

# Teachers' Perceived Ease of Use and Perceived Usefulness of Technology at Higher Education Level

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## Abstract

*The availability of technological resources does not guarantee the success of technology integration in the teaching and learning process; Rather, it must be observed from the teachers' skills and competencies in choosing and successfully employing technology that is suitable to learning content and methodology. The objectives of this study were to determine the perceived ease of use and usefulness of technology in teachers at higher education levels. Using a stratified random sampling technique, a sample size of 96 teachers, including 67 male teachers and 29 female teachers from six social sciences departments (Education, Economics, Sociology, Psychology, Mass Communication and Management Sciences) of the Institute of Southern Punjab, Multan, Pakistan. A questionnaire was adopted and modified according to the requirements of the study. The data was collected through the adopted questionnaire. The SPSS was used to analyze the collected data. The study's findings indicated that most of the teachers of social sciences departments perceived that they could not easily use technology in teaching and learning at a higher education level. The study also indicated that most of the teachers of social sciences departments perceived technology as helpful in teaching and learning at higher education levels.*

**Keywords:** Analyzing, Usefulness, Ease of Use, Technology, Higher Education Level.

## Introduction

The teacher is a crucial component in implementing and using technology in classrooms. According to Durriyah and Zuhdi (2018), a teacher with the necessary technical knowledge, skills, and abilities may create an engaging learning environment for students to help them improve their ability to use technology in their education. Teachers are essential in every attempt to integrate technology at any level of school. Therefore, before taking any action, it is necessary to fully understand their beliefs and points of view (Hafeez et al., 2021). Technology availability does not ensure that technological integration will be successful. The ability of instructors to choose and effectively use technology that complements their teaching methods and material must be evaluated, nevertheless (Hafeez, 2021).

With a user, even the finest tool is useful. The frequency and degree to which instructors use tools are significantly influenced by how users or potential users perceive them. Davis (1989) specifically identified two elements that significantly impact a person's decision to employ information technology. One aspect of that prediction is perceived utility, or how much the prospective user believes the technology will enhance a particular area of their daily routines

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and activities. The third element of this projection is perceived ease of use or the amount of work a prospective user would think it would take to use the technology.

### **Objectives of the Study**

1. To find the ease of use of technology in teachers at higher education levels.
2. To determine the usefulness of technology in teachers at higher education levels.

### **Research Questions**

The following research questions were addressed in this research study:

1. How much do teachers feel at ease in using technology
2. How much do teachers feel technology is useful?

### **Review of the Literature**

The individual perspectives of teachers significantly influence the successful integration of technology. Their pedagogical choices on how to use technology in their teaching practices are informed by their values to meet the demands of students in the twenty-first century (Tondeur et al., 2017). Additionally, earlier studies have demonstrated that instructors' pedagogical views greatly influence how they instruct students. Teachers choose technology based on their beliefs about pedagogical philosophies and successful teaching strategies. In other words, how teachers utilize technology is intimately related to their beliefs about the nature of education (Watson & Rockinson-Szapkiw, 2021).

Since instructors are the primary practitioners in the classroom and technology cannot change education independently, it is reasonable to claim that just adding technology into schooling does not guarantee its effectiveness. Teachers must be tech-savvy and behave appropriately to include technology. There is little use in incorporating technology if educators forbid all attempts to use it in the classroom. Perceptions are believed to significantly impact teachers' willingness to employ technology as a teaching tool in the school. Teachers were less likely to accept and use technology in school if they had an unfavourable opinion of it (Wang & Dostál, 2017).

Experienced teachers who have yet to gain professional development in the use of technology in the classroom are less likely to use it and recognize its benefits, according to Nikolopoulou and Gialamas (2016). According to a study by Parsons et al. (2019), teachers who actively participated in setting up classroom technology were more likely to utilize it for instruction. According to Lai et al. (2022), teachers perceived their responsibilities as less student- and teacher-centered. Teachers, however, did not anticipate teaching differently or having new duties in a classroom with technology.

