel, while the normality test was conducted in the SPSS through the computation of skewness and kurtosis (Noel, 2021). Data were normal, with the skewness and kurtosis values ranging from +2 to -2.

Demographic	Type	n	0/0	
Gender	Female	400	76.03	
Gender	Male	126	23.97	
	17-19	206	39.15	
Age	20-22	270	51.33	
	>22	47	8.93	
	Institution A	118	16.73	
Institution	Institution B	235	44.68	
	Institution C	173	32.87	
	1 st	187	35.59	
Years in University	2 nd	88	16.73	
	3 rd	157	29.81	
	4 th	94	17.86	

Table 1. Respondents of the study (n. 526)

4. Analysis and Findings

This study's data were calculated using PLS-SEM through the measurement and structural model assessment.

4.1. Measurement Model

A measurement model is defined as a procedure to evaluate construct validity and reliability of a framework (Becker et al., 2023; Habibi, Yaakob & Sofwan, 2022). The step includes the assessments of data's loading values, internal consistency reliability (ICR), convergent validity, and discriminant validity. For loadings, items with values lower than .500 were eliminated, while the values of higher than 500 were maintained (Shokery, Nawi, Nasir & Mamun, 2016). We inputted in the SmartPLS and did the algorithm that resulted in the most data having good loading values. One item (PU4) was excluded because its loading value was below .500.

ICR is an attempt to examine the consistency of computational values of survey items (Hair, Hult, Ringle & Sarstedt, 2022). The values range between 0 and 1; the higher the value, the better the reliability. Alpha and composite reliability (CR) should have values higher than .700 (Hair et al., 2022). The reports, shown in Table 2, inform that all items obtained the standard. The weakest alpha value was AU (.811), while the best Cronbach alpha emerged for IU (.899). In addition, CR values ranged from .897 to .937; the lowest CR was AT, while the highest was IU.

Convergent validity refers to the tests having similar constructs should be highly correlated. We reported AVE or average extracted variance for the assessment of convergent validity (Habibi, Riady et al., 2022). The AVE values should be higher than .500 (Hair et al., 2022), informing 50% of the items' variance. Table 2 presents the AVE values that exceeds the value of .500, between .744 (AT) and .840 (AU).

Discriminant validity is evidence if constructs that should not be correlated are not related (Cheung, Cooper-Thomas, Lau & Wang, 2023; Hair et al., 2022). The discriminant validity was informed using the heterotrait-monotrait (HTMT). The values for HTMT should be <.900 (Hair et al., 2022). If the value is < .900, discriminant validity will be a problem. Through the computation in the SmartPLS, all HTMT values of the data in the current study were lower than .900, between .646 and .892 (Table 3). The results

suggest that no discriminant validity issues emerged. In short, the items obtained for the proposed model of this study appeared valid and reliable based on the measurement model (Appendix A).

Variable	Items	Load	alpha	CR	AVE
AT	AT1	0.881	0.829	0.897	0.744
	AT2	0.834			
	AT3	0.872			
AU	AU1	0.930	0.811	0.913	0.840
AU	AU2	0.903			
	IU1	0.908	0.899	0.937	0.832
IU	IU2	0.922			
	IU3	0.906			
	PE1	0.878	0.889	0.931	0.818
PE	PE2	0.932			
	PE3	0.902			
	PEU1	0.830	0.886	0.922	0.746
DELL	PEU2	0.900			
PEU	PEU3	0.860			
	PEU4	0.864			
	PU1	0.761	0.883	0.914	0.681
	PU2	0.863			
PU	PU3	0.840			
	PU5	0.793			
	PU6	0.865			
	SN1	0.879	0.872	0.921	0.796
SN	SN2	0.917			
	SN3	0.881			

Table 2. Alpha, CR, AVE, cross-loading

	AU	AT	IU	PEU	PE	PU	Model fit	
AT	0.869						SRMR	0.049
IU	0.899	0.892					d_ULS	0.651
PEU	0.774	0.865	0.780				d_G	0.429
PE	0.859	0.862	0.858	0.850				
PU	0.828	0.863	0.802	0.834	0.766			
SN	0.755	0.711	0.758	0.646	0.766	0.694		

