

E-LEARNING AND THE FACTORS THAT INFLUENCE THE FEAR OF FAILING AN ACADEMIC YEAR IN THE ERA OF COVID-19

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Abstract

The aim of this research has enabled us to establish the influential relationship between factors associated with e-learning, such as individual impact and depression, and the mediating role in psychological distress and computer anxiety related to the fear of failing an academic year in times of COVID-19 in university students at two universities in the Arequipa region of Peru. The methodology used was developed in two stages; in the first stage, an Exploratory Factor Analysis (EFA) was performed, which enabled us to compare the initial results from the theoretical matrix proposed with the observed matrix; in the following stage, a Confirmatory Factor Analysis (CFA) was performed, as an analytic condition for the factors and to determine the robustness of the proposed model. For this purpose, the Structural Equation Modeling (PLS-SEM) was used, based on partial minimum squares. The sample for the study was made up by 252 students. It is concluded that there are significant influential relationships among the variables observed, such as the individual impact of e-learning, depression, mediated by psychological distress and anxiety for fear of failing the academic year.

Keywords – E-learning, Depression, Psychological distress, Fear of failing the academic year, COVID-19, PLS-SEM.

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1. Introduction

There are more and more studies today that reveal that online learning is not producing the desired results, especially in underdeveloped countries. This is due to the fact that a large number of students have limitations when it comes to accessing the Internet, not only due to technical and economic problems, but also for other circumstances that interfere with an adequate participation in online activities, such as the lack of face-to-face interaction with the instructor, the response time and the lack of traditional socialization in the classroom (Adnan & Anwar, 2020). The latent and unsatisfactory image of online learning as the result of the emergency programs that have been implemented

maintains the permanent idea of facing increasingly recurrent challenges in the educational practice (Saha, Dutta & Sifat, 2021). In a similar way, there is also little doubt about the advantages and disadvantages associated with implementing e-learning systems in the global context. There are undoubtedly layers that are both visible and (for the moment) hidden in electronic learning systems, and their implementation has been a very prominent event in university education, as a crucial tool for continuing with the educational process during the COVID-19 pandemic (Salahshori, Eslami, Boostani, Zahiri, Jahani, Arjmand et al., 2022).

The proper and efficient use of e-learning is directly related to the academic success of students (Almaiah, 2018), and so for universities, the implementation of the system implies not only learning strategies, but also teaching strategies, in such a way that the instructors are also experiencing a strengthening of their competences in the use of tools to administer the virtual environments for teaching and learning; students, on the other hand, have to be willing to accept and use e-learning. Aung and Khaing previously warned that the lack of knowledge in the area of information technology (IT), deficient network infrastructures and the development of deficient contents are the main challenges to accepting the electronic learning system in underdeveloped countries (Aung & Khaing, 2015). Likewise, we must begin by recognizing that a digital divide exists, in light of the results of the e-learning experiences between rural and urban students. These contextual factors make these differences even more evident, especially during the COVID-19 pandemic (Zhao, Cao, Li & Li, 2022).

Accordingly, for students, the extreme fear of postponing or failing an academic year is associated with psychological distress and has become a topic of interest and concern in public health around the world, due to the devastating consequences caused by the coronavirus (Hossain, Ahmmed, Rahman, Sanam, Emran & Mitra, 2021). In this context, university students are suffering anxiety as the result of stress, economic factors and the severe fear of widening the existing academic divide, in such a way that the economic consequences and their effects on daily life, besides the delays in educational activities, are positively associated with symptoms of anxiety (Cao, Fang, Hou, Han, Xu, Dong et al., 2020), which could result in situations of students abandoning their studies and failing the academic year. Likewise, this situation affects the mental health of the students (Asal & Abdel-Fattah, 2007; Stewart-Brown, Evans, Patterson, Petersen, Doll, Balding et al., 2000). While the stress caused by these pandemic circumstances may be beneficial and considered adaptive, excessive stress may be very harmful to the structure and function of the brain (Macartney, Lagisz & Nakagawa, 2022), strongly affecting the expected academic success of university students.

The relationship between e-learning systems and psychological distress in students has been a recurring topic during the COVID-19 pandemic, even more so if these study variables result in the “fear of failing an academic year”. For Hasan and Bao (2020), successful e-learning programs can reduce the fear of failing the academic year by promoting proper mental health of students. The same authors warn that impersonal communication increases the risk of students abandoning their studies. Fawaz and Samaha (2021) add that psychological distress is linked to the digital divide of students who do not have the necessary technological resources to learn in real time, with female students showing greater distress or stress than their male counterparts. In a similar fashion, this seriously affects the mental health of students in rural areas (as compared to those of urban areas) and also students from families with low economic income levels (Hossain et al., 2021; Schmits, Dekeyser, Klein, Luminet, Yzerbyt & Glowacz, 2021). In different countries like Peru, the presence of COVID-19 has caused drastic changes in the lives of people and has directly impacted university education, especially the mental health status of the students, resulting in stress, depression and dropping out of the university (Lovón-Cueva & Cisneros-Terrones, 2020). Likewise, the internalization of ICT may be influencing the emotional states of university students (Huanca, Aguilar, Perez & Aguilar, 2021).

On the other hand, there are studies on academic stress in university students and the relationship this has with depression, anxiety and academic performance (Restrepo, Sánchez & Castañeda-Quirama, 2020). In addition, the contributions by Sundarasan, Chinna, Kamaludin, Nurunnabi, Baloch, Khoshaim et al. (2020) find that age, gender, major of study and living conditions are significantly associated with levels of

anxiety; as a consequence of this, anxiety is the result of the lack of confidence by the student in the use of e-learning, with the blame falling on the instructors who do not know how to use the e-learning platforms properly (Hasan & Bao, 2020; Hossain et al., 2021; Salim, Sadoon, Salim-Al-Nasrawii, Jasim & Dhahir, 2021).

This is how socialization and the implementation of cooperative strategies in educational models based on e-learning strengthen the idea of remaining in school and motivation in achieving academic goals. Alavudeen, Easwaran, Mir, Shahrani, Aseeri, Khan et al. (2021) maintain that the social and psychological impact is different in people who are alone or with their families; according to their study, it was revealed that those who lived with their families and those that were not quarantined had a positive attitude and perceptions and “social and psychological well-being.” As a result, the e-learning improved the students’ abilities, making them more effective and useful.

Different factors, such as an excessive academic work load and the digital divide that exists in the educational practice, can lead to stressful loads that generate anxiety and depressive symptoms among students. On the other hand, the limited interaction in class and inefficient scheduling also have a significant effect on the levels of student satisfaction. For this reason, it is necessary to emphasize the proper conditions in the digital infrastructure and digital skills for both students and instructors (Chaturvedi, Vishwakarma & Singh, 2021). There is little doubt that e-learning is not without its flaws since there are educational and technical difficulties associated with its implementation in higher education. It is necessary to overcome educational challenges, such as educational support, progress evaluation, self-learning skills, attention capacity, interactivity and class size. At the same time, the technical challenges include Internet connectivity, Information Technology (IT) support, proper use of Learning Management Systems (LMS) and training courses (Alsaou, Abbas & Alfayly, 2022).

