International Journal of
Mental Health Promotion

Tech Science Press

DOI: 10.32604/ijmhp.2022.021176

ARTICLE

Multitasking Behavior and Perceptions of Academic Performance in University Business Students in Mexico during the COVID-19 Pandemic

Victoria Gonzáles-Gutierrez[1], Aldo Alvarez-Risco[2], Alfredo Estrada-Merino[2], María de las Mercedes Anderson-Seminario[2], Sabina Mlodzianowska[2], Shyla Del-Aguila-Arcentales[3] and Jaime A. Yáñez[4,5,*]

[1]CETYS Universidad, Mexicali, Baja California, Mexico

[2]Universidad de Lima, Facultad de Ciencias Empresariales y Económicas, Carrera de Negocios Internacionales, Lima, Peru

[3]Escuela Nacional de Marina Mercante "Almirante Miguel Grau", Callao, Peru

[4]Universidad Norbert Wiener, Vicerrectorado de Investigación, Lima, Peru

[5]Teoma Global, Gerencia Corporativa de Asuntos Científicos y Regulatorios, Lima, Peru

[*]Corresponding Author: Jaime A. Yáñez. Email: jaime.yanez@uwiener.edu.pe

Received: 30 December 2021 Accepted: 11 April 2022

ABSTRACT

The current study measures the influence of multitasking behavior and self-efficacy for self-regulated learning (SESRL) on perceptions of academic performance and views in university students during the COVID-19 pandemic in Mexico. 264 university students fulfilled an online questionnaire. It was observed that multitasking behavior negatively influences SESRL (−0.203), while SESRL showed a positive influence of 0.537 on perceptions of academic performance, and multitasking behavior had an influence of −0.097 on the perception of academic performance. Cronbach's alpha and Average Variance Extracted values were 0.809 and 0.577 (multitasking behavior), 0.819 and 0.626 (SESRL), 0.873 and 0.725 (perceptions of academic performance), respectively. The results of the bootstrapping test showed that the path coefficients were significant. The study outcomes can support new plans in universities to ensure the best academic outcomes. Our study showed evidence of the COVID-19 impact on education behavior. This study's novelty is based on using the partial least square structural equation modeling (PLS-SEM) technique to evaluate these variables.

KEYWORDS

Multitasking behavior; COVID-19; Mexico; self-efficacy for self-regulated learning; academic performance; online class; pandemic; Peru

1 Introduction

The role of companies is to create new products and services for the customers; however, good training is essential to ensure a high performance [1–4], monitoring of basic needs [5–9], promote sustainability [10–16] and human willingness [17–19]. The education activity is one of the most important in creating better societies [20,21], being important to promote the creation of new jobs as entrepreneurs [22]. However, since the final of December of 2019, everything has been modified. The COVID-19 pandemic has drastically changed the world in different ways and sectors. In this way, companies [23–26], tourism and

hospitality activities [27–29], prices [30,31], health care professionals [32–45], and people [46–52] were affected. In the education area, the pandemic created different barriers [53] and interests in the learners [54] and changed the way to teach and learn [55–60]. More specifically, the pandemic changed the way the classes were taught and different activities related to the subjects, such as doing group work virtually among the students and the mentoring of the teacher in those same virtual environments [61], generating different levels of satisfaction between students [62]. The new model of education forced universities to switch from traditional face-to-face classroom learning to virtual classes quickly, in some cases even in a matter of days [63]. This unplanned event has speeded up the technology adaptation into a pedagogical model. Even educational institutions that refused to implement online programs before COVID-19 had to adapt to the new situation and start using digital devices for educational purposes.

Digital technology can provide valuable learning opportunities and benefits to students [63,64]; however, adaptive mindsets are needed for effective learning processes. Online learning involves more commitment, self-discipline, and self-management than during face-to-face classes. Technological devices offer students many distractions, such as texting, gaming, browsing the Internet, social media, and phone calls [65,66]. While in the traditional physical classrooms, instructors may have control over student behavior, this task becomes much more challenging to apply in online classes. Online learning also involves different teaching strategies [67] to capture students' attention. Lecturers should motivate students to participate actively in the class and encourage them to interact with other participants [64]. Students without an instructor's physical supervision and who become bored in the classroom may be more likely to use their technological devices and multitask more during online classes than face-to-face courses [67]. Multitasking behavior may affect learner's outcome [68,69], and lower participation and engagement in a course may result in more unsatisfactory academic performance [69–74]. This article examines the issue of students' multitasking activities during online lectures and how those actions affect their learning outcome in Mexico. For this reason, the objective of this study is to evaluate the influence of multitasking behavior through self-efficacy for self-regulated learning (SESRL) on perceptions of academic performance (PAP) in business students in Mexico during the COVID-19 pandemic.

2 Literature Review

The COVID-19 pandemic has caused students and teachers to be connected technologically many hours a day to fulfill their learning responsibilities. According to Daniel [75], this change in education due to the pandemic has generated that institutions prepare as best as possible for virtual education by using computer systems such as BlackBoard [76], Google Meet [77], Zoom [78], and others for online classes. On the other hand, social isolation has generated mental distress and pressure on students and parents, which caused the simplification of certain processes, adjustment of study plans, re-evaluation of schedules and forms of delivery for tasks [79]. Another significant change in this virtual adaptation process has been the evaluations, which were modified due to social isolation to be carried out from home in real-time in many cases [79]. This modified the traditional pedagogical model since universities faced an extreme challenge for which they were not prepared to face in the short term, and only resilience capacity has allowed for some to adjust faster and more efficient than others [80]. Those careers in which learning requires practical applications *in situ* have been the ones to face the most difficulties in education during the pandemic. A clear example of this is medical students who need to contact patients for their learning [81,82]. Due to this need for practical knowledge and the impossibility of having patients available, various institutions implemented simulators that have partially alleviated student learning [83].

Due to the pandemic physical isolation was the main preventive measure implemented worldwide to avoid the contagion [51,84,85], which caused multiple lifestyle changes in people. Many people have experienced anxiety and mental distress [26,41,44] because of the death of family and friends [86–90]. Disinformation [91], fake news and anti-vaccine comments [92,93] have caused people to self-medicate,

use of medicinal plants [94], other alternative treatments [95] and affect their willingness to get vaccinated [96]. The COVID-19 pandemic has changed many aspects in people's lives and accentuated work-home conflict, which can lead to an increase in the incidence of technostress [53].

The use of technology in universities' learning processes started years ago [97] with various educational benefits for teachers and students [98]. However, it also has been observed to reduce engagement, interaction and bidirectional debate, compared to traditional classroom teaching [99]. The percentage of daily internet daily usage by university students significantly increased during the COVID-19 pandemic [100], and progressively increased the use of social networks to post information about their classes and access virtual learning platforms [101]. However, the extended social networks' use overload has been reported to overlap with their academic responsibilities leading to technostress [53]. On a previous study we have reported how communication overload, social overload and technostress lead to exhaustion that ultimately affect academic performance in university students [53]. Furthermore, it has been reported that technostress affects the quality of sleep [102] and academic performance od university students [103,104].

Multitasking can be defined as the simultaneous execution of several activities in a specific period [105]. For the current study, multitasking in the learning arena means that the student executes several activities unrelated to the class during its face-to-face online class. Currently, due to technology and the pandemic where life is associated with the Internet connection; media multitasking has surged as the circumstance when the use of two or more digital tools occur at the same time, such as listening to a virtual class while chatting or while sending emails [106]. Multitasking in students generates different impacts on their perceptions of academic performance (PAP). On the one hand, multitasking produces better PAP, which could become a distractor that leads to lower student performance. In this way, there is evidence of the relationship between multitasking, mediated by self-efficacy for self-regulated learning (SESRL), to academic outcomes. Faced with this multitasking, which is inevitable in these times of high connectivity, it has been proposed that SESRL can reduce the negative impact to promote the students' beliefs in their capacities to carry out their academic responsibilities [107]. In this way, Johnson et al. [108] have shown that the SESRL of e-learners is directly related to e-learning outcomes. Simmering et al. [109] showed that SESRL is positively related to online learning, and that it serves as a potential mediator of PAP [110].