Table 3. HTMT

4.2. Structural Model

Before reporting the structural model of the study, the Variance Inflation Factor (VIF) was the standard to report the collinearity issues; VIF values should be less than 3 (Becker et al., 2023). Table 4 exhibits the VIF values from 1.000 to 2.955. To ensure that the model is a good fit, it is suggested to report the model fit indices before presenting the structural model. In studies that use PLS-SEM, it is recommended to use the standardized root mean square residual (SRMR) to assess model fit, and the maximum value for the SRMR should be .08 (Schuberth, Rademaker & Henseler, 2022). The assessment of model fit in this process includes the squared Euclidean distance (d_ULS) and the geodesic distance (d_G). Table 3 shows that the SRMR value, d_ULS, and d_G meet the required criteria. Specifically, the SRMR value was below .08, while the values for d_ULS and d_G were 0.651 and .429, respectively, which are considered satisfactory (Schuberth et al., 2022).

To analyze the relationships between variables in the structural model, researchers use a method that simultaneously examines the connections between the variables. A bootstrapping procedure was conducted using the SmartPLS software to determine whether these connections were significant. The significance of the results was reported using path coefficient (β), t-value, and p-value at a significance level of 5%. (Hair et al., 2022; Sofyan, Habibi, Sofwan, Yaakob, Alqahtani, Jamila et al., 2023). According to Table 4 and Figure 3, all the correlations presented in the structural model are significant. The computation carried out using PLS-SEM demonstrated the significance of all the hypotheses (H1-H10).

The variable PEU was found to be the strongest predictor of PU (β = .493; p < .01; t = 9.371), followed by SN (β = .222; p < .01; t = 5.750). The weakest correlation was between PE and PU (β = .163; p < .05; t = 2.896). PE was the most significant predictor of PEU regarding the use of YouTube to improve English-speaking skills (β = .684; p < .01; t = 20.014), followed by SN (β = .108; p < .05; t = 2.794), confirming H4 and H2 respectively. For AT, the least strong predictor was PEU (β = .425; p < .01; t = 7.398) and the strongest predictor was PU (β = .431; p < .01; t = 8.339), supporting H6 and H7). AT was the best predicting factor of IU (β = .530; p < .01; t = 11.460). Finally, IU significantly affects AU (β = .819; p < .01; t = 42.402), the most significant related variables that support the last hypothesis (H11).

Н	Relation	Path	p-value	Significance	f	VIF
H1	SN -> PU	0.222	0.000	Yes	0.068	1.872
H2	SN -> PEU	0.108	0.007	Yes	0.015	1.844
Н3	PE -> PU	0.163	0.004	Yes	0.023	2.955
H4	PE -> PEU	0.684	0.000	Yes	0.602	1.844
H5	PEU -> PU	0.493	0.000	Yes	0.264	2.375
Н6	PEU -> AT	0.425	0.000	Yes	0.223	2.229
H7	PU -> AT	0.431	0.000	Yes	0.230	2.229
Н8	PU -> IU	0.325	0.000	Yes	0.131	2.256
Н9	AT -> IU	0.530	0.000	Yes	0.350	2.256
H10	IU -> AU	0.819	0.000	Yes	2.041	1.000

Table 4. Path, t-value, and p-value

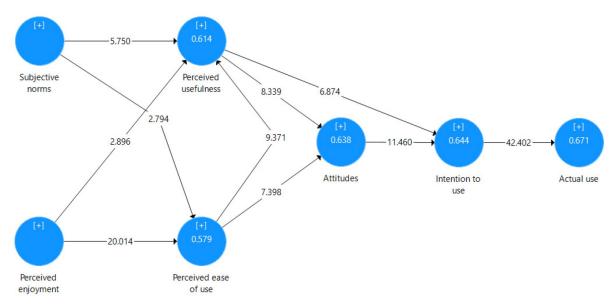


Figure 3. Structural model

In addition to conducting significance tests, we used effect sizes (f²), coefficient determination (R²), and predictive relevance (Q²) to evaluate the performance of the PLS-SEM model shown in Table 5 (Becker et

al., 2023; Hair et al., 2022). Effect sizes (f²) were used to measure the impact of predictors on dependent variables. The most robust effect size was found between IU and AU (2.041), while the smallest effect size was between SN and PEU (.015). Further, R² was used to assess the model's predictive accuracy, and we found that the R² values for PU, PEU, AT, IU, and AU were 0.614, 0.579, 0.638, 0.644, and 0.671 (medium), respectively. Predictive relevance was also assessed using Stone-Geisser's Q2 values, which measure how well the model predicts the data points of indicators in the model. We informed that the Q² values for all endogenous variables were above 0, indicating that the model had predictive relevance. Overall, these statistical approaches provide additional information about the performance of the PLS-SEM model beyond significance testing and can help assess the model's predictive accuracy and the strength of the relationships between variables.