Faculty members felt comfortable using technology, including email, overhead projectors, and movies, according to Jannah et al. (2020). There was a difference in how instructors and students saw email usage, nevertheless, with the former believing that they used it more often for teaching than for students. Teachers feel that a person must be committed to using technology and confident in their ability to use it, according to a study on the qualities needed to be an exceptional technology user in the classroom (Bakhsh et al., 2022).

According to Badia et al. (2013), when technical limitations like access and assistance are not significant, teachers prefer to see technology tools as helpful as long as they serve their overall learning objectives. This outcome demonstrated that the next phase of technology integration is less about the technology itself and more about the lessons, learning activities, and teaching strategies. Azhar and Iqbal (2018) found that students may participate in more interesting learning activities, including hands-on activities, independent research, and cooperative learning, when technology is fully integrated into the classroom.

### Perceived Ease of Use of Technology

Perceived ease of use is the extent to which a person believes using a particular technology will be simple (Davis, 1989). According to Baek and Sung (2020), anything may be considered easy to use if it is loved or sought after as the basis of something regarded as advantageous or containing elements of utility. However, another indicator of ease of use is how customers perceive technology (Elisa et al., 2022). Users think that because information technology systems are easy to use, they will feel more comfortable working because they will perceive the system's usefulness. Even if the contrary is confirmed, a system that is hard to control would provide a low degree of convenience. Perceived ease of use affects favorable views about usage (Hong et al., 2021).

Frequent usage of a system is a sign that its users are more used to, informed about, and skilled with it. Several factors influence how user-friendly technology is, such as the user's experience with similar technology, the reputation of the technology they have acquired (Salsabila & Usman, 2021), and the use of technology that is easy to grasp, control, and become proficient with (Bregashtian & Herdinata, 2021).

The degree to which a person thinks a particular technology will be easy to use is perceived ease of use. The more easily a person can use a specific technology, the more likely they are to employ it. The technology that takes the least amount of time and effort to operate is the most user-friendly. There is a connection between perceived ease of use and the presentation of a technical system. Its simplicity is one of the most critical elements in determining a user's system adoption (Davis, 1989).

A system's perceived ease of use is a measure of its perceived simplicity. People's frequency of interaction and level of system use might impact its usability. The amount of work individuals do influences technology's perceived ease of use into utilizing it (Basuki et al., 2022). How easy it is to understand and utilize information technology systems in educational contexts is referred to as perceived ease of use. The ease with which technology can be understood, used, and operated is its perceived simplicity. The extent to which these technological innovations are implemented depends on how simple cloud computing is considered to be (Kucukusta et al., 2015).

Ozturk (2017) found that perceived usability is a self-determining factor in evaluating the impact of technology. They showed that perceived ease of use significantly impacts users' intentions to stick with their technology. They also discovered that perceived comfort and ease of use were significantly impacted by compatibility and that loyalty was considerably impacted by perceived comfort and ease of use.

Perceived ease of use is the extent to which a user thinks using a particular piece of technology would be simple and hassle-free (Wang & Ha-Brookshire, 2018). Additionally, they noted that the ease of use experienced by Chinese owners of textile and apparel businesses was centered on the convenience of use of technology and the seamless integration of the company's technological infrastructure, staff capabilities, and resources.

To better understand how self-employed taxpayers effectively utilize the online tax system, Mustapha and Sheik Obid (2015) examined the mediating effects of perceived ease of use on the relationship between the quality of tax services and online tax in Nigeria. They found a statistically significant correlation between the online tax system's perceived ease of use and the calibre of its tax services. Sánchez-Prieto et al. (2023) examined instructors' opinions about using mobile devices using PLS-SEM methodologies. There should be stronger connections between perceived usefulness and behavioural intention, perceived self-efficacy and ease of use, and perceived ease of use and perceived usefulness.

