A Cross-sectional Study on Zoom Fatigue and Satisfaction with Online Learning among Filipino Nursing Students

Un estudio transversal sobre la fatiga y la satisfacción de Zoom en el aprendizaje en línea entre estudiantes de enfermería filipinos

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ABSTRACT

This study determined the associations between Zoom fatigue and satisfaction with online learning among nursing students in a higher institution of learning in the Philippines. A cross-sectional research design was employed and a web-based survey using two self-report measures was conducted in 2021. Descriptive statistics, Pearson's correlation, and linear regression were used to analyze the responses of 408 student respondents. The sample demonstrated high levels of Zoom fatigue and low to average online learning satisfaction. There was a significant difference in the Zoom fatigue levels between male and female students. Higher Zoom fatigue levels predicted reduced online learning satisfaction. This study underscores that online learning and virtual meetings have a likely negative impact on students' online learning experiences. Nursing schools may need to reconsider the existing learning and teaching strategies and start measures that will foster more meaningful and positive experiences in the virtual learning environment.

KEYWORDS Fatigue; nursing students; online learning; videoconferencing; Zoom.

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RESUMEN

Este estudio determinó las asociaciones entre la fatiga al usar Zoom y la satisfacción en el aprendizaje en línea entre estudiantes de enfermería en una institución superior de aprendizaje en Filipinas. Se empleó un diseño de investigación transversal y se realizó una encuesta basada en la web con dos medidas de autoinforme en 2021. Se usaron estadísticas descriptivas, correlación de Pearson y regresión lineal para analizar las respuestas de 408 estudiantes encuestados. La muestra demostró altos niveles de fatiga al utilizar Zoom y una satisfacción de aprendizaje en línea de baja a media. Hubo una diferencia significativa en los niveles de fatiga al usar Zoom entre estudiantes masculinos y femeninos. Los niveles más altos de fatiga al utilizar Zoom predijeron una reducción de la satisfacción del aprendizaje en línea. Este estudio subraya que el aprendizaje en línea y las reuniones virtuales probablemente tengan un impacto negativo en las experiencias de aprendizaje en línea de los estudiantes. Es posible que las escuelas de enfermería deban reconsiderar las estrategias de aprendizaje y enseñanza existentes e iniciar medidas que fomenten experiencias más significativas y positivas en el entorno de aprendizaje virtual.

PALABRAS CLAVE Fatiga; estudiantes de enfermería; aprendizaje en línea; videoconferencia; Zoom.

1. INTRODUCTION

The coronavirus pandemic has wreaked havoc on educational systems and immensely impacted various aspects of students' lives around the globe (Cantero Téllez et al., 2022; Egcas et al., 2021). Information and Communication Technology (ICT) has transformed education and has been instrumental in the changes in the educational landscape during the global crisis and implementation of emergency remote teaching (Corell-Almuzara et al., 2021; Galván Orozco et al., 2022; Moreno-Guerrero et al., 2021, 2022; Torras Virgili, 2021). With the transition to online learning during the COVID-19 pandemic, nursing education has embraced videoconferencing tools and other technological advancements as the new trend in instructional delivery (Moralista et al., 2022; Oducado, 2021; Öztürk et al., 2020). With this abrupt change in teaching-learning landscapes, several studies have revealed varying levels of satisfaction among academic staff and learners, which has shown a substantial impact on student performance and the attainment of learning outcomes in blended learning modalities (Baber, 2020; Gopal et al., 2021; Ranadewa et al., 2021). According to a survey by Nambiar (2020), 68.4 % of students struggled to comprehend online lectures through platforms such as videoconferencing tools, while 67.5 % had difficulty articulating their doubts online compared to in-person lectures. Moreover, Peytcheva-Forsyth et al. (2018) observed that students with higher digital competence favored online learning, whereas Chogo (2020) reported that about 52 % of students were dissatisfied with remote learning. These findings highlight the possibility that the technical aspects of online learning platforms may influence student satisfaction. Aside from being multidimensional and complex, considerable evidence supports that student learner satisfaction is critical, encompassing various elements in the online learning environment such as technology tools and support, communication, engagement, workload, flexibility, instructor pedagogical skills, and feedback (Ranadewa et al., 2021; Wei, & Chou, 2020).

