

## Student Adoption of Asynchronous Learning

Artika Arista<sup>a,b,\*</sup>, Intan Hesti Indriana<sup>a</sup>, Yulnelly<sup>a</sup>

<sup>a</sup> Information systems, Faculty of Computer Science, Universitas Pembangunan Nasional Veteran Jakarta, Jakarta, Indonesia

<sup>b</sup> Department of Information Systems, Faculty of Computer Science & Information Technology, Universiti Malaya, 50603 Kuala Lumpur, Malaysia

Corresponding author: \*artika.arista@upnvj.ac.id

**Abstract**—The educational process has been reorganized due to the epidemic, requiring educators to adopt new approaches to remote and virtual learning techniques. Future educators will employ strategies based on the use of social media, the production of videos, and the usage of virtual platforms. To develop learning videos that support online learning practicum activities or distance learning in Introduction to Databases Practicum courses, this research aims to investigate student acceptance of asynchronous learning video recordings of online learning practicum of introduction to databases in the COVID-19 pandemic. This study adopted the DeLone and McLean's Information System Success Model (DL&ML model), the Technology Acceptance Model (TAM), and the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) theories as the conceptual framework for examining the student adoption of video recordings in the context Introduction to Databases Practicum course. Using SmartPLS 4 software, the data were modeled and evaluated utilizing the Partial Least Square Structural Equation Model (PLS-SEM). According to the 126-sample data, Perceived Ease of Use, Perceived Usefulness, Video Quality, and Information Quality affected behavioral intention to use Video Recordings during the Introduction to Databases Practicum when Covid-19 was a pandemic. The behavioral intention influences the use behavior of Video Recordings. It is suggested that the government create an adequate infrastructure to support online learning and help lecturers gain more knowledge and expertise in using technology, particularly when developing, implementing, and conducting evaluations of online learning.

**Keywords**— Online learning; student adoption; video recordings; introduction to database practicum course; Covid-19 pandemic.

Manuscript received 5 Feb. 2023; revised 31 Oct. 2023; accepted 3 Jan. 2024. Date of publication 29 Feb. 2024.  
IJASEIT is licensed under a Creative Commons Attribution-Share Alike 4.0 International License.



### I. INTRODUCTION

The novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV2), initially identified in Wuhan, China, in December 2019, quickly spread worldwide and caused the COVID-19 pandemic [1]. As a global pandemic in December 2022, COVID-19 resulted in 640 million cases and 6.6 million deaths [2]. The virus can be transmitted through droplets or bodily fluids, inhalation of infectious particles, and close contact with the surface of objects contaminated by someone with a respiratory problem [3]. Many countries and nations are facing a health crisis due to the coronavirus' rapid spreading [4]. The coronavirus has created significant turbulences in the economy, society, education, demographics, and geopolitical situations, causing health problems [5].

Since the WHO classified the COVID-19 outbreak as a pandemic, governments worldwide have made numerous efforts to identify vaccines and therapies to stop the spread of

the virus [6]. As an immediate strategy, the governments of many countries decided to restrict interactions by enforcing lockdowns, banning gatherings and public events, issuing directives to work from home, suggesting physical distancing and staying-at-home, closing educational institutions [schools and universities], testing and contact tracing, and restricting domestic and international transport. People must adjust how they conduct trade, travel, migration, urbanization, and technology adoption [5]. Advanced technology plays an integral part in the adaptation to the new environment [7]–[10]. Telework, online education, and telemedicine are some new opportunities that emerged during the pandemic lockdown [11].

Traditional face-to-face learning methods have been replaced with online or remote learning modes to ensure that education delivery is not disrupted by the closure of educational institutions [12]. Consequently, introducing virtual classrooms was a method to explore how technology might be used to overcome the disruption brought on by

COVID-19[13]. Adaptation to the new way of teaching and learning in educational institutions pushed teachers and students to rely heavily on information and communications technology (ICT). ICT integration into the design and implementation of the online teaching and learning process [14]. Numerous educational institutions are adopting online learning immediately due to the increasing COVID-19 cases. Some teachers or lecturers are using platforms such as FaceTime, Zoom, Skype [15], WhatsApp [16], [17], YouTube, and Instagram and social networks such as Facebook [18], Google Classrooms, WebQuest, and other online sites to conduct the learning process or to share the materials with the students.

Online higher education attempts to bring educators online to improve the learning opportunities for students [19]. Geographical limitations on learning and knowledge sharing are no longer an issue thanks to online education, which offers a platform for global student-teacher collaboration[20]. Investigations on the effectiveness of the educational system, notably higher education, are required to deal with today's pandemic situations to strengthen the educational plan and make it more resilient and sustainable in the future, as online education plays a vital role in higher education, especially in these pandemic situations [21]. Additionally, there is an opportunity to develop better online education technology implementation, especially for students.

Universitas Pembangunan Nasional Veteran Jakarta (UPNVJ) issued Circular Letter Number 23/UN61.0/SE/2020 about Countermeasures to avoid Coronavirus (COVID-19) Transmission Within the UPN Veteran Jakarta to stop the COVID-19 virus from spreading [22]. One of the policies conveyed in the circular letter was to change face-to-face lectures to Distance Learning. In online learning or distance learning, practicum courses have more challenges to deliver in online learning compared to theory classes. Students are expected to be able to practice the learning theory learned directly in practical activities—which, of course, require direct supervision—in practical or practicum lectures. A typical practicum activity is currently carried out without standard laboratory equipment because of the COVID-19 epidemic. One way to do this is to present video-based practicum media. The use of video-based practicum media is one approach to overcoming these issues. The use of audio-visual media in education will increase the importance of process-oriented, active learning in the classroom, as well as the creativity of the students and teachers [23].