According to Shafira and Yasri (2021), teachers may find using technology easy when considering several factors, including how easy it is to make payments. The technology's ease of use or operation is the next stage following installations. Historically, perceived ease of use

has been the most important and extensively offered factor in assessing technology adoption. Perceived ease of usage refers to an individual's perception of the process that results in the desired output.

### **Perceived Usefulness**

One benefit that makes teachers trust the technology used in specific applications is their perception of its usefulness. The perceived utility is a predictor of technology's acceptance in society. One of the most important things that teachers learn from using innovation linked to the usability value of technology is that it serves as a mechanism for them to trust in the performance of educational institutions. If an application can help and assist the activity, people are often more inclined to use it (Lai & Zainal, 2015).

The perceived utility of a system influences user behaviour and adoption. If a technology provides the utility value consumers desire, it is deemed successful. Regardless of how simple or complex the system is, consumers will utilize it if it is beneficial. According to Usman et al. (2020), perceived usefulness is the extent to which an individual thinks using a particular system will enhance its functionality. According to Udayana et al. (2022), attitudes and intentions to use technology are positively impacted by perceived utility.

Perceived usefulness, according to Davis et al. (1989), is the degree to which an individual believes using a particular technology would benefit. The degree to which a person believes that the technology they are using may ultimately be the sole element needed to accomplish their learning goals is known as the technology's perceived utility. Perceived usefulness is a concept that illustrates how altering people's behaviour is a specific feature of extended use on several occasions. Both extrinsic and intrinsic motivation are valid concepts that influence how individuals use technology. Extrinsic motivation manifests as a type of fervor that stems from the belief that one may use technology to augment certain advantages obtained from specific activities (Wilson et al., 2021).

Educational institutions, especially those that consistently implement new technologies to improve the system and individual productivity, greatly benefit from perceived usefulness. People may be reluctant to purchase or utilize new technology if they believe that "the new product or technology will not improve my performance, or will not give me any additional value compared to the technology or product that I'm currently using" (Pitafi et al., 2020).

As evidenced by the concept of perceived usefulness, altering people's behaviour is a characteristic of extended usage on several occasions. Both intrinsic and extrinsic motivation are appropriate notions for encouraging people to utilize technology. According to Doshi (2018), the person's extrinsic motivation seems to be their conviction that the technology they are using might be the sole factor in accomplishing their learning goals.

Increased productivity, personal advantages, efficacy, speedier transactions, and activity effectiveness are the five different size indicators that Nenandha (2022) looked into while examining or evaluating the perceived usefulness variable. Employee attitudes toward mobile marketing tools and services are greatly influenced by perceived relevance to their jobs or responsibilities, especially when such solutions are accessible. Therefore, businesses must develop strategies that communicate to their target audience the value of a process or product. Reconnecting with influential people, being useful in life, successfully staying in connection with others, being easy to stay in touch, and being simple to keep informed from others are the five indicators used to evaluate the perceived utility of technology (Hansen et al., 2018). This metric was used by Muflihadi and Rubiyanti (2016) to evaluate cloud computing. They found that people believe cloud computing is helpful because it can improve efficiency, simplify information storage, and have advantages. According to Manda and Salim (2021), defining measurable goods for perceived utility enables smoother transactions, quicker payments, and more productivity and usefulness for online transactions.

The connection between reported ease of use and perceived utility has been the subject of several studies. Numerous studies indicate that the more user-friendly a technology is, the more valuable it is. As a result, PEOU directly affects usefulness. Additionally, through perceived ease of use, perceived usefulness positively impacts attitudes (Davis, 1989). However, a recent study on online purchasing discovered that while PU has less effect on views, PEOU is progressively becoming a determinable indicator. Based on the literature, researchers concluded that PEOU affected PU. Furthermore, the importance of the two variables varies depending on the technology, usage, and other elements considered in different studies (Alduaij, 2019).