	R2	Q2
Actual use	0.671	0.557
Attitudes	0.638	0.469
Intention to use	0.644	0.532
Perceived ease of use	0.579	0.428
Perceived usefulness	0.614	0.408

Table 5. R^2 and Q^2

5. Discussion

This study evaluated the factors affecting the intention to use and actual use of YouTube to foster English-speaking skills in Indonesian higher education institutions by extending TAM. Specifically, the measurement model was used to evaluate the validity and reliability of the proposed TAM of the current study. We reported loadings, ICR, convergent validity, and discriminant validity to assess the quality of the measures. The results showed that most items had satisfactory loading values, and all variables met the required values. The findings suggest that the proposed model is valid and reliable. Following the measurement model, the fit model was reported to be sufficient, supporting the validity and reliability of the data (Schuberth et al., 2022). Prior studies have also informed the steps in validating and assigning the reliability of their model IU (Gurban & Almogren, 2022; Holdack et al., 2022; Huang et al., 2023; Nguyen & Llosa, 2023). For instance, Nguyen and Llosa (2023) did a measurement model assessment for their model. The study investigated why collaborative consumers bypass certain aspects of the collaborative economy and proposed a theoretical framework to clarify their intentions to bypass.

The findings indicate that all the correlations presented in the structural model are significant. Thus, all the hypotheses are supported. The study found that perceived ease of use (PEU) was the strongest predictor of perceived usefulness (PU), followed by social norms (SN). PEU and PU were reported to be significantly correlated for the use of telepresence robots in universities (Lei et al., 2022). PEU was a significant determinant of e-learning use perceived by the users, as Gurban and Almogren (2022) reported in a study conducted during Covid-19. Recent studies also disclosed the importance of SN in affecting PU for various technology applications in education (Aji et al., 2020; Izuagbe et al., 2019; Lei et al., 2022; Tran et al., 2022) Izuagbe et al. (2019) and Hanif and Imran (2022) discussed the importance of SN to influence PU as social media use in education, including YouTube. Although the weakest correlation, PE still has a role in predicting PU reported in this study. The correlation confirms prior studies; Huang et al. (2022) revealed the importance of PE on PEU in the use of the Internet for learning. Another study supports the findings, stating that PE significantly affected IU in AR wearable use in education (Holdack et al., 2022). In brief, Indonesian preservice English teachers' feelings on YouTube benefit improving English-speaking skills will be improved if they find it easy to use and their friends, families, and teachers support the use. The benefits will also be significant when they enjoy using it for learning English speaking.

For PEU, PE was the most significant predictor, followed by SN. The finding supports prior studies. Monica and Japarianto (2022) disclosed the role of PE on PEU. Additionally, Huang et al. (2022) revealed

the importance of PE on PEU regarding the use of the Internet for learning. As for SN, PE was also reported significantly affect PEU (Aji et al., 2020; Izuagbe et al., 2019; Lei et al., 2022; Tran et al., 2022) Aji et al. (2020) elaborated on the significant intervention of SN on PU regarding the use of e-money. Indonesian preservice English teachers are more likely to perceive YouTube as easy to use if they enjoy using it and people important to them encourage to use the technology.

In addition, PU was the strongest predictor of Attitude (AT). Since the establishment of the original TAM model, PU has been empirically elaborated to play an essential role in predicting AT. A recent study by Fussel and Truong (2022) revealed that PU was a significant predictor for AT within the context of virtual reality integration in higher education institutions. Through the findings of this study, preservice English teachers' attitudes towards using YouTube to improve English-speaking skills can be maximized when they believe in the technology's positive benefits and contents. AT was not only determined by PU but also PEU, confirming that the ease of utilizing YouTube to learning English speaking can improve the feeling of the users, the preservice teachers (Gurban & Almogren, 2022; Lei et al., 2022). These findings underscore the relevance of considering PU and PEU to improve the potential of internet platforms like YouTube for enhancing the likable feelings perceived by the users.

