

Phan Cong Thao Tien; Tran Thien Phuc; Nguyen Thi Hai Binh

Conference Paper — Published Version

A hybrid SEM/ANN analysis to understand youtube video content's influence on university students' eLearning acceptance behavior

Suggested Citation: Phan Cong Thao Tien; Tran Thien Phuc; Nguyen Thi Hai Binh (2023) : A hybrid SEM/ANN analysis to understand youtube video content's influence on university students' eLearning acceptance behavior, In: Dao Thi Hien (Ed.): Proceedings of the National Conference in Education and Commerce, ISBN 978-604-79-3671-7, Finance Publishing House, Ho Chi Minh City, Vietnam, pp. 651-661

This Version is available at:

<https://hdl.handle.net/10419/279146>

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

A HYBRID SEM/ANN ANALYSIS TO UNDERSTAND YOUTUBE VIDEO CONTENT'S INFLUENCE ON UNIVERSITY STUDENTS' ELEARNING ACCEPTANCE BEHAVIOR

Phan Cong Thao Tien^a, Tran Thien Phuc^a, Nguyen Thi Hai Binh^b
^aHo Chi Minh City University of Foreign Languages-Information Technology
^bUniversity of Finance-Marketing
tienpct@huflit.edu.vn

Abstract

A hybrid analysis of Structural Equation Modeling (SEM), Artificial Neural Network (ANN), and Importance-Performance Map Analysis (IPMA) was used to examine how YouTube videos affect university students' acceptance in Ho Chi Minh City (HCMC). Performance expectation was the most important component by both ANN and IPMA assessments, and theoretically, the presented model gave several explanations for the effect of individual determinants of desire to utilize eLearning from Internet services. The findings support earlier research showing performance and effort expectations strongly impact eLearning adoption. The report encouraged academics in HCMC to utilize YouTube. Respondents wanted to employ modern technologies in their teaching. UTAUT and TAM were used to discuss the findings.

Keywords: #Social media, #YouTube, #Higher education, #eLearning, #Ho Chi Minh City's students, #TAM, #UTAUT

1. Introduction

Every country has been affected by the Covid-19 in different ways and to different degrees (Topf, J.M., Williams, P.N., 2021). So, countries have put in place similar rules, such as strict social separation by closing businesses and other social sectors, like universities (Almanthari, A., Maulina, S., Bruce, 2020). As a direct consequence of this, local governments have begun to assist their educational initiatives by implementing electronic learning systems (eLearning). These limits provide a new experience into the realm of eLearning, which has provided several educational institutions with possibilities as well as challenges as a direct consequence. In order to secure the supply of educational materials and services, they have modified eLearning by making use of new technologies and media, such as YouTube and others (Widodo, A., Ermiana, I., Erfan, 2021).

Although the pandemic has had an impact on both the public and private sectors throughout the globe, the prevalence of online communities has prompted a more upbeat outlook (Černá & Borkovcová, 2020). Numerous online communities are making an effort to help their members, and notably young students, deal with academic pressures. When considering the scope of online resources, one cannot ignore YouTube's prominence as a hub for knowledge, entertainment, and education (Welbourne, D.J., Grant, 2015). According to studies, combining YouTube with transformative pedagogy would illustrate the boundless potential of the Internet (Jackman, 2019). Benefits may include, but are not limited to, enhanced subject understanding, course interest, abstract visualization, and critical thinking (Balbay, S., Kilis, 2017). Others have noted many elements that influence eLearning users' adoption of online systems, including as perceived usefulness and perceived ease-of-use. Even though the use of YouTube material in education has been studied in the academic literature, very little is known about the variables that influence adoption of eLearning among YouTube users, especially users' behavioral intention.

This study investigates the behavioral intents of university users with regard to the adoption of eLearning by examining their performance expectations as well as their effort expectations. Gaining an awareness of these elements would contribute to gaining an understanding of behavioral-intention aspects surrounding the acceptance of eLearning as a model for long-term use in the future. As a result, this study makes a contribution to the knowledge of the influence that YouTube as a platform may have in an online learning environment.

2. Literature review

2.1. eLearning and Technology Acceptance

Several colleges worldwide provide online learning, allowing students to study anytime and wherever they choose (Aristovnik et al. & 2018; Widodo et al., 2021). Certain educational institutions have become more familiar with the

effects of embracing digital technology owing to its flexibility, less cost, and ease, while others have argued that eLearning may vary from campus-based/face-to-face outcomes (El Refae, G., Kaba, A., Eletter, 2021). eLearning is said to include online interaction between instructors/peers and students (Prastiyo, W., Djohar, A., Teknik, 2018). Nonetheless, Covid-19 has forced many companies and universities to use eLearning for their workers and students (El Refae, G., Kaba, A., Eletter, 2021). So, in today's world, "eLearning" means meaningful online learning that uses modern technology and the Internet (Radha, R., Mahalakshmi, K., Sathis, K., Saravanakumar, 2020). It also includes websites, portals, video conferencing software (like Zoom or Teams), audio platforms, and social-video platforms used for education (Shahzad, A., Hassan, R., Aremu, A.Y., Hussain, A., Lodhi, 2020).

There is one more aspect about the learners that has to be discussed, and that is the fact that they are responsible for their own learning. It is vital to take into consideration the learners' acceptance of the usage of technology as well as their behavioral objectives (e.g., YouTube for education). As a result, Technology Acceptance Model (TAM) theoretical model that was selected to carry out examination of learners' behavioral intents may be described by the views of YouTube users about the platform's potential as a learning environment. The study is carried out using the TAM model, which makes use of two significant elements referred to as perceived ease-of-use (PEU) and perceived usefulness (PU) (YouTube in education) (Nguyen, H., & Nguyen, 2021). With the help of this model, it is possible to anticipate and evaluate the user acceptability of a certain piece of technology based on user attitudes and actions (Davis, F.D., Bagozzi, R.P., Warshaw, 1989). PEU is used to figure out how users feel and what they plan to do with a certain technology or app, such as how willing they are to use YouTube to learn while PU is used to evaluate the positive or negative perception of the user's attitude about certain technology, such as the user's attitude in evaluating the usefulness of YouTube in terms of education (Ashkanani, 2017).