Empirical evidence has linked learner satisfaction to a range of variables in online learning, including stress and burnout (Atmaca et al., 2020; Oducado, & Estoque, 2021). During the pandemic, a new phenomenon known as "Zoom fatigue," which refers to feelings of worry, tiredness, or exhaustion triggered by excessive use of virtual communication platforms (Bowser et al., 2022; Döring et al., 2022; Fauville et al. 2021a;

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Salhab, 2022; Williams, 2021) was noted. In nursing education, Vandenberg and Magnuson (2021) reported that only 12 % of student nurses enjoyed online practice courses. Nursing students were dissatisfied with the usage of Zoom conferencing for clinical or related learning experiences, claiming that "we are not learning anything" or that "clinicals cannot be done over Zoom" (Vandenberg, & Magnuson, 2021). Navigating online videoconferencing has led to technical concerns that did not exist during in-person lectures, including frozen screens, broken audio, and poor or nonexistent internet connectivity (Bailey, 2021). On the other hand, the study by Elshami et al. (2021) among Medical and Health Science schools reported that overall satisfaction with online learning was 41.3 % among students and 74.3 % for the faculty. The same study showed that student learners' highest satisfaction areas were flexibility and communication. Divergent viewpoints have been documented in related studies, with some claiming that videoconferencing and other synchronous or asynchronous activities promote flexibility while others find them time-consuming and rigorous, often leading to stress and burnout (Badia et al., 2019, Duke et al., 2020).

During the COVID-19 era, the rapid expansion of online learning and technology-enhanced tools in Philippine nursing schools led to a paradigm shift where both teachers and learners confronted unprecedented levels of challenges and stress (Guillasper et al., 2020; Guillasper et al., 2021; Oducado, & Soriano, 2021). In an undergraduate nursing school study conducted by Oducado and Estoque (2021), students reported low to moderate satisfaction as well as high levels of stress during the pandemic. High-stress levels are typically associated with a propensity to spiral into academic burnout syndrome (Nurhidayati et al., 2021; Wang et al., 2022). This trend also referred to as "school burnout" or "learning burnout," has been attributed to a confluence of academic inefficacy, emotional exhaustion, and cynicism as a consequence of an ongoing failure to manage schooling pressure effectively (Sveinsdóttir et al., 2021). This must be given attention as academic challenges in nursing school along with other pandemic-related and personal stressors make it difficult for students to stay motivated (Stevenson, 2022).

The outcomes of the literature review and the researchers' personal experiences as nurse educators enabled them to recognize the possible ramifications of excessive Zoom or videoconferencing fatigue on learners. These include feelings of being overwhelmed, exhaustion, decreased motivation, and mental health deviations or physical illnesses (Dhir et al., 2018; Fauville et al., 2021a; 2021b). Nurse educators and school administrators must investigate and respond to these palpable problems, backed by robust research. Primarily, this study was motivated by the lack of information on the relationships among the main variables, particularly among nursing students in a resource-limited setting. Furthermore, the knowledge gained from this study will be leveraged to promote feasible strategies and measures in virtual or blended learning platforms in the future.

Meanwhile, several studies have shown that issues related to videoconferencing or Zoom fatigue are mediated by the gender of the respondents (Bailenson, 2021; Bennett et al., 2021; Hacker et al., 2020). Notably, researchers from Stanford University indicated that one in seven women reported feeling highly worn out and exhausted after participating in Zoom sessions (Fauville, 2021b). These findings was attributed to the females' "self-consciousness" and "self-focused attention" (Dutta et al., 2021; Fauville, 2021b; Oducado et al., 2021; Oducado et al., 2022b; 2022c). Considering other demographic uses and personality attributes, women were significantly affected by Zoom fatigue compared to men, according to the above literature.

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Understanding gender differences and how it affects students' performance can help in formulating and advancing effective policies to address equity and quality concerns in education (Organization for Economic Cooperation and Development, 2009).