Likewise, on a previous study half of the people surveyed stated that better performance could be achieved using mobile phones since it allows students to access information in different academic and social areas [48]. However, the rest indicated that the use of mobile phones creates distractions, which can decrease their PAP [48]. On the other hand, media multitasking has been reported to have a negative impact on students' PAP [111,112]. For instance, it has been reported that the use of telephones in class negatively affects PAP because its use exceeds more than 25% of the duration of lectures, and distractions occur every 3–4 min for more than a minute affecting their attention span [66]. Another study evaluated the disconnection time related to media multitasking and the intention to read, and it was found that there was a higher intention to read when there was a high and constant disconnection rate from media multitasking [113]. Mental wandering rates have also been assessed observing that they remain stable regardless of media multitasking and a lower PAP [113]. Also, le Roux et al. [114] reported that the study area influences the relationship between multitasking and PAP. Jamet et al. [115] identified that multitasking behavior has a negative impact on the memorization of the content of courses, but no significant effects were found on comprehension. Also, it was evidenced that students who used laptops had a multitasking behavior both through multimedia and social media, generating a negative impact on PAP [115].

Additionally, Law et al. [116] reported a negative impacts in the learning of students who multitasked while faced with new information, suggesting that multitasking negatively impacts cognitive control processes. Similarly, through a Pearson correlation, Uzun et al. [117] indicated a significant weak

negative relationship between academic performance and preferences for multitasking, the use of media and technology, but not with the control of self-regulation. Also, Karim et al. [118] found that Facebook has a negative influence on PAP. Similarly, Spence et al. [119] reported that people who use social networks such as Instagram during class or social settings reduce their retention capacity to the exposed information. Likewise, the use of electronic devices during class has been reported to negatively impacting students' test scores; however, it does not diminish the understanding of the topics covered in class [120]. Also, multitasking has been reported to negatively affect students' performance in different aspects, such as their grade averages, test performance, reading comprehension, self-regulation, efficiency during studying for tests, and interfering with their attention and memory [72].

Because students have the perception that multitasking decreases their grades, students with higher grades tend to pay more attention during classes and perform less multitasking [121]. Larkin et al. [122] indicated that many students relate to their mobile phones as they prepare themselves to intentionally have or not external distractions while studying. On the other hand, it has been reported that a higher level of multitasking generates poor academic performance, possibly due to a decrease in executive functions and greater impulsivity, which were associated with a higher level of multitasking and low PAP [123]. Another study found that multitasking with mobile phones is not necessarily related to PAP, but that the level of participation in the classroom was more relevant for PAP [124]. Regardless of this, it has been proposed that students should avoid interruptions caused by notifications from their phones while they are studying [125]. Also, to effectively use social networks as a learning tool in the classroom, activities must be designed that link the learning objectives with social networks [126]. Likewise, to generate a decrease in university students' media multitasking, it is helpful to carry out a self-management strategy based on antecedents [127]. Even promoting online activities is perceived as an essential tool for learning since a study indicated that its application promoted behavior linked to the task that was being developed [128]. In terms of online courses, the application of short modules is recommended so that it is not associated with counterproductive practices related to multitasking and technology [129]. On the other hand, in terms of multitasking differences in face-to-face and online classes, it was evidenced that multitasking occurs more frequently during virtual courses than face-to-face courses, and that both modalities have different predictors for multitasking [67].

2.1 Research Model

SESRL is proposed as a mediating variable. Fig. 1 shows the influences between the variables. It is relevant to see the positive and negative influences proposed in the model.

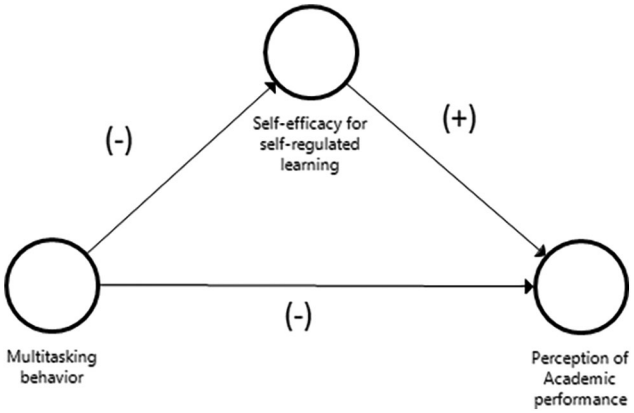

Figure 1: Research model

2.2 Hypothesis

Hypothesis 1 (H1): Multitasking behavior has a negative effect on SESRL.

Hypothesis 2 (H2): The SESRL has a positive effect on PAP.

Hypothesis 3 (H3): Multitasking behavior has a negative effect on PAP.

3 Methodology

3.1 Sample

The total number of respondents was 264 students. The mean of years of the surveyed students was 26 (SD = 38.94). The information was collected from students of business-related careers in Mexico using an electronic survey between June 05 and July 08, 2020.

3.2 Instrument and Data Collection

The data collection was made using an online questionnaire in Google Forms distributed to students by email and personal chats between June 05 and July 08, 2020. The questionnaire includes items based on the instrument used by Alghamdi et al. [110], Zimmerman et al. [130], and Yu et al. [131] to evaluate multitasking, SESRL, and PAP. The variables were evaluated by a 5-point Likert scale. The original items were translated and adapted linguistically. Education experts checked the first version of the online questionnaire, which was uploaded to Google Forms. The authors followed international requirements for research ethics. The participants received the following information: "The online questionnaire is for scientific purposes. If after you start answering the questions, you do not want to continue for different reasons, feel free to stop".

3.3 Analysis of Data

Variance based partial least square structural equation modeling (PLS-SEM) was used to evaluate the data collected using the software SmartPLS version 3.3.3. PLS-SEM is used when the distribution of the data collected is non-normal, and it needs a non-parametric analysis, as in this study. Additionally, PLS-SEM shows the R^2 values and verifies the significance of the model. Also, the reliability of each indicator and the internal consistency of subscales were analyzed. Then, the Fornell–Larcker criterion [132,133] was used to verify the discriminant validity. The bootstrapping technique was used to evaluate if the model was significant [133,134].

4 Results

4.1 Reliability

The Cronbach's Alpha values were higher than 0.5, the expected minimum in the exploratory analysis [133] (see Table 1).

Table 1: Analysis of internal consistency for reliability

Scales	Items	Cronbach's Alpha values	Range of Items values
Multitasking behavior	5	0.792	0.577–0.809
SESRL	7	0.842	0.626–0.819
Perception of academic performance	4	0.816	0.725–0.873

Sample: 264 questionnaires to university students.

4.2 Validation with SEM-PLS

Table 2 shows the coefficients of reliability by SEM PLS. The outcomes confirmed the reliability of the questionnaire.

Table 2: Scale-items validation

Scales	Factorial weight	Composite reliability	Average extracted variance
Multitasking (When I am in online classes, …….)		0.836	0.509
….. I communicate through social networks (P1)	0.483		
….. I watch TV or videos (P2)	0.803		
….. I see non-academic topics on the Internet (P3)	0.704		
….. I play video games (P4)	0.861		
….. I chat with friends (P5)	0.495		
Self-efficacy for self-regulated learning (SESRL) (I can…….)		0.881	0.516
….. study when there are other interesting things to do (P6)	0.657		
….. concentrate on university subjects (P7)	0.773		
….. plan my university work (P8)	0.625		
….. organize my university work (P9)	0.650		
….. arrange a place to study without distractions (P10)	0.819		
….. motivate me to do university work (P11)	0.739		
….. participate in class discussions (P12)	0.744		
Perceptions of academic performance (PAP)		0.877	0.643
I am confident about the adequacy of my academic skills and abilities (P13)	0.719		
I feel competent conducting my course assignments (P14)	0.834		
I have learned how to successfully perform my coursework in an efficient manner (P15)	0.875		
I have performed academically as well as I anticipated I would (P16)	0.768		

Sample: 264 questionnaires to university students.

4.3 Discriminant Validity Using SEM-PLS

The discriminant validity was calculated using the Fornell-Larcker criterion [132,133]. Table 3 shows the fulfillment of this criterion in all the subscales.