The Unified Theory of Acceptance and Use of Technology (UTAUT) is an additional potential supporting theoretical approach that defines the user's behavior in regards to their intents to embrace a new technology or application (Venkatesh et al., 2003). PE in the UTAUT paradigm is analogous to the PU notion in the TAM model; both indicate the user's impression of receiving specific advantages as a result of utilizing the technology (Dang, D. T. V., Nguyen, L., & Nguyen, 2022). The user's expectations of a technology are tied to the system's performance, and this affects their choice about how simple or difficult it is to accept the usage of the technology. It is evaluated that the influence of PE on BI in relation to university students' use of eLearning and found that eLearning adoption was supported (Chao, 2019).

H1: YouTube videos (YTV) has a substantial influence on users' behavioral intention (BI).

H2: Performance expectancy (PE) has a substantial influence on users' behavioral intention (BI).

2.2. eLearning and YouTube videos

eLearning makes use of digital technology to facilitate communication across various learning environments and to influence user behavior in relation to their responsibilities (Jaya, S.N., Nadzirin, M., Nur, A., Faslih, 2017). Studies have previously identified the several conceptualizations of eLearning in education, particularly in the field of information and communication technology (Franklin, U.E., Nahari, 2018). Among the many different factors that impact adoption of eLearning, this study focuses on on YouTube videos, PE, and EE in connection to BI to utilize YouTube as a platform for educational activities.

YouTube, the world's most popular website, provides a wealth of entertainment and other information (Lee, D.Y., Lehto, 2013). YouTube makes sharing easy (Celestine, A.U., Nonyelum, 2018; Stout, 2020). In 2021, approximately 2.3 billion people use YouTube monthly (Newberry, 2021). So, YouTube provides a vast amount of good educational content, which has been used to improve education and learning (Bonk, 2011; Kaya, C., Usta, T., Baghaki, H.S., Oral, 2020). It allows users to participate, exchange, and develop a wide variety of educational material, and it has been shown that the more people visit educational websites, the more comprehensive and helpful the content is (Sood, A., Sarangi, S., Pandey, A., Murugiah, 2011). Some believe YouTube instructional videos may help consumers learn and answer numerous questions during self-study. This helps users preserve and build on their learning edge to succeed (Černá & Borkovcová, 2020). Nevertheless, some (Kaya, C., Usta, T., Baghaki, H.S., Oral, 2020) caution against using YouTube for scientific learning due to a lack of high-quality videos and reliable and useful content. Especially in science (Topf, J.M., Williams, P.N., 2021).

H3: Effort Expectancy (EE) has a substantial influence on users' behavioral intention (BI).

H4: Users' behavioral intention (BI) has a substantial influence on eLearning acceptance (EA).

2.3. The conceptual framework of the study

In the past, YouTube has also been a useful resource for sharing learning materials for users, however, when the Covid pandemic came, YouTube was increasingly considered as one of the important platforms to apply for a new learning environment (Jung, I., Lee, 2015; Luu, N., Yver, C., Douglas, J., Tasche, K., Thakkar, P.G., Rajasekaran, 2020; Ramírez-Correa, P., Mariano-Melo, A. et al., 2019). In this study, the authors want to hypothesize a model to evaluate the effects of YouTube-based eLearning adoption among university students in HCMC.

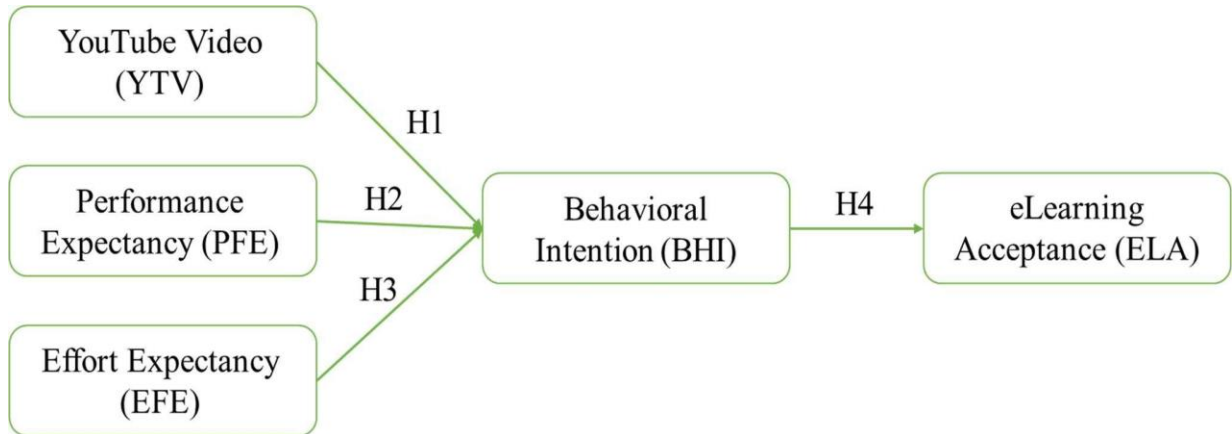


Figure 1: Conceptual framework

According to some theories, the application of YouTube to teaching as an educational platform has both positive and negative assumptions (Luu, N., Yver, C., Douglas, J., Tasche, K., Thakkar, P.G., Rajasekaran, 2020). However, after the Covid period made online learning mandatory, and although students have now returned to school, the risk of online learning can still occur at any time, so the conducting study to assess the acceptability of YouTube as a learning platform is necessary, especially in Southeast Asian countries like Vietnam. Therefore, this study has a contribution regarding the impact of YouTube video content on the behavioral intention of university students when accepting eLearning in HCMC - Vietnam.