Learning videos serve as learning catalysts or stimuli by stimulating pupils' interest in the subject so they do not lose interest and can learn the material more quickly. Because children's learning styles vary, learning from video media is crucial. Some children learn better through auditory, visual, or kinesthetic learning styles. Learning materials are presented in engaging learning videos with audio and visual components. A variety of students' learning preferences are accommodated by the combination of text, graphics, and audiovisual content in this instructional video.

The Introduction to Database Practicum course studies the essential introduction to databases. Many materials require code representation examples of Structured Query Language (SQL) syntax and understanding from students to be able to implement code to the Terminal or Command-Line. Lecturers

must be creative in their lessons during the COVID-19 pandemic to select and apply appropriate learning media following the materials in practical courses. This is one reason to take advantage of technological advancements to learn. As a result, an effort is needed to improve education effectiveness by incorporating media into the teaching and learning process in the classroom. One way is to use video-based learning media.

Consumer acceptance of technology is essential for the system's adoption to be successful. One of these concepts is the Technology Acceptance Model (TAM), designed by Davis in 1986 [24], which has been extensively used in research to identify the variables influencing users' acceptance of emerging technologies. Aside from the TAM, many other theories are used to investigate the main factors that influence how people adopt new technology, such as the Innovation Diffusion Theory (IDT), the Unified Theory of Acceptance and Use of Technology (UTAUT), the Theory of Reasoned Action (TRA), DeLone and McLean's Information System Success Model (DL&ML model) [25]. Performance expectancy, effort expectancy, social influence, and enabling factors are the four fundamental components of the UTAUT model [26] that determine whether a technology will be accepted. It was also predicted that facilitating conditions would directly impact user behavior. To capture the innate tendencies of the target market more accurately, three additional customer-focused concepts—habit, hedonic motivation, and pricing value—were added to the original UTAUT2 model [27], [28].

At UPNVJ, the transition from face-to-face instruction to distance lectures affects the Introductory Database Practicum course, where video recordings of asynchronous learning are available. The Ministry of Education and Culture revealed that during the COVID-19 pandemic, distance learning impacted students' academic scores throughout Indonesia [29]. Many students struggle to understand the subject because they are not used to participating in online learning. Active student involvement influences study success because of these challenges and the researcher's personal experience in class. This is a problem that the authors want to address in this study. Therefore, to develop learning videos that support online learning practicum activities or distance learning in Introduction to Databases Practicum courses, it is necessary to evaluate students' acceptance of asynchronous learning video recordings of online learning practicum in Introduction to Databases courses during the COVID-19 pandemic.

## II. MATERIAL AND METHOD

The UTAUT2 paradigm is far more pertinent when considering individual consumers and how well they accept technology while using it to access internet services. The adoption of mobile FinTech [30], mobile banking [31], and mobile payment [32] [27], [28], for example, have all been found to be better explained by the UTAUT2 model, which connects a variety of technological and behavioral elements. This investigation follows the DL&ML model, the TAM, and UTAUT2 [33] theories as the conceptual model for examining the student adoption of video recordings within the subject Introduction to Databases Practicum course. Integrate the TAM with the updated DeLone and McLean's model (DL&ML) to investigate whether quality factors like system,

information, and service quality, as well as individual beliefs like perceived usefulness and perceived ease of use, are the precursors to students' satisfaction and their intention to use, thereby improving their actual utilization of mobile learning systems [34]. The UTAUT2 was also adopted because it provided an improved variation value ( $R^2$ ) in behavioral intention (74%) and technology use/use behavior (52%) [33]. Similarities between the current study and the prior research [34]–[39] utilized as references include using the TAM, the UTAUT2 theories, and the DL&ML model. This is depicted in Figure 1. Figure 1 displays several hypotheses that were tested:

- Hypothesis 1 (H1). Perceived Ease of Use positively influences behavioral intention to use Video Recordings of the Introduction to Databases Practicum during the COVID-19 Pandemic.
- Hypothesis 1a (H1a). Gender moderates the relationship between perceived ease of use and behavioral intention to use video recordings of the Introduction to Databases Practicum during the COVID-19 Pandemic.
- Hypothesis 2 (H2). Perceived Usefulness positively influences behavioral intention to use Video Recordings of the Introduction to Databases Practicum during the COVID-19 Pandemic.
- Hypothesis 2a (H2a). Gender moderates the relationship between Perceived Usefulness and behavioral intention to use Video Recordings of the

Introduction to Databases Practicum during the COVID-19 Pandemic.

- Hypothesis 3 (H3). Video Quality positively influences behavioral intention to use Video Recordings of the Introduction to Databases Practicum during the COVID-19 Pandemic.
- Hypothesis 3a (H3a). Gender moderates the relationship between Video Quality and behavioral intention to use Video Recordings of the Introduction to Databases Practicum during the COVID-19 Pandemic.
- Hypothesis 4 (H4). Information Quality positively influences behavioral intention to use Video Recordings of the Introduction to Databases Practicum during the COVID-19 Pandemic.
- Hypothesis 4a (H4a). Gender moderates the relationship between Information Quality and behavioral intention to use Video Recordings of the Introduction to Databases Practicum during the COVID-19 Pandemic.
- Hypothesis 5 (H5). The behavioral intention positively influences the use behavior of Video Recordings of the Introduction to Databases Practicum during the COVID-19 Pandemic.
- Hypothesis 5a (H5a). Gender moderates the relationship between behavioral intention and the use behavior of Video Recordings of the Introduction to Databases Practicum during the COVID-19 Pandemic.

