

## **Understanding E-Learning Acceptance of Gen Z Students: An Extension of the Technology Acceptance Model (TAM)**

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### **Abstract:**

The COVID-19 pandemic disrupted instructional practices at educational institutions. Countermeasures included transitioning the majority of classes from primarily in-class learning to primarily eLearning. This shift has been met with varied levels of resistance and acceptance, while one study showed that 85% of higher education students prefer in-class learning [1]. Models developed years ago don't account for the dynamic nature of the education world and the students within it. As a result, there is demand for an understanding of the unique set of needs presented by Generation Z, the population born between 1997 and 2015, during their college years.

The purpose of this study is to explore factors influencing Generation Z students' eLearning acceptance by considering students' backgrounds such as behavioral and personality traits, level of academic success, and course of study. In this study we conducted focus group discussions to explore all factors influencing eLearning acceptance of Generation Z. This focus groups were conducted with three groups of Industrial and Systems Engineering (ISE) students who have three or more courses at University of Florida during the pandemic.

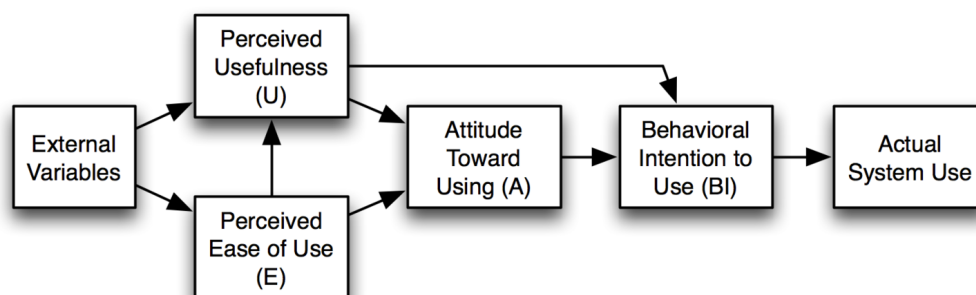
As a result, the most relevant factors for Generation Z user acceptance that mentioned in the focus group discussions are compatibility, perceived cognitive absorption, perceived usefulness, service quality, system quality, information quality, accessibility, and privacy/security. Based on the findings from focus group discussions, theoretical foundations, and empirical evidence, we will hypothesize an innovative and integrated technology acceptance model for eLearning. In near future, we will analyze reliability of the models, fitness of the measured models, and convergent validity by performing confirmatory factor analysis (CFA). We also plan to study racial bias in E-learning. The framework and outcome of this study provide valuable guidelines for ISE departments that allow better understanding of Generation Z students' needs and their acceptance of e-learning.

## **Introduction and background:**

The COVID-19 pandemic quickly spread across the globe, causing countries to rethink the traditional face-to-face interactions of everyday life. The World Health Organization encouraged countries to adopt measures to reduce the spread by limiting person-to-person contact [2]. Since the virus can live on surfaces for days, it was recommended by the Centers for Disease Control and Prevention (CDC) to avoid both contaminated surfaces and infected people [3]. Regulations were put into place such as mask wearing, social distancing (keeping 6 ft between you and members outside of your immediate household), and in some places, ‘stay home’ mandates. The traditional face-to-face classroom structure of tertiary education did not comply with these new regulations and had to rapidly adapt.

The disrupted instructional practices at educational institutions globally initiated a sudden, yet critical switch to online course delivery [4], [5]. eLearning, also known as electronic learning, is the use of technology to access educational curriculum [6]. Before the pandemic, eLearning had already become a widely used educational tool at the university level [7], but the quick, mandatory switch was met with different levels of resistance and acceptance [1], [5]. Zalaznick’s study [1] showed that 85% of higher education students still preferred traditional in-class learning over eLearning. Socially distant education creates a demand for effective online tools and resources. To develop useful, lasting resources, it is first necessary to understand the prerequisites affecting eLearning acceptance for Generation Z [8].