3. Methodology

The researchers used purposive and non-probability sampling. The students used a Google Form-based survey to obtain sample responder data. Respondents were permitted to leave the research at any time without penalty. The online survey questionnaire included two parts: the first part collected demographic information including gender, status, and academic level, and the second part collected responses to the study's latent variables using a 7-point Likert scale modified from prior research. Just full questionnaires from 299 were obtained. Hair et al., (2011) recommend a sample size of 10 times the number of formative indicators used in construction or structural pathways provided in the structural model. 299 is clearly more than 30 for this study. G-Power analysis using 0.80 statistical power, 0.05% margin of error, 0.15 effect size, and 4 predictor number indicated the sample size. The sample size surpasses 77. Participants included 64.2% men, 35.8% women, 25.1% first-year students, 23.4% second-year students, 17.4% third-year students, 27.7% final-year students, and 6.4% post-graduate students.

In contrast to earlier study, which only used a single step of SEM analysis, this study utilized a hybrid SEM-ANN technique. There are two distinct phases involved in this procedure. PLS-SEM was first performed (Leguina, 2015) since it is the study model that is suggested to be used. SmartPLS was used for this. PLS-SEM was used because of the analytical nature of this theoretical model, in addition to the dearth of previously conducted study in a similar field. According to study that was conducted in the past, it is necessary to proceed in two stages (Hair et al., 2016; Leong et al., 2020). In order to identify the relevance of each construct in the study model and the performance of those constructs, this study makes use of the IPMA, which is a contemporary approach in PLS-SEM. In addition, ANN is an appropriate tool for assessing operation in circumstances in which the fundamental linkages between output and input are intricate and non-linear (Li et al., 2018). This is one of the conditions in which ANN is useful.

4. Results

4.1. Measurement mode assessment

Cronbach's alpha and composite reliability (CR) are analyzed to determine the instrument's reliability. In order to test the validity, we looked at both convergent and discriminant validity (Henseler et al., 2014). All of Cronbach's alpha and CR values are larger than the minimum needed level of 0.70, as indicated in Table 1. (Lim et al., 2021). Furthermore, all average variance extracted (AVE) values greater than 0.50 (Ooi et al., 2018) were statistically confirmed, indicating construct dependability and convergent validity. Furthermore, as shown in Table 2, all of the HTMT correlation values were within acceptable ranges, demonstrating discriminant validity. Table 1 reveals that all square roots of the AVEs are bigger than their respective coefficients of correlation (Tan & Ooi, 2018), indicating that discriminant validity was achieved. In agreement with Hew et al., (2015), we evaluated the cross-loadings to further establish discriminant validity and discovered that the relevant items load very strongly on their own construct. As a result, we verified that discriminant validity is met.

Table 1: Descriptive Statistics and Reliability Coefficients for Constructs

	Loadings	Cronbach's alpha	Rho_a	Composite reliability	Average variance extracted (AVE)
BHI1	0.88	0.819	0.834	0.892	0.735
BHI2	0.903				
BHI3	0.785				
EFE1	0.853	0.82	0.833	0.893	0.735
EFE2	0.826				
EFE3	0.892				
ELA1	0.959	0.911	0.911	0.957	0.918
ELA2	0.957				
PFE1	0.813	0.782	0.784	0.873	0.696
PFE2	0.848				
PFE3	0.842				
YTV1	0.89	0.858	0.859	0.914	0.78
YTV2	0.898				
YTV3	0.86				

Table 2: The HTMT correction test results

	BHI	EFE	ELA	PFE	YTV
BHI					
EFE	0.802				
ELA	0.828	0.76			
PFE	0.589	0.608	0.576		
YTV	0.617	0.645	0.539	0.659	

Table 3: The Cross Loadings

	BHI	EFE	ELA	PFE	YTV
BHI1	0.88	0.565	0.629	0.411	0.462
BHI2	0.903	0.635	0.667	0.428	0.533
BHI3	0.785	0.5	0.541	0.377	0.336
EFE1	0.532	0.853	0.561	0.399	0.42
EFE2	0.524	0.826	0.517	0.481	0.481
EFE3	0.641	0.892	0.611	0.375	0.493
ELA1	0.697	0.637	0.959	0.489	0.471
ELA2	0.678	0.626	0.957	0.446	0.443
PFE1	0.406	0.421	0.43	0.813	0.405
PFE2	0.411	0.399	0.415	0.848	0.483

PFE3	0.363	0.388	0.375	0.842	0.462
YTV1	0.481	0.488	0.42	0.457	0.89
YTV2	0.45	0.457	0.379	0.475	0.898
YTV3	0.456	0.492	0.464	0.498	0.86

5. Accessing the structural model

The PLS-SEM approach (Mayer et al., 1995) was used to test the aforementioned four hypotheses by analysis of variance, which specified the R² values along each path. Table 4 displays the reported strong predictive power of R² values for BI (0.811) and eLearning acceptance (0.820) within these constructs for the proposed model, along with the corresponding assumption path significance associations (Elareshi et al., 2022). The conclusions drawn from the analysis of the data are consistent with our hypotheses, as indicated in Table 4. Hypotheses showed that H1, H2, and H3 were supported by the intention that respondents' behavioural intentions were influenced by their performance expectancy, their exposure to YouTube videos and their effort expectancy. Similarly, our fourth hypothesis was supported by the data, which demonstrated that respondents' behavioural intention can result in eLearning acceptance.

5.1. Structural model assessment

The results of structural model investigation are listed in Table 4 and illustrated in Fig. 2. All hypotheses are supported. The relevant explanations for these outcomes are further elaborated in later discussion section. The results showed that EFE ($\beta=0.502$, p-value < 0.05), PFE ($\beta=0.133$, p-value < 0.05), YTV ($\beta=0.18$, p-value < 0.05) have direct positive effect on BHI. Besides, all the paths in the BHI baseline model are confirmed. BHI is able to predict ELA ($\beta=0.718$, p-value < 0.05). BHI has strong effect on ELA. Moreover, EFE makes strongest impacts to BHI in relative to other stimulants. In general, BHI is explained 73.5% by three variables and is accounted for ELA with 91.8% respectively.