In the context of the pandemic, in late 2021 and early 2022, the different mutations of the coronavirus, such as the Delta and Omicron mutations and the proliferation of cases of Flurona, associated with the risk of co-infection, generated uncertainty and fear, increasing stress and vulnerability, with a detrimental impact on subjective mental health, but in such a way that those who are more resilient are less susceptible to the negative psychological consequences of the pandemic. This is true since they experience a lesser increase in future anxiety as compared to people with lower levels of resilience (Paredes, Apaolaza, Fernandez-Robin, Hartmann & Yañez-Martinez, 2021).

According to Hagedorn, Wattick and Olfert (2021), in their study on the psychosocial and academic frustrations of students during the pandemic, it was demonstrated that the participants in this study exhibited significant difficulties in their capacity to complete tasks and maintain emotional and mental well-being in online learning. As a result, this caused an increase in academic and psychosocial frustration and prevented the students from prospering during their academic experience. The importance of affective support is thus recognized, especially in constructivist settings online in the era of COVID-19 (Gutiérrez-Aguilar, Duche-Pérez & Turpo-Gebera, 2022). There is thus no doubt that dropout and study abandonment rates are problems that concern the entire educational community (Lovos & Aballay, 2021), as are psychological distress and the mediating role in these factors, such as the fear of failing the academic year, especially in university students. In Peru, more than 83,000 students dropped out during the 2021 academic year, according to the report by the Ombudsman Office, and an additional 301,000 students did not complete their enrollment in 2021. According to Alicia Abanto, this is a very serious problem that is due to the lack of access to remote education, the availability of technological equipment, school dropouts, decreased learning and mental health disorders (La República, 2021).

2. Individual Impact of E-learning and Computer Anxiety

Studies related to e-learning and computer anxiety coincide in indicating that the technical problems associated with connectivity, accessibility, learning resources and above all, to a large extent, with limited teacher performance in the administration of virtual environments due to inexperience and the lack of teacher preparation, brought about problems of computer anxiety. This had a negative effect on the

academic performance of students, a situation that was especially evident during virtual exams, caused by the duration and method of one-way navigation that was used. The students even said that this type of exam is more stressful than the classroom-based evaluations (Elsalem, Al-Azzam, Jum'ah, Obeidat, Sindiani & Kheirallah, 2020). In Peru, a great challenge to overcome this problem is tackling digital poverty as a distinctive trait of students in conditions of vulnerability, which also applies to the instructors. Digital poverty is evidenced in the lack of connectivity and technological resources, such as computers, laptops, tablets and cell phones for effective communication (Barrantes, 2007), and it also implies the absence of technological skills (Parkes, Stein & Reading, 2015) in order to interact in a virtual environment for educational purposes (Benites, 2021).

On the contrary, adequate skills in terms of the perception of the electronic learning methods can be attributed to the good communications channels between students and professors and adequate teaching strategies (De Michele, 2020; Dwivedi, Kaur, Shukla, Gandhi & Tripathi, 2020). For this reason, it is necessary to build the instructors' skills in the use of technologies like Google Meet and Classroom, along with Microsoft Teams and LMS such as Moodle and Blackboard, as well as the use of personal devices, such as laptops, smartphones and tablets, which would help to reduce anxiety and stress in university students. Therefore, virtual education represents a real challenge, as do the difficulties related to accessing learning platforms, such as poor signals, geographic location, the network, a computer to be used personally by the student, family income, among others. This has led to the increase in academic dropout rates in Colombia and Peru at the start of the pandemic (Serna-Alarcón, Paraguay, Mejía, Rodríguez-Alarcón, Vinelli-Arzuviaga, Vilela-Estrada et al., 2021).

3. The Impact of E-learning and the Fear of Failing the Academic Year

Hoque, Hannan, Imran, Alam, Matubber and Saha (2021) support the thesis that there are three problems with e-learning and its repercussion on the fear of failing the academic year. They are: learning only at home, the lack of access to learning resources and the inaccessibility of electronic learning platforms. Therefore, the fear of failing the academic year by upper-level students is assessed on an ongoing basis by educational institutions, due to the fact that it hampers the teaching and learning process and deeply affects the concept of e-learning; on the contrary, the implementation of good instructional practices makes it possible to reduce this fear (Al-Marroof, Alhumaid, Akour, Salloum, Sarasa-Cabezuelo, Caballé et al., 2021).

According to Lovos and Aballay (2021), one latent concern on the educational level surfaces in the cases of dropping out and abandonment of studies, which would obviously be related to the previous fear of failing the academic year, in such a way that the processes of distress that trigger the fear of failing the academic year would be related to dropping out, which is a problem that also affects university education and would be associated with feelings of frustration and failure.

As a result, the educational system is challenged with adapting to the virtual world and to online education. As such, e-learning has been around for the last twenty years and it is in this context that it gains great notoriety, due to the pandemic (Toro, 2021). In this way, learning is influenced by different factors that alter the emotional realm of everyone related to it, in which the academic load has been indicated as a factor that generates conditions of stress, anxiety and depression in university students (Trunce-Morales, Villarroel-Quinchalef, Arntz-Vera & Werner-Contreras, 2020).

4. Computer Anxiety - Psychological Distress

Making the transition from classroom-based education to remote education has not been an easy task for either students or instructors. This is due to the fact that in many cases there are limitations to the proper use of ICT in carrying out educational tasks, which obviously affects the performance and concentration of students on their online learning. This is where anxiety and doubts about the future represent counterproductive frames of mind in university students (Martínez-Libano, 2020). According to Da Silva-Ribeiro, Bragé, Ramos, Fialho, Vinholes & Lacchini (2021), the results of studies conducted at universities during the first semesters of the COVID-19 pandemic showed that students exhibited high levels of depression, anxiety and stress. This was attributed to doubts about how the academic year would

unfold and the subsequent consequences (Khoshaim, Al-Sukayt, Chinna, Nurunnabi, Sundarasan, Kamaludin et al., 2020).

For Vento et al. (2021), the concept of anxiety in the era of the COVID-19 pandemic implies worry, fear, apprehension, doubts and anxiety that, if frequent, would affect the normal physical and psychological performance of the individual. It has been found that students who work online show greater levels of anxiety related to uncertainty and depression, which could be due to the sense of loneliness that they experience. Thus, remote or online education could be generating dissatisfaction and feelings of loneliness, and consequently depression, as well as the lack of the technological mastery that is so necessary in a virtual world (Prieto-Molinari, Aguirre-Bravo, de Pierola, Victoria-de-Bona, Mereca-Silva, Lazarte-Nuñez et al., 2020). As a result of this, Sáez-Ávila and Atienza de Frutos (2010) warn that the anxiety that is generated around e-learning may derive in anxiety and the rejection of ICT, which is reflected in dropping out of courses as the result of not knowing how to ward off online or computer anxiety. The study revealed that 35% of the students experienced moderate to severe anxiety. Female students and fourth year students were the most anxious as compared to their counterparts.