This study is anchored on Daft and Lengel's (1986) Media Richness theory to explain the relationships between the primary variables. According to this model, media can be appraised along a rich-to-lean spectrum, encompassing feedback, message customization, linguistic variation, and several communication routes and indicators. The hypothesized association between Zoom fatigue and online learning satisfaction may be linked with the precepts of this theory, which asserts that improper or mismanaged media choices (i.e., in instructional delivery) may convey imprecise messages to the recipients (i.e., learners), resulting in uncertainty or equivocality (Daft, & Lengel, 1986) thus low satisfaction. The theory contends that when media is not utilized responsibly (e.g., excessive or inappropriate use of videoconferencing tools), this may lead to issues, such as poor learning satisfaction which was considerably prevalent among students during the new normal. Hence, systems such as educational institutions should closely examine, select, and manage media options in various contexts of remote learning (Tang, & Hew, 2019; Tanupabrungsun, & Hemsley, 2018). Fan-Chen et al. (2019) also claim that end-users who perceive higher or better-quality media richness in online interactions have higher satisfaction levels in virtual learning environments. According to Kobayashi (2017), students prefer recorded lectures with slides and audio over synchronous video lectures such as Zoom conferencing, which presents a number of technological issues. In the same study, learners favored collaborative and rich media platforms. Further, according to Kingsley-Westerman et al. (2015), proper media selection and practices, such as when using Zoom videoconferencing, can enable the transmission of media-rich channels that lead to "closer relationships," less ambiguity, and/or burnout, which may translate to higher levels of satisfaction among online environment participants. To understand Zoom fatigue experience, Shoshan and Wehrt (2022) argued that while videoconferences would be considered richer than other media, this is not as rich as face-to-face communication. Additionally, the authors argued that the subjective experiences of users in videoconferences might lead to increased exhaustion levels and determine how the characteristics of virtual meetings are perceived and appraised (Shoshan, & Wehrt, 2022).

The current evidence in the literature underscored the critical importance of the study's key variables on students' holistic wellness and the potential impact of these elements on nursing education and the profession at large. In addition, given the scarcity of data on the topic in local nursing schools, the researchers felt compelled to investigate the relationships between Zoom fatigue and satisfaction with online learning among nursing students at a higher education institution in the Philippines.

2. MATERIAL AND METHOD

2.1. Research design and participants

This cross-sectional research analyzed the responses of 408 students of a four-year baccalaureate nursing degree program in a higher institution of learning in the Philippines. Krejcie and Morgan's (1970) sampling table determined the required sample size. The minimum sample requirement for a total population of 1400 was 302.

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2.2. Instrument

Two adopted scales were used in this study, namely, the Zoom Exhaustion and Fatigue Scale and the Online Learning Satisfaction Scale. The Zoom Exhaustion and Fatigue Scale by Fauville et al. (2021a) has 15 items with 5-point Likert options (1 = "not at all/never" to 5 = "extremely/always"). The Online Learning Satisfaction Scale from the research of Strong et al. (2012) has seven items with 5-point Likert response options ("1-strongly disagree" to "5-strongly agree"). Generally, higher scores obtained on the scales suggest higher Zoom fatigue and satisfaction levels. For this study, the following was used to interpret the mean scores: very low (1.00-1.50), low (1.51-2.50), moderate (2.51-3.50), high (3.51-4.50), very high (4.51-5.00). The two measures of this study had acceptable Cronbach's alpha reliability values of greater than .70. The reliability scores of the Zoom Exhaustion and Fatigue Scale and the Online Learning Satisfaction Scale were .91 and .94, respectively (Oducado et al., 2021; Oducado et al., 2022a). The demographic information (age, sex, and year level) and duration of online learning ("On a typical day, how many hours do you spend for online learning?") were also asked at the beginning of the survey after the information sheet and consent.

2.3. Data collection

This study is part of a bigger research study on online learning in nursing education. Data collection was done online in 2021 in June after administrative clearance of the sound and ethical conduct of academic research was obtained from the University where the study was conducted. Respondents were recruited broadly through a general announcement in the exclusive online social group (Facebook) where all students of the nursing program are members. The first page of the survey included the information sheet about the study, and respondents were asked to tick a box to indicate consent before accessing the actual survey. Participation in the study was voluntary and the participants' responses were kept anonymous and confidential.