Table 3: Discriminant validity by the Fornell-Larcker criterion

Scales	PAP	Multitasking behavior	SESRL
PAP	0.802		
Multitasking behavior	−0.170	0.713	
SESRL	0.556	−0.197	0.718

Sample: 264 questionnaires to university students.

4.4 Bootstrapping

The calculation was carried out, indicating that it was to be carried out 5000 times in the software. The values were found significant with a p-value < 0.01 (Table 4).

Table 4: Significance of trajectory coefficients (beta)

Scales	Original sample	Mean sample	Standard deviation	t-statistic	p-value
Multitasking behavior → SESRL	−0.203	−0.211	0.072	2.551*	0.006**
SESRL → PAP	0.537	0.543	0.045	10.228*	0.000**
Multitasking behavior → PAP	−0.097	−0.091	0.066	5.443	0.000**

Note: *Bootstrapping (5,000 times).
**Statistically significant.

The outcomes confirmed that multitasking behavior through SESRL influences perception of academic performance (Fig. 2).

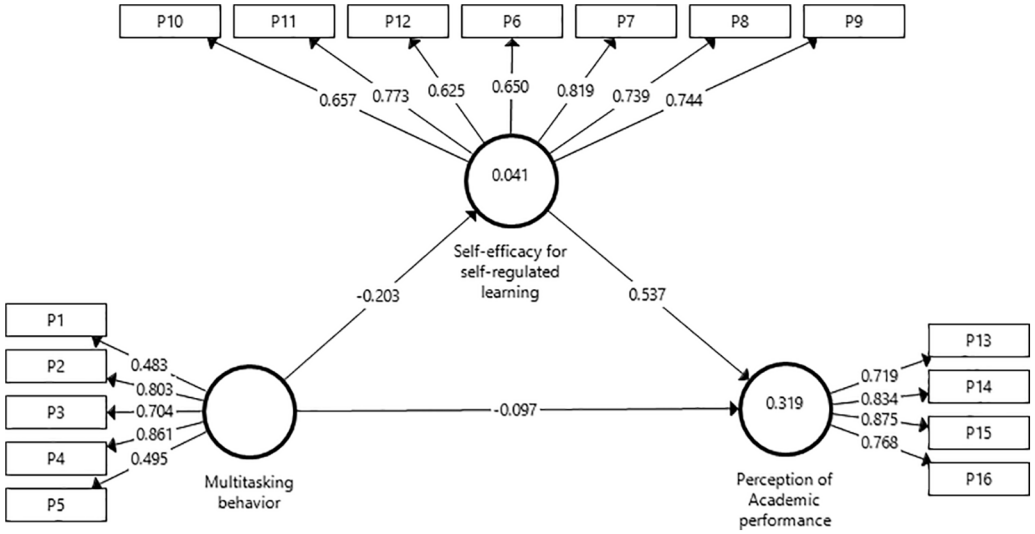

Figure 2: Research model evaluated

4.5 Test of Hypothesis

Hypothesis 1 (H1): The multitasking behavior has a negative effect on SESRL

The multitasking behavior has an effect of −0.203 in SESRL. In other words, as multitasking behavior increased, SESRL decreased and vice versa. Also, the multitasking behavior explains 4.1% of SESRL.

Hypothesis 2 (H2): The SESRL has a positive effect on PAP

The SESRL has an effect of 0.537 in PAP. In other words, as SESRL increased, PAP increased and vice versa.

Hypothesis 3 (H3): Multitasking has a negative effect on PAP

Multitasking has an effect of −0.097 in PAP. Also, multitasking behavior and SESRL explain 31.9% of the PAP.

5 Discussion

This research has the objective to test a model in business university students in Mexico, establishing the link between multitasking, SESRL, and PAP, as well as its validity and discriminant reliability. The survey outcome results were found to be reliable, valid, and statistically relevant. The scales showed reliability and validity and can be used in the following studies in Latin American countries and Spain. A very relevant aspect of the study was linked to emphasizing the distraction factors found during online classes, which coincide with other studies, with their different contents: the use of smartphones [66,122,127,135,136] and social networks [113,116,117,126,127], which correlate with the effect that multitasking behavior has on the PAP of students [67,114,117,118,120,126,137].

It is important to comment about SESRL variance explained by multitasking. According to the bootstrapping analysis, the inverse relationship between multitasking is significant; However, the low percentage of SESRL variance by multitasking could be explained because the existence of other factors such as the stimulus of the university that allows the student to be empowered and to develop their activities. Another influence could also be given by the support of their parents to ensure that the student successfully carry out their academic tasks. Another influence can also come from the social support from their fellow students to make them feel that they can fulfill their academic responsibilities. It is recommended to incorporate these factors so that SESRL can be explained in more detail in future studies.

The present study's contribution lies in having measured these variables during the COVID-19 pandemic when there was a higher use of social networks, and that the obligation of greater Internet connection could have consequences on academic performance. Because the COVID-19 pandemic still causes classes to remain virtual, the observed influence continues, making it very relevant to re-measure these variables when classes are resumed face-to-face and even hybrid classes (virtual and face-to-face) are started. Finally, the versatility of the student's activities should not be confused with the distraction generated by the use of the Internet during synchronous online classes. Knowing the effect of multitasking activity on PAP helps educational institutions promote multiple student activities without neglecting classes in real-time.

The evidence serves to generate changes in the education system in universities. For the development of daily classes, the connection times are now longer, which leads to mental fatigue, and it can be explained that students to cope with said fatigue can alternate with activities that allow them to stay animated. This situation generated in students serves as the basis for active pauses every so often in virtual synchronous classes. It is also possible to evaluate how convenient it is for the 3-hour face-to-face classes to fully be converted to synchronous virtuality.

5.1 Practical Implications

Education at all levels, especially in universities, has changed, but these changes were not programmed, and in many cases, they were not controlled. Almost 2 years after observing the results obtained in the 100% implementation of virtual education, studies like this must be considered to generate effective strategies that help students and teachers obtain the best knowledge and skills and best teaching techniques in the virtual world. A crowdsourcing process is needed [138–140] where the participation of each actor is required to formulate the same educational strategic plan to help the operational management of universities. The accrediting institutions that had scheduled visits to the universities canceled the scheduled visits because of the pandemic and have transferred the accreditation process to virtuality [141]. The authorities of the universities must be ready to adapt very quickly to the virtual process to obtain or renew their certifications and accreditations based on changes done since the pandemic started. Furthermore, they need to evaluate the barriers and enablers [142], and the projection to return to face-to-face classes [143], which most likely be a hybrid with online classes and with different challenges related to multitasking.

5.2 Limitations and Future Direction

Due to COVID-19 pandemic social isolation in Mexico was required during the collection time. Thus, the research was done by an online survey, which was not controlled, and the respondents could have varied their responses. The multitasking behavior can be valuable to perform many activities simultaneously; however, this benefit can change when other learning processes are involved. More research is needed based on this instrument to see the changes generated in the use of the Internet by students, the increase or decrease of multitasking, and its subsequent influence on academic performance.

6 Conclusions

The results obtained must be analyzed to evaluate the development of support strategies to students in the universities to achieve efficient use of the Internet during synchronous online classes, ultimately generating an impact on the perception of student performance. With almost 2 years of the pandemic, virtual education has been the only way education has continued to develop worldwide. Although in some places the face-to-face classes are progressively been implemented, online education continues to be an essential part of the teaching-learning processes, so the impact that has been evidenced by multitasking behavior should be evaluated in educational institutions to create efficient strategies that help reduce the impact on the academic performance of students.

Acknowledgement: We are thankful for our respondents for their time and participation in the survey.

Funding Statement: The authors received no specific funding for this study.

Conflicts of Interest: The authors declare that they have no conflicts of interest to report regarding the present study.