Researchers have developed various theoretical models to explain the relations between technology acceptance factors and actual use. Among these, the technology acceptance model (TAM), proposed by Davis, [9] has become a widely accepted framework used in other studies (see Figure 1). The TAM theorizes the cause effect relationship between external factors and the use of a system. This model has proven effective for predicting the acceptance of a variety of technologies [10], [11]. The external variables influence perceived usefulness and perceived ease of use which in turn affects one’s attitude toward using, behavioral intention to use, and actual system use.



**Figure 1: The Technology Acceptance Model (TAM) as proposed by Davis [9]**

Another model which is widely used to predict user acceptance is the information systems (IS) success model proposed by DeLone & McLean [12]. Ten years later, the author's modified IS model consists of the following six components: system quality, information quality, and service quality, intention to use/use, user satisfaction, and net benefits [13].

To better explore eLearning technology acceptance, researchers extended earlier models. For example, Mohammadi [14] expanded on the TAM with the external factors of technical system quality, educational system quality, content and information quality, service quality, user satisfaction, intention to use, influential towards use of system, system loyalty, and goal achievement. They concluded that “system quality” and “information quality” were key factors for eLearning acceptance and that “perceived usefulness” predicted the relationship for users’ intentions and ease of use [14].

Roca and his colleagues [15] did an extension of the TAM based on the Expectancy disconfirmation theory [16] where satisfaction directly precedes continuance intention. This study found that satisfaction is determined by perceived usefulness, information quality, service quality, system quality, perceived ease of use and cognitive absorption [15]. Based on the results, researchers concluded that top user concerns include how the eLearning system provides information and how overall productivity is affected.

Estriegana conducted a study [8] which extended the TAM with the factors of perceived efficiency, playfulness, and satisfaction. After analyzing the questionnaire results, they concluded that each newly introduced factor has a positive influence on the original TAM variables [8].

Salloum and his colleagues [17] performed an in-depth literature review on eLearning TAM extension factors in the last 12 years. The following factors showed up most frequently: system quality, content quality, information quality, computer self-efficacy, subjective norm, enjoyment, accessibility, and computer playfulness. The pilot study and subsequent questionnaire revealed that subjective norm has an insignificant impact on both perceived usefulness and perceived ease of use, and that there was no positive relationship between computer self-efficacy and computer playfulness with perceived usefulness [17].

While much research has been done in regard to an eLearning TAM, there’s a research gap regarding fully virtual eLearning acceptance by Generation Z students. This study combines the factors used in previous studies with the factors introduced by the focus group presenting an innovative approach. According to a literature review of 120 significant TAM extension studies for eLearning, the most repeatedly used factors in studies conducted over the past 12 years are computer self-efficacy, subjective/social norm, enjoyment, system quality, information quality, content quality, accessibility, and computer playfulness [17]. Each of these factors along with a

variety of others were considered during this study. Moreover, theories developed years ago don't necessarily account for the dynamic nature of the education world and the students within it. Generation Z's educational desires and preferences won't be met in a campus environment designed for the generations that came before [18]. As a result, there is demand for an understanding of the unique educational needs presented by Generation Z. Using an extension of the TAM combined with the factors affecting Generation Z eLearning needs, this generational subgroup can be specifically investigated. This study explores the sentiment surrounding eLearning acceptance within Generation Z amidst the online learning switch in the COVID-19 pandemic. By investigating what affects student acceptance, intention to use, and adoption of eLearning tools, this study reveals the needs and expectations of the successful eLearning systems to come.

### **Methodology:**

**Participants.** After getting IRB approval, we targeted students who are between the ages of 18 and 23, have taken three or more courses online at the University of Florida and who study in the department of Industrial and Systems Engineering. Participants were recruited via researcher contacts. The researchers provided information to their known contacts who met all of the requirements to participate in the study. The qualified and interested subjects verbally agreed to participate before filling out the survey with their information and consent. The survey collected data about each participant prior to their participation in the focus group and the data is displayed in Table 1 and Figure 2.