Finally, the study also found that AT was the best predictor of intention to use (IU), and IU significantly affects actual use (AU), indicating that users' intentions to use YouTube to improve English-speaking skills strongly influence their actual use of the platform. The more AT the users have toward using YouTube in language learning, especially speaking, the higher the chance they will learn using it. The significant relationship between AT and IU technology in education was similarly discussed by prior research (Fussell & Truong, 2022; Gurban & Almogren, 2022; Huang et al., 2023). Further, IU in this study was informed to significantly affect AU, confirming prior findings (Ramírez-Correa et al., 2015; Sukendro, Habibi, Khaeruddin, Indrayana, Syahruddin, Makadada, 2020). It is strongly advised that all relevant stakeholders use their utmost efforts in promoting YouTube as a language learning medium, with a particular emphasis on English language acquisition. In summary, this study offers significant contributions to our understanding of the determinants that impact the utilization of YouTube to enhance English-speaking proficiency. These findings have implications for designing and implementing interventions and approaches aimed at promoting the adoption of this platform for language acquisition purposes. A rigorous examination of many hypotheses was conducted using PLS-SEM. This investigation successfully identified and confirmed significant associations between different variables, thereby facilitating a thorough analysis of the determinants that impact users' intentions and behaviors to use YouTube for English language purposes.

6. Conclusion

In summary, this study emphasizes the significance of the determinants that influence users' inclination and subsequent actions in utilizing YouTube to enhance their proficiency in spoken English. The results indicate that individuals are more inclined to utilize YouTube as a platform for language acquisition if they consider it to possess a user-friendly interface, derive pleasure from its usage, and obtain assistance from their social circles. The findings of this study hold potential value in the development of efficacious interventions and methods aimed at fostering the utilization of YouTube as a tool for language acquisition, hence yielding advantages for language learners on a global scale. The utilization of PLS-SEM facilitated a meticulous examination of the interconnections among the variables, establishing a sturdy basis for future investigations in this domain. The research offers significant contributions to understanding the various aspects that impact the utilization of YouTube as a means to enhance English-speaking abilities. However, it is important to acknowledge certain limitations associated with this study. This study's weakness is its exclusive focus on a singular setting, namely language acquisition. Hence, the results may lack generalizability to alternative circumstances.

Moreover, the research depends on self-reported data, hence potentially susceptible to biases and mistakes. The study's findings have major significance for theoretical understanding, as they enhance our knowledge of technology acceptability and usage, specifically in the context of language acquisition within

developing nations. The findings of the study provide support for and expand upon the existing theory of the technology acceptance model (TAM) by emphasizing the significance of elements such as social norms and enjoyment in influencing users' intentions and behaviors regarding the utilization of YouTube for language acquisition. The study's findings hold significant implications for language instructors and policymakers from a pragmatic standpoint. The results indicate that instructors have the potential to encourage the utilization of YouTube as a tool for language acquisition by highlighting its user-friendly interface, practicality, and pleasurable nature. Policymakers can facilitate the utilization of YouTube as a tool for language acquisition through the formulation of policies and initiatives that foster the creation of language learning content of superior quality on the platform. This research study offers valuable perspectives on the determinants that impact the utilization of YouTube to enhance English-speaking abilities. These findings are significant for theoretical frameworks, practical applications, and policy considerations. Despite several limitations, the study's findings provide valuable insights for the formulation of impactful treatments and methods to foster the utilization of YouTube as a tool for language acquisition.

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References

- Abdullah, F., & Ward, R. (2016). Developing a general extended technology acceptance model for E-Learning (GETAMEL) by analysing commonly used external factors. *Computers in Human Behavior*, 56, 238-256. https://doi.org/10.1016/j.chb.2015.11.036
- Acock, A.C. (2005). Working with missing values. *Journal of Marriage and Family*, 67(4), 1012-1028. https://doi.org/10.1111/j.1741-3737.2005.00191.x
- Agudo-Peregrina, Á.F., Hernández-García, Á., & Pascual-Miguel, F.J. (2014). Behavioral intention, use behavior and the acceptance of electronic learning systems: Differences between higher education and lifelong learning. *Computers in Human Behavior*, 34, 301-314. https://doi.org/10.1016/j.chb.2013.10.035
- Aji, H.M., Berakon, I., & Riza, A.F. (2020). The effects of subjective norm and knowledge about riba on intention to use e-money in Indonesia. *Journal of Islamic Marketing*, 12(6), 1180-1196. https://doi.org/10.1108/JIMA-10-2019-0203
- Ajzen, I., & Fishbein, M. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological Bulletin*, 84(5), 888-918. https://doi.org/10.1037/0033-2909.84.5.888
- Al-Sabaawi, M.Y.M., Dahlan, H.M., Alshaher, A.A., & Shehzad, H.M.F. (2022). Understanding the role of social media in informal learning by researchers in Malaysian higher education. *International Journal of Innovation and Learning*, 31(2). https://doi.org/10.1504/IJIL.2022.120645
- Albahiri, M.H., & Alhaj, A.A.M. (2020). Role of visual element in spoken English discourse: implications for YouTube technology in EFL classrooms. *Electronic Library*, 38(3), 531-544. https://doi.org/10.1108/EL-07-2019-0172
- Albahlal, F.S. (2019). The impact of YouTube on improving secondary school students' speaking skills: English language teachers' perspectives. *Journal of Applied Linguistics and Language Research*, 6(2), 1-17.
- Almahasees, Z., Mohsen, K., & Amin, M.O. (2021). Faculty's and Students' Perceptions of Online Learning During COVID-19. Frontiers in Education, 6, 1-10. https://doi.org/10.3389/feduc.2021.638470