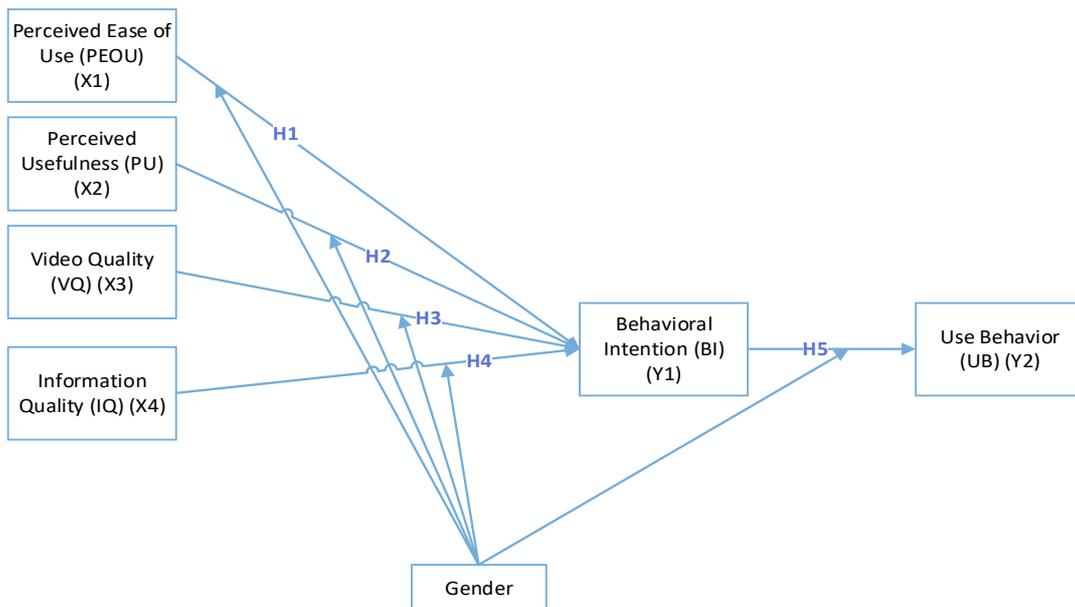


Fig. 1 The proposed Research Model

All active students in the Faculty of Computer Science at Universitas Pembangunan Nasional "Veteran" Jakarta who use social media in computing education, especially project-based courses, became a subset of the study's participants. The authors used the following formula to determine the minimum sample size needed for the study [40]:

$$n = \frac{N}{1+N(e)^2} \quad (1)$$

where  $n$  is the size or quantity of the sample,  $N$  is the number of people or population size, and  $e$  is accuracy or tolerance for error.

According to data from UPN Veteran Jakarta's academic information systems, the number of active students who took the Introduction to Databases Practicum in 2021 is 167, so using an error tolerance of 5%, the sample size is 118. There should be ten times as many samples as arrows pointing at a particular construct, whether they are serving as an endogenous construct's structural pathway or as its formative

indication [41]. Smaller sample sizes (<100) are acceptable in certain circumstances, but larger sample sizes (>100) are often preferred [41].

The questionnaire is divided into two parts. The first section of the questionnaire inquires about the respondents' personal information (gender). The second section discusses the respondents' acceptance rate and usage frequency of the questionnaire and provides the video recordings from the Introduction to Databases Practicum course in 2021. This assertion was founded on prior research, the DL&ML model, the TAM, and the UTAUT2 theory, all of which have been thoroughly examined for this investigation. Each modified statement was graded on a five-point Likert-type scale with the options "agree-disagree" and "never-very frequent" (see Appendix). A pre-test (pilot test) was performed initially to ensure the validity and reliability of the survey instrument.

Questionnaire data were managed and analyzed using SmartPLS 4 software and the Partial Least Square Structural Equation Model (PLS-SEM). Because PLS-SEM may be beneficial for complex models (many constructs and indicators) independent of distribution assumptions[39], it will be utilized to measure target constructs in this study.

### III. RESULT AND DISCUSSION

Table I shows the demographics of the 126 survey respondents. The responders are divided into two groups based on gender. The percentage is also the same. The data were modeled and evaluated using the SmartPLS 4 software and the PLS-SEM. The PLS path model is divided into two parts:

TABLE I  
DEMOGRAPHICS OF THE SURVEY RESPONDENTS (N=126)

Demographic profile	Categories	Frequency	Percent (%)
Gender	Male	63	50
	Female	63	50

(1) the structural model, also known as the inner model in PLS-SEM, which illustrates the relationship among latent variables or constructs; and (2) the measurement model, also known as the outer model in PLS-SEM, which illustrates how they have related latent variables or constructs and their indicators [41].