Table 4: Hypothesis testing

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values	Results
BHI -> ELA	0.718	0.717	0.04	17.768	0	Supported
EFE -> BHI	0.502	0.503	0.059	8.445	0	Supported
PFE -> BHI	0.133	0.135	0.052	2.567	0.01	Supported
YTV -> BHI	0.18	0.18	0.068	2.632	0.009	Supported

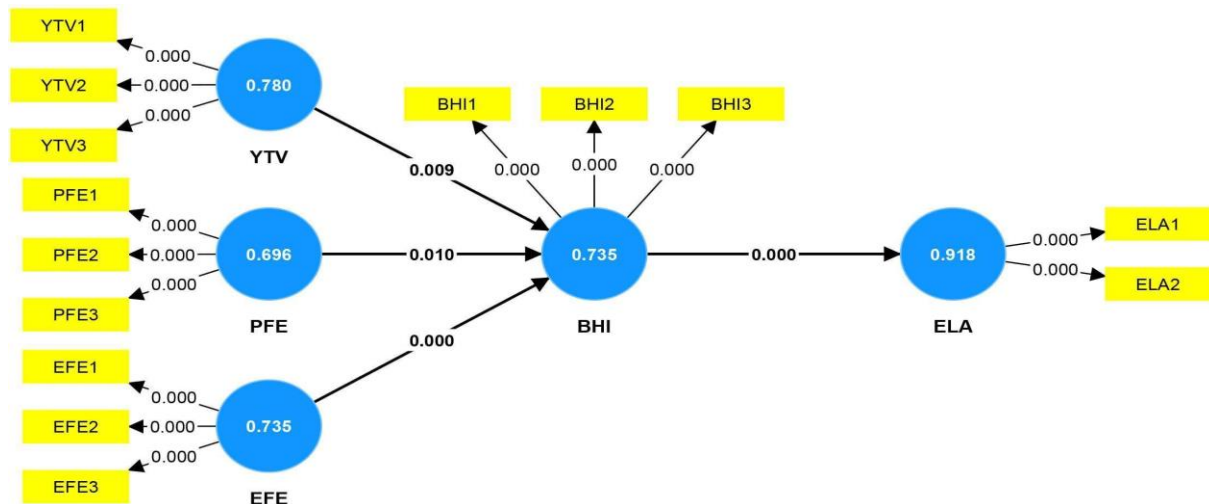


Figure 2: Structural model result

An examination of the study model's explanatory power reveals that our formulation accounts for 49.1% of the variance in behavior intention, 51.5% of the variance in eLearning acceptance. In addition, a small standard error of the

mean relative error (SRMR = 0.052) indicates a very good level of model fit. Our findings show that the suggested model has strong explanatory power since the exogenous variables can account for a sizable amount of the endogenous variable's variance (Hair et al., 2016).

Table 5: R-square

	R-square	R-square adjusted
BHI	0.491	0.486
ELA	0.515	0.513

5.2. Neural network analysis

Hypothesis testing with PLS-SEM enabled the integration of SEM and ANN in the analysis of the neural network. Sigmoid functions were utilized for both the activation and result layers. Errors can be decreased and prediction accuracy can be increased through the numerous stages of the learning procedure (D. T. V. Dang et al., 2022; H.-B. Nguyen & Nguyen, 2021; L.-T. Nguyen, Nguyen, et al., 2022).

We allocated 90% of the samples to be utilized in training activities, while the remaining 10% were used for testing. The ANN model's accuracy as a predictor was evaluated using the RMSE, or root-mean-squared error (Leong et al., 2020). The learning process contains multiple steps that can be used to refine the model and increase the reliability of predictions (Dao et al., 2023; L.-T. Nguyen, Duc, et al., 2023). We allocated 90% of the samples to be utilized in training activities, while the remaining 10% were used for testing. The predictive accuracy of the ANN model was evaluated using the root mean square of the error, or RMSE (T. Q. Dang et al., 2023; Tien, Tri, et al., 2023).

The values for the study variables fluctuate marginally between the training and testing phases. The RMSE values for both training and testing are 0.675 and 0.643 in table 6. Simultaneously, the sensitivity analysis is an evaluation of how each predictor affects behavior intention to use YouTube for learning as shown in table 7. The weighted average of the relative importance of each implanted neuron was then divided by that of the most important neuron to determine the final weighted average (L.-T. Nguyen, Dwivedi, et al., 2022; L.-T. Nguyen, Nguyen, et al., 2023). The findings show that EFE, PFE, and YTV are the most important predictors of behavior intention to use YouTube content in education, with 100%, 73%, and 66% normalized relative importance, respectively, in eLearning through YouTube.

Path Coefficient and Normalized Relative Importance are used to determine the order of importance in PLS-SEM and ANN, respectively. These findings also confirmed EFE ranks first in both ANN and PLS-SEM when considering the magnitude of its impact. This also represents the capability of modeling both linear and non-linear associations between variables (C. N. B. Dang et al., 2023; B.-T. H. Nguyen et al., 2023; Tien, Luan, et al., 2023), hence the employment of a two-stage analysis approach (PLS-ANN) in this investigation is highly warranted.