References

1. Del-Aguila-Arcentales, S., Alvarez-Risco, A. (2013). Human error or burnout as explanation for mistakes in pharmaceutical laboratories. *Accreditation and Quality Assurance, 18(5),* 447–448. DOI 10.1007/s00769-013-1000-0.
2. Enciso-Zarate, A., Guzmán-Oviedo, J., Sánchez-Cardona, F., Martínez-Rohenes, D., Rodríguez-Palomino, J. C. et al. (2016). Evaluation of contamination by cytotoxic agents in Colombian hospitals [Evaluación de la contaminación con agentes citotóxicos en hospitales en Colombia]. *Pharmaceutical Care Espana, 18(6),* 241–250.
3. Álvarez-Risco, A., Arellano, E. Z., Valerio, E. M., Acosta, N. M., Tarazona, Z. S. (2013). Pharmaceutical care campaign as a strategy for implementation of pharmaceutical services: Experience Peru [Campaña de atención farmacéutica como estrategia de implementación de los servicios farmacéuticos: Experiencia Perú]. *Pharmaceutical Care Espana, 15(1),* 35–37.
4. Zhang, Z. (2021). Infrastructuralization of Tik tok: Transformation, power relationships, and platformization of video entertainment in China. *Media*, *Culture & Society, 43(2),* 219–236. DOI 10.1177/0163443720939452.
5. Nadew, S. S., Beyene, K. G. M., Beza, S. W. (2020). Adverse drug reaction reporting practice and associated factors among medical doctors in government hospitals in Addis Ababa, Ethiopia. *PLoS One, 15(1),* e0227712. DOI 10.1371/journal.pone.0227712.
6. Mejía-Acosta, N., Alvarez-Risco, A., Solís-Tarazona, Z., Matos-Valerio, E., Zegarra-Arellano, E. et al. (2016). Adverse drug reactions reported as a result of the implementation of pharmaceutical care in the institutional pharmacy DIGEMID-ministry of health [Reacciones adversas a medicamentos reportadas como resultado de la implementación de atención farmacéutica en la farmacia institucional DIGEMID-ministerio de salud de Peru]. *Pharmaceutical Care Espana, 18(2),* 67–74.
7. van Aerschot, L., Parviainen, J. (2020). Robots responding to care needs? A multitasking care robot pursued for 25 years, available products offer simple entertainment and instrumental assistance. *Ethics and Information Technology, 22(3),* 247–256. DOI 10.1007/s10676-020-09536-0.

8. Alvarez-Risco, A., Turpo-Cama, A., Ortiz-Palomino, L., Gongora-Amaut, N., Del-Aguila-Arcentales, S. (2016). Barriers to the implementation of pharmaceutical care in pharmacies in cusco, Peru [Barreras para la implementación de la atención farmacéutica en establecimientos farmacéuticos de cusco, perú]. *Pharmaceutical Care Espana, 18(5),* 194–205.
9. Bell, S. J. (2020). Frameworks for urban water sustainability. *WIREs Water, 7(2),* e1411. DOI 10.1002/wat2.1411.
10. Sauermann, H., Vohland, K., Antoniou, V., Balázs, B., Göbel, C. et al. (2020). Citizen science and sustainability transitions. *Research Policy, 49(5),* 103978. DOI 10.1016/j.respol.2020.103978.
11. Alvarez-Risco, A., Rosen, M. A., Del-Aguila-Arcentales, S. (2020). A new regulation for supporting a circular economy in the plastic industry: The case of Peru (Short communication). *Journal of Landscape Ecology, 13(1),* 1–3. DOI 10.2478/jlecol-2020-0004.
12. Hatanaka, M. (2020). Beyond consuming ethically? Food citizens, governance, and sustainability. *Journal of Rural Studies, 77,* 55–62. DOI 10.1016/j.jrurstud.2020.04.006.
13. Alvarez-Risco, A., van Mil, J. F. (2007). Pharmaceutical care in community pharmacies: Practice and research in Peru. *Annals of Pharmacotherapy, 41(12),* 2032–2037. DOI 10.1345/aph.1K117.
14. Sachin, N., Rajesh, R. (2021). An empirical study of supply chain sustainability with financial performances of Indian firms. *Environment, Development and Sustainability, 24,* 6577–6601. DOI 10.1007/s10668-021-01717-1.
15. Lo, F. Y., Wong, W. K., Geovani, J. (2021). Optimal combinations of factors influencing the sustainability of Taiwanese firms. *International Journal of Emerging Markets, 16(5),* 909–928. DOI 10.1108/IJOEM-02-2020-0205.
16. Tiago, F., Gil, A., Stemberger, S., Borges-Tiago, T. (2021). Digital sustainability communication in tourism. *Journal of Innovation & Knowledge, 6(1),* 27–34. DOI 10.1016/j.jik.2019.12.002.
17. Alvarez-Risco, A., Del-Aguila-Arcentales, S. (2015). Prescription errors as a barrier to pharmaceutical care in public health facilities: Experience Peru [Errores de prescripción como barrera para la atención farmacéutica en establecimientos de salud públicos: Experiencia perú]. *Pharmaceutical Care Espana, 17(6),* 725–731.
18. Ansari, N. Y., Farrukh, M., Raza, A. (2021). Green human resource management and employees pro-environmental behaviours: Examining the underlying mechanism. *Corporate Social Responsibility and Environmental Management, 28(1),* 229–238. DOI 10.1002/csr.2044.
19. Izogo, E. E., Elom, M. E., Mpinganjira, M. (2021). Examining customer willingness to pay more for banking services: The role of employee commitment, customer involvement and customer value. *International Journal of Emerging Markets, 16(6),* 1176–1201. DOI 10.1108/IJOEM-10-2019-0850.
20. Alvarez-Risco, A., Del-Aguila-Arcentales, S., Diaz-Risco, S. (2018). Pharmacovigilance as a tool for sustainable development of healthcare in Peru. *PharmacoVigilance Review, 10(2),* 4–6.
21. Tsui, A. S. (2022). From traditional research to responsible research: The necessity of scientific freedom and scientific responsibility for better societies. *Annual Review of Organizational Psychology and Organizational Behavior, 9,* 1–32. DOI 10.1146/annurev-orgpsych-062021-021303.
22. Shah, I. A., Amjed, S., Jaboob, S. (2020). The moderating role of entrepreneurship education in shaping entrepreneurial intentions. *Journal of Economic Structures, 9(1),* 19. DOI 10.1186/s40008-020-00195-4.
23. Alvarez-Risco, A., Estrada-Merino, A., Rosen, M. A., Vargas-Herrera, A., Del-Aguila-Arcentales, S. (2021). Factors for implementation of circular economy in firms in COVID-19 pandemic times: The case of Peru. *Environments, 8(9),* 95. DOI 10.3390/environments8090095.
24. Alvarez-Risco, A., Del-Aguila-Arcentales, S. (2021). A note on Changing regulation in international business: The World Intellectual Property Organization (WIPO) and Artificial Intelligence. In: Verbeke, A., van Tulder, R., Rose, E. L., Wei, Y. (Eds.), *The multiple dimensions of institutional complexity in international business research*, vol. 15, pp. 363–371. Bingley, UK, Emerald Publishing Limited. DOI 10.1108/S1745-886220210000015020.
25. Huang, S., Liu, H. (2021). Impact of COVID-19 on stock price crash risk: Evidence from Chinese energy firms. *Energy Economics, 101,* 105431. DOI 10.1016/j.eneco.2021.105431.
26. Yan, J., Kim, S., Zhang, S. X., Foo, M. D., Alvarez-Risco, A. et al. (2021). Hospitality workers' COVID-19 risk perception and depression: A contingent model based on transactional theory of stress model. *International Journal of Hospitality Management, 95,* 102935. DOI 10.1016/j.ijhm.2021.102935.