The pandemic, which brought about situations of social isolation, for example, has increased the levels of anxiety and stress on a global level, affecting the quality of life and well-being of students who saw their learning change from classroom-based instruction at school to online learning (Ticona, Zela & Vásquez, 2021). Likewise, anxiety would be related to the use of ICT and the loss of control, supposedly by breaking away from previously established teaching and learning customs, and by considering it as a source of frustration and isolation, the excessive use of which would generate dependence (Sánchez-Macías, Flores-Rueda, Veytia-Bucheli, Azuara-Pugliese, Sánchez-Macías, Flores-Rueda et al., 2021). Therefore, it is necessary for educators and staff members involved in educational management to make a considerable effort to reduce the anxiety related to COVID-19, so that students can improve their distance electronic learning results (Kim & Park, 2021). Based on the previous considerations, the following hypotheses are proposed:

- H1 Psychological anxiety has an influence on the fear of failing the academic year.*
- H2 Computer anxiety has a positive influence on psychological distress.*
- H3 Computer anxiety has an influence on the fear of failing the academic year.*
- H4 E-learning and depression have an influence on psychological distress.*
- H5 E-learning and depression have an influence on computer anxiety.*
- H6 E-learning and depression have an influence on the fear of failing the academic year.*
- H7 The individual impact of e-learning has an influence on psychological distress.*
- H8 The individual impact of e-learning has an influence on computer anxiety.*
- H9 The impact of e-learning has an influence on the fear of failing the academic year.*

5. Methodology

For this study, online surveys were distributed to a convenience sample of students registered during the even-numbered semester of studies in 2021, between the months of July and September in the midst of the social isolation as the result of COVID-19. The sample studied corresponds to students at the public San Agustín National University and students at the private Santa María Catholic University, both in the Arequipa region of Peru, with a total of 252 students. The ages are between 18 and 30 years, with a mean age of 21.019 and a standard deviation of 3.2473. (See Table 1.)

Men	70	27.8%
Private University	16	6.3%
Public University	54	21.4%
Female	182	72.2%
Private University	33	13.1%
Public University	149	59.1%
Overall total	252	100.0%

Table 1. Study sample

5.1. Instrument

The instrument applied is an adaptation of that used by Najmul Hasan and Yukun Bao, entitled: *Impact of “e-Learning crack-up” perception on psychological distress among college students during COVID-19 pandemic: A mediating role of “fear of academic year loss”* (Hasan & Bao, 2020).

During the validation and approval process for the instrument, semantic adjustments were made by a linguist specialized in foreign languages, to prevent any problems with interpretation and comprehension of the items, A preliminary statistical test was performed before applying the final instrument with 50 students, for the purpose of establishing the validity and reliability, and in particular, adequate discrimination of the instrument items with their corresponding factors, taking into account the theoretical construct used in the research. Furthermore, as part of the process, an Exploratory Factor Analysis (EFA) was performed. The statistical software JASP v. 0.16 was used. The Kaiser-Meyer-Olkin (KMO) test obtained a result of 0.934, which is acceptable, while the Bartlett’s test had a result of X^2 9461.909, gl 861.000 and a p value of $< .001$.

6. Results

The estimated reliability reached values above 0.700, which can be considered acceptable for Omega and Cronbach’s Alpha tests. (See Table 2.)

In the EFA, the criteria were used that included a 5-factor manual number with orthogonal Varimax rotation for the independent variables, with output options with items greater than 0.500, in which additional fit indexes were obtained that allow us to compare the theoretical matrix to the observed matrix with the initial results. The TLI is 0.943, which is an indicator of a comparative fit, with the ideal value being greater than 0.950; with regard to the RMSEA (Root Mean Square Error of Approximation), which indicates an absolute fit, the value obtained is 0.074, which is adequate. Table 3 shows the rotated component matrix, where an adequate composition of the items with their corresponding factors is seen.

With regard to the results of the model, Confirmatory Factor Analysis (CFA) tests were performed as an analytic condition for the factors; their application would contribute to determining the robustness of the proposed model.

The Comparative Fit Index (CFI) has a value of 0.943, which demonstrates an adequate fit; in turn, the Tucker-Lewis (TLI) index has a value of 0.954, which is considered adequate for the model, with values $\geq .900$ being recommendable according to (Keith, 2015: page 312). (See Table 4.)

	McDonald’s ω	Cronbach’s α
Point estimate	0.949	0.947
95% lower CI limit	0.940	0.938
95% upper CI limit	0.958	0.955

Table 2. Reliability statistics

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Uniqueness
EII1			0.803			0.34
EII2			0.820			0.28
EII3			0.821			0.316
EII4			0.828			0.3
EII5			0.774			0.381
EII6			0.847			0.266
EII7			0.832			0.287
MPAA1					0.657	0.432
MPAA2					0.606	0.404
MPAA3					0.778	0.26
MPAA4					0.824	0.218
MPAA5					0.699	0.447
MPAA6					0.643	0.345
MPAA7					0.614	0.43
LCA1				0.794		0.271
LCA2				0.817		0.223
LCA3				0.845		0.202
LCA4				0.697		0.385
LCA6				0.729		0.317
LCA7				0.697		0.393
LCA8				0.544		0.465
ED1	0.686					0.334
ED2	0.570					0.413
ED3	0.520					0.41
ED4	0.766					0.251
ED5	0.507					0.547
ED6	0.532					0.536
ED7	0.616					0.29
ED8	0.752					0.256
ED9	0.780					0.296
ED10	0.605					0.528
ED11	0.527					0.6
PhyDis2		0.623				0.332
PhyDis3		0.827				0.201
PhyDis4		0.795				0.189
PhyDis5		0.742				0.279
PhyDis6		0.703				0.375
PhyDis7		0.649				0.352
PhyDis8		0.605				0.376
PhyDis9		0.684				0.301
PhyDis10		0.599				0.402

Note: The Varimax rotation method has been applied.

Table 3. Factor loads of the rotated component

Index	Value
Comparative Fit Index (CFI)	0.943
Tucker-Lewis Index (TLI)	0.954

Table 4. Fit index

Different authors suggest different criteria for the validation of the fit measurements, such as in the case of RMSEA. Accordingly, values lesser than or equal to 0.05 would be valid for Brown (2015: page 72); however, it should be warned that authors such as Jöreskog and Sörbom (1996) suggest greater values of $P > .50$. In terms of the SRMR measure, a value of $\leq .08$ is proposed for a good fit, although $\leq .06$ could be a better criterion (Keith, 2015: page 312). Table 5 shows the fit measurements achieved, which for the RMSEA was a value of 0.079 and for the SRMR, a value of 0.060 is obtained.

For the determination and structural design of the model, the Structural Equations Modeling (SEM) was used with partial least squares (PLS), using SmartPLS (v.3.3.3) software created by Christian M. Ringle, Sven Wende and Jan-Michael Becker (Ringle, Wende & Becker, 2015).

In order to evaluate the consistency of the model, the Cronbach’s alpha test was conducted to establish the levels of reliability of the indicators, the results of which exceed 0.700, with these values being acceptable for the structural model (George & Mallery, 2003). (Figure 1.)