**Table 1: Participant Background Data**

	Group 1	Group 2	Group 3
Number of participants	6	7	7
Age	Mean: 20 SD: 1	Mean: 20.29 SD: 0.70	Mean: 20.86 SD: 0.64
Gender	Male: 4	Male: 4	Male: 2
	Female: 2	Female: 3	Female: 5
Asynchronous & Synchronous Classes	Both: 6	Both: 7	Both: 7
GPA range	3.5-4.0: 6	3.5-4.0: 7	3.5-4.0: 4 3.0-3.5: 3



**Figure 2: Participant Background Data, Personality**

**Procedure.** Once the participants were determined, they were split into three focus groups containing 6-7 students. Zoom was the platform utilized to conduct the focus groups. Students were instructed to change their Zoom name to their participant ID before joining the meeting. This step allowed for any identifiable information to be removed before their input was collected ensuring the confidentiality of each participant. Once the focus group began, students were encouraged to unmute themselves and share any and all input they wanted to contribute. If preferred, they could also utilize the chat box option on Zoom to share their thoughts. The whole Zoom session was securely recorded for the researchers to further analyze after the conclusion of the focus group. Each focus group session lasted 60 minutes and was facilitated using the following questions:

1. What concerns/benefits do you experience with education being completely online?
2. Describe your experience navigating eLearning technologies for the first time versus navigating them now.
3. Trust refers to reliability, quality, and security. How much trust do you have in eLearning systems?
4. Focus refers to concentrating your attention or effort. Describe your ability to focus while using eLearning compared to in person.
5. Usefulness refers to whether or not you feel a system enhances your learning performance. What has been your experience with eLearning in that regard?
6. Accessibility is the degree of ease to access and use the information extracted from the system. What has been your experience regarding accessing eLearning?
7. So far, we have discussed concerns/benefits, navigating for the first time, reliability, quality, security and focus. What other input have you not shared yet?

After the conclusion of each focus group, the facilitator and moderators had a meeting to compare notes and discuss potential findings. Upon completing the three focus groups, a transcript was generated of each focus group in order to analyze the students' input. Another meeting was held to complete data mapping and classify each comment into more specific headings. These headings were further categorized under an existing or new factor. After all of the data was collected, analyzed, and categorized, the factors which proved most important to the eLearning acceptance of Generation Z were included in the revised TAM.

## **Results:**

In this study, 241 statements pertaining to eLearning technology user acceptance were recorded. Each statement was then classified under the most commonly mentioned factors to observe the themes revealed in this focus group study. Table 2 lists each factor along with the frequency of its appearance, the percentage of comments classified within each factor, and a verbatim quote.

**Compatibility.** was the most frequently mentioned factor that influenced eLearning technology user acceptance, accounting for 20.33% of the comments recorded. Compatibility is defined as the degree to which adopting the eLearning system is compatible with what people do [20]. In this study, compatibility was mentioned by participants in the following ways: (1) whether eLearning fits the way they like to work in regard to professor interaction, (2) classmate collaboration, and (3) preferred learning environment. Participants also mentioned (4) the ways eLearning is or isn't compatible with their own personal work style. For example, comments were made regarding user-controlled pace versus professor dictated pace for lectures.

**Perceived Cognitive Absorption.** was the second most highly mentioned factor. Perceived cognitive absorption in the framework of this study indicates a state of deep involvement and enjoyment with the eLearning system [21]. Accounting for 17.01% of the recorded comments, this factor was mentioned by participants in regard to (1) the ability to focus on course material in an online setting, (2) the ability to lose track of time to the absorption of your studies, and (3) the ability to block out distractions during schoolwork.

**Perceived Usefulness.** refers to the degree to which individuals believe that the use of a new technology can improve their job performance [9]. In this study, participant's comments pertaining to perceived usefulness constituted 15.35% of the recorded comments and were mentioned in the following ways: (1) autonomy over where and when they do their work, (2) productivity levels and performance with self-navigated studies, and (3) the usefulness of specific eLearning features such as course calendars, files, announcements, lecture video features, and available resources for help.

**Service Quality.** showed up in 12.86% of the recorded focus group comments. Service quality refers to the difference between expected and perceived service and can be defined as "a global judgement or attitude relating to the superiority of a service" [22]. Focus group commentary on service quality pertained to (1) professors' technological ability to provide proper assistance and instruction about how to use the system, (2) availability and response time of live help services, and (3) effectiveness of course management such as clearly demonstrated expectations for assignment content, assignment deadlines, and lecture requirements.