2.4. Data analysis

The data were analyzed using IBM Statistical Package for the Social Sciences (SPSS) 26. Both inferential (Pearson's and simple linear regression analysis) and descriptive (frequency, percentage, mean, and standard deviation) statistics were utilized for data analysis. The level of significance was set at .05 alpha.

3. RESULTS

Table 1 shows that of 408 respondents, 75.2 % were females, and 46.3 % were in their second year. The mean age was 19.95 (SD=2.20) years, and they spend an average of 8.08 (SD=8.18) hours on online learning.

TABLE 1. Profile of respondents

Profile	f	%
Age [M=19.95 (SD=2.20)]		
18-19 years old	206	50.5
20-21 years old	202	49.5

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Gender		
Prefer not to say	9	2.2
Male	92	22.5
Female	307	75.2
Year level		
First Year	110	27.0
Second Year	189	46.3
Third and Fourth Year	109	26.7
Duration of online learning [M=8.08 (SD=8.18)]		
4 hours or less	42	10.3
5 to 8 hours	206	50.5
9 to 12 hours	130	31.9
13 hours or more	23	5.6

The levels of Zoom fatigue and satisfaction are shown in Table 2. About half (50.7 %) of the respondents experienced high levels of Zoom fatigue. In terms of satisfaction with online learning, 34.1 % had low, and 35.3 % had only an average level of satisfaction.

TABLE 2. Level of Zoom fatigue and online learning satisfaction

Level	Zoom Fatigue (M=3.84, SD=.76)		Satisfaction (M=2.52, SD=.99)	
	f	%	f	%
Very High	74	18.1	11	2.7
High	207	50.7	50	12.3
Average	113	27.7	144	35.3
Low	14	3.4	139	34.1
Very low	-		64	15.7

In analyzing the gender differences, we excluded the nine participants who preferred not to report their gender or sex. Statistical analysis using the t-test for independent samples revealed significant gender differences in students' Zoom fatigue (t=-3.208, p=.001). However, there was no significant gender differences in students' online learning satisfaction levels (t=1.685, p=.093).

TABLE 3. Gender differences in Zoom fatigue and satisfaction

Variables	Categories	M	SD	t	*p*-value
Zoom fatigue	Male	3.62	.69	-3.208*	.001
	Female	3.88	.67		
Satisfaction	Male	2.69	.96	1.685	.093
	Female	2.51	.93		

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The bivariate analysis of the major variables using Pearson's correlation is shown in Table 4. Statistical analysis revealed a significantly low inverse correlation (r=-.204, *p*=.000) between Zoom fatigue and online learning satisfaction. The simple linear regression analysis in Table 4 indicates that Zoom fatigue significantly predicts (B=-.280, *p*=.000) online learning satisfaction explaining 4.2 % of the variance.

TABLE 4. Association between Zoom fatigue and satisfaction

	B	t	*p*	r	*p*	R2	F	*p*
Constant	3.619	13.985	.000	-.204	.000	.042	17.696	.000
Zoom fatigue	-.280	-4.207	.000					

4. DISCUSSION

This study looked into Zoom fatigue and learning satisfaction among nursing students. This study found a significant number of students reporting high levels of Zoom fatigue. The online phenomenon of videoconferencing fatigue also known as Zoom fatigue was described as exhaustion, overload frustration, and other forms of psychological or behavioral afflictions affecting online learners (Amponsah et al., 2021; de Oliveira Kubrusly Sobral et al., 2022; Oducado et al., 2021). Based on the thematic analysis of the study of Bennett et al. (2021), the participants reported experiencing "long periods" of "video fatigue" after numerous video-conference meetings due to the "extended periods" of "screen time length". Students also expressed various stressors during virtual streaming, which adds to the cognitive load and anxiety spurred by "Zooming". Moreover, it often drains energy to concentrate on different stimulations in the online virtual space. When Zooming or during virtual meetings, technical issues contribute to the stressors affecting students and elevating their stress levels. These issues include screen freezing, nervousness regarding virtual recording and data control, and a lack of data or connectivity when engaging in synchronous sessions (Jiang, 2020; Lawson, 2020; Oducado et al., 2021; Reisinger, 2020). There are also study findings linking Zoom fatigue with poor mental well-being (Deniz et al., 2022; Montag et al., 2022; Oducado et al., 2022d). Further, Massner (2021) proposed a multifactorial model of Zoom fatigue attributing the effects of fatigue and burnout to situational, environmental, communication, and individual factors.