## **Research Methodology**

### **Research Design**

A research design describes how the study will be conducted to determine the causal relationship between the independent and dependent variables. It is a tactic used to look for answers to the research questions. The survey research design was used to answer the questions raised in this study. A survey method was used to collect the data. For surveys, a large sample of respondents is usually selected from the known population (Kelly, 2016). This study employed a quantitative survey research methodology to ascertain how instructors at the higher education level regarded the usability and simplicity of the use of technology.

### **Sampling Technique and Sample Size**

A sampling methodology is a statistical method that selects an appropriate sample based on a thorough analysis of the population data gathered. A stratified random sampling approach was employed to choose the proper sample for the current investigation. Using a stratified random sampling technique, 96 teachers consisting of 67 male teachers and 29 female teachers from six social science departments (education, economics, sociology, psychology, mass communication, and management sciences) at the Institute of Southern Punjab in Multan, Pakistan, were included in the sample.

### **Data Collection Tool**

According to earlier study investigations (Afari & Achampong, 2010; Kahveci et al., 2013; Samuel et al., 2018; Mills & Gay, 2019), a questionnaire was used. The findings of pilot testing and expert opinion led to slightly modifying the items on standardized questionnaires.

## **Results**

### **Teachers' Perceived Ease of Use of Technology**

The first objective of this research study was "To find perceived ease of use of technology in teachers at higher education level." The research question regarding this objective was "How much do teachers feel at ease in using technology?" Descriptive analysis was applied to achieve this objective and find the answer to the research question. The results of the descriptive analysis are shown in Table 1.



**Table 1: Perceived Ease of Use of Technology**

Sr. No	Statement	M	SD
1	I can easily use technological tools/devices in teaching	2.56	0.887
2	It is easy for me to execute the use of technology in teaching	2.61	0.891
3	I face no trouble in remembering how to use technology for teaching-related tasks	2.43	0.820
4	My interaction with using technology for teaching is understandable and clear	2.81	0.816
5	It is easy for me to become skillful in using technology in teaching	2.84	0.923
6	It is easy for me to find the teaching materials by using technology	2.81	0.682
7	It is easy for me to manipulate technological tools while teaching	2.70	0.712
8	I can easily manage the troubleshoot problems related to technology	2.47	0.920
	Overall	2.65	0.831

Table 1 shows the results of the descriptive statistical analysis of the perceived ease of use of technology for each statement and overall. The table shows that the mean value (M) for the statement that I can easily use technological tools/devices in teaching was 2.56 and the value of standard deviation (SD) was 0.887. As the value of the mean is less than 3 so, most of the teachers cannot easily use technological tools/devices in teaching. The M value for the statement that it is easy for me to execute the use of technology in teaching was 2.61 and the value of SD was 0.891. As the mean value is less than 3 so, it is not easy for most of the teachers to execute the use of technology in teaching. The M value for the statement that I face no trouble in remembering how to use technology for teaching-related tasks was 2.43 and the value of SD was 0.820. As the mean value is less than 3 so, most of the teachers face trouble in remembering how to use technology for teaching-related tasks. The M value for the statement that My interaction in using technology for teaching is understandable and clear was 2.81 and the value of SD was 0.816. As the mean value is less than 3 so, most of the teachers don't have understandable and clear interactions in using technology for teaching. The M value for the statement that It is easy for me to find the teaching materials by using technology was 2.81 and the value of SD was 0.682. As the mean value is less than 3 so, it was not easy for most of the teachers to find the teaching materials by using technology. The M value for the statement that It is easy for me to manipulate the technological tools during teaching was 2.70 and the value of SD was 0.712. As the mean value is less than 3 so, it was not easy for most of the teachers to manipulate the technological tools during teaching. The M value for the statement that I can easily manage the troubleshooting problems related to technology was 2.47 and the value of SD was 0.920. As the mean value is less than 3 so, most of the most were unable to easily manage the troubleshooting problems related to technology. The overall mean of the perceived ease of use of technology was 2.65 and the value of SD was 0.831. As the value of the overall mean was less than 3 so, most of the teachers of social sciences departments perceived that they could not easily use the technology in teaching at a higher education level.