**System Quality.** determines the way that the system characteristics like functionality and system structure influence the outlooks of the users with respect to the use of eLearning systems [23]. This factor showed up in 12.03% of the comments and was revealed through participant



discussion about (1) variability in system interactions from class to class, (2) commentary on Canvas, Honorlock, and ProctorU regarding platform functionality, and (3) competence of eLearning features to allow effective engineering course content delivery in courses such as programming or simulation.

**Accessibility.** refers to the degree of ease for a user to access and use the information extracted from the system [24]. Mentioned 8.71% of the time in this study, accessibility is discussed in the following contexts: (1) ability of an individual's technology to meet eLearning demands, (2) internet related accessibility commentary, and (3) ease of access to eLearning platform such as login, access for course content, and accessibility to what's needed for assignment submission.

**Information Quality.** is defined as “the degree to which the customer receives complete, precise and well-timed information over the electronic service interface” [25]. Tied with accessibility at 8.71% of the comments, information quality pertains to (1) how up to date, (2) relevant, and (3) clear the output information within the eLearning system is. Information quality was also mentioned in regard to the (4) quality of feedback on learning performance. The positive/negative comments made about information quality were found to vary greatly depending on the nature of each participant's courses and instructors.

**Privacy/security.** is “a combination of control and limitations” in regard to how an individual can “influence the flow of their personal information and prevent others from accessing it” [27]. Accounting for 4.98% of the recorded comments, this factor was mentioned by participants in regard to a (1) lack of security of eLearning systems and (2) testing platforms invading privacy.

**Table 2: Identified Factors from Focus Groups**

<b>Factors</b>	<b>Frequency</b>	<b>Direct Quotations</b>
Compatibility	49 20.33%	"It's overwhelming and definitely a lot of screen time, but I've liked having some classes that are synchronous and some classes that are asynchronous because I feel like if I had all asynchronous, I would be off track, so I like having a balance between the two is nice."
Perceived Cognitive Absorption	41 17.01%	"I think my focus is definitely lower online. I think just sitting at my desk in front of my computer watching hours of lecture, makes my brain begin to like to shut down by the end of the day. At least for me, just looking at a screen for so long each day, I find it's much easier to get distracted."

<b>Factors</b>	<b>Frequency</b>	<b>Direct Quotations</b>
Perceived Usefulness	37 15.35%	"For prerecorded classes I know you have to have a lot of discipline to keep up but at the same time, being able to pause when you see a concept that didn't click the first time, I think has been amazing and really helped me a lot."
Service Quality	31 12.86%	"It's just hard cause like if I was in class, I'd just raise my hand and get my question answered, but now I have to decide if it's important enough and then try to get ahold of my professor, and honestly it's hit or miss because sometimes it takes them days to respond and by the time, they do I have 6 more questions for them."
System Quality	29 12.03%	"I have this programming class that's so hard to do online. Like usually the TAs would help you debug your programs so it runs perfectly but they can't access our computers, so we try sharing screens but then that isn't enough, I just wish there were better functions to make it easier to learn that sort of thing."
Accessibility	21 8.71%	"My internet at my parents' house is not good at all, I will get kicked out of zooms all the time and things take so long to load." "One time I was taking an exam and the exam file wouldn't download so I lost 15 minutes of an hour and half exam because of Wi-Fi issues."
Information Quality	21 8.71%	"I have this one class where my professor uploads stuff that we can never open and like the weeks are all shifted, and the lecture slides are labeled wrong. I just think you can have very different experiences depending on how well your professor can get the information to you."
Privacy/security	12 4.98%	"To take an exam I have to download a browser... and every once and a while I'm kind of suspicious that they might still have access to my computer afterwards or something like that which isn't the most comforting."

Based on the focus group analysis, the most frequently mentioned factors regarding the eLearning user acceptance of Generation Z are as follows: compatibility, perceived cognitive absorption, perceived usefulness, service quality, system quality, information quality, accessibility, and privacy/security. In near future, we will develop items for above-mentioned factors and conduct online survey. Furthermore, we will analyze reliability of the models, fitness of the measured models, and convergent validity by performing confirmatory factor analysis (CFA).