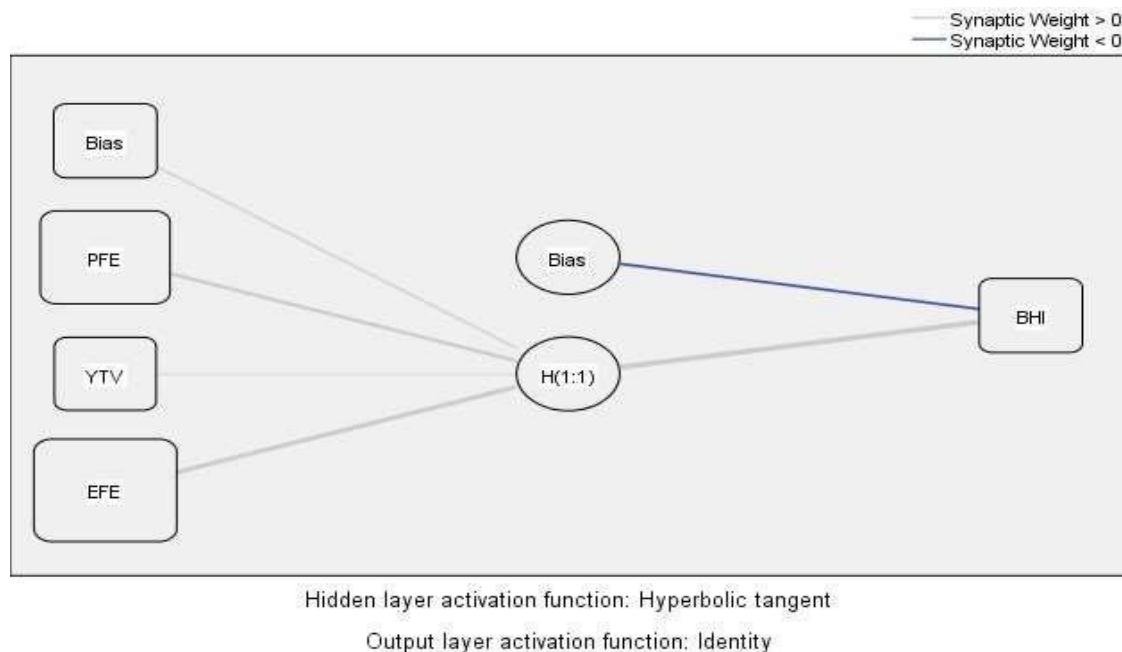


Table 6: RMSE values of ANN

Input: PFE, YTV, EFE
Output: BHI

Neural Network	TRAINING			TESTING			TOTAL
	N	SSE	RMSE	N	SSE	RMSE	
1	263	540.09	0.658	36	67.685	0.528	299
2	266	529.101	0.665	32	63.295	0.656	298
3	257	532.594	0.677	42	84.024	0.714	299
4	272	564.765	0.68	27	53.967	0.63	299
5	266	539.436	0.677	33	71.825	0.788	299
6	263	549.317	0.684	36	63.816	0.528	299
7	276	554.332	0.678	23	53.115	0.826	299
8	263	519.097	0.684	36	72.259	0.583	299
9	266	553.833	0.692	32	54.796	0.469	298
10	268	540.452	0.66	31	63.875	0.71	299
Means		542.3017	0.675		64.8657	0.643	
SD		13.5605414	0.11		9.66604353	0.118	

Table 7: Sensitivity analyses: normalized importance of constructs for ANN model

Neural Network	PFE	YTV	EFE
1	0.344	0.304	0.352
2	0.185	0.3	0.515
3	0.209	0.353	0.438
4	0.242	0.283	0.475
5	0.321	0.224	0.454
6	0.285	0.276	0.439
7	0.186	0.275	0.539
8	0.19	0.32	0.49
9	0.334	0.285	0.382
10	0.171	0.322	0.507
Means	0.36	0.208	0.431
Normalized Importance	83.50%	48.30%	100.00%

5.3. Importance-performance map analysis (IPMA)

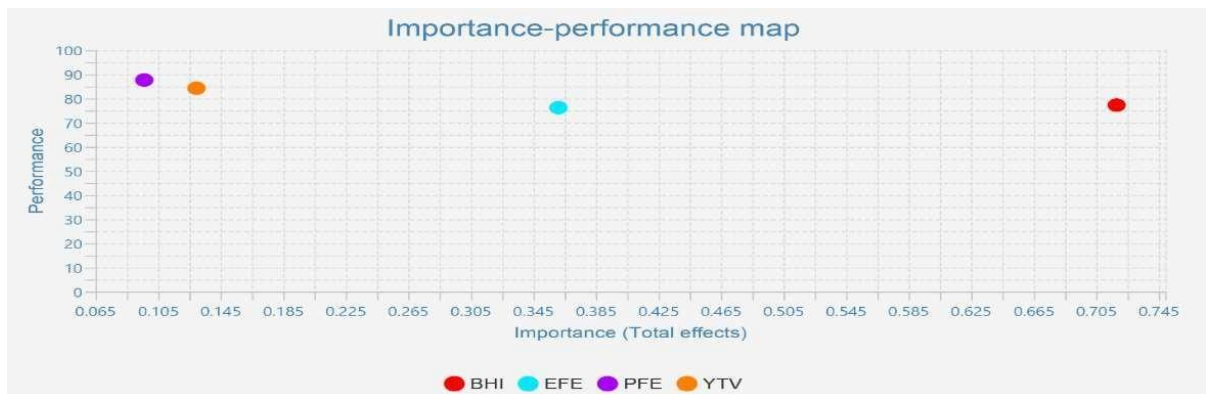


Figure. 4 IPMA result

Finally, an importance-performance map analysis, or IMPA, was performed to determine which antecedents were important but performed poorly for SI in order to implement improvement (Leong et al., 2013). For the ELA, BHI and EFE has the high importance, but lower performance as shown in Fig. 4.

6. Discussion

6.1. Discussion

This study discussed how YouTube and other video-sharing sites affected the popularity of eLearning especially through the Covid-19 pandemic (L.-T. Nguyen, 2023). It uses the TAM and UTAUT theories to guide its PLS-SEM analysis via SmartPLS software of college students' opinions on and reactions to the use of YouTube videos in the classroom. Every country has looked for different ways to handle the Covid-19 dilemma, and many have turned to eLearning (Edelhauser, E., Lupu- Dima, 2020). Virtually every school and company in the world now makes extensive use of some form of internet messaging.