### Teachers' Perceived Usefulness

The second objective of this research was "To find perceived usefulness in technology of teachers at higher education level" and the research question regarding this objective was "How much do teachers feel technology as usefulness?" To achieve this intended objective and to find the answer to the research question, descriptive analysis was applied. The results of the descriptive analysis are shown in table 2.

**Table 2: Perceived Usefulness of Technology**

Sr. No	Statement	M	SD
1	Technology improved my teaching skills	3.11	0.772
2	Technology improved my work efficiency	3.19	0.784
3	Using technology enhanced the effectiveness of my teaching activities	3.34	0.809
4	Using technology improved my quality of teaching	3.23	0.784
5	Technology-based teaching improved the productivity of my department/ faculty	3.59	0.813
6	Using technology enables me to accomplish teaching tasks more quickly	3.22	0.721
	Overall	3.28	0.780

Table 2 shows the results of the descriptive statistical analysis of the perceived usefulness of Technology in teaching at the higher education level. The table shows that the mean value (M) for the statement that Technology improved my teaching skills was 3.11, and the standard deviation (SD) value was 0.772. As the mean value was more than three, most teachers perceived that Technology improved their teaching skills. The M value for the statement that Technology improved my work efficiency was 3.19, and the value of SD was 0.784. As the mean value was more than three, most teachers perceived that Technology improved their work efficiency. The M value for the statement that using Technology enhanced the effectiveness of my teaching activities was 3.34, and the value of SD was 0.809. As the mean value was more than three, most of the teachers perceived that using technology enhanced the effectiveness of their teaching activities. The M value for the statement that using Technology improved my quality of teaching was 3.23, and the value of SD was 0.784. As the mean value was more than three, most of the teachers perceived that using Technology improved their quality of teaching. The M value for the statement that technology-based teaching improved the productivity of my department/ faculty was 3.59, and the value of SD was 0.792. As the mean value was more than three, most teachers perceived that technology-based teaching improved the productivity of their departments/ faculties. The M value for the statement that using Technology enables me to accomplish teaching tasks more quickly was 3.22, and the value of SD was 0.721. As the mean value is more than three, most teachers perceived that using Technology enabled them to accomplish teaching tasks more quickly. The overall mean value of the perceived usefulness of Technology was 3.28, and the value of SD was 0.780. As the overall mean value was more than three, most of the teachers of social sciences departments perceived Technology as helpful in teaching at higher education levels.

## Discussion

A person's propensity to adopt and employ a particular technology is likely influenced by perceived ease of use. Shafira and Yasri (2021) suggested that teachers might find it simple to use technology when considering various factors. In evaluating technology adoption, perceived ease of use was the most significant and widely affected factor. A person's view of the procedure leading to the outcome is perceived as ease of use. The findings of this study regarding the perceived ease of use indicated that most of the teachers perceived that they could not easily use the technology in the teaching and learning process. The mean value for the perceived ease of use of technology was 2.65, which shows that most of the teachers of social sciences departments perceived that they could not easily use Technology in the teaching and learning process.

Perceived usefulness is the key factor in user acceptance of a technology. The system's effectiveness, efficiency, and overall benefits in improving user performance all impact how

valuable people find it to be. Perceived usefulness plays a significant role in helping educational institutions, particularly those that continuously introduce new Technology to enhance the productivity of the individuals and the system (Pitafi et al., 2020). The findings of this study regarding the perceived usefulness indicated that most teachers perceived technology as applicable in the teaching and learning process. The mean value for the perceived usefulness of technology was 3.28, indicating that most of the teachers of social sciences departments perceived Technology as useful to the teaching and learning process.

## Conclusion

This research study aimed to analyze teachers' perceived ease of use of technology and its usefulness at Technology levels. The study concluded that most of the teachers of social sciences departments perceived that they could not easily use the technology at higher education level. The study also concluded that most of the teachers of social sciences departments perceived technology as useful in teaching at higher education levels.