## **Conclusion and Discussion:**

**Discussion.** This research was conducted to reveal the underlying factors of Generation Z eLearning acceptance and create foundation to develop an extension of the technology acceptance model geared specifically towards this generation. The abrupt switch to eLearning amidst the COVID-19 pandemic left students and universities having to adapt quickly. By investigating what affects student acceptance of eLearning through focus groups, this study revealed the factors necessary to ensure the success of future eLearning systems.

The results of this study include several important findings that can be used to design and implement online learning systems that meet the needs of Generation Z students. The first result is that compatibility impacts an eLearner's acceptance of the system. This finding is consistent with [27] where compatibility was seen as an important factor when expanding the Technology Acceptance Model (TAM) in the context of education. Outside the context of education, yet within the information systems domain, compatibility is shown to be a strong predictor of user acceptance [28], [29], [30]. In studies of similar nature, compatibility has not often surfaced as an important factor [8], [14], [15], [17] which could be a result of the mandatory nature of eLearning in the COVID-19 pandemic. Compatibility is based on whether a system is consistent with the "existing values, needs and past experiences of potential adopters" [31] but a sudden, mandatory switch to online would inherently provoke previous sentiments of acceptance.

The second result is that perceived ease of use did not surface as an important factor in the focus group, while perceived usefulness surfaced frequently. Perceived ease of use had consistently surfaced in eLearning user acceptance models prior to the virtual learning switch during the global pandemic [8], [17], [27]. This result is consistent with the findings of the TAM extension in [15] in reference to perceived usefulness and cognitive absorption as strong predictors of eLearning continuance intention but differ from [15] in the significance of perceived ease of use. Defined as "the perceived amount of effort required to perform a behavior" [9] this effort-based factor shows inconsistent levels of effect on user acceptance in the eLearning realm. Other studies such as [29] corroborate this finding by showing perceived ease of use to only have an indirect effect on intention to use. One possible reason is that technology has been heavily integrated into society over the past couple of decades. Generation Z's developmental years have taken place in this technology rich environment leading to more exposure, stronger competence, and potentially less concern about ease of use.

The third result shows that service quality is highly valued while perceived computer self-efficacy didn't surface in the focus group results. Perceived computer self-efficacy is defined as "the individuals' confidence in their own capacity to take steps needed to deal with future situations" [32] and has been an important factor in predicting eLearning user acceptance in previous studies [15], [17], [33], [34], [35]. In the present study, perceived computer self-

efficacy didn't surface nor did any comments referring to the students own personal confidence in navigating eLearning technology. However, what surfaced in this study was concern about the computer efficacy or technological capability of the instructor which is represented in the data through the frequent mentioning of service quality. The use of service quality as an important factor affecting eLearning acceptance is consistent with the following studies: [15], [36], [37], [38]. In this study, service quality shows up in the following contexts: the instructor's efficacy to provide proper assistance and instruction about how to use the system, availability and response time of live help services, and effectiveness of course management. One explanation for this is the rather savvy technological abilities of Generation Z contrasted against with the varying technological abilities of the older generations. With academic success dependent on the instruction of the generations before Generation Z, the need for clear, consistent, well delivered eLearning services becomes very significant.

**Limitation.** It is worth noting that this study has some limitations. All of the participants are all ISE students at University of Florida located in Gainesville, FL. This creates several limitations for this study. First, the age range is limited to the older population within Generation Z. For this reason, the results of this study are only a reflection of the user acceptance of this age range. Second, all participants are learning in the state of Florida the region could impact a student's previous exposure to technology and consequently affect their needs regarding eLearning. Third, all of the participants are undergraduates studying ISE so their input is a reflection of the concerns and demands of this specific major. Caution should be taken when applying these findings to other age groups, geographic regions, or courses of study. Finally, all focus group participants made the online transition in the midst of the COVID-19 pandemic; their adoption of this technology was essential for continuing their college education. This study reveals the most important eLearning factors to Generation Z under the involuntary condition's participants were presented with.