COVID-19 has not been managed yet, thus the trend toward using online or blended learning environments in schools is expected to continue. As a result, people must embrace crucial that people embrace such technology (such as YouTube) to order to reap its benefits. Despite this, eLearning, in conjunction with distant learning, can be an answer (El Refae, G., Kaba, A., Eletter, 2021). Many people are already aware of the concept of distance learning and the concept of online learning, but until recently, online learning was never required (Alfadda, H.A., Mahdi, 2021).

The relevance of YouTube as a teaching tool has been underscored by our study, which is not surprising given the site's massive user base. YouTube is a go-to source for obtaining knowledge and amusement, and it also happens to be a powerful tool for enhancing students' academic progress. YouTube has become a crucial platform for education (Kaya, C., Usta, T., Baghaki, H.S., Oral, 2020; Stout, 2020; Topf, J.M., Williams, P.N., 2021) as well as for communication and engagement and the results of this study corroborate this trend.

When taking into account the connection between user attitudes and technological acceptance, the results are consistent with the TAM and UTAUT theories (Ashraf et al., 2021; Davis, F.D., Bagozzi, R.P., Warshaw, 1989). Results suggest, for instance, that our respondents' BI may be predicted in the direction of accepting YouTube in education (eLearning environment). (Ashkanani, 2017; Chao, 2019). Respondents' BHI were influenced by their PFE as they utilized YouTube as part of their learning process, lending support to the first hypothesis that users' PFE had an effect on BHI in regards to the adoption of the eLearning system. The results also backed up H2, showing that people's attitudes toward BHI in education might be influenced by the content they see on YouTube.

Importantly, this study also found that respondents' BHI was correlated with their expectations about the amount of effort required to use YouTube material (H3), suggesting that this factor has a role in influencing whether or not people would embrace and accept such a platform (Alghizzawi, M., Habes, M., Salloum, S.A., Ghani, M.A., Mhamdi, C., Shaalan, 2019). Acceptance of eLearning was predicted by respondents' BHI toward YouTube (H4), suggesting that YouTube influences respondents' BHI toward embracing the eLearning system (Salloum, S.A., Al-Emran, M., Habes, M.M., Alghizzawi, M., Ghani, M.A., Shaalan, K. & M., 2019). YouTube, it seems, may be a viable option for several organizations, both academic and others. Problems with professionalism, privacy, and the veracity of the films shown are all present in this approach (Kaya et al., 2020; Topf and Williams, 2021). Accordingly, this study will add to our understanding of how social media affects the educational process.

6.2. Conclusion

The results of this study have consequences for the difficulties faced by higher education institutions (HEIs) due to the prevalence of Covid, particularly in Vietnam's education sector. Our findings suggest that most HEIs would benefit greatly from adopting YouTube and other forms of modern technology (such as eLearning in education), with the exception of the more traditionally oriented HEIs, which have been hit particularly hard by the epidemic (El Refae et al., 2021). It is said that the education system may advance with the adoption of these new developments and the use of new technologies like YouTube. We need more high-quality, professionally produced videos on YouTube, but this time with more trustworthy curators.

Supporting the sustainability of such transformation, the eLearning environment relies heavily on reliable Internet access and ICT. This study helps us better comprehend how YouTube has affected distance education. Higher education

institutions (HEIs) would be able to obtain the resources needed for eLearning if this was put into practice. Only 299 students from Vietnam participated in the study, which is a significant constraint. Also, the data were acquired only via surveys. It would be worthwhile to refine the instrument and increase the sample size before attempting to apply it to other fields and demographics. There are other methods of information gathering that should be examined, such as focusgroups and interviews.

References

- Alfadda, H.A., Mahdi, H. S. (2021). Measuring students use of Zoom application in language course based on the Technology Acceptance Model (TAM). *J. Psycholinguist. Res.*, 50 (4), 883–900.
- Alghizzawi, M., Habes, M., Salloum, S.A., Ghani, M.A., Mhamdi, C., Shaalan, K. (2019). The effect of social media usage on students e-learning acceptance in higher education: a case study from the United Arab Emirates. *Int. J. Inform. Techn. Lang. Stud.*, 3 (3), 13–26.
- Almanthari, A., Maulina, S., Bruce, S. (2020). Secondary school mathematics teachers views on e-learning implementation barriers during the covid-19 pandemic: the case of Indonesia. *Eurasia J. Math. Sci. Technol. Educ.*, 16 (7), 1860.
- Aristovnik et al., 2020; Srivastava, & 2018; Widodo et al., 2021. (n.d.). No Title. Ashkanani, A., 2017. An Investigation of the Application of the Technology Acceptance Model (TAM) to Evaluate Instructors' Perspectives on E-Learning at Kuwait University. Unpublished Doctoral Dissertation. University, UAE, Dublin City. [Http:// Doras.Dcu](http://Doras.Dcu).
- Ashkanani, A. (2017). An Investigation of the Application of the Technology Acceptance Model (TAM) to Evaluate Instructors Perspectives on E- Learning at Kuwait University. Unpublished Doctoral Dissertation. University, UAE, Dublin City.
- Ashraf, A. R., Thongpapanl Tek, N., Anwar, A., Lapa, L., & Venkatesh, V. (2021). Perceived values and motivations influencing m-commerce use: A nine-country comparative study. *International Journal of Information Management*, 59(December 2020), 102318. <https://doi.org/10.1016/j.ijinfomgt.2021.102318>
- Balbay, S., Kilis, S. (2017). Students perceptions of the use of a YouTube channel specifically designed for an academic speaking skills course. *Eurasian J. Appl. Linguist.*, 3 (2), 235–251.
- Bonk, C. J. (2011). YouTube anchors and enders: the use of shared online video content as a macro context for learning. *Asia-Pacific Collab. Educ. J.*, 7 (1), 13–24.
- Celestine, A.U., Nonyelum, O. F. (2018). Impact of social media on students academic performance. *Int. J. Sci. Eng. Res.*, 9 (3), 1454-1462.
- Černá, M., & Borkovcová, A. (2020). Youtube dominance in sustainability of gaining knowledge via social media in university setting—case study. In *Sustainability (Switzerland)* (Vol. 12, Issue 21). <https://doi.org/10.3390/su12219126>
- Chao, C. M. (2019). Factors determining the behavioral intention to use mobile learning: an application and extension of the UTAUT model. *Front. Psychol.*, 10 (JULY), 16–52.
- Dang, D. T. V., Nguyen, L., & Nguyen, A. H. D. (2022). Extending UTAUT2 in Mobile money adoption and actual use behavior: An empirical research in Vietnam during the Covid-19. *Industrielle Beziehungen. Zeitschrift Für Arbeit, Organisation Und Management*, 10(4). <https://doi.org/10.53384/inbe.101390943.2779.1862003510>
- Davis, F.D., Bagozzi, R.P., Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Manag. Sci.*, 35 (8), 982-1003.
- Edelhauser, E., Lupu-Dima, L. (200 C.E.). Is Romania prepared for elearning during the COVID-19 pandemic? *Sustainability*, 12 (13), 130.
- El Refae, G., Kaba, A., Eletter, S. (2021). The impact of demographic characteristics on academic performance: face-to-face learning versus distance learning implemented to prevent the spread of Covid-19. *Int. Rev. Res. Open Dist. Learn*, 22 (1), 91-110.
- Elareshi, M., Habes, M., Youssef, E., Salloum, S. A., Alfaisal, R., & Ziani, A. (2022). SEM-ANN-based approach to understanding students' academic- performance adoption of YouTube for learning during Covid. *Heliyon*, 8(4), e09236. <https://doi.org/10.1016/j.heliyon.2022.e09236>
- Franklin, U.E., Nahari, A. A. (2018). The impact of e-learning on academic performance: preliminary examination of King Khalid University. *Int. J. Acad. Res. Prog. Educ. Dev.*, 7 (1).
- Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2016). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)* (2nd ed.). Sage Publications.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice*, 19(2), 139–152.
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2014). A new criterion for assessing discriminant validity in variance-based structural equation modeling.