This study focuses solely on evaluating reflective measurement models because these models mediate the interaction between the construct and its indicators in this study. This reflecting measurement is used to evaluate models based on (1) construct reliability and validity and (2) discriminant validity:

TABLE III  
HETEROTRAIT-MONOTRAIT RATIO (HTMT)

	BI	Gender	IQ	PEOU	PU	UB	VQ	Gender x PU	Gender x BI	Gender x IQ	Gender x VQ	Gender x PEOU
<b>BI</b>												
<b>Gender</b>	0.095											
<b>IQ</b>	0.739	0.072										
<b>PEOU</b>	0.846	0.168	<b>0.957</b>									
<b>PU</b>	0.802	0.043	0.869	<b>0.985</b>								
<b>UB</b>	0.618	0.142	0.472	0.543	0.444							
<b>VQ</b>	0.790	0.166	0.899	<b>0.943</b>	<b>0.905</b>	0.519						
<b>Gender x PU</b>	0.425	0.015	0.465	0.575	0.699	0.321	0.488					

TABLE II  
CONSTRUCT RELIABILITY AND VALIDITY

	Cronbach's alpha	rho_a	rho_c	AVE
<b>BI</b>	0.828	0.829	0.897	0.745
<b>IQ</b>	0.815	0.827	0.890	0.729
<b>PEOU</b>	0.865	0.872	0.917	0.786
<b>PU</b>	0.872	0.878	0.912	0.722
<b>VQ</b>	0.888	0.894	0.923	0.749

where rho\_a is composite reliability. The results of the AVE show construct reliability and validity. The construct-level convergent validity metric is called Average Variance Extracted (AVE). The indicator's squared loadings are summed to form the AVE (sum of the squared loadings divided by the number of indicators). If the AVE is less than 0.50, it is assumed that the item error variance is typically greater than the variance expelled by the construct [41]. Table II summarizes the Construct's reliability and validity.

Table II shows that every indicator satisfies the AVE > 0.5 requirement. As a result, everything can be retained because all indicators comply with the fundamental guidelines of convergent validity requirements. Cronbach's alpha, A traditional internal consistency standard, provides accurate preliminary calculations based on the observed intercorrelations of indicator variables. Composite dependability is also used to fit PLS-SEM. A construct is considered valid if the criteria for Cronbach's alpha and composite reliability are met (i.e., 0.70 and 0.70, respectively) for internal consistency and reliability [41]. Cronbach's alpha and composite reliability exceeded 0.70, as shown in Table 2. This indicates that the architecture met the internal reliability and consistency standards.

Discriminant validity measures how far one construct deviates from another regarding empirical norms. Discriminant Validity serves as a marker for the singularity of a construct and captures things that are not included in the model's other constructs. Discriminant validity assessments were evaluated using the heterotrait-monotrait ratio (HTMT) outcome. The HTMT technique was adopted based on a recent study (Henseler et al., 2015, as cited in [41]). It examined the cross-loading performance and the Fornell-Larcker criterion to evaluate discriminant validity. According to the study, both approaches could be more effective at identifying discriminant validity issues. When two constructs are accurately measured, the HTMT technique determines real correlation on either side of the constructs (truly reliable). The disattenuated correlation is commonly referred to as the genuine correlation. When the disattenuated correlation on either side of the two constructs is close to one, discriminant validity is insufficient [41]. The result of the heterotrait-monotrait ratio's (HTMT) is shown in Table III.

	BI	Gender	IQ	PEOU	PU	UB	VQ	Gender x PU	Gender x BI	Gender x IQ	Gender x VQ	Gender x PEOU
Gender x BI	0.717	0.066	0.397	0.452	0.413	0.386	0.365	0.597				
Gender x IQ	0.442	0.056	0.643	0.547	0.498	0.300	0.466	0.711	0.617			
Gender x VQ	0.382	0.121	0.443	0.520	0.494	0.389	0.694	0.705	0.528	0.670		
Gender x PEOU	0.468	0.122	0.508	0.707	0.572	0.380	0.507	0.816	0.648	0.773	0.725	

Table III shows that the correlation between constructs has met the discriminant validity criteria in most hypotheses where the disattenuated is less than 1. The structural model's assessment considers correlation and predictive power on each side of the constructs. The structural model is assessed, and its predictive ability is quantified using the coefficient of determination ( $R^2$  Value or R-square). The squared correlation between the expected values and the endogenous construct on either side yields  $R^2$  values.  $R^2$  values range from 0 to 1, with higher values suggesting greater prediction accuracy. It is challenging to establish broad guidelines for acceptable  $R^2$  values because they depend on the research topic and model complexity. An  $R^2$  value of 0.20 is considered high in the scientific community, for example, in the study of consumer behavior.  $R^2$  values of 0.25, 0.50, and 0.75 are categorized as weak, moderate, or considerable in scientific marketing research for endogenous latent variables [41]. Table IV displays the  $R^2$  Value or R-square results.

TABLE IV  
R-SQUARE

	R-square	R-square adjusted
BI	0.582	0.549
UB	0.326	0.309

The path coefficients explain the correlations among the independent and dependent variables. The standardized value range of a path coefficient is between -1 and +1. Path coefficients close to 1 indicate a significant positive connection (and vice versa for a negative value). The model's original hypothesis is then tested by contrasting the questionnaire results with the model's data. A hypothesis can be tested using the T Statistics, t-values, or p-value generated by the SmartPLS bootstrapping. The link under consideration is significant at the 5% level, with a significance level of 0.05 (= 5%) and a P-value of 0.05 [41]. Thus, if p-values are less than 0.05, the hypothesis is accepted. Table V summarizes the findings of the research hypothesis testing.