**Conclusion.** The purpose of this research was to understand the needs of Generation Z regarding eLearning user acceptance. This study consisted of focus groups with Generation Z students after the virtual spring and fall semesters of 2020. The results show that compatibility, perceived cognitive absorption, perceived usefulness, service quality, system quality, information quality, accessibility, and privacy/security are eLearning user's most pertinent concerns. The next extension of this research includes a questionnaire which will be administered to students who have completed one or more fully virtual semesters. The findings will cover a group of constructs that affect behavioral intention to use eLearning systems and their relationships. The framework and outcome of this study, upon the completion of the second phase, will provide valuable guidelines for ISE departments that allow better understanding of Generation Z students' needs for eLearning acceptance.

## **References:**

- [1] M. Zalaznick, "What Do Students Think of Online Learning?" *University Business Magazine*, June 18, 2020. [Online]. Available: <https://universitybusiness.com/onlineLearning-survey-classes-degrees-generation-z-in-person-wily-regenerations/>. [Accessed October 6, 2021].
- [2] World Health Organization (WHO), "Coronavirus," *World Health Organization*, 2020. [Online]. Available: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>, <https://www.who.int/news-room/q-a-detail/q-a-coronaviruses>. [Accessed January 23, 2021].
- [3] Centers for Disease Control and Prevention (CDC), "Coronavirus Disease 2019 (COVID-19)," *Centers for Disease Control and Prevention*, 2020. [Online]. Available: <https://www.cdc.gov/coronavirus/2019-ncov/index.html>, <https://www.cdc.gov/coronavirus/2019-ncov/faq.html#Coronavirus-Disease-2019>. [Accessed January 23, 2021].
- [4] S. J. Daniel, "Education and the COVID-19 pandemic," *Prospects*, vol. 49, no. 1, pp. 91-96, April 2020. [Online]. Available: <https://link.springer.com/article/10.1007/s11125-020-09464-3>.
- [5] W. Ali, "Online and remote learning in higher education institutes: A necessity in light of COVID-19 pandemic," *Higher Education Studies*, vol. 10, no. 3, pp.16-25, 2020. [Online]. Available: <https://eric.ed.gov/?id=EJ1259642>.
- [6] C. Wang, D. M. Shannon, and M. E. Ross, "Students' characteristics, self-regulated learning, technology self-efficacy, and course outcomes in online learning," *Distance Education*, vol. 34, no. 3, pp. 302-323, May 2013. [Online]. Available: <https://www.tandfonline.com/doi/full/10.1080/01587919.2013.835779>.
- [7] K. L. Kumar and R. Owston, "Evaluating eLearning accessibility by automated and student-centered methods," *Educational Technology Research and Development*, vol. 64, no. 2, pp. 263–283, April 2016. [Online]. Available: <https://www.learntechlib.org/p/193548/>.
- [8] R. Estriegana, J. Medina-Merodio, and R. Barchino, "Student acceptance of virtual laboratory and practical work: An extension of the technology acceptance model," *Computers. & Education*, vol. 135, pp. 1-14, 2019 [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S0360131519300399>.
- [9] F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Quarterly*, vol. 13, no. 3, pp. 319–340, 1989. [Online]. Available: [https://www.jstor.org/stable/249008?seq=1#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/249008?seq=1#metadata_info_tab_contents).