27. Carvache-Franco, M., Carvache-Franco, O., Carvache-Franco, W., Alvarez-Risco, A., Estrada-Merino, A. (2021). Motivations and segmentation of the demand for coastal cities: A study in Lima, Peru. *International Journal of Tourism Research, 23(4),* 517–531. DOI 10.1002/jtr.2423.
28. Carvache-Franco, M., Alvarez-Risco, A., Carvache-Franco, O., Carvache-Franco, W., Estrada-Merino, A. et al. (2021). Perceived value and its influence on satisfaction and loyalty in a coastal city: A study from Lima, Peru. *Journal of Policy Research in Tourism. Leisure and Events, 1,* 1–16. DOI 10.1080/19407963.2021.1883634.
29. Alvarez-Risco, A., Estrada-Merino, A., Perez-Luyo, R. (2020). Sustainable development goals in hospitality management. In: Ruël, H., Lombarts, A. (Eds.), *Sustainable hospitality management*, vol. 24, pp. 159–178. Bingley, UK, Emerald Publishing Limited. DOI 10.1108/S1877-636120200000024012.
30. Apcho-Ccencho, L. V., Cuya-Velásquez, B. B., Alvarado Rodríguez, D., Anderson-Seminario, M. D. L. M., Alvarez-Risco, A. et al. (2021). The impact of international price on the technological industry in the United States and China during times of crisis: Commercial war and COVID-19. In: Lawrence, K. D., Klimberg, R. K. (Eds.), *Advances in business and management forecasting*, vol. 14, pp. 149–160. Bingley, UK, Emerald Publishing Limited. DOI 10.1108/S1477-407020210000014010.
31. Leiva-Martinez, M. A., Anderson-Seminario, M. D. L. M., Alvarez-Risco, A., Estrada-Merino, A., Mlodzianowska, S. (2021). Price variation in lower goods as of previous economic crisis and the contrast of the current price situation in the context of COVID-19 in Peru. In: Lawrence, K. D., Klimberg, R. K. (Eds.), *Advances in business and management forecasting*, vol. 14. Bingley, UK, Emerald Publishing Limited. DOI 10.1108/S1477-407020210000014011.
32. Chung, S. A., Olivera, S., Rojas Román, B., Alanoca, E., Moscoso, S. et al. (2021). Temáticas de la producción científica de la *Revista Cubana de Farmacia* indizada en Scopus (1967–2020). *Revista Cubana de Farmacia, 54(1)*.
33. Alvarez-Risco, A., Dawson, J., Johnson, W., Conteh-Barrat, M., Aslani, P. et al. (2021). Ebola virus disease outbreak: A global approach for health systems. *Revista Cubana de Farmacia, 53(4)*.
34. Alvarez-Risco, A., Del-Aguila-Arcentales, S., Stevenson, J. G. (2015). Pharmacists and mass communication for implementing pharmaceutical care. *American Journal of Pharmacy Benefits, 7(3),* e125–e126.
35. da Silva Neto, R. M., Benjamim, C. J. R., de Medeiros Carvalho, P. M., Neto, M. L. R. (2021). Psychological effects caused by the COVID-19 pandemic in health professionals: A systematic review with meta-analysis. *Progress in Neuro-Psychopharmacology and Biological Psychiatry, 104,* 110062. DOI 10.1016/j.pnpbp.2020.110062.
36. Visacri, M. B., Figueiredo, I. V., de MendonçaLima, T. (2021). Role of pharmacist during the COVID-19 pandemic: A scoping review. *Research in Social and Administrative Pharmacy, 17(1),* 1799–1806. DOI 10.1016/j.sapharm.2020.07.003.
37. Alvarez-Risco, A., Del-Aguila-Arcentales, S., Yáñez, J. A. (2021). Telemedicine in Peru as a result of the COVID-19 pandemic: Perspective from a country with limited internet access. *The American Journal of Tropical Medicine and Hygiene, 105(1),* 6–11. DOI 10.4269/ajtmh.21-0255.
38. Alharbi, A., Alharbi, S., Alqaidi, S. (2020). Guidelines for dental care provision during the COVID-19 pandemic. *The Saudi Dental Journal, 32(4),* 181–186. DOI 10.1016/j.sdentj.2020.04.001.
39. Rojas Román, B., Moscoso, S., Chung, S. A., Limpias Terceros, B., Álvarez-Risco, A. et al. (2020). Tratamiento de la COVID-19 en perú y Bolivia y los riesgos de la automedicación. *Revista Cubana de Farmacia, 53(2)*.
40. Fersia, O., Bryant, S., Nicholson, R., McMeeken, K., Brown, C. et al. (2020). The impact of the COVID-19 pandemic on cardiology services. *Open Heart, 7(2),* e001359. DOI 10.1136/openhrt-2020-001359.
41. Zhang, S. X., Chen, J., Afshar Jahanshahi, A., Alvarez-Risco, A., Dai, H. et al. (2022). Succumbing to the COVID-19 pandemic—Healthcare workers Not satisfied and intend to leave their jobs. *International Journal of Mental Health and Addiction, 20(2),* 956–965. DOI 10.1007/s11469-020-00418-6.
42. Zhang, S. X., Sun, S., Afshar Jahanshahi, A., Alvarez-Risco, A., Ibarra, V. G. et al. (2020). Developing and testing a measure of COVID-19 organizational support of healthcare workers–results from Peru, Ecuador, and Bolivia. *Psychiatry Research, 291,* 113174. DOI 10.1016/j.psychres.2020.113174.

43. Alvarez-Risco, A., Mejia, C. R., Delgado-Zegarra, J., Del-Aguila-Arcentales, S., Arce-Esquivel, A. A. et al. (2020). The Peru approach against the COVID-19 infodemic: Insights and strategies. *The American Journal of Tropical Medicine and Hygiene, 103(2),* 583–586. DOI 10.4269/ajtmh.20-0536.
44. Chen, X., Zhang, S. X., Jahanshahi, A. A., Alvarez-Risco, A., Dai, H. et al. (2020). Belief in a COVID-19 conspiracy theory as a predictor of mental health and well-being of health care workers in Ecuador: Cross-sectional survey study. *JMIR Public Health Surveill, 6(3),* e20737. DOI 10.2196/20737.
45. Yáñez, J. A., Afshar Jahanshahi, A., Alvarez-Risco, A., Li, J., Zhang, S. X. (2020). Anxiety, distress, and turnover intention of healthcare workers in Peru by their distance to the epicenter during the COVID-19 crisis. *The American Journal of Tropical Medicine and Hygiene, 103(4),* 1614–1620. DOI 10.4269/ajtmh.20-0800.
46. Alvarez-Risco, A., Mlodzianowska, S., García-Ibarra, V., Rosen, M. A., Del-Aguila-Arcentales, S. (2021). Factors affecting green entrepreneurship intentions in business university students in COVID-19 pandemic times: Case of Ecuador. *Sustainability, 13(11),* 6447. DOI 10.3390/su13116447.
47. Chafloque-Cespedes, R., Alvarez-Risco, A., Robayo-Acuña, P. V., Gamarra-Chavez, C. A., Martinez-Toro, G. M. et al. (2021). Effect of sociodemographic factors in entrepreneurial orientation and entrepreneurial intention in university students of Latin American Business Schools. In: Jones, P., Apostolopoulos, N., Kakouris, A., Moon, C., Ratten, V., Walmsley, A. (Eds.), *Universities and entrepreneurship: Meeting the educational and social challenges*, vol. 11, pp. 151–165. Bingley, UK, Emerald Publishing Limited.
48. Alvarez-Risco, A., Estrada-Merino, A., Anderson-Seminario, M. D. L. M., Mlodzianowska, S., García-Ibarra, V. et al. (2020). Multitasking behavior in online classrooms and academic performance: Case of university students in Ecuador during COVID-19 outbreak. *Interactive Technology and Smart Education, 18(3),* 422–434. DOI 10.1108/ITSE-08-2020-0160.
49. Mouter, N., Hernandez, J. I., Itten, A. V. (2021). Public participation in crisis policymaking. How 30,000 Dutch citizens advised their government on relaxing COVID-19 lockdown measures. *PLoS One, 16(5),* e0250614. DOI 10.1371/journal.pone.0250614.
50. Quispe-Cañari, J. F., Fidel-Rosales, E., Manrique, D., Mascaró-Zan, J., Huamán-Castillón, K. M. et al. (2021). Self-medication practices during the COVID-19 pandemic among the adult population in Peru: A cross-sectional survey. *Saudi Pharmaceutical Journal, 29(1),* 1–11. DOI 10.1016/j.jsps.2020.12.001.
51. Yáñez, J. A., Alvarez-Risco, A., Delgado-Zegarra, J. (2020). COVID-19 in Peru: From supervised walks for children to the first case of kawasaki-like syndrome. *BMJ, 369,* m2418. DOI 10.1136/bmj.m2418.
52. Chung, S. A., Rebollo, A., Quiroga, A., Paes, I., Yáñez, J. A. (2021). Factores de riesgo de ansiedad en estudiantes de Bolivia durante la pandemia de la COVID-19. *Revista Cubana de Farmacia, 54(4)*.
53. Alvarez-Risco, A., Del-Aguila-Arcentales, S., Yáñez, J. A., Rosen, M. A., Mejia, C. R. (2021). Influence of technostress on academic performance of university medicine students in Peru during the COVID-19 pandemic. *Sustainability, 13(16),* 8949. DOI 10.3390/su13168949.
54. Alvarez-Risco, A., Del-Aguila-Arcentales, S., Rosen, M. A., García-Ibarra, V., Maycotte-Felkel, S. et al. (2021). Expectations and interests of university students in COVID-19 times about sustainable development goals: Evidence from Colombia, Ecuador, Mexico, and Peru. *Sustainability, 13(6),* 3306. DOI 10.3390/su13063306.
55. Smigelski, M., Movassaghi, M., Small, A. (2020). Urology virtual education programs during the COVID-19 pandemic. *Current Urology Reports, 21(12),* 50. DOI 10.1007/s11934-020-01004-y.
56. Cho, M. J., Hong, J. P. (2021). The emergence of virtual education during the COVID-19 pandemic: The past, present, and future of the plastic surgery education. *Journal of Plastic, Reconstructive & Aesthetic Surgery, 74(6),* 1413–1421. DOI 10.1016/j.bjps.2020.12.099.
57. Krishnamurthy, S. (2020). The future of business education: A commentary in the shadow of the COVID-19 pandemic. *Journal of Business Research, 117,* 1–5. DOI 10.1016/j.jbusres.2020.05.034.
58. Donthu, N., Gustafsson, A. (2020). Effects of COVID-19 on business and research. *Journal of Business Research, 117,* 284–289. DOI 10.1016/j.jbusres.2020.06.008.
59. Rana, S., Anand, A., Prashar, S., Haque, M. M. (2020). A perspective on the positioning of Indian business schools post COVID-19 pandemic. *International Journal of Emerging Markets, 17(2),* 353–367. DOI 10.1108/IJOEM-04-2020-0415.