TABLE V  
RESULTS OF THE HYPOTHESIS TEST

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ((O/STDEV))	P values	Significance (p < 0.05)?
PEOU -> BI	0.398	0.356	0.205	1.938	0.027	H1: yes
Gender x PEOU -> BI	-0.076	-0.041	0.318	0.240	<b>0.405</b>	H1a: no
PU -> BI	0.115	0.135	0.135	0.851	<b>0.197</b>	H2: no
Gender x PU -> BI	0.016	0.023	0.228	0.071	<b>0.472</b>	H2a: no
VQ -> BI	0.533	0.54	0.175	3.039	0.001	H3: yes
Gender x VQ -> BI	-0.500	-0.512	0.262	1.908	0.028	H3a: yes
IQ -> BI	-0.218	-0.191	0.127	1.714	0.044	H4: yes
Gender x IQ -> BI	0.508	0.465	0.236	2.150	0.016	H4a: yes
BI -> UB	0.534	0.551	0.102	5.255	0.000	H5: yes
Gender x BI -> UB	0.047	0.024	0.207	0.228	<b>0.410</b>	H5a: no

The modified DL&ML model, the TAM, and the UTAUT2 theory provided in this study help to broaden its relevance to video recordings adoption in the context of the Introduction to Databases Practicum when COVID-19 was a pandemic. According to the empirical findings, H1: Perceived Ease of Use positively impacts behavioral intention to use video recordings of the Introduction to Databases Practicum during the COVID-19 pandemic. H1a: Gender does not moderate the relationship between Perceived Ease of Use and behavioral intention to use Video Recordings of the Introduction to Databases Practicum during the COVID-19 Pandemic. This means that there is no difference in how male and female students use the video. According to previous research, these findings thus support the acceptability [42]. Regarding perceived ease of use, some participants believe that expertise and abilities are not required to become familiar with new technologies. According to the study's findings, personnel with experience using similar applications and receiving less training appear to have high perceived self-efficacy. Because these new technologies have been incorporated into most

people's daily lives, most respondents gave highly favorable answers for their intention to utilize them.

H2: Perceived Usefulness has no significant influence on behavioral intention to use Video Recordings of the Introduction to Databases Practicum during The Covid-19 Pandemic in this study. H2a: Gender does not moderate the relationship between Perceived Usefulness and behavioral intention to use Video Recordings of the Introduction to Databases Practicum during the COVID-19 Pandemic. This conclusion is the opposite of [43], which found that the positive and large impact of performance expectancy demonstrates that consumers view virtual doctor visits as a practical way to contact a medical expert. This demonstrates that telemedicine is a practical addition to routine healthcare visits. H3: Video Quality significantly impacts behavioral intention to use Video Recordings of the Introduction to Databases Practicum during the COVID-19 pandemic. H3a: Gender has a significant influence as a moderating variable. There is a noticeable difference in how male and female students perceive the video quality. Regarding video quality, a sizable proportion of the respondents believe that the video

recordings are high quality. According to the study's findings [44], system quality has favorable effects on perceived utility, demonstrating that when users believe the system's overall operating quality is excellent and can easily and smoothly perform its many features, they view the system as more beneficial. The greatest influence on users' perceptions of system functionality is system quality. This suggests that future system development should emphasize system quality more. When COVID-19 was a pandemic, H4: Information Quality had a positive significant impact on behavioral intention to use Video Recordings of the Introduction to Databases Practicum. H4a: Gender has an important moderating effect. This indicates a significant difference in how male and female students perceive video information quality. According to this investigation in [45], when disseminating EV-related information to customers, the quality of the information should be considered to increase their perceptions of EV reliability and value. According to the theory of information overload, providing customers with excessive information may potentially result in information overload issues, which may have a detrimental impact on their views and further deter them from making intelligent judgments. The negative effects of information overload can be mitigated by improving information quality. High-quality information helps consumers establish an objective opinion of a product and make better decisions by speeding up the information processing process and facilitating them to do it successfully.

H5: The behavioral intention significantly positively affected the use behavior of Video Recordings of the Introduction to Databases Practicum when Covid-19 was a pandemic. H5a: Gender does not moderate the relationship between behavioral intention and the use behavior of Video Recordings of the Introduction to Databases Practicum during the COVID-19 Pandemic. This indicates no significant gap exists in how male and female students use the video. This conclusion is consistent with the research's findings [46]. According to the marginal impact estimate of behavioral intention, stronger behavioral intention is associated with a 12% increase when the younger generation uses mobile payments. The marginal impact of behavioral intention is the largest among all the factors of actual usage. One of UTAUT's major ideas is the strong structural link between behavioral intention and actual conduct. The findings of this research support the extended UTAUT model's validity as a theoretical explanation for Generation Y and Generation Z's use of mobile payments.

#### IV. CONCLUSION

The educational process was restructured during the pandemic, requiring teachers to employ new methods and improve their use of immersion, remote, and virtual learning techniques. Because of the institutions' socioeconomic constraints, future instructors' techniques are based on the creation of instructions, the production of videos, the use of social media, and, in some cases, the use of virtual platforms. Many strategies, primarily the use of media in instruction, are used by various countries to discuss classroom learning. Because technological advancements in the educational sector are rapid and continuous, evaluating students' perceptions about using practical learning media is essential to adjust for

a better learning environment. According to the findings of this study, Perceived Ease of Use, Perceived Usefulness, Video Quality, and Information Quality affect behavioral intention to use Video Recordings during the Introduction to Databases Practicum during the COVID-19 pandemic. The behavioral intention influences the use behavior of Video Recordings. Future researchers should consider reexamining student attitudes and the degree to which they are willing to try new educational technologies, particularly in information systems and technology education, observing the survey results and how rapidly educational systems have become virtual.