- Ávila-Cabrera, J.J., & Corral-Esteban, A. (2021). The project SubESPSKills: Subtitling tasks for students of Business English to improve written production skills. *English for Specific Purposes*, 63, 33-44. https://doi.org/10.1016/j.esp.2021.02.004
- Azuka, O.J., & Ikemefula, M.S. (2022). Technological innovations in education: A comparative analysis of ICT and Youtube in teaching and learning amongst education students in the University of Port Harcourt, Nigeria. *International Journal of Research and Innovation in Social Science*, 06(02), 651-656. https://doi.org/10.47772/ijriss.2022.6231
- Becker, J.M., Cheah, J.H., Gholamzade, R., Ringle, C.M., & Sarstedt, M. (2023). PLS-SEM's most wanted guidance. In *International Journal of Contemporary Hospitality Management*, 35(1), 321-346. https://doi.org/10.1108/IJCHM-04-2022-0474
- Behr, D. (2017). Assessing the use of back translation: the shortcomings of back translation as a quality testing method. *International Journal of Social Research Methodology*, 20(6), 573-584. https://doi.org/10.1080/13645579.2016.1252188
- Brown, J.D. (2002). The Cronbach alpha reliability estimate. *Shiken: JALT Testing & Evaluation SIG Newsletter*, 6(1), 17-18.
- Cheung, G.W., Cooper-Thomas, H.D., Lau, R.S., & Wang, L.C. (2023). Reporting reliability, convergent and discriminant validity with structural equation modeling: A review and best-practice recommendations. *Asia Pacific Journal of Management*, 1-39. https://doi.org/10.1007/s10490-023-09871-y
- Chien, C., Huang, Y., & Huang, P. (2020). YouTube videos on EFL college students' listening comprehension. *English Language Teaching*, 13(6), 96-103. https://doi.org/10.5539/elt.v13n6p96
- Connell, J., Carlton, J., Grundy, A., Taylor-Buck, E., Keetharuth, A.D., Ricketts, T. et al. (2018). The importance of content and face validity in instrument development: lessons learnt from service users when developing the Recovering Quality of Life measure (ReQoL). *Quality of Life Research*, 27(7), 1893-1902. https://doi.org/10.1007/s11136-018-1847-y
- Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly: Management Information Systems, 13(3), 319-339. https://doi.org/10.2307/249008
- Davis, F.D., Bagozzi, R.P., & Warshaw, P.R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982-1003. https://doi.org/10.1287/mnsc.35.8.982
- Donny, C., & Adnan, N. (2022). TESL undergraduates' perceptions: Utilizing social media to elevate speaking skills. *Arab World English Journal*, 13(4), 539-561. https://doi.org/10.24093/awej/vol13no4.35
- Fussell, S.G., & Truong, D. (2022). Using virtual reality for dynamic learning: an extended technology acceptance model. *Virtual Reality*, 26(1), 249-267. https://doi.org/10.1007/s10055-021-00554-x
- Gurban, M.A., & Almogren, A.S. (2022). Students' actual use of e-learning in higher education during the Covid-19 pandemic. *SAGE Open*, 12(2), 1-16. https://doi.org/10.1177/21582440221091250
- Habibi, A., Riady, Y., Al-Adwan, A.S., & Albelbisi, N.A. (2022). Beliefs and knowledge for pre-service teachers' technology integration during teaching practice: An extended theory of planned behavior. *Computers in the Schools*, 40(2), 107-132. https://doi.org/10.1080/07380569.2022.2124752
- Habibi, A., Yaakob, M.F.M., & Sofwan, M. (2022). Student use of digital libraries during COVID-19: structural equation modelling in Indonesian and Malaysian contexts. *The Electronic Library*, 40(4), 472-485. https://doi.org/10.1108/EL-12-2021-0212
- Haider, A., & Al-Salman, S. (2020). Covid-19's impact on the higher education system in jordan: advantages, challenges, and suggestions. *Humanities & Social Sciences Reviews*, 8(4), 1418-1428. https://doi.org/10.18510/hssr.2020.84131