60. Zia, A. (2020). Exploring factors influencing online classes due to social distancing in COVID-19 pandemic: A business students perspective. *The International Journal of Information and Learning Technology, 37(4),* 197–211. DOI 10.1108/IJILT-05-2020-0089.
61. Bao, W. (2020). COVID-19 and online teaching in higher education: A case study of peking university. *Human Behavior and Emerging Technologies, 2(2),* 113–115. DOI 10.1002/hbe2.191.
62. Cicha, K., Rizun, M., Rutecka, P., Strzelecki, A. (2021). COVID-19 and higher education: First-year students' expectations toward distance learning. *Sustainability, 13(4),* 1889. DOI 10.3390/su13041889.
63. Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of Educational Technology Systems, 49(1),* 5–22. DOI 10.1177/0047239520934018.
64. Ally, M. (2008). Foundations of educational theory for online learning. In: *The theory and practice of online learning*. 2nd ed., vol. 2, pp. 15–44. Athabasca, Alberta, Canada: Athabasca University Press.
65. Amez, S., Baert, S. (2020). Smartphone use and academic performance: A literature review. *International Journal of Educational Research, 103,* 101618. DOI 10.1016/j.ijer.2020.101618.
66. Kim, I., Kim, R., Kim, H., Kim, D., Han, K. et al. (2019). Understanding smartphone usage in college classrooms: A long-term measurement study. *Computers & Education, 141,* 103611. DOI 10.1016/j.compedu.2019.103611.
67. Lepp, A., Barkley, J. E., Karpinski, A. C., Singh, S. (2019). College students' multitasking behavior in online versus face-to-face courses. *SAGE Open, 9(1),* 2158244018824505. DOI 10.1177/2158244018824505.
68. Hawi, N. S., Samaha, M. (2016). To excel or not to excel: Strong evidence on the adverse effect of smartphone addiction on academic performance. *Computers & Education, 98,* 81–89. DOI 10.1016/j.compedu.2016.03.007.
69. Reinhold, F., Hoch, S., Werner, B., Richter-Gebert, J., Reiss, K. (2020). Learning fractions with and without educational technology: What matters for high-achieving and low-achieving students? *Learning and Instruction, 65,* 101264. DOI 10.1016/j.learninstruc.2019.101264.
70. Badri, M., Nuaimi, A. A., Guang, Y., Rashedi, A. A. (2017). School performance, social networking effects, and learning of school children: Evidence of reciprocal relationships in Abu Dhabi. *Telematics and Informatics, 34(8),* 1433–1444. DOI 10.1016/j.tele.2017.06.006.
71. Carter, S. P., Greenberg, K., Walker, M. S. (2017). The impact of computer usage on academic performance: Evidence from a randomized trial at the United States military academy. *Economics of Education Review, 56,* 118–132. DOI 10.1016/j.econedurev.2016.12.005.
72. May, K. E., Elder, A. D. (2018). Efficient, helpful, or distracting? A literature review of media multitasking in relation to academic performance. *International Journal of Educational Technology in Higher Education, 15(1),* 13. DOI 10.1186/s41239-018-0096-z.
73. Patterson, R. W., Patterson, R. M. (2017). Computers and productivity: Evidence from laptop use in the college classroom. *Economics of Education Review, 57,* 66–79. DOI 10.1016/j.econedurev.2017.02.004.
74. Ravizza, S. M., Uitvlugt, M. G., Fenn, K. M. (2017). Logged in and zoned out: How laptop internet use relates to classroom learning. *Psychological Science, 28(2),* 171–180. DOI 10.1177/0956797616677314.
75. Daniel, S. J. (2020). Education and the COVID-19 pandemic. *Prospects, 49(1),* 91–96. DOI 10.1007/s11125-020-09464-3.
76. Almekhlafy, S. S. A. (2020). Online learning of English language courses via blackboard at Saudi universities in the era of COVID-19: Perception and use. *PSU Research Review, 5(1),* 16–32. DOI 10.1108/PRR-08-2020-0026.
77. Al-Maroof, R. S., Salloum, S. A., Hassanien, A. E., Shaalan, K. (2020). Fear from COVID-19 and technology adoption: The impact of google meet during coronavirus pandemic. *Interactive Learning Environments, 1,* 1–16. DOI 10.1080/10494820.2020.1830121.
78. Cziboly, A., Bethlenfalvy, A. (2020). Response to COVID-19 zooming in on online process drama. *Research in Drama Education: The Journal of Applied Theatre and Performance, 25(4),* 645–651. DOI 10.1080/13569783.2020.1816818.
79. García-Peñalvo, F. J., Corell, A., Abella-García, V., Grande-de-Prado, M. (2021). Recommendations for mandatory online assessment in higher education during the COVID-19 pandemic. In: Burgos, D., Tlili, A., Tabacco, A. (Eds.), *Radical solutions for education in a crisis context: COVID-19 as an opportunity for global learning*, pp. 85–98. Singapore: Singapore.