#### ACKNOWLEDGMENT

This work is supported by the Faculty of Computer Science at Universitas Pembangunan Nasional "Veteran" Jakarta (UPNVJ), the Research Institute and Community Service (LPPM), and the Information Systems Study Program at UPNVJ for providing funding and supporting the implementation of this research.

#### REFERENCES

- [1] K. Kim *et al.*, "The case fatality rate of COVID-19 during the Delta and the Omicron epidemic phase: A meta-analysis," *Journal of Medical Virology*, vol. 95, no. 2, Feb. 2023, doi: 10.1002/jmv.28522.
- [2] P. Schuchmann *et al.*, "Exhaled aerosols among PCR-confirmed SARS-CoV-2-infected children," *Frontiers in Pediatrics*, vol. 11, Apr. 2023, doi: 10.3389/fped.2023.1156366.
- [3] M. Ting, J. A. Molinari, and J. B. Suzuki, "Current SARS-CoV-2 Protective Strategies for Healthcare Professionals," *Biomedicines*, vol. 11, no. 3, p. 808, Mar. 2023, doi: 10.3390/biomedicines11030808.
- [4] L. Mishra, T. Gupta, and A. Shree, "Online teaching-learning in higher education during lockdown period of COVID-19 pandemic," *International Journal of Educational Research Open*, vol. 1, no. September, p. 100012, 2020, doi: 10.1016/j.ijedro.2020.100012.
- [5] A. Aristovnik, D. Keržič, D. Ravšelj, N. Tomaževič, and L. Umek, "Impacts of the COVID-19 pandemic on life of higher education students: A global perspective," *Sustainability (Switzerland)*, vol. 12, no. 20, pp. 1–34, 2020, doi: 10.3390/su12208438.
- [6] A. A. K. Abdul Hamid *et al.*, "Improvement of Time Forecasting Models Using Machine Learning for Future Pandemic Applications Based on COVID-19 Data 2020–2022," *Diagnostics*, vol. 13, no. 6, p. 1121, Mar. 2023, doi: 10.3390/diagnostics13061121.
- [7] A. Arista and K. N. M. Ngafidin, "An Information System Risk Management of a Higher Education Computing Environment," *International Journal on Advanced Science, Engineering and Information Technology (IJASEIT)*, vol. 12, no. 2, pp. 557–564, 2022, doi: 10.18517/ijaseit.12.2.13953.
- [8] T. Theresiawati, H. B. Seta, and A. Arista, "Implementing quality function deployment using service quality and Kano model to the quality of e-learning," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 12, no. 3, pp. 1560–1571, Sep. 2023, doi: 10.11591/ijere.v12i3.25511.
- [9] U. Rusdiana, I. Ernawati, N. Falih, and A. Arista, "Comparison of Distance Metrics on Fuzzy C-Means Algorithm Through Customer Segmentation," in *2021 International Conference on Informatics, Multimedia, Cyber and Information System (ICIMCIS)*, 2021, pp. 307–311.
- [10] W. Cholil, F. Panjaitan, F. Ferdiansyah, A. Arista, R. Astriratma, and T. Rahayu, "Comparison of Machine Learning Methods in Sentiment Analysis PeduliLindungi Applications," in *2022 International Conference on Informatics, Multimedia, Cyber and Information System (ICIMCIS)*, IEEE, 2022, pp. 276–280.
- [11] W. He, Z. (Justin) Zhang, and W. Li, "Information technology solutions, challenges, and suggestions for tackling the COVID-19 pandemic," *International Journal of Information Management*, vol. 57, no. November 2020, 2021, doi: 10.1016/j.ijinfomgt.2020.102287.
- [12] S. A. Iqbal, M. Ashiq, S. U. Rehman, S. Rashid, and N. Tayyab, "Students' Perceptions and Experiences of Online Education in Pakistani Universities and Higher Education Institutes during COVID-