## References

- Afari, E., & Achampong, A. (2010). Modeling computer usage intentions of tertiary students in a developing country through the Technology Acceptance Model. *International Journal of Education and Development using ICT*, 6(1), 102-116.
- Alduaij, M. (2019). Employing the technology acceptance model to explore the trends of social media adoption and its effect on perceived usefulness and perceived ease of use. *Journal of Information Technology Management*, 11(2), 129-143.
- Azhar, K. A., & Iqbal, N. (2018). Effectiveness of Google classroom: Teachers' perceptions. *Prizren Social Science Journal*, 2(2), 52.
- Badia, A., Meneses, J., & Sigalés Conde, C. (2013). Teachers' perceptions of factors affecting the educational use of ICT in technology-rich classrooms. *Electronic Journal of Research in Educational Psychology*, 2013, 11(3).
- Baek, E. O., & Sung, Y. H. (2020). Pre-service teachers' perception of technology competencies based on the new ISTE technology standards. *Journal of Digital Learning in Teacher Education*, 37(1), 48-64.
- Bakhsh, K., Hafeez, M., Shahzad, S., Naureen, B., & Faisal Farid, M. (2022). Effectiveness of digital game based learning strategy in Higher Educational Perspectives. *Journal of Education and E-learning Research*, 9(4), 258-268.
- Basuki, R., Tarigan, Z. J. H., Siagian, H., Limanta, L. S., Setiawan, D., & Mochtar, J. (2022). *The effects of perceived ease of use, usefulness, enjoyment and intention to use online platforms on behavioral intention in online movie watching during the pandemic era* (Doctoral dissertation, Petra Christian University).
- Bregashtian, B., Christian Herdinata, S. E., & MM, C. (2021). The effect of perceived ease of use, usefulness and risk on intention to use the go-food application in Surabaya and Sidoarjo. *KnE Social Sciences*, 169-183.
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use and User Acceptance of Information Technology. *MIS quarterly*.
- Davis, F. D. (1989). Technology acceptance model: TAM. *Al-Suqri, MN, Al-Aufi, AS: Information Seeking Behavior and Technology Adoption*, 205, 219.
- Doshi, P. V. (2018). Relationship of perceived ease use and perceived usefulness on usage of e-commerce site. *International Journal of Academic Research and Development*, 3(1), 495-498.
- Durriyah, T. L., & Zuhdi, M. (2018). Digital Literacy with EFL Student Teachers: Exploring Indonesian Student Teachers' Initial Perception about Integrating Digital Technologies into a Teaching Unit. *International Journal of Education and Literacy Studies*, 6(3), 53-60.
- Elisa, Z. P., Nabella, S. D., & Sari, D. P. (2022). The Influence of Role Perception, Human Resource Development, and Compensation on Employee Performance Universitas Ibnu Sina. *Enrichment: Journal of Management*, 12(3), 1606-1612.