Metric	Value
Root Mean Square Error of Approximation (RMSEA)	0.079
RMSEA 90% lower CI limit	0.074
RMSEA 90% upper CI limit	0.083
Standardized Root Mean Squared (SRMR)	0.060

Table 5. Other fit measurements

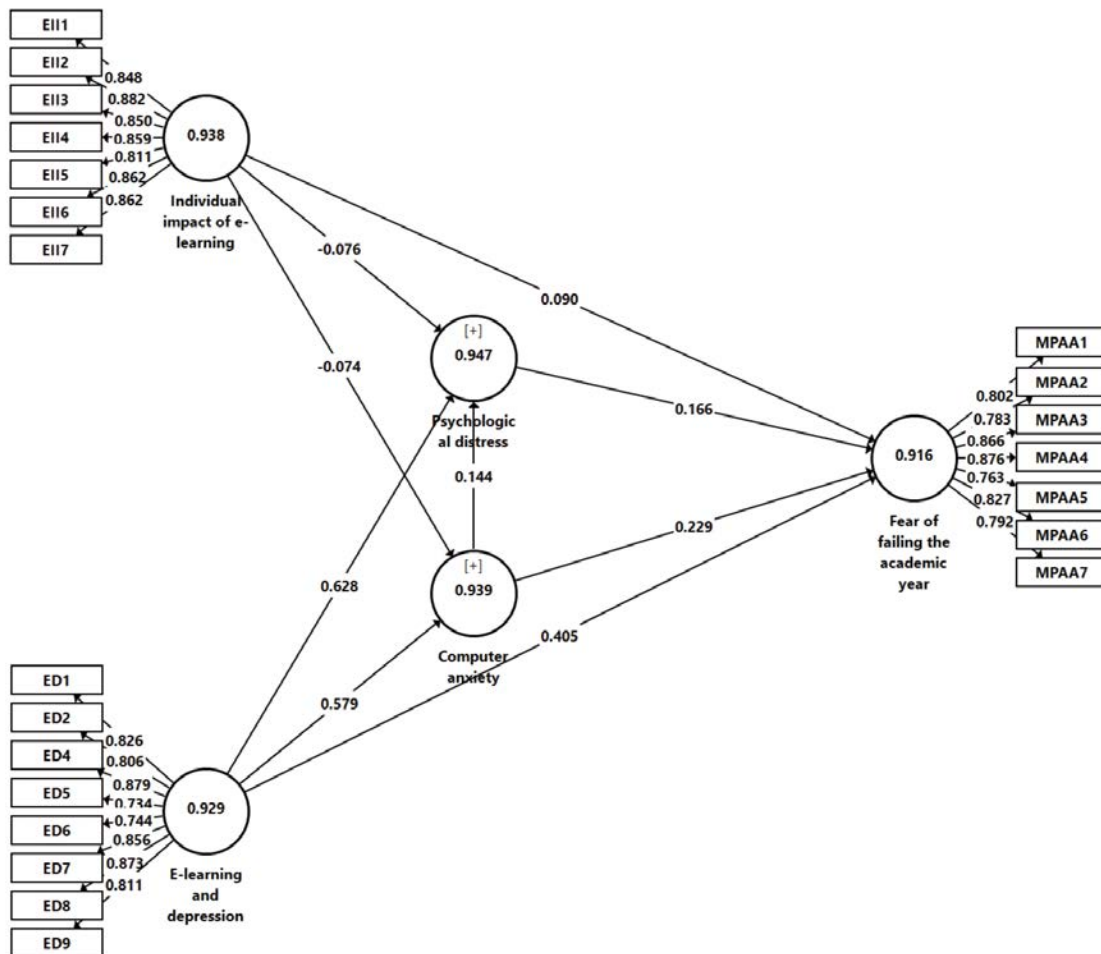


Figure 1. Cronbach’s alpha from the SmartPLS model

For the measurement model, the reliability and validity are obtained through the calculation with the PLS algorithm in SmartPLS. Path coefficients are also obtained, using 300 iterations in the exploratory analysis, with a stop criterion of 10⁻⁷. The results, explained based on the R² (coefficient of determination) will serve to find the relationship that exists between the proposed factors in the model. (See Figure 2.)

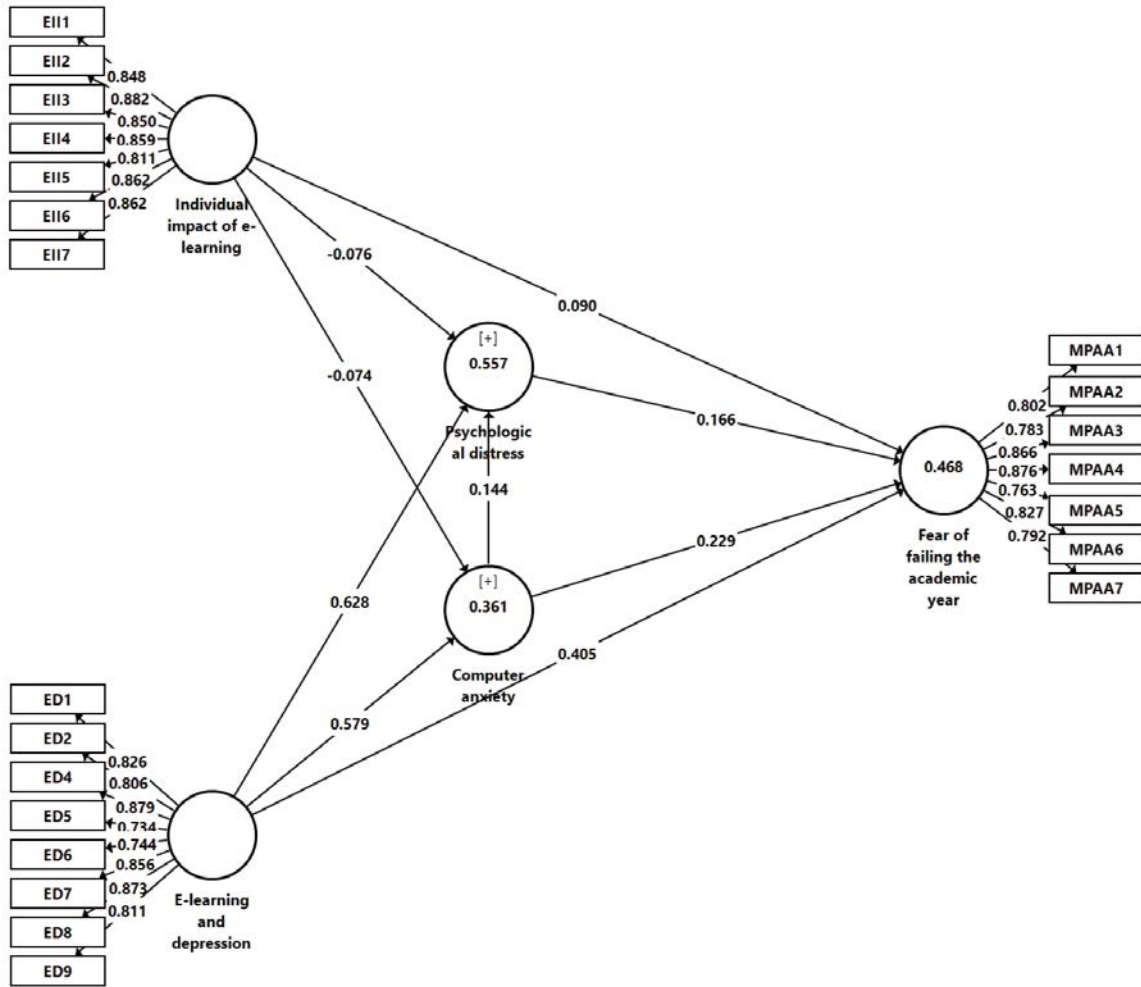


Figure 2. R² according to PLS-SEM

The validity of the model was demonstrated with the reliability and validity tests, through the correlation of their variables; the results obtained for Cronbach’s alpha reached values of between 0.916 and 0.947, which represents acceptable levels of reliability. The results for the Average Variance Extracted (AVE) fluctuated between 0.572 and 0.667, exceeding the minimum accepted value of 0.500 (Hair Jr, Hult, Ringle & Sarstedt, 2016), which would demonstrate the variance with other factors of the model (Cheng, Yang & Sheu, 2014). The application of the Composite Reliability test has been recommended by various authors (Bagozzi & Yi, 1988; Hair, Sarstedt, Pieper & Ringle, 2012). Said authors propose that if the results are greater than 0.600, this would demonstrate reasonable levels of reliability in terms of the internal consistency for each of the variables. The results show values of between 0.933 and 0.955. The coefficient rho_A is used to check the reliability of the results obtained in the PLS design. The authors Dijkstra and Henseler (2015) suggest results above 0.700 show an adequate level of reliability. The data presented in Table 6, range from 0.920 to 0.951.