- 19," *Education Sciences* , vol. 12, no. 3, Mar. 2022, doi: 10.3390/educsci12030166.
- [13] D. Mhlanga and T. Moloi, "COVID-19 and the digital transformation of education: What are we learning on 4ir in South Africa?," *Education Sciences* , vol. 10, no. 7, pp. 1–11, Jul. 2020, doi: 10.3390/educsci10070180.
- [14] E. Birska, M. Kljun, and B. Kopačin, "ICT Usage for Cross-Curricular Connections in Music and Visual Arts during Emergency Remote Teaching in Slovenia," *Electronics (Switzerland)*, vol. 11, no. 13, Jul. 2022, doi: 10.3390/electronics11132090.
- [15] T. Chen, L. Peng, X. Yin, J. Rong, J. Yang, and G. Cong, "Analysis of User Satisfaction with Online Education Platforms in China during the COVID-19 Pandemic," *Healthcare*, vol. 8, no. 3, p. 200, 2020, doi: 10.3390/healthcare8030200.
- [16] H. Mulyono, G. Suryoputro, and S. R. Jamil, "The application of WhatsApp to support online learning during the COVID-19 pandemic in Indonesia," *Heliyon*, vol. 7, no. 8, Aug. 2021, doi: 10.1016/j.heliyon.2021.e07853.
- [17] L. Budianto and Y. Arifani, "Utilizing whatsapp-driven learning during covid-19 outbreak: Efl users' perceptions and practices," *Call-Ej*, vol. 22, no. 1, pp. 264–281, 2021, Accessed: Oct. 20, 2022. [Online]. Available: <http://callej.org/journal/22-1/Budianto-Arifani2021.pdf>
- [18] Á. Antón-Sancho and M. Sánchez-Calvo, "Influence of Knowledge Area on the Use of Digital Tools during the COVID-19 Pandemic among Latin American Professors," *Education Sciences* , vol. 12, no. 9, Sep. 2022, doi: 10.3390/educsci12090635.
- [19] M. Li and Z. Yu, "Teachers' Satisfaction, Role, and Digital Literacy during the COVID-19 Pandemic," *Sustainability (Switzerland)*, vol. 14, no. 3, MDPI, Feb. 01, 2022, doi: 10.3390/su14031121.
- [20] R. Gupta *et al.*, "Covid-19 Pandemic and Online Education: Impact on Students, Parents and Teachers," *Journal of Human Behavior in the Social Environment* , vol. 32, no. 4, pp. 426–449, 2022, doi: 10.1080/10911359.2021.1909518.
- [21] K. H. Mok, W. Xiong, G. Ke, and J. O. W. Cheung, "Impact of COVID-19 pandemic on international higher education and student mobility: Student perspectives from mainland China and Hong Kong," *International Journal of Educational Research* , vol. 105, no. 54, 2021, doi: 10.1016/j.ijer.2020.101718.
- [22] UPN Veteran Jakarta, *Circular Letter Number: 23/UN61.0/SE/2020 concerning Measures to prevent the spread of the coronavirus (covid-19) in the UPN Veteran Jakarta environment*. 2020. Accessed: Oct. 20, 2022. [Online]. Available: <https://www.upnvj.ac.id/id/berita/2020/03/edaran-upnvj-tentang-tindakan-pencegahan-penyebaran-virus-corona-covid-19-di-lingkungan-upnvj.html>
- [23] J. M. Barlis, J. D. Fajardo, and B. M. Manila, "The Evolution of Science Education: You Don't Know? YouTube It," *Sage Open*, vol. 13, no. 2, Apr. 2023, doi: 10.1177/21582440231168778.
- [24] F. D. David, "A technology acceptance model for empirically testing new end - user information systems : theory and results," Ph.D. dissertation, MIT Sloan School of Management, Cambridge , MA, 1986. Accessed: Sep. 25, 2022. [Online]. Available: <https://dspace.mit.edu/bitstream/handle/1721.1/15192/14927137-MIT.pdf>
- [25] W. H. DeLone and E. R. McLean, "The DeLone and McLean Model of Information Systems Success: A Ten-Year Update," *Journal of Management*
- [26] S. Kapsler and M. Abdelrahman, "Acceptance of autonomous delivery vehicles for last-mile delivery in Germany – Extending UTAUT2 with risk perceptions," *Transportation Research Part C: Emerging Technologies* , vol. 111, pp. 210–225, Feb. 2020, doi: 10.1016/j.trc.2019.12.016.
- [27] A. De Keyser and W. H. Kunz, "Living and working with service robots: a TCCM analysis and considerations for future research," *Journal of Service Management*, vol. 33, no. 2, pp. 165–196, Feb. 2022, doi: 10.1108/JOSM-12-2021-0488.
- [28] - Haryudi, "Evaluasi PJJ, Kemendikbud: Ada Penurunan Nilai Hasil Belajar Siswa," [edukasi.sindonews.com](https://edukasi.sindonews.com). [Online]. Available: <https://edukasi.sindonews.com/read/312472/212/evaluasi-pjj-kemend...>
- [29] M. S. Hassan, M. A. Islam, M. F. bin Yusof, H. Nasir, and N. Huda, "Investigating the Determinants of Islamic Mobile FinTech Service Acceptance: A Modified UTAUT2 Approach," *Risks*, vol. 11, no. 2, Feb. 2023, doi: 10.3390/risks11020040.
- [30] A. Hilal and C. Varela-Neira, "Understanding Consumer Adoption of Mobile Banking: Extending the UTAUT2 Model with Proactive Personality," *Sustainability (Switzerland)*, vol. 14, no. 22, Nov. 2022, doi: 10.3390/su142214708.
- [31] M. G. de Blanes Sebastián, A. Antonovica, and J. R. Sarmiento Guede, "What are the leading factors for using Spanish peer-to-peer mobile payment platform Bizum? The applied analysis of the UTAUT2 model," *Technological Forecasting and Social Change* , vol. 187, Feb. 2023, doi: 10.1016/j.techfore.2022.122235.
- [32] V. Venkatesh, J. Y. L. Thong, and X. Xu, "Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology," *MIS Quarterly*, vol. 36, no. 1, pp. 157–178, 2012, doi: <https://doi.org/10.2307/41410412>.
- [33] M. A. Almaiah *et al.*, "A Conceptual Framework for Determining Quality Requirements for Mobile Learning Applications Using Delphi Method," *Electronics (Switzerland)*, vol. 11, no. 5, Mar. 2022, doi: 10.3390/electronics11050788.
- [34] A. Althunibat, F. Altarawneh, R. Dawood, and M. A. Almaiah, "Propose a New Quality Model for M-Learning Application in Light of COVID-19," *Mobile Information Systems*, vol. 2022, 2022, doi: 10.1155/2022/3174692.
- [35] M. N. Khan, M. A. Ashraf, D. Seinen, K. U. Khan, and R. A. Laar, "Social Media for Knowledge Acquisition and Dissemination: The Impact of the COVID-19 Pandemic on Collaborative Learning Driven Social Media Adoption," *Frontiers in Psychology* , vol. 12, May 2021, doi: 10.3389/fpsyg.2021.648253.
- [36] L. F. Al-Qora'n, A. M. Al-odat, S. Al-jaghoub, and H. Al-Yaseen, "State of the Art of Mobile Learning in Jordanian Higher Education: An Empirical Study," *Multimodal Technologies and Interaction*, vol. 7, no. 4, Apr. 2023, doi: 10.3390/mti7040041.
- [37] L. C. Juera, "Digitalizing skills development using simulation-based mobile (SiM) learning application," *Journal of Computers in Education*, 2022, doi: 10.1007/s40692-022-00246-8.
- [38] A. Arista and B. S. Abbas, "Using the UTAUT2 model to explain teacher acceptance of work performance assessment system," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 11, no. 4, pp. 2200–2208, 2022, doi: 10.11591/ijere.v11i4.22561.
- [39] G. D. Israel, "Determining Sample Size," *series of the Agricultural Education and Communication Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida*, no. June, pp. 1–5, 2013, Accessed: Oct. 20, 2022. [Online]. Available: <https://www.psycholosphere.com/Determining%20sample%20size%20by%20Glen%20Israel.pdf>
- [40] J. F. Hair, G. T. M. Hult, C. M. Ringle, and M. Sarstedt, *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM), Second Edition*. SAGE Publications, 2017.
- [41] F. Kitsios, I. Giatsidis, and M. Kamariotou, "Digital transformation and strategy in the banking sector: Evaluating the acceptance rate of e-services," *Journal of Open Innovation: Technology, Market, and Complexity*, vol. 7, no. 3, Sep. 2021, doi: 10.3390/foitmc7030204.
- [42] A. Schmitz, A. M. Diaz-Martín, and M. J. Yagüe Guillén, "Modifying UTAUT2 for a cross-country comparison of telemedicine adoption," *Computers in Human Behavior* , vol. 130, May 2022, doi: 10.1016/j.chb.2022.107183.
- [43] C. C. Chen and J. L. Tsai, "Determinants of behavioral intention to use the Personalized Location-based Mobile Tourism Application: An empirical study by integrating TAM with ISSM," *Future Generation Computer Systems*, vol. 96, pp. 628–638, Jul. 2019, doi: 10.1016/j.future.2017.02.028.
- [44] W. Zhang, S. Wang, L. Wan, Z. Zhang, and D. Zhao, "Information perspective for understanding consumers' perceptions of electric vehicles and adoption intentions," *Transportation Research Part D: Transport and Environment*, vol. 102, Jan. 2022, doi: 10.1016/j.trd.2021.103157.
- [45] M. F. Wei, Y. H. Luh, Y. H. Huang, and Y. C. Chang, "Young generation's mobile payment adoption behavior: Analysis based on an extended utaut model," *Journal of Theoretical and Applied Electronic Commerce Research*, vol. 16, no. 4, pp. 1–20, Jul. 2021, doi: 10.3390/jtaer16040037.