- Eze, N. U., Obichukwu, P. U., & Kesharwani, S. (2021). Perceived usefulness, perceived ease of use in ICT support and use for teachers. *IETE Journal of Education*, 62(1), 12-20.
- Hafeez, M. (2021). Impact of Teacher's Training on Interest and Academic Achievements of Students by Multiple Teaching Methods. *Pedagogical Research*, 6(3).
- Hafeez, M., Ajmal, F., & Kazmi, Q. A. (2021). Challenges faced by the teachers and students in online learning. *International Journal of Innovation, Creativity and Change*, 15(2), 325-346.
- Halizah, S. N., Retnowati, E., Darmawan, D., Khayru, R. K., & Issalillah, F. (2022). Determinants of Customer Trust: A Study on Safety, Ease-of-use, and Perceived usefulness of Herbal Products of Kuku Bima Ener-G. *Journal of Trends Economics and Accounting Research*, 2(4), 86-92.
- Hanafi, W. N. W., & Toolib, S. N. (2020). Influences of perceived usefulness, perceived ease of use, and perceived security on intention to use digital payment: a comparative study among Malaysian younger and older adults. *International Journal of Business Management (IJBM)*, 3(1), 15-24.
- Hansen, J. M., Saridakis, G., & Benson, V. (2018). Risk, trust, and the interaction of perceived ease of use and behavioral control in predicting consumers' use of social media for transactions. *Computers in human behavior*, 80, 197-206.
- Hong, J., Liu, W., & Zhang, Q. (2024). Closing the digital divide: The impact of teachers' ICT use on student achievement in China. *Journal of Comparative Economics*, 52(3), 697-713.
- Hong, X., Zhang, M., & Liu, Q. (2021). Preschool teachers' technology acceptance during the COVID-19: An adapted technology acceptance model. *Frontiers in Psychology*, 12, 691492.
- Iriani, S. S., & Andjarwati, A. L. (2020). Analysis of perceived usefulness, perceived ease of use, and perceived risk toward online shopping in the era of Covid-19 pandemic. *Systematic Reviews in Pharmacy*, 11(12), 313-320.
- Jannah, A. M., Suwono, H., & Tenzer, A. (2020, April). Profile and factors affecting students' scientific literacy of senior high schools. In *AIP Conference Proceedings*, 2215(1). AIP Publishing.
- Kahveci, M. (2010). Students' Perceptions to Use Technology for Learning: Measurement Integrity of the Modified Fennema-Sherman Attitudes Scales. *Turkish Online Journal of Educational Technology-TOJET*, 9(1), 185-201.
- Kelly, A. E. (2016). Design research in education: Yes, but is it methodological? In *Design-based Research* (pp. 115-128). Psychology Press.
- Kucukusta, D., Law, R., Besbes, A., & Legohérel, P. (2015). Re-examining perceived usefulness and ease of use in online booking: The case of Hong Kong online users. *International Journal of Contemporary Hospitality Management*, 27(2), 185-198.
- Lai, P. C., & Zainal, A. A. (2015). Consumers' intention to use a single platform e-payment system: A study among Malaysian internet and mobile banking users. *Journal of Internet Banking and Commerce*, 20(1), 1-13.
- Lai, X., Nie, C., Huang, S., Yao, Y., Li, Y., Dai, X., & Wang, Y. (2022). Classes of problematic smartphone use and information and communication technology (ICT) self-efficacy. *Journal of Applied Developmental Psychology*, 83, 101481.
- Manda, E. F., & Salim, R. (2021). Analysis of the influence of perceived usefulness, perceived ease of use and attitude toward using technology on actual to use Halodoc application using the technology acceptance model (TAM) method approach. *Int. Res. J. Adv. Eng. Sci*, 6(1), 135-140.
- Mills, G. E., & Gay, L. R. (2019). *Educational research: Competencies for analysis and applications*. Pearson. One Lake Street, Upper Saddle River, New Jersey 07458.
- Muflihadi, I., & Rubiyanti, R. N. (2016). The Influence of Perceived Usefulness, Perceived Ease of Use, and Trust on Consumer Satisfaction (Study on Gojek Bandung). *e-Proceedings of Management*, 3(2).
- Mustapha, B., & Obid, S. N. B. S. (2015). Tax service quality: The mediating effect of perceived ease of use of the online tax system. *Procedia-Social and Behavioral Sciences*, 172, 2-9.
- Nenandha, N. (2022). The Influence of Perceived Usefulness, perceived ease of use, and Perceived Risk in Using Digital Payment Services in Accounting Students. *Journal Ekonomi Trisakti*, 2(2), 611-676.