- Hair, J., Hult, G.T.M., Ringle, C.M., & Sarstedt, M. (2022). *PLS-SEM book: A Primer on PLS-SEM* (3rd ed.). Thousand Oaks: Sage.
- Hanif, A., & Imran, M. (2022). When technology-based learning is the only option: evaluating perceived usefulness of social media. *Turkish Online Journal of Distance Education*, 23(2), 107-119.
- Hazzi, O.A., & Maaldaon, I.S. (2015). A pilot study: Vital methodological issues. *Business: Theory and Practice*, 16(1), 53-62. https://doi.org/10.3846/btp.2015.437
- Holdack, E., Lurie-Stoyanov, K., & Fromme, H.F. (2022). The role of perceived enjoyment and perceived informativeness in assessing the acceptance of AR wearables. *Journal of Retailing and Consumer Services*, 65, 1-11. https://doi.org/10.1016/j.jretconser.2020.102259
- Hong, J.C., Chen, M.L., & Ye, J.H. (2020). Acceptance of YouTube applied to dance learning. *International Journal of Information and Education Technology*, 10(1), 7-14. https://doi.org/10.18178/ijiet.2020.10.1.1331
- Huang, F., Teo, T., & Scherer, R. (2022). Investigating the antecedents of university students' perceived ease of using the Internet for learning. *Interactive Learning Environments*, 30(6), 1060-1076. https://doi.org/10.1080/10494820.2019.1710540
- Huang, Y.C., Li, L.N., Lee, H.Y., Browning, M.H.E.M., & Yu, C.P. (2023). Surfing in virtual reality: An application of extended technology acceptance model with flow theory. *Computers in Human Behavior Reports*, 9, 1-10. https://doi.org/10.1016/j.chbr.2022.100252
- Im, J. (2022). Hip-hop and English Education for Korean EFL Learners: An Investigation of Hip-hop English Content on YouTube. *Modern English Education*, 23(1), 15-27. https://doi.org/10.18095/meeso.2022.23.1.15
- Imşek, A.S., & Ateş, H. (2022). The extended technology acceptance model for Web 2.0 technologies in teaching. *Innoeduca. International Journal of Technology and Educational Innovation*, 8(2), 165-183. https://doi.org/10.24310/innoeduca.2022.v8i2.15413
- Izuagbe, R., Ifijeh, G., Izuagbe-Roland, E.I., Olawoyin, O.R., & Ogiamien, L.O. (2019). Determinants of perceived usefulness of social media in university libraries: Subjective norm, image and voluntariness as indicators. *Journal of Academic Librarianship*, 45(4). https://doi.org/10.1016/j.acalib.2019.03.006
- Keskin, B. (2018). What Do YouTube Videos Say About Public Education? SAGE Open, 8(1). https://doi.org/10.1177/2158244018757831
- Kristiani, P.E., & Pradnyadewi, D.A.M. (2021). Effectiveness of YouTube as learning media in improving learners' speaking skills. *The Art of Teaching English as a Foreign Language*, 2(1). https://doi.org/10.36663/tatefl.v2i1.97
- Lei, M., Clemente, I.M., Liu, H., & Bell, J. (2022). The acceptance of telepresence robots in higher education. *International Journal of Social Robotics*, 14(4). https://doi.org/10.1007/s12369-021-00837-y
- McCord, M. (2006). Technology acceptance model. *Handbook of Research on Electronic Surveys and Measurements*, 306-308. https://doi.org/10.4018/978-1-59140-792-8.ch038
- Monica, F., & Japarianto, E. (2022). Analisa pengaruh perceived ease of use dan melalui perceived enjoyment terhadap behavior intention pada digital payment. *Jurnal Manajemen Pemasaran*, 16(1). https://doi.org/10.9744/pemasaran.16.1.9-15
- Mukminin, A., Habibi, A., Muhaimin, M., & Prasojo, L. D. (2020). Exploring the drivers predicting behavioral intention to use m-learning management system: Partial least square structural equation model. *IEEE Access*, 8, 181356-181365. https://doi.org/10.1109/ACCESS.2020.3028474