## APPENDIX

### Section I. Personal Data and Level of Experience

Data from Respondents

Gender:  1. Male       2. Female

### Section II. Level of Acceptance and Frequency of Use

*Note:* Measurement scales ranged from “Strongly Disagree” to “Agree” on a 1–5 scale.

#### *Perceived Ease of Use (PEOU)*

PEOU1. According to my opinion, the Video Recordings of the Introduction to Databases Practicum are easily accessible.

PEOU2. My interaction with the Video Recordings of the Introduction to Databases Practicum is clear and understandable.

PEOU3. Overall, I think the Video Recordings of the Introduction to Databases Practicum are easy to use to view academic content recordings.

#### *Perceived Usefulness (PU)*

PU1. Using the Video Recordings of the Introduction to Databases Practicum allows me to have flexibility in the management of my studies.

PU2. Using the Video Recordings of the Introduction to Databases Practicum allowed me to review the material presented in class.

PU3. Using the learning video of the Video Recordings of the Introduction to Databases Practicum allowed me not to worry about taking notes in class and so I could concentrate more on the lecturer's presentation.

PU4. Overall, I think the Video Recordings of the Introduction to Databases Practicum are useful for my learning.

#### *Video Quality (VQ)*

VQ1. According to my opinion, the quality of the Video Recordings of the Introduction to Databases Practicum is good

VQ2. I feel the audio quality of the Video Recordings of the Introduction to Databases Practicum is good

VQ3. The Video Recordings of the Introduction to Databases Practicum are available for use when needed

VQ4. I feel that the duration of the Video Recordings of the Introduction to Databases Practicum is in accordance with the standards

#### *Information Quality (IQ)*

IQ1. I think the Video Recordings of the Introduction to Databases Practicum provide complete information

IQ2. I feel that the information from the Video Recordings of the Introduction to Databases Practicum is easy to understand

IQ3. The information in the Video Recordings of the Introduction to Databases Practicum is relevant to the learning material

*Behavioral Intention (BI)* BI1. The video recordings of the Introduction to Databases practicum will still be used by me in the foreseeable future.

BI2. I always will make an effort to incorporate the video recordings of the Introduction to Databases practicum in my learning.

BI3. I'm going to persist in using the Video Recordings of the Introduction to Databases Practicum as often as possible.

#### *Use Behavior (UB)*

UB1. The frequency with which I use the Video Recordings of the Introduction to Databases Practicum

*Note:* Frequency ranged from “Never” to “Very Frequent” on a 1–5 scale.