- Nikolopoulou, K., & Gialamas, V. (2016). Barriers to ICT use in high schools: Greek teachers' perceptions. *Journal of Computers in Education*, 3, 59-75.
- Öztürk, Ö. (2017). *An investigation of English lecturers' attitudes toward information and communication technologies (ICT) and their use of technology* (Master's thesis, Uludağ Üniversitesi).
- Parsons, S., Kruijt, A. W., & Fox, E. (2019). Psychological science needs a standard practice of reporting the reliability of cognitive-behavioral measurements. *Advances in Methods and Practices in Psychological Science*, 2(4), 378-395.
- Pitafi, A. H., Kanwal, S., & Khan, A. N. (2020). Effects of perceived ease of use on SNSs-addiction through psychological dependence, habit: The moderating role of perceived usefulness. *International Journal of Business Information Systems*, 33(3), 383-407.
- Prieto-Egido, I., Sanchez-Chaparro, T., & Urquijo-Reguera, J. (2023). Impacts of information and communication technologies on the SDGs: the case of Mayu Telecomunicaciones in rural areas of Peru. *Information technology for development*, 29(1), 103-127.
- Salsabila, T., & Usman, O. (2021). Influence of student motivation, student learning facilities and lecturer teaching skills towards learning interest. *Student Learning Facilities and Lecturer Teaching Skills Towards Learning Interest (January 15, 2021)*.
- Shafira, V., & Yasri, Y. (2021). The influence of perceived ease of use, perceived usefulness, and perceived risk on intention to use Gopay on Gojek application users. *Operations Management and Information System Studies*, 1(4), 240-249.
- Siagian, H., Tarigan, Z. J. H., Basana, S. R., & Basuki, R. (2022). *The effect of perceived security, perceived ease of use, and perceived usefulness on consumer behavioral intention through trust in digital payment platform* (Doctoral dissertation, Petra Christian University).
- Teo, T. (2016). Modelling Facebook usage among university students in Thailand: the role of emotional attachment in an extended technology acceptance model. *Interactive Learning Environments*, 24(4), 745-757.
- Tondeur, J., Scherer, R., Siddiq, F., & Baran, E. (2017). A comprehensive investigation of TPACK within pre-service teachers' ICT profiles: Mind the gap! *Australasian Journal of educational technology*, 33(3).
- Tyas, E. I., & Darma, E. S. (2017). The Influence of Perceived Usefulness, Perceived Ease of Use, Perceived Enjoyment, and Actual Usage on Acceptance of Information Technology: An Empirical Study of Employees in the Accounting and Finance Section of Baitul Maal Wa Tamwil in the Special Region of Yogyakarta. *Indonesian Accounting and Business Review*, 1(1), 25-35.
- Udayana, I. B. N., Cahya, A. D., & Aqdella, F. A. (2022). The effect of perceived usefulness, perceived ease of use on behavioral intention to use through the intervening attitude toward using variables in the study of shopeepay E-Wallet services. *Journal Terapan Manajemen Dan Bisnis*, 8(1), 29-40.
- Usman, O., Septianti, A., Susita, M., & Marsofiyati, M. (2020). The effect of computer self-efficacy and subjective norm on the perceived usefulness, perceived ease of use and behavioural intention to use technology. *Journal of Southeast Asian Research*, 11.
- Venkatesh, V. (2015). Technology acceptance model and the unified theory of acceptance and use of technology. *Wiley encyclopedia of management*, 1-9.
- Wang, B., & Ha-Brookshire, J. E. (2018). Exploration of digital competency requirements within the fashion supply chain with an anticipation of industry 4.0. *International Journal of Fashion Design, Technology and Education*, 11(3), 333-342.
- Wang, X., & Dostál, J. (2017). Flipped class promoting oral English as foreign language teaching. In *ICERI2017 Proceedings* (pp. 3814-3820). IATED.
- Watson, J. H., & Rockinson-Szapkiw, A. (2021). Predicting preservice teachers' intention to use technology-enabled learning. *Computers & Education*, 168, 104207.
- Wilson, N., Keni, K., & Tan, P. H. P. (2021). The role of perceived usefulness and perceived ease-of-use toward satisfaction and trust which influence computer consumers' loyalty in China. *Gadjah Mada International Journal of Business*, 23(3), 262-294.