80. Liguori, E., Winkler, C. (2020). From offline to online: Challenges and opportunities for entrepreneurship education following the COVID-19 pandemic. *Entrepreneurship Education and Pedagogy, 3(4),* 346–351. DOI 10.1177/2515127420916738.
81. Rose, S. (2020). Medical student education in the time of COVID-19. *JAMA, 323(21),* 2131–2132. DOI 10.1001/jama.2020.5227.
82. Singh, K., Srivastav, S., Bhardwaj, A., Dixit, A., Misra, S. (2020). Medical education during the COVID-19 pandemic: A single institution experience. *Indian Pediatrics, 57(7),* 678–679. DOI 10.1007/s13312-020-1899-2.
83. Kogan, M., Klein, S. E., Hannon, C. P., Nolte, M. T. (2020). Orthopaedic education during the COVID-19 pandemic. *Journal of the American Academy of Orthopaedic Surgeons, 28(11),* e456–e464. DOI 10.5435/JAAOS-D-20-00292.
84. Salathé, M., Althaus, C. L., Neher, R., Stringhini, S., Hodcroft, E. et al. (2020). COVID-19 epidemic in Switzerland: On the importance of testing, contact tracing and isolation. *Swiss Medical Weekly, 150,* 1112. DOI 10.4414/smw.2020.20225.
85. MacIntyre, C. R. (2020). Case isolation, contact tracing, and physical distancing are pillars of COVID-19 pandemic control, not optional choices. *The Lancet Infectious Diseases, 20(10),* 1105–1106. DOI 10.1016/S1473-3099(20)30512-0.
86. VanderWeele, T. J. (2020). Challenges estimating total lives lost in COVID-19 decisions: Consideration of mortality related to unemployment, social isolation, and depression. *JAMA, 324(5),* 445–446. DOI 10.1001/jama.2020.12187.
87. Yanez, J. A., Chung, S. A., Inga-Berrospi, F., Mejia, C. R. (2020). Demographic and geographic COVID-19 death risk factors in Peru. A nationwide analysis. *SSRN*. DOI 10.2139/ssrn.3648543.
88. Gonzales-Tamayo, L., Arevalo-Oropeza, M., Yanez, J. A. (2020). COVID-19 physician deaths in Peru: A result of an underfunded and fragmented healthcare system. *SSRN*. DOI 10.2139/ssrn.3676849.
89. Yáñez, J. A., Alvarez-Risco, A., Delgado-Zegarra, J. (2020). Rapid response: Does Peru really have that high number of COVID-19 confirmed cases? The deception of combining RT-PCR and rapid test results. *BMJ*.
90. Yáñez, J. A., Alvarez-Risco, A., Delgado-Zegarra, J. (2020). Rapid response: Clearing the path for COVID-19 in Peru? The decision of supervised walks for children and adolescents. *BMJ*.
91. Bernard, R., Bowsher, G., Sullivan, R., Gibson-Fall, F. (2020). Disinformation and epidemics: Anticipating the next phase of biowarfare. *Health Security, 19(1),* 3–12. DOI 10.1089/hs.2020.0038.
92. Stolle, L. B., Nalamasu, R., Pergolizzi, J. V., Varrassi, G., Magnusson, P. et al. (2020). Fact vs fallacy: The anti-vaccine discussion reloaded. *Advances in Therapy, 37(11),* 4481–4490. DOI 10.1007/s12325-020-01502-y.
93. Burki, T. (2020). The online anti-vaccine movement in the age of COVID-19. *The Lancet Digital Health, 2(10),* e504–e505. DOI 10.1016/S2589-7500(20)30227-2.
94. Villena-Tejada, M., Vera-Ferchau, I., Cardona-Rivero, A., Zamalloa-Cornejo, R., Quispe-Florez, M. et al. (2021). Use of medicinal plants for COVID-19 prevention and respiratory symptom treatment during the pandemic in Cusco, Peru: A cross-sectional survey. *PLoS One, 16(9),* e0257165. DOI 10.1371/journal.pone.0257165.
95. Yáñez, J. A., Chung, S. A., Román, B. R., Hernández-Yépez, P. J., Garcia-Solorzano, F. O. et al. (2021). Chapter 14-Prescription, Over-the-Counter (OTC), Herbal, and other treatments and preventive uses for COVID-19. In: Hadi Dehghani, M., Karri, R. R., Roy, S. (Eds.), *Environmental and health management of novel coronavirus disease (COVID-19)*, pp. 379–416. London, UK: Academic Press.
96. Vizcardo, D., Salvador, L. F., Nole-Vara, A., Dávila, K. P., Alvarez-Risco, A. et al. (2022). Sociodemographic predictors associated with the willingness to get vaccinated against COVID-19 in Peru: A cross-sectional survey. *Vaccines, 10(1),* 48. DOI 10.3390/vaccines10010048.
97. Judd, T., Kennedy, G. (2010). A Five-year study of on-campus internet use by undergraduate biomedical students. *Computers & Education, 55(4),* 1564–1571. DOI 10.1016/j.compedu.2010.06.022.
98. Rayan, A., Dadoul, A. M., Jabareen, H., Sulieman, Z., Alzayyat, A. et al. (2017). Internet use among university students in south west bank: Prevalence, advantages and disadvantages, and association with psychological health. *International Journal of Mental Health and Addiction, 15(1),* 118–129. DOI 10.1007/s11469-016-9658-2.

99. Dumford, A. D., Miller, A. L. (2018). Online learning in higher education: Exploring advantages and disadvantages for engagement. *Journal of Computing in Higher Education, 30(3),* 452–465. DOI 10.1007/s12528-018-9179-z.

100. Sun, Y., Li, Y., Bao, Y., Meng, S., Sun, Y. et al. (2020). Brief report: Increased adictive iternet and sbstance use behavior during the COVID-19 pandemic in China. *The American Journal on Addictions, 29(4),* 268–270. DOI 10.1111/ajad.13066.

101. https://reutersinstitute.politics.ox.ac.uk/sites/default/files/2019-06/DNR_2019_FINAL_0.pdf (01 July 2021).

102. Salo, M., Pirkkalainen, H., Koskelainen, T. (2019). Technostress and social networking services: Explaining users' concentration, sleep, identity, and social relation problems. *Information Systems Journal, 29(2),* 408–435. DOI 10.1111/isj.12213.

103. Hsiao, K. -L., Shu, Y., Huang, T. C. (2017). Exploring the effect of compulsive social app usage on technostress and academic performance: Perspectives from personality traits. *Telematics and Informatics, 34(2),* 679–690. DOI 10.1016/j.tele.2016.11.001.

104. Qi, C. (2019). A double-edged sword? Exploring the impact of students' academic usage of mobile devices on technostress and academic performance. *Behaviour & Information Technology, 38(12),* 1337–1354. DOI 10.1080/0144929X.2019.1585476.

105. Kenyon, S., Lyons, G. (2007). Introducing multitasking to the study of travel and ICT: Examining its extent and assessing its potential importance. *Transportation Research Part A: Policy and Practice, 41(2),* 161–175. DOI 10.1016/j.tra.2006.02.004.

106. Pilotta, J. J., Schultz, D. E., Drenik, G., Rist, P. (2004). Simultaneous media usage: A critical consumer orientation to media planning. *Journal of Consumer Behaviour, 3(3),* 285–292. DOI 10.1002/(ISSN)1479-1838.

107. Wentworth, D. K., Middleton, J. H. (2014). Technology use and academic performance. *Computers & Education, 78,* 306–311. DOI 10.1016/j.compedu.2014.06.012.

108. Johnson, R. D., Hornik, S., Salas, E. (2008). An empirical examination of factors contributing to the creation of successful e-learning environments. *International Journal of Human-Computer Studies, 66(5),* 356–369. DOI 10.1016/j.ijhcs.2007.11.003.

109. Simmering, M. J., Posey, C., Piccoli, G. (2009). Computer self-efficacy and motivation to learn in a self-directed online course. *Decision Sciences Journal of Innovative Education, 7(1),* 99–121. DOI 10.1111/j.1540-4609.2008.00207.x.

110. Alghamdi, A., Karpinski, A. C., Lepp, A., Barkley, J. (2020). Online and face-to-face classroom multitasking and academic performance: Moderated mediation with self-efficacy for self-regulated learning and gender. *Computers in Human Behavior, 102,* 214–222. DOI 10.1016/j.chb.2019.08.018.

111. Luo, J., Yeung, P. S., Li, H. (2020). The relationship among media multitasking, academic performance and self-esteem in Chinese adolescents: The cross-lagged panel and mediation analyses. *Children and Youth Services Review, 117,* 105308. DOI 10.1016/j.childyouth.2020.105308.

112. Raza, M. Y., Khan, A. N., Khan, N. A., Ali, A., Bano, S. (2020). Dark side of social media and academic performance of public sector schools students: Role of parental school support. *Journal of Public Affairs, 20(3),* e2058. DOI 10.1002/pa.2058.