- Muslem, A., Sahardin, R., Heriansyah, H., Fata, I.A., Djalaluddin, Y., & Hankinson, E. (2022). YouTube teaching materials with peer support to improve students' mastery of subject content learning. *Studies in English Language and Education*, 9(2), 651-666. https://doi.org/10.24815/siele.v9i2.25236
- Nasution, A.K.R. (2019). YouTube as a media in English language teaching (ELT) context: teaching procedure text. *Utamax: Journal of Ultimate Research and Trends in Education*, 1(1). https://doi.org/10.31849/utamax.v1i1.2788
- Nguyen, S., & Llosa, S. (2023). When users decide to bypass collaborative consumption platforms: The interplay of economic benefit, perceived risk, and perceived enjoyment. *Tourism Management*, 96. https://doi.org/10.1016/j.tourman.2022.104713
- Noel, D.D. (2021). Normality assessment of several quantitative data transformation procedures. *Biostatistics and Biometrics Open Access Journal*, 10(3). https://doi.org/10.19080/bboaj.2021.10.555786
- Noori, A.Q., Orfan, S.N., Akramy, S.A., & Hashemi, A. (2022). The use of social media in EFL learning and teaching in higher education of Afghanistan. *Cogent Social Sciences*, 8(1). https://doi.org/10.1080/23311886.2022.2027613
- Ramírez-Correa, P.E., Arenas-Gaitán, J., & Rondán-Cataluña, F.J. (2015). Gender and acceptance of e-learning: A multi-group analysis based on a structural equation model among college students in Chile and Spain. *PLoS ONE*, 10(10), 1-17. https://doi.org/10.1371/journal.pone.0140460
- Ríos-Vázquez, A., & Romero-Tena, R. (2022). YouTube y el aprendizaje formal de matemáticas. Percepciones de los estudiantes en tiempos de COVID-19. *Innoeduca. International Journal of Technology and Educational Innovation*, 8(2), 27-42. https://doi.org/10.24310/innoeduca.2022.v8i2.14516
- Saed, H.A., Haider, A.S., Al-Salman, S., & Hussein, R.F. (2021). The use of YouTube in developing the speaking skills of Jordanian EFL university students. *Heliyon*, 7(7), 1-6. https://doi.org/10.1016/j.heliyon.2021.e07543
- Sari, A.B.P., Dardjito, H., & Azizah, D.M. (2020). EFL students' improvement through the reflective youtube video project. *International Journal of Instruction*, 13(4), 393-408. https://doi.org/10.29333/iji.2020.13425a
- Schepers, J., & Wetzels, M. (2007). A meta-analysis of the technology acceptance model: Investigating subjective norm and moderation effects. *Information and Management*, 44(1), 90-103. https://doi.org/10.1016/j.im.2006.10.007
- Schuberth, F., Rademaker, M.E., & Henseler, J. (2022). Assessing the overall fit of composite models estimated by partial least squares path modeling. *European Journal of Marketing*, 57(6), 1678-1702. https://doi.org/10.1108/EJM-08-2020-0586
- Shim, J.Y., Kim, E.K., Ko, E.M., Kim, H.S., & Park, M.J. (2022). Social network analysis of changes in youtube home economics education content before and after Covid-19. *Family and Environment Research*, 60(1), 1-20. https://doi.org/10.6115/fer.2022.001
- Shokery, N.M., Nawi, N., Nasir, N.A., & Mamun, A. (2016). Factors contributing to the acceptance of social media as a platform among student entrepreneurs: A review. *Mediterranean Journal of Social Sciences*, 7(2), 42-51 https://doi.org/10.5901/mjss.2016.v7n2p42
- Sofyan, S., Habibi, A., Sofwan, M., Yaakob, M.F.M., Alqahtani, T.M., Jamila, A. et al. (2023). TPACK-UotI: the validation of an assessment instrument for elementary school teachers. *Humanities and Social Sciences Communications*, 10(1), 55. https://doi.org/10.1057/s41599-023-01533-0