	Cronbach's alpha	rho_A	Composite reliability	Average Variance Extracted (AVE)
Psychological distress	0.947	0.948	0.955	0.703
Computer anxiety	0.939	0.939	0.949	0.672
E-learning and depression	0.929	0.932	0.942	0.669
Individual impact of e-learning	0.938	0.951	0.949	0.729
Fear of failing the academic year	0.916	0.920	0.933	0.667

Table 6. Reliability and validity of the construct

	Psychological distress	Computer anxiety	E-learning and depression	Individual impact of e-learning	Fear of failing the academic year
Psychological distress	0.839				
Computer anxiety	0.535	0.820			
E-learning and depression	0.732	0.597	0.818		
Individual impact of e-learning	-0.259	-0.214	-0.241	0.854	
Fear of failing the academic year	0.562	0.54	0.642	-0.1	0.817

Table 7. Analysis of the Fornell-Larcker criterion for verification and discriminant validity

	Psychological distress	Computer anxiety	E-learning and depression	Individual impact of e-learning	Fear of failing the academic year
Psychological distress					
Computer anxiety	0.566				
E-learning and depression	0.775	0.635			
Individual impact of e-learning	0.267	0.224	0.254		
Fear of failing the academic year	0.594	0.576	0.686	0.109	

Table 8. Heterotrait-Monotrait Criterion – HTMT for verification and discriminant validity

Two methods were used to check the discriminant validity; the first is that proposed by Fornell and Larcker (Fornell & Larcker, 1981), who recommend that for the square root of the AVE in each variable, the results should be greater than the values of the correlation between the variables. Accordingly, Table 7 evidences the discriminant validity in the proposed structural model.

The other method is that formulated by Henseler, C. M. Ringle and M. Sarstedt (Henseler, Ringle & Sarstedt, 2015), who suggest that the lack of discriminant validity is better manifested by means of the *Heterotrait-Monotrait* (HTMT) relationship. The HTMT coefficient was thus used for this purpose. The result was fully justified by means of the resulting values, due to the fact that they are below the recommended threshold of 0.850 suggested by G. Franke and M. Sarstedt (Franke & Sarstedt, 2019). Other authors like Hosen (Hosen, Ogbeibu, Giridharan, Cham, Lim & Paul, 2021) have explained that HTMT is more suitable when reaching greater fits in terms of specificity and sensitivity (97%-99%) as compared to cross loadings (Ab Hamid, Sami & Sidek, 2017). See Table 8.

For the hypotheses tests, the *Bootstrapping* method was used through resampling extraction (10,000), by replacing the original sample in order to then estimate the parameters of the proposed model. The standard error of an estimate is deduced from the standard deviation of the bootstrap values (Henseler, 2017). Considering the level of significance with the P Value ($p < 0.05$), hypotheses H7; H8 and H9 have been rejected and the hypotheses H1; H2; H3; H4; H5 and H6 have been accepted. (Table 9.)

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	t statistics (O/STDEV)	P-value
H1 Psychological distress -> fear of failing the academic year	0.166	0.166	0.084	1.971	0.024
H2 Computer anxiety -> Psychological distress	0.144	0.145	0.074	1.960	0.025
H3 Computer anxiety -> Fear of failing the academic year	0.229	0.234	0.068	3.348	0.000
H4 E-learning and depression -> Psychological distress	0.628	0.627	0.068	9.235	0.000
H5 <i>E-learning</i> and depression -> Computer anxiety	0.579	0.579	0.050	11.596	0.000
H6 E-learning and depression -> Fear of failing the academic year	0.405	0.402	0.091	4.445	0.000
H7 Individual impact of e-learning -> Psychological distress	-0.076	-0.078	0.051	1.497	0.067
H8 Individual impact of e-learning -> Computer anxiety	-0.074	-0.077	0.059	1.246	0.106
H9 Individual impact of e-learning -> Fear of failing the academic year	0.090	0.089	0.056	1.607	0.054

Table 9. Hypothesis test - Bootstrapping

7. Discussion

The present study reveals the mediating effect of psychological distress and computer anxiety on the fear of failing the academic year, with a significant effect of e-learning and depression. When comparing conventional instruction with e-learning, it was found that there is no impact on the improvement of skills (Alavudeen et al., 2021).

These findings reveal that psychological distress has an influence on the fear of failing the academic year, which leads to feelings of worry, nervousness and anxiety with regard to online academic work. In a similar manner, it has been found that this perceived threat can lead to students dropping out (Lovón-Cueva & Cisneros-Terrones, 2020), as this vulnerability has the effect of increasing stress, affecting their health and mental well-being (Hasan & Bao, 2020; Hossain et al., 2021; Paredes et al., 2021). Frustration is the most negative emotion (Lovón-Cueva & Cisneros-Terrones, 2020) and to counteract these effects, it is sustained that contact with the family and friends can lower the levels of anxiety and depression; likewise, physical activity can provide a certain degree of protection against psychological distress (Schmits et al., 2021).

Thus, computer anxiety is a key factor in establishing causal relationships with psychological distress, where fear, worry and insecurity flourish, as the result of not having the necessary competences to use the devices. Likewise, university students in their first semesters show high levels of depression, anxiety and stress related to doubts about how the academic year will unfold and the subsequent consequences (Da Silva-Ribeiro et al., 2021). Likewise, the levels of anxiety and depression, feelings of loneliness (Prieto-Molinari et al., 2020) and frustration due to the lack of technological mastery (Prieto-Molinari et al., 2020) lead to stress, and so the hypothesis is confirmed that computer anxiety has an influence on the fear of failing the academic year.

Likewise, e-learning and depression influence psychological distress, with a very high inclination towards not being able to concentrate, fear of failure, along with family problems that lead to poor academic performance. Checking other studies, the derivation of responsibility to instructors who do not know how to properly use the e-learning platforms overwhelms students (Hasan & Bao, 2020; Hossain et al., 2021), affecting their emotional and mental well-being in online learning (Hagedorn et al., 2021). Work online has generated insecurity and fear, with financial limitations predominating (Sundarasan et al., 2020); it has been established that e-learning and depression have an influence on computer anxiety, with an emphasis on accessibility. Inexperience and the lack of preparation are the

main barriers that limit acceptance by students. Contrary to what is presented here, experiences in favor of continuing to learn by means of e-learning have also been found, with a low level of perceived stress (Dwivedi et al., 2020). The use of personal devices and their interactive use also made it possible to mitigate anxiety (De Michele, 2020).