- Journal of the Academy of Marketing Science. <https://doi.org/10.1007/s11747-014-0403-8>
- Hew, J. J., Lee, V. H., Ooi, K. B., & Wei, J. (2015). What catalyses mobile apps usage intention: an empirical analysis. *Industrial Management & Data Systems*, 115(7), 1269–1291. <https://doi.org/10.1108/IMDS-01-2015-0028>
- Leong, L. Y., Hew, T. S., Ooi, K. B., & Wei, J. (2020). Predicting mobile wallet resistance: A two-staged structural equation modeling-artificial neural network approach. *International Journal of Information Management*. <https://doi.org/10.1016/j.ijinfomgt.2019.102047>
- Li, _, & ebana-Cabanillas, F., Marinkovic, V., de Luna, I.R., Kalinic, Z. (2018). Predicting the determinants of mobile payment acceptance: a hybrid SEM-neural network approach. *Technol. Forecast. Soc. Change*, 129, 117–130.
- Liao, H., Lu, H. (2008). The role of experience and innovation characteristics in the adoption and continued use of e-learning websites. *Comput. Educ.*, 51 (4), 1405-1416.
- Lim, A. F., Lee, V. H., Foo, P. Y., Ooi, K. B., & Wei–Han Tan, G. (2021). Unfolding the impact of supply chain quality management practices on sustainability performance: an artificial neural network approach. *Supply Chain Management*, April. <https://doi.org/10.1108/SCM-03-2021- 0129>
- Luu, N., Yver, C., Douglas, J., Tasche, K., Thakkar, P.G., Rajasekaran, K. (2020). Assessment of YouTube as an educational tool in teaching key indicator cases in otolaryngology during the COVID-19 pandemic and beyond: neck dissection. *J. Surg. Educ.*, 78 (1), 214–231.
- Mayer, R. C., Davis, J., & David Schoorman, F. (1995). AN INTEGRATIVE MODEL OF ORGANIZATIONAL TRUST. *Academy of Management Review*, 20(3), 709–734.
- Newberry, C. (2021). 25 YouTube Statistics that May surprise You: 2021 Edition. Hootsuite.Com. <https://blog.hootsuite.com/youtube-stats-marketers/>.
- Nguyen, H., & Nguyen, L. (2021). Factors Influence Blockchain Adoption in Supply Chain Management Among Companies Based in Ho Chi Minh City. *Conference Towards ASEAN Chairmanship 2023*, 1–13.
- Ooi, K. B., Lee, V. H., Tan, G. W. H., Hew, T. S., & Hew, J. J. (2018). Cloud computing in manufacturing: The next industrial revolution in Malaysia? *Expert Systems with Applications*. <https://doi.org/10.1016/j.eswa.2017.10.009>
- Prastiyono, W., Djohar, A., Teknik, P. (2018). Development of YouTube integrated Google classroom based e-learning media for the light-weight vehicle engineering vocational high school. *Jurnal Pendidikan Vokasi*, 8 (1), 53–66.
- Radha, R., Mahalakshmi, K., Sathis, K., Saravanakumar, A. R. (2020). E-Learning during lockdown of covid-19 pandemic: a global perspective. *Int. J. Contr. Autom.*, 13 (4), 1088-1099.
- Ramírez-Correa, P., Mariano-Melo, A., A.-P., _, & Erez, J. (2019). Predicting and explaining the acceptance of social video platforms for learning: the case of Brazilian YouTube users. *Sustainability*, 11 (24), 111.
- Salloum, S.A., Al-Emran, M., Habes, M.M., Alghizzawi, M., Ghani, M.A., Shaalan, K., A., & M. (2019). Understanding the impact of social media practices on e-learning systems acceptance. In: *International Conference on Advanced Intelligent Systems and Informatics*, 1058. Springer, 360- 369.
- Shahzad, A., Hassan, R., Aremu, A.Y., Hussain, A., Lodhi, R. N. (2020). Effects of COVID-19 in E-learning on higher education institution students: the group comparison between male and female. *Qual. Quantity*, 122.
- Sood, A., Sarangi, S., Pandey, A., Murugiah, K. (2011). YouTube as a source of information on kidney stone disease. *Urology*, 77, 558-562.
- Stout, D. (2020). Social media Statistics 2020: Top Networks by the Numbers. Dustinstout. [Dustincount.Com. https://dustinstout.com/social-media- statistics/](https://dustinstout.com/social-media- statistics/).
- Tan, G. W. H., & Ooi, K. B. (2018). Gender and age: Do they really moderate mobile tourism shopping behavior? *Telematics and Informatics*, 35(6), 1617–1642. <https://doi.org/10.1016/j.tele.2018.04.009>
- Topf, J.M., Williams, P.N. (2021). COVID-19, social media, and the role of the public physician. *Blood Purif*, 595601.
- Welbourne, D.J., Grant, W. J. (2015). Science communication on YouTube: factors that affect channel and video popularity. *Publ. Understand. Sci.*, 25 (6)(706718).
- Dang, C. N. B., Nguyen, D. T., Le, T. T., Nguyen, V. H., & Nguyen, L. T. (2023). Factors influencing student citizenship behavior (SCB) and long-term student relationship orientation (LRO) in Vietnamese education sector. *The Second International Conference on Science, Economics and Society Studies–UEF 2023*, 67–81.
- Dang, D. T. V., Nguyen, L., & Nguyen, A. H. D. (2022). Extending UTAUT2 in Mobile money adoption and actual use behavior: An empirical research in Vietnam during the Covid-19. *Industrielle Beziehungen. Zeitschrift Für Arbeit, Organisation Und Management*, 10(4). <https://doi.org/10.53384/inbe.101390943.2779.1862003510>
- Dang, T. Q., Nguyen, L.-T., & Thuy, T. N. T. (2023). The capability of E-reviews in online shopping.