Sukendro, S., Habibi, A., Khaeruddin, K., Indrayana, B., Syahruddin, S., Makadada, F.A. et al. (2020). Using an extended Technology Acceptance Model to understand students' use of e-learning during Covid-19: Indonesian sport science education context. *Heliyon*, 6(11), 1-9. https://doi.org/10.1016/j.heliyon.2020.e05410

Teo, A.C., Tan, G.W.H., Cheah, C.M., Ooi, K.B., & Yew, K.T. (2012). Can the demographic and subjective norms influence the adoption of mobile banking? *International Journal of Mobile Communications*, 10(6), 578-597. https://doi.org/10.1504/IJMC.2012.049757

Teo, T., & Noyes, J. (2011). An assessment of the influence of perceived enjoyment and attitude on the intention to use technology among pre-service teachers: A structural equation modeling approach. *Computers and Education*, 57(2), 1645-1653. https://doi.org/10.1016/j.compedu.2011.03.002

Toleuzhan, A., Sarzhanova, G., Romanenko, S., Uteubayeva, E., & Karbozova, G. (2023). The educational use of YouTube videos in communication fluency development in English: Digital learning and oral skills in secondary education. *International Journal of Education in Mathematics, Science and Technology*, 11(1), 198-221. https://doi.org/10.46328/ijemst.2983

Tran, H.T.T., Nguyen, N.T., & Tang, T.T. (2022). Influences of subjective norms on teachers' intention to use social media in working. *Contemporary Educational Technology*, 15(1), ep400. https://doi.org/10.30935/cedtech/12659

Trang, N.M. (2022). Using youtube videos to enhance learner autonomy in writing: A qualitative research design. *Theory and Practice in Language Studies*, 12(1), 36-45. https://doi.org/10.17507/tpls.1201.05

Venkatesh, V., & Davis, F.D. (2000). Theoretical extension of the Technology Acceptance Model: Four longitudinal field studies. *Management Science*, 46(2), 186-204. https://doi.org/10.1287/mnsc.46.2.186.11926

Appendix A

1: Strongly disagree

Demographic information
Institution
Gender
Male
Female
Semester
17-19
20-22
>23
Years at university
Year 1
Year 2
Year 3
Year 4
Year 5
If you use YouTube to learn English Speaking, please continue.
1 0 1 1

- 2: Disagree
- 3: Neutral
- 4: Agree
- 5: Strongly agree

Variable	Item	Source		
	Using YouTube would enable me to accomplish English Speaking tasks more effectively.			
	Using YouTube would improve my productivity in English Speaking.	Davis (1989); Sukendro et al (2020)		
Perceived	Using YouTube would improve my academic performance in English Speaking.			
usefulness	Learning on YouTube is easier than learning in offline classes for English Speaking.			
	I would find learning English Speaking in YOUTUBE useful for me.			
	Using YouTube would enhance my effectiveness in learning English Speaking.			
	Learning English Speaking through YouTube is easy.			
Perceived ease	Using YouTube while learning English Speaking is clear and easy to understand.	Davis (1989);		
of use	Using YouTube while learning English Speaking is flexible	Sukendro et al		
01 400	It would be easy for me to be skillful at using YouTube to participate in learning English Speaking.	(2020)		
	Using YouTube is a good idea for learning English Speaking.			
Attitudes	I think using YouTube is a trend for learning English Speaking.			
	YouTube is compatible with the smart devices I use to learn English Speaking.	Davis (1989); Sukendro et al (2020)		
T	I will use YouTube to learn English Speaking.			
Intention to use	I plan to use YouTube to learn English Speaking in the future.	(====)		
use	I would recommend using YouTube to learn English Speaking.			
Actual use	I use YouTube to learn English Speaking.	Davis (1989); Sukendro et al		
Actual use	I use YouTube to find information about English Speaking.	(2020)		
Subjective	Lecturers at the university supported me in using YouTube to learn English Speaking.	Davis (1989);		
norm	My classmates support the use of YouTube in learning English Speaking.	Mukminin et al		
	Families support the use of YouTube in learning English Speaking.	(2020)		
	Using YouTube to learn English Speaking is fun	Teo & Noyes		
Perceived	Learning English Speaking is more interesting on YouTube.			
enjoyment	I like using YouTube to learn English Speaking. (2011			
	I enjoy the aspects of my English-Speaking using YouTube.	l		

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