- [10] M. Al-Emran, V. Mezhyuev, and A. Kamaludin, "Technology acceptance model in m-learning context: A systematic review," *Computers & Education*, vol. 125, pp. 389–412, Oct. 2018. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S0360131518301519>. [Accessed January 23, 2020].
- [11] K. A. Al-Busaidi, "An empirical investigation linking learners' adoption of blended learning to their intention of full eLearning," *Behaviour & Information Technology*, vol. 32, no. 11, pp. 1168–1176, 2013. [Online]. Available: <https://www.tandfonline.com/doi/abs/10.1080/0144929x.2013.774047>.
- [12] W.H. DeLone and E.R. McLean, "Information systems success: The quest for the dependent variable," *Information Systems Research*, vol. 3, no. 1, pp. 60-95, 1992. [Online]. Available: <https://pubsonline.informs.org/doi/abs/10.1287/isre.3.1.60>.
- [13] W.H. DeLone and E.R. McLean, "The DeLone and McLean model of information systems success: A ten-year update," *Journal of Management Information Systems*, vol. 19, no. 4, pp. 9-30, 2003. [Online]. Available: <https://www.tandfonline.com/doi/abs/10.1080/07421222.2003.11045748>.
- [14] H. Mohammadi, "Investigating users' perspectives on eLearning: An integration of TAM and IS success model," *Computers in Human Behaviors*, vol. 45, pp. 359-374, 2015. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S074756321400418X>.
- [15] J. C. Roca, C. Chiu, and F. J. Martínez, "Understanding eLearning continuance intention: An extension of the Technology Acceptance Model," *International Journal of Human-Computer Studies*, vol. 64, no. 8, pp.683-696, 2006. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S107158190600005X>.
- [16] R.L. Oliver, "A cognitive model for the antecedents and consequences of satisfaction," *Journal of Marketing Research*, vol. 17, pp. 460-469, 1980. [Online]. Available: <https://journals.sagepub.com/doi/abs/10.1177/002224378001700405>.
- [17] S. A. Salloum, A. Qasim Mohammad Alhamad, M. Al-Emran, A. Abdel Monem and K. Shaalan, "Exploring Students' Acceptance of eLearning Through the Development of a Comprehensive Technology Acceptance Model," *IEEE Access*, vol. 7, pp. 128445-128462, 2019. [Online]. Available: <https://ieeexplore.ieee.org/abstract/document/8825866>.
- [18] C. Seemiller and M. Grace, "Generation Z: Educating and Engaging the Next Generation of Students" *Amer. Col. Person. Assoc. and Wiley Period. Inc.*, vol. 22, no 3, pp. 21-26, Jul/Aug, 2017. [Online]. Available: <https://journals.sagepub.com/doi/abs/10.1002/abc.21293?journalCode=acaa>.
- [19] V. Venkatesh and F. D. Davis, "A theoretical extension of the technology acceptance model: Four longitudinal field studies," *Manage. Sci.*, vol. 46,

no. 2, pp. 186–204, 2000. [Online]. Available:

<https://pubsonline.informs.org/doi/abs/10.1287/mnsc.46.2.186.11926>.

[20] Karahanna, Elena, et al. “Information Technology Adoption Across Time: A Cross-Sectional Comparison of Pre-Adoption and Post-Adoption Beliefs.” *MIS Quarterly*, vol. 23, no. 2, pp. 183–213, 1999. [Online]. Available:

[https://www.jstor.org/stable/249751?seq=1#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/249751?seq=1#metadata_info_tab_contents).

[21] Agarwal, R., Karahanna, E., “Time flies when you’re having fun: cognitive absorption and beliefs about information technology usage.” *MIS Quarterly*, vol. 24, no. 4, pp. 665–694, 2000.

[Online]. Available: [https://www.jstor.org/stable/3250951?seq=1#metadata\\_info\\_tab\\_contents](https://www.jstor.org/stable/3250951?seq=1#metadata_info_tab_contents).

[22] Parasuraman, A., Zeithaml, V.A., Berry, L., 1988. “SERVQUAL: a multiple-item scale for measuring customer perceptions of service quality.” *Journal of Retailing*. Vol. 64, no. 1, pp. 12–40, 1988. [Online]. Available: Google Books. .

[23] A. Alia, “An investigation of the application of the Technology Acceptance Model (TAM) to evaluate instructors’ perspectives on eLearning at Kuwait University,” Ph.D. dissertation, Dept. Social Sci., Dublin City Univ., Dublin, Ireland, 2016.

[24] M. M. Al-Debei, “The quality and acceptance of websites: An empirical investigation in the context of higher education,” *Int. J. Bus. Inf. Syst.*, vol. 15, no. 2, pp. 170–188, 2014. [Online].

Available: <https://www.inderscienceonline.com/doi/abs/10.1504/IJBIS.2014.059252>.

[25] I.-F. Liu, M. C. Chen, Y. S. Sun, D. Wible, and C.-H. Kuo, “Extending the TAM model to explore the factors that affect Intention to Use an Online Learning Community,” *Comput. Educ.*, vol. 54, no. 2, pp. 600–610, Feb. 2010. [Online]. Available:

<https://www.sciencedirect.com/science/article/pii/S0360131509002498>.