In the same way, the e-learning associated with depression in students would have an influence on the fear of failing the academic year, as other authors have warned (Al-Marroof et al., 2021; De Michele, 2020; Hoque et al., 2021; Martínez-Libano, 2020), resulting from having to learn alone, mastering technology and accessing learning resources, all of which can lead to dropping out and failing the academic year. In this sense, student satisfaction with e-learning was measured, along with the depression, anxiety and stress scale. The results showed a significant negative relationship among the variables, showing dissatisfaction with online learning in line with the prevalence of depressive symptoms (Fawaz & Samaha, 2021), which demonstrates a relationship with the findings regarding our hypothesis. Contrary to this, the positive utility of using technology has been found, guaranteed with good practices in reducing fear (Al-Marroof et al., 2021). It is understood that this manner depends on the emotional state, so that the student feels secure enough to work in an e-learning context.

And finally, the hypotheses H7 (the individual impact of e-learning has an influence on psychological distress); H8 (the individual impact of e-learning has an influence on computer anxiety) and H9 (the individual impact of e-learning has an influence on the fear of failing the academic year) proven not to have any relationship. However, as an independent factor, in addition to presenting factor loads greater than 0.800, e-learning increases productivity, generates personalized experiences and allows commitments to be fulfilled and is useful for work, among others.

As a result, this article has presented certain novel and practical implications. First of all, university instructors must rely on different interactive methods of learning in order to inspire confidence and attempt to eradicate the fear of failing the academic year, generating acceptance of the use of technology with adequate, flexible and ubiquitous strategies. Secondly, the fear and its implications would trigger poor performance and dropping out, as well as feelings of worry and insecurities, which could lead to levels of depression, deteriorating the student's emotional state. Thirdly, there are substantial relationships between e-learning, psychological distress and the fear of failing the academic year. This research contributes to optimizing the efficiency of teaching and learning in universities and can lead to greater acceptance of e-learning by students if connectivity is ensured in the case of disadvantaged students. Flexible, ubiquitous environments, collaborative strategies, autonomy and personalized learning and proper tutoring would in turn allow for the strengthening of emotions with regard to the use of e-learning, excluding the fear of failing the academic year.

The results of the CFA confirmed the consistency and robustness of the factor model proposed for this study, which will serve as a basis for conducting new predictive studies in the future. The novelty of this proposal lies in the fact that structural equations were integrated into the modeling, including the CB-SEM fit indexes, such as the CFI and the RMSEA indexes and the measurement model assessment for reflective PLS-SEM constructs. Additional complementary research is needed to verify the psychometric parameters of reliability and validity of the instruments developed in our study. Finally, we hope that the participating Peruvian universities implement an e-learning system that is more efficient in the use of technology that would permit monitoring the methodology that is implemented and that would promote the satisfaction, motivation and positive feelings of students.

8. Conclusions

There are substantial relationships among the three variables observed: e-learning, psychological distress and fear of failing the academic year. Therefore, the findings confirm the importance of internal resource management for successful online learning during the pandemic and to promote secure, reliable environments that permit emotional control in the use and acceptance of technologies, as well as the integration of dynamic and ubiquitous methods in e-learning settings.

The results indicate that students evaluate their distance learning experience with emotions of worry, anxiety and insecurity due to the connectivity, economic and digital divides, in order to successfully complete their academic year. This could have a tendency to cause anxiety in students.

In general, the current study contributes to the literature by stressing the importance of digital learning environments, which are user-friendly and accessible to university students in contexts such as the COVID-19 pandemic. They must be supported by instructors who are prepared to handle the pertinent current technological tools, which strengthens the need to continue to investigate experiences in e-learning settings, as well as the factors that we offer in the applied instrument.

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References

- Ab Hamid, M., Sami, W., & Sidek, M.M. (2017). Discriminant validity assessment: Use of Fornell & Larcker criterion versus HTMT criterion. *Journal of Physics: Conference Series*, 890. <https://doi.org/10.1088/1742-6596/890/1/012163>
- Adnan, M., & Anwar, K. (2020). Online Learning amid the COVID-19 Pandemic: Students' Perspectives. *Journal of Pedagogical Sociology and Psychology*, 2(1), 45-51. <https://doi.org/10.33902/JPSP.2020261309>
- Al-Marouf, R.S., Alhumaid, K., Akour, I., Salloum, S., Sarasa-Cabezuelo, A., Caballé, S. et al. (2021). Factors That Affect E-Learning Platforms after the Spread of COVID-19: Post Acceptance Study. *MDPI Journal*, 6(5), 49. <https://doi.org/10.3390/data6050049>
- Alavudeen, S.S., Easwaran, V., Mir, J.I., Shahrani, S.M., Aseeri, A.A., Khan, N.A. et al. (2021). The influence of COVID-19 related psychological and demographic variables on the effectiveness of e-learning among health care students in the southern region of Saudi Arabia. *Saudi Pharmaceutical Journal*, 29(7), 775-780. <https://doi.org/10.1016/j.jsps.2021.05.009>
- Almaiah, M.A. (2018). Acceptance and usage of a mobile information system services in University of Jordan [Article]. *Education and Information Technologies*, 23(5), 1873-1895. <https://doi.org/10.1007/s10639-018-9694-6>
- Alsahou, H., Abbas, Z., & Alfayly, A. (2022). The attitude of undergraduates towards E-learning considering educational and technical challenges and requirements in Kuwait Applied Colleges. *Journal of Technology and Science Education*, 12(1). <https://doi.org/10.3926/jotse.1358>
- Asal, A.R., & Abdel-Fattah, M.M. (2007). Prevalence, symptomatology, and risk factors for depression among high school students in Saudi Arabia. *Neurosciences (Riyadh)*, 12(1), 8-16. <https://doi.org/10.1037/e677552011-004>
- Aung, T.N., & Khaing, S.S. (2015). Challenges of implementing e-learning in developing countries: A review. *International conference on genetic and evolutionary computing* (388). https://doi.org/10.1007/978-3-319-23207-2_41
- Bagozzi, R.P., & Yi, Y. (1988). On the evaluation of structural equation models. *Journal of the academy of marketing science*, 16(1), 74-94. <https://doi.org/10.1007/BF02723327>
- Barrantes, R. (2007). Analysis of ICT demand: what is digital poverty and how to measure it? *Digital Poverty: Latin American and Caribbean Perspectives*, 29-53. <https://doi.org/10.3362/9781780441115.002>