- Integration of the PLS-SEM and ANN method. *International Journal of Professional Business Review*, 8(7), 1–29. <https://doi.org/https://doi.org/10.26668/businessreview/2023.v8i7.2638>
- Dao, N.-Y., Nguyen, L.-T., & Dinh, V.-H. (2023). Factors Driving Vietnamese University Students' Adoption in a Smart Learning Environment: The Application of Self-determination Theory and Technology Acceptance Model BT - Smart Learning for A Sustainable Society. In C. Anutariya, D. Liu, Kinshuk, A. Tlili, J. Yang, & M. Chang (Eds.), *Smart Learning for A Sustainable Society* (pp. 185–190). Springer Nature Singapore.
- Nguyen, B.-T. H., Le, T. H., Dang, T. Q., & Nguyen, L.-T. (2023). What Role Does AI Chatbot Perform in the F&B Industry? Perspective from Loyalty and Value Co-Creation: Integrated PLS-SEM and ANN Techniques. *Journal of Law and Sustainable Development*, 44(4), 1–39.
- Nguyen, H.-B., & Nguyen, L.-T. (2021). Factors Influence Blockchain Adoption in Supply Chain Management Among Companies Based in Ho Chi Minh City. *Conference Towards ASEAN Chairmanship 2023 (TAC 23 2021)*, 1–13. <https://www.atlantispress.com/proceedings/t-a-c-23-21/125965535>
- Nguyen, L.-T. (2023). Financial Inclusion through Mobile Money in developing countries: the case of Vietnam. *Digital Transformation, Cooperation and Global Integration in the New Normal*, 121–141.
- Nguyen, L.-T., Duc, D. T. V., Dang, T.-Q., & Nguyen, D. P. (2023). Metaverse Banking Service: Are We Ready to Adopt? A Deep Learning-Based Dual-Stage SEM-ANN Analysis. *Human Behavior and Emerging Technologies*, 2023, 6617371. <https://doi.org/10.1155/2023/6617371>
- Nguyen, L.-T., Dwivedi, Y. K., Tan, G. W. H., Aw, E. C. X., Lo, P. S., & Ooi, K. B. (2022). Unlocking Pathways to Mobile Payment Satisfaction and Commitment. *Journal of Computer Information Systems*, 00(00), 1–18. <https://doi.org/10.1080/08874417.2022.2119444>
- Nguyen, L.-T., Nguyen, D., Ngoc, K. N.-N., & Duc, D. T. V. (2023). Blockchain adoption in logistics companies in Ho Chi Minh City. *Cogent Business & Management*, 10(2), 1–24. <https://doi.org/10.1080/23311975.2023.2216436>
- Nguyen, L.-T., Nguyen, V. P., & Dang, D. T. V. (2022). Critical Factors Affecting the Adoption of Artificial Intelligence: An Empirical Study in Vietnam. *The Journal of Asian Finance, Economics and Business (JAFEB)*, 9(5), 225–237. <https://doi.org/10.13106/jafeb.2022.vol9.no5.225>
- Tien, P. C. T., Luan, N. T., & Tri, D. Q. (2023). Exploring the brand experience of Korean brands on customer interactions in Ho Chi Minh City, Vietnam: non-linear structural equation modelling approach. In *Kỷ yếu hội thảo khoa học quốc tế Việt-Hàn 2023* (pp. 276–289). Ho Chi Minh City, Vietnam: Information and Communications Publishing House.
- Tien, P. C. T., Tri, D. Q., & Luan, N. T. (2023). Belief of Customers in Social Commerce Performed via Social Networking Sites : An Empirical Study from Hồ Chí Minh City. *Vietnam Social Sciences*, 2(214), 61–80. [https://doi.org/10.56794/VSSR.2\(214\).61-80](https://doi.org/10.56794/VSSR.2(214).61-80)
- Widodo, A., Ermiana, I., Erfan, M. (2021). Emergency online learning: how are students perceptions? In: *Proceedings of the 4th Sriwijaya University Learning and Education International Conference (SULE-IC 2020)*, 263268.