[26] D. Ifenthaler and C. Schumacher, “Student perceptions of privacy principles for learning analytics.” *Education Tech Research Dev* 64, pp. 923–938, 2016. [Online]. Available:

<https://doi.org/10.1007/s11423-016-9477-y>.

[27] W. M. Al-Rahmi et al., “Integrating Technology Acceptance Model With Innovation Diffusion Theory: An Empirical Investigation on Students’ Intention to Use eLearning Systems,” *IEEE Access*, vol. 7, pp. 26797–26809, 2019. [Online]. Available:

<https://ieeexplore.ieee.org/abstract/document/8643360>.

[28] A. M. Mutahar, N. M. Daud, T. Ramayah, L. Putit, and O. Isaac, “Examining the Effect of Subjective Norms and Compatibility as External Variables on TAM: Mobile Banking

Acceptance in Yemen,” *Science International*, vol. 29, no. 4, pp. 769–776, 2017. [Online]. Available: <https://www.researchgate.net/>.

[29] X. Li, M. D. Troutt, A. Brandyberry, and T. Wang, "Decision Factors for the Adoption and Continued Use of Online Direct Sales Channels among SMEs," *Journal of the Association for Information Systems*: vol. 12, no. 1, article 4, 2011. [Online]. Available: <https://aisel.aisnet.org/jais/vol12/iss1/4/>.

[30] A. B. Ozturk, A. Bilgihan, K. Nusair, and F. Okumus, “What keeps the mobile hotel booking users loyal? Investigating the roles of self-efficacy, compatibility, perceived ease of use, and perceived convenience,” *International Journal of Information Management*, vol. 36, no. 6, pp. 1350–1359, 2016. [Online]. Available: <http://doi.org/10.1016/j.ijinfomgt.2016.04.005>.

[31] E. M. Rogers, (1995). *Diffusion of Innovations* (4th ed.). New York, London: The Free Press, pp. 518, 1995.

[32] R. A. Sánchez and A. D. Hueros, “Motivational factors that influence the acceptance of Moodle using TAM,” *Comput. Hum. Behav.*, vol. 26, no. 6, pp. 1632–1640, 2010. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S0747563210001834>.

[33] N. Fathema, D. Shannon, and M. Ross, “Expanding The technology acceptance model (TAM) to examine faculty use of learning management systems (LMSs) in higher education institutions,” *J. Online Learn. Teach.*, vol. 11, no. 2, pp. 210–232, 2015. [Online]. Available: <https://eds.b.ebscohost.com/eds/pdfviewer/pdfviewer?vid=0&sid=ded231c8-d164-4291-8c52-f134fd95f298%40pdc-v-sessmgr04>.

[34] F. Kanwal and M. Rehman, “Factors affecting eLearning adoption in developing countries—empirical evidence from Pakistan’s higher education sector,” *IEEE Access*, vol. 5, pp. 10968–10978, 2017. [Online]. Available: <https://ieeexplore.ieee.org/abstract/document/7945517>.

[35] S. Y. Park, “An analysis of the technology acceptance model in understanding university students’ behavioral intention to use eLearning,” *J. Educ. Technol. Soc.*, vol. 12, no. 3, pp. 150–162, 2009. [Online]. Available: <http://41.204.183.105/handle/11732/4040>.

[36] Y. Cheng, "Effects of quality antecedents on e-learning acceptance," *Internet Research*, vol. 22, no. 3, pp. 361-390, 2012. [Online]. Available: <https://www.emerald.com/insight/content/doi/10.1108/10662241211235699/full/html>.



[37] H. C. Wang and Y. F. Chiu, "Assessing eLearning 2.0 system success" *Computers & Education*, vol. 57, no. 2, pp. 1790-1800, 2011. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S0360131511000704>.

[38] R. A. Tajuddin, M. Baharudin, T. S. Hoon, "System Quality and its Influence on Students' Learning Satisfaction in UiTM Shah Alam," *Procedia - Social and Behavioral Sciences*, vol. 90, pp. 677-685, 2013. [Online]. Available: <https://www.sciencedirect.com/science/article/pii/S1877042813020284>.