113. Wammes, J. D., Ralph, B. C. W., Mills, C., Bosch, N., Duncan, T. L. et al. (2019). Disengagement during lectures: Media multitasking and mind wandering in university classrooms. *Computers & Education, 132,* 76–89. DOI 10.1016/j.compedu.2018.12.007.

114. le Roux, D. B., Parry, D. A. (2017). In-lecture media use and academic performance: Does subject area matter? *Computers in Human Behavior, 77,* 86–94. DOI 10.1016/j.chb.2017.08.030.

115. Jamet, E., Gonthier, C., Cojean, S., Colliot, T., Erhel, S. (2020). Does multitasking in the classroom affect learning outcomes? A naturalistic study. *Computers in Human Behavior, 106,* 106264. DOI 10.1016/j.chb.2020.106264.

116. Law, A. S., Stock, R. (2019). Learning approach and its relationship to type of media use and frequency of media-multitasking. *Active Learning in Higher Education, 20(2),* 127–138. DOI 10.1177/1469787417735612.

117. Uzun, A. M., Kilis, S. (2019). Does persistent involvement in media and technology lead to lower academic performance? Evaluating media and technology use in relation to multitasking, self-regulation and academic performance. *Computers in Human Behavior, 90,* 196–203. DOI 10.1016/j.chb.2018.08.045.

118. Karim, S., He, H., Mallah, G. A., Laghari, A. A., Madiha, H. et al. (2019). In the impact of using Facebook on the academic performance of university students. In: Sun, X., Pan, Z., Bertino, E. (Eds.), *Artificial intelligence and security cham*, pp. 405–418. Springer International Publishing: Cham, Switzerland.

119. Spence, A., Beasley, K., Gravenkemper, H., Hoefler, A., Ngo, A. et al. (2020). Social media use while listening to new material negatively affects short-term memory in college students. *Physiology & Behavior, 227,* 113172. DOI 10.1016/j.physbeh.2020.113172.

120. Glass, A. L., Kang, M. (2019). Dividing attention in the classroom reduces exam performance. *Educational Psychology, 39(3),* 395–408. DOI 10.1080/01443410.2018.1489046.

121. Tassone, A., Liu, J. J., Reed, M. J., Vickers, K. (2020). Multitasking in the classroom: Testing an educational intervention as a method of reducing multitasking. *Active Learning in Higher Education, 21(2),* 128–141. DOI 10.1177/1469787417740772.

122. Larkin, T. L., Hein, B. R. (2018). 24/7 connectedness and its potential impact on today's physics students: Technology use, multitasking, and GenMe. *International Journal of Engineering Pedagogy, 8(2),* 72–87. DOI 10.3991/ijep.v8i2.8138.

123. Cain, M. S., Leonard, J. A., Gabrieli, J. D. E., Finn, A. S. (2016). Media multitasking in adolescence. *Psychonomic Bulletin & Review, 23(6),* 1932–1941. DOI 10.3758/s13423-016-1036-3.

124. Deng, L., Ku, K. Y. L., Kong, Q. (2019). Examining predictive factors and effects of in-class multitasking with mobile phones. *Interactive Technology and Smart Education, 16(1),* 49–58. DOI 10.1108/ITSE-08-2018-0056.

125. Liu, Y., Deng, L., Lin, L., Gu, X. (2021). Patterns of triggers for on-task and off-task behaviors: University students in independent study. *Interactive Learning Environments, 1,* 1–17. DOI 10.1080/10494820.2021.1905003.

126. Rodríguez-Triana, M. J., Prieto, L. P., Holzer, A., Gillet, D. (2020). Instruction, student engagement, and learning outcomes: A case study using anonymous social media in a face-to-face classroom. *IEEE Transactions on Learning Technologies, 13(4),* 718–733. DOI 10.1109/TLT.4620076.

127. Guinness, K. E., Beaulieu, L., MacDonald, J. M. (2018). Effects of technology breaks on media multitasking with college students. *Behavioral Interventions, 33(4),* 427–439. DOI 10.1002/bin.1529.

128. Wood, E., Mirza, A., Shaw, L. (2018). Using technology to promote classroom instruction: Assessing incidences of on-task and off-task multitasking and learning. *Journal of Computing in Higher Education, 30(3),* 553–571. DOI 10.1007/s12528-018-9185-1.

129. Miller, M. D., Doherty, J. J., Butler, N. M., Coull, W. G. (2020). Changing counterproductive beliefs about attention, memory, and multitasking: Impacts of a brief, fully online module. *Applied Cognitive Psychology, 34(3),* 710–723. DOI 10.1002/acp.3662.

130. Zimmerman, B. J., Bandura, A., Martinez-Pons, M. (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting. *American Educational Research Journal, 29(3),* 663–676. DOI 10.3102/00028312029003663.

131. Yu, A. Y., Tian, S. W., Vogel, D., Chi-Wai Kwok, R. (2010). Can learning be virtually boosted? An investigation of online social networking impacts. *Computers & Education, 55(4),* 1494–1503. DOI 10.1016/j.compedu.2010.06.015.

132. Fornell, C., Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18(1),* 39–50. DOI 10.1177/002224378101800104.

133. Lopez-Odar, D., Alvarez-Risco, A., Vara-Horna, A., Chafloque-Cespedes, R., Sekar, M. C. (2020). Validity and reliability of the questionnaire that evaluates factors associated with perceived environmental behavior and perceived ecological purchasing behavior in Peruvian consumers. *Social Responsibility Journal, 16(3),* 403–417. DOI 10.1108/SRJ-08-2018-0201.

134. Streukens, S., Leroi-Werelds, S. (2016). Bootstrapping and PLS-SEM: A step-by-step guide to get more out of your bootstrap results. *European Management Journal, 34(6),* 618–632. DOI 10.1016/j.emj.2016.06.003.

135. Hayashi, Y., Nenstiel, J. N. (2021). Media multitasking in the classroom: Problematic mobile phone use and impulse control as predictors of texting in the classroom. *Current Psychology, 40(9),* 4500–4506. DOI 10.1007/s12144-019-00395-7.

136. Rojas-Osorio, M., Alvarez-Risco, A. (2019). Intention to use smartphones among Peruvian university students. *iJIM, 13(3),* 13. DOI 10.3991/ijim.v13i03.9356.

137. Malik, A., Dhir, A., Kaur, P., Johri, A. (2021). Correlates of social media fatigue and academic performance decrement. *Information Technology & People, 34(2),* 557–580. DOI 10.1108/ITP-06-2019-0289.

138. Desai, A., Warner, J., Kuderer, N., Thompson, M., Painter, C. et al. (2020). Crowdsourcing a crisis response for COVID-19 in oncology. *Nature Cancer, 1(5),* 473–476. DOI 10.1038/s43018-020-0065-z.

139. Geng, Y., Huang, P. S., Huang, Y. M. (2021). Crowdsourcing in nursing education: A possibility of creating a personalized online learning environment for student nurses in the post-COVID Era. *Sustainability, 13(6),* 3413. DOI 10.3390/su13063413.

140. Vermicelli, S., Cricelli, L., Grimaldi, M. (2021). How can crowdsourcing help tackle the COVID-19 pandemic? *R&D Management, 51(2),* 183–194. DOI 10.1111/radm.12443.

141. Nasca, T. J. (2020). ACGME's early adaptation to the COVID-19 pandemic: Principles and lessons learned. *Journal of Graduate Medical Education, 12(3),* 375–378. DOI 10.4300/JGME-D-20-00302.1.

142. Darras, K. E., Spouge, R. J., de Bruin, A. B. H., Sedlic, A., Hague, C. et al. (2021). Undergraduate radiology education during the COVID-19 pandemic: A review of teaching and learning strategies. *Canadian Association of Radiologists Journal, 72(2),* 194–200. DOI 10.1177/0846537120944821.

143. Mukherjee, U. K., Bose, S., Ivanov, A., Souyris, S., Seshadri, S. et al. (2021). Evaluation of reopening strategies for educational institutions during COVID-19 through agent based simulation. *Scientific Reports, 11(1),* 6264. DOI 10.1038/s41598-021-84192-y.