- Benites, R. (2021). La educación superior universitaria en el Perú post-pandemia. *Políticas y debates públicos - PUCP*. Available at: <https://escuela.pucp.edu.pe/gobierno/wp-content/uploads/2021/05/La-Educacion-Superior-Universitaria-en-el-Peru-post-pandemia-VF.pdf>
- Brown, T.A. (2015). *Confirmatory Factor Analysis for Applied Research* (2nd ed.). The Guilford Press.
- Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J. et al. (2020). The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Research*, 287, 112934. <https://doi.org/10.1016/j.psychres.2020.112934>
- Chaturvedi, K., Vishwakarma, D.K., & Singh, N. (2021). COVID-19 and its impact on education, social life and mental health of students: A survey. *Children and Youth Services Review*, 121(July 2020), 105866-105866. <https://doi.org/10.1016/j.childyouth.2020.105866>
- Cheng, C.C. J., Yang, C.L., & Sheu, C. (2014). The link between eco-innovation and business performance: a Taiwanese industry context. *Journal of Cleaner Production*, 64, 81-90. <https://doi.org/10.1016/j.jclepro.2013.09.050>
- Da Silva-Ribeiro, L., Brag e,  .G., Ramos, D.B., Fialho, I.R., Vinholes, D.B., & Lacchini, A.J.B. (2021). Covid-19 pandemic effects on the mental health of an academic community. *ACTA Paulista de Enfermagem*, 34. <https://doi.org/10.37689/ACTA-APE/2021AO03423>
- De Michele, R. (2020). Benefits, drawbacks and psychological impact of online lectures during quarantine due to Covid-19 pandemic. *ACM International Conference Proceeding Series*, 257-260. <https://doi.org/10.1145/3411170.3411265>
- Dijkstra, T.K., & Henseler, J. (2015). Consistent partial least squares path modeling. *MIS quarterly*, 39(2), 297-316. <https://doi.org/10.25300/MISQ/2015/39.2.02>
- Dwivedi, D., Kaur, N., Shukla, S., Gandhi, A., & Tripathi, S. (2020). Perception of stress among medical undergraduate during coronavirus disease-19 pandemic on exposure to online teaching. *National Journal of Physiology, Pharmacy and Pharmacology*, 10, 8-8. <https://doi.org/10.5455/njppp.2020.10.05107202009052020>
- Elsalem, L., Al-Azzam, N., Jum'ah, A.A., Obeidat, N., Sindiani, A.M., & Kheirallah, K.A. (2020). Stress and behavioral changes with remote E-exams during the Covid-19 pandemic: A cross-sectional study among undergraduates of medical sciences. *Annals of Medicine and Surgery*, 60(November), 271-279. <https://doi.org/10.1016/j.amsu.2020.10.058>
- Fawaz, M., & Samaha, A. (2021). E-learning: Depression, anxiety, and stress symptomatology among Lebanese university students during COVID-19 quarantine. *Nursing Forum*, 56(1), 52-57. <https://doi.org/10.1111/nuf.12521>
- Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of marketing research*, 18(1), 39-50. <https://doi.org/10.1177/002224378101800104>
- Franke, G., & Sarstedt, M. (2019). Heuristics versus statistics in discriminant validity testing: a comparison of four procedures. *Internet Research*, 29(3), 430-447. <https://doi.org/10.1108/IntR-12-2017-0515>
- George, D., & Mallery, M. (2003). *Using SPSS for Windows step by step: a simple guide and reference*. Allyn & Bacon
- Guti rrez-Aguilar, O., Duche-P erez, A., & Turpo-Gebera, O. (2022). Affective Support Mediated by an On-Line Constructivist Environment in Times of Covid-19. *Smart Innovation, Systems and Technologies*, 259, 458-468. Available at: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85116921175&doi=10.1007%2f978-981-16-5792-4_45&partnerID=40&md5=ac60e3b70151fd8263344065d011aa59 https://doi.org/10.1007/978-981-16-5792-4_45
- Hagedorn, R.L., Wattick, R.A., & Olfert, M.D. (2021). "My Entire World Stopped": College Students' Psychosocial and Academic Frustrations during the COVID-19 Pandemic. *Applied Research in Quality of Life*, 17, 1069-1090. <https://doi.org/10.1007/s11482-021-09948-0>

- Hair, J.F., Sarstedt, M., Pieper, T.M., & Ringle, C.M. (2012). The use of partial least squares structural equation modeling in strategic management research: a review of past practices and recommendations for future applications. *Long range planning*, 45(5-6), 320-340. <https://doi.org/10.1016/j.lrp.2012.09.008>
- Hair Jr, J.F., Hult, G.T.M., Ringle, C., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Sage publications.
- Hasan, N., & Bao, Y. (2020). Impact of “e-Learning crack-up” perception on psychological distress among college students during COVID-19 pandemic: A mediating role of “fear of academic year loss”. *Children and Youth Services Review*, 118, 105355-105355. <https://doi.org/10.1016/j.childyouth.2020.105355>
- Henseler, J. (2017). Partial least squares path modeling. In *Advanced methods for modeling markets* (361-381). Springer. https://doi.org/10.1007/978-3-319-53469-5_12
- Henseler, J., Ringle, C.M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115-135. <https://doi.org/10.1007/s11747-014-0403-8>
- Hoque, M.N., Hannan, A., Imran, S., Alam, M.A., Matubber, B., & Saha, S.M. (2021). Anxiety and Its Determinants among Undergraduate Students during E-learning in Bangladesh Amid Covid-19. *Journal of Affective Disorders Reports*, 6, 100241-100241. <https://doi.org/10.1016/j.jadr.2021.100241>
- Hosen, M., Ogbeibu, S., Giridharan, B., Cham, T.H., Lim, W.M., & Paul, J. (2021). Individual motivation and social media influence on student knowledge sharing and learning performance: Evidence from an emerging economy. *Computers & Education*, 172, 104262. <https://doi.org/10.1016/j.compedu.2021.104262>
- Hossain, M.J., Ahmmed, F., Rahman, S.M.A., Sanam, S., Emran, T.B., & Mitra, S. (2021). Impact of online education on fear of academic delay and psychological distress among university students following one year of COVID-19 outbreak in Bangladesh. *Helvion*, 7(6), e07388. <https://doi.org/10.1016/j.helivion.2021.e07388>
- Huanca, S.C., Aguilar, A.G., Perez, A.B.D., & Aguilar, O.G. (2021). The internalization of ICT and its influence on emotional states in university students. *Iberian Conference on Information Systems and Technologies, CISTI*. Available at: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-85115744946&doi=10.23919%2fCISTI52073.2021.9476543&partnerID=40&md5=97df76110465e8828869f970fad776> <https://doi.org/10.23919/CISTI52073.2021.9476543>
- Jöreskog, K.G., & Sörbom, D. (1996). *LISREL 8: User's Reference Guide*. Scientific Software International.
- Keith, T.Z. (2015). *Multiple Regression and Beyond: An Introduction to Multiple Regression and Structural Equation Modeling* (2nd ed.). Taylor & Francis.
- Khoshaim, H.B., Al-Sukayt, A., Chinna, K., Nurunnabi, M., Sundarasan, S., Kamaludin, K. et al. (2020). Anxiety Level of University Students During COVID-19 in Saudi Arabia [Original Research]. *Frontiers in Psychiatry*, 11. <https://doi.org/10.3389/fpsy.2020.579750>
- Kim, S.H., & Park, S. (2021). Influence of learning flow and distance e-learning satisfaction on learning outcomes and the moderated mediation effect of social-evaluative anxiety in nursing college students during the COVID-19 pandemic: A cross-sectional study. *Nurse Education in Practice*, 56, 103197. <https://doi.org/10.1016/j.nepr.2021.103197>
- La República (2021). Defensoría: Más de 83.000 estudiantes desertaron del año escolar este 2021. *La República*. Available at: <https://larepublica.pe/sociedad/2021/11/12/defensoria-mas-de-83000-estudiantes-desertaron-del-ano-escolar-este-2021/>
- Lovón-Cueva, M.A., & Cisneros-Terrones, S.A. (2020). Repercusiones de las clases virtuales en los estudiantes universitarios en el contexto de la cuarentena por COVID-19: El caso de la PUCP. *Propósitos y Representaciones*, 8(SPE3), e588. <https://doi.org/10.20511/pyr2020.v8nSPE3.588>

- Lovos, E.N., & Aballay, L. (2021). Deserción Académica y Emociones en Ambientes E-learning. *Revista Iberoamericana de Tecnología en Educación y Educación en Tecnología*, 27, e10. <https://doi.org/10.24215/18509959.27.e10>
- Macartney, E.L., Lagisz, M., & Nakagawa, S. (2022). The relative benefits of environmental enrichment on learning and memory are greater when stressed: A meta-analysis of interactions in rodents. *Neuroscience & Biobehavioral Reviews*, 135, 104554. <https://doi.org/10.1016/j.neubiorev.2022.104554>
- Martínez-Líbano, J. (2020). Salud mental en estudiantes chilenos durante confinamiento por Covid-19: revisión bibliográfica. *Revista Educación las Américas*, 10(2), 265-276. <https://doi.org/10.35811/rea.v10i2.126>
- Paredes, M.R., Apaolaza, V., Fernandez-Robin, C., Hartmann, P., & Yañez-Martinez, D. (2021). The impact of the Covid-19 pandemic on subjective mental well-being: The interplay of perceived threat, future anxiety and resilience. *Personality and Individual Differences*, 170(July 2020), 110455-110455. <https://doi.org/10.1016/j.paid.2020.110455>
- Parkes, M., Stein, S., & Reading, C. (2015). Student preparedness for university e-learning environments. *The Internet and Higher Education*, 25, 1-10. <https://doi.org/10.1016/j.iheduc.2014.10.002>
- Prieto-Molinari, D.E., Aguirre-Bravo, G.L., de Pierola, I., Victoria-de-Bona, G.L., Merea-Silva, L.A., Lazarte-Nuñez, C.S. et al. (2020). Depresión y ansiedad durante el aislamiento obligatorio por el COVID-19 en Lima Metropolitana. *Liberabit: Revista Peruana de Psicología*, 26(2), 425-425. <https://doi.org/10.24265/liberabit.2020.v26n2.09>
- Restrepo, J.E., Sánchez, O.A., & Castañeda-Quirama, T. (2020). Estrés académico en estudiantes universitarios. *Psicoespacios*, 14(24), 17-37. <https://doi.org/10.25057/21452776.1331>
- Ringle, C., Wende, S., & Becker, J.M. (2015). SmartPLS 3. SmartPLS GmbH, Boenningstedt. *Journal of Service Science and Management*, 10(3).
- Sáez-Ávila, D.R., & Atienza de Frutos, D. (2010). *La prevención de la ansiedad virtual en los cursos para la formación de profesores de ELE online de la Universidad Antonio de Nebrija*. Universidad Nacional Autónoma de México.
- Saha, A., Dutta, A., & Sifat, R.I. (2021). The mental impact of digital divide due to COVID-19 pandemic induced emergency online learning at undergraduate level: Evidence from undergraduate students from Dhaka City. *Journal of Affective Disorders*, 294, 170-179. <https://doi.org/10.1016/j.jad.2021.07.045>
- Salahshori, A., Eslami, K., Boostani, H., Zahiri, M., Jahani, S., Arjmand, R. et al. (2022). The university students' viewpoints on e-learning system during COVID-19 pandemic: the case of Iran. *Helvion*, e08984. <https://doi.org/10.1016/j.heliyon.2022.e08984>
- Salim, M., Sadoon, B., Salim-Al-Nasrawii, M., Jasim, B., & Dhahir, A.M. (2021). The impact of “e-learning” on psychological distress among college students during the Covid-19 pandemic from the students' point of view. *Turkish Journal of Physiotherapy and Rehabilitation*, 32(3).
- Sánchez-Macías, A., Flores-Rueda, I.C., Veytia-Bucheli, M.G., Azuara-Pugliese, V., Sánchez-Macías, A., Flores-Rueda, I.C. et al. (2021). Techno-stress and addiction to information and communication technologies (ICT) in Mexican university students: instrument diagnosis and validation. *Formación universitaria*, 14(4), 123-132. <https://doi.org/10.4067/S0718-50062021000400123>
- Schmits, E., Dekeyser, S., Klein, O., Luminet, O., Yzerbyt, V., & Glowacz, F. (2021). Psychological distress among students in higher education: One year after the beginning of the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, 18(14). <https://doi.org/10.3390/ijerph18147445>
- Serna-Alarcón, V., Paraguay, K.M., Mejía, A.S., Rodríguez-Alarcón, J.F., Vinelli-Arzuabiaga, D., Vilela-Estrada, M.A. et al. (2021). Percepción de los estudiantes universitarios peruanos acerca de las repercusiones académicas generadas por la COVID-19. *Boletín de Malaria y Salud Ambiental*, 61(ee2), 163-169. <https://doi.org/10.52808/bmsa.7e5.61e2.019>

- Stewart-Brown, S., Evans, J., Patterson, J., Petersen, S., Doll, H., Balding, J. et al. (2000). The health of students in institutes of higher education: an important and neglected public health problem? *Journal Public Health*, 22(4), 492-499. <https://doi.org/10.1093/pubmed/22.4.492>
- Sundarasan, S., Chinna, K., Kamaludin, K., Nurunnabi, M., Baloch, G.M., Khoshaim, H.B. et al. (2020). Psychological impact of covid-19 and lockdown among university students in malaysia: Implications and policy recommendations. *International Journal of Environmental Research and Public Health*, 17(17), 1-13. <https://doi.org/10.3390/ijerph17176206>
- Ticona, M., Zela, N., & Vásquez, L. (2021). Ansiedad y estrés en la educación virtual en el periodo de emergencia sanitaria por el COVID-19. *Revista Científica de Sistemas e Informática*, 1(2), 27-37. <https://doi.org/10.51252/rcsi.v1i2.161>
- Toro, L.R.L. (2021). La Educación Virtual: un imperativo en el curso universitario 2020/2021. Papel de la UMET en este nuevo reto. *Revista Metropolitana de Ciencias Aplicadas*, 4(2), 191-201. <http://remca.umet.edu.ec/index.php/REMCA/article/view/401>
- Trunce-Morales, S.T., Villarroel-Quinchalef, G.P., Arntz-Vera, J.A., & Werner-Contreras, K.M. (2020). Niveles de depresión, ansiedad, estrés y su relación con el rendimiento académico en estudiantes universitarios. *Investigación en Educación Médica*(36), 8-16.
- Vento, T.L.S., Salud, M.G.G.A.R.C. et al. (2021). *Ansiedad durante la pandemia COVID-19, en docentes de instituciones educativas del distrito de Yanahuanca en Pasco*. Cuidadoysaludpublica.org.pe. <https://doi.org/10.53684/csp.v1i1.9>
- Zhao, L., Cao, C., Li, Y., & Li, Y. (2022). Determinants of the digital outcome divide in E-learning between rural and urban students: Empirical evidence from the COVID-19 pandemic based on capital theory. *Computers in Human Behavior*, 130, 107177. <https://doi.org/https://doi.org/10.1016/j.chb.2021.107177>

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