Additionally, students in this study reported low to moderate online learning satisfaction. Prior studies conducted locally and abroad likewise reported almost similar findings. Only 12 % of student nurses enjoyed online practice courses in the study by Vandenberg and Magnuson (2021). The study by Elshami et al. (2021) reported 41.3 % overall satisfaction with online learning among students. Oducado and Estoque (2021) noted low to moderate satisfaction during the pandemic outbreak among Filipino nursing students.

Remedies for Zoom fatigue and improving online satisfaction must be made. Effective innovative strategies requiring technological tools and pedagogical design may be adopted to enhance students' engagement and motivation in online learning environments (Romero Andonegui et al., 2021; Sánchez et al., 2022) while trying to manage online fatigue. Scholars have explored strategies to lessen academic stress and burnout, including taking intermittent breaks and using the Zoom chat tool (Jiang, 2020; Halupa, & Bollinger, 2020; Pettersson, 2018). These strategies may be adopted in the local educational setting.

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This study also discovered that females experienced more Zoom fatigue than males. According to newly published Stanford research by Fauville et al. (2021a; 2021b), the shift from face-to-face to virtual meetings has had a toll on women. In the first large-scale study examining the whole range of Zoom fatigue, Stanford University researchers discovered that women report feeling more worn out than men following video talks. According to the study findings, the exhaustion associated with a day of back-to-back online meetings is more severe for women. Moreover, the study reported that one in seven females (13.8 %) and one in twenty males (5.5 %) reported feeling very exhausted following Zoom calls. Additionally, the researchers discovered that the primary factor contributing to women's exhaustion was an increase in what social psychologists refer to as "self-focused attention" triggered by video conferencing's self-view. Self-focused attention refers to an increased awareness of one's appearance or how one comes across in a conversation. Further, the researchers explained that women are more likely than males to focus exclusively on themselves when in front of a mirror, a phenomenon known as "mirror anxiety." Women's perception of physical confinement due to the requirement to remain centered in the camera's range of vision is also related to increased Zoom fatigue. Unlike in-person meetings, where participants can move around, pace, and stretch, video conferencing inhibits movement. Furthermore, even when women attended the same number of meetings each day as men, their sessions were reported as longer. It was also found that women had fewer breaks in between sessions, which contributed to their tiredness. A gender difference in the problematic use of ICTs was also noted (Colomo Magaña et al., 2021). Moreover, the gender difference in Zoom fatigue was also found in other studies (Dutta et al., 2021; Oducado et al., 2021; Oducado et al., 2022c). This finding suggests being mindful of the impact of online fatigue particularly among female students.

This study found that Zoom fatigue was significantly correlated with and predicted online learning satisfaction. Congruent with the study findings, the literature has shown that Zoom fatigue can likely reduce online learning satisfaction among learners. Massner (2021), Oducado et al. (2021), and Oducado et al. (2022b) noted that using online video conferences such as Zoom is reported to negatively impact satisfaction with teaching and learning and may have an undesirable impact among higher education institution students and faculty. Additionally, studies also noted that online learning along with the use of videoconferencing applications for education purposes creates negative or indifferent attitudes and dissatisfaction among students in medicine, nursing, and other allied health courses during the pandemic (Abbasi et al., 2020; Oducado, & Estoque, 2021; Sasmal, & Roy, 2021). It was also noted that lesser online meetings were linked to the participants' satisfaction with the utility of videoconferences (Johnson, 2021). Moreover, Fauville et al. (2021b) and Darshana (2021) identified that the limited field of vision when utilizing Zoom and decreased mobility contribute to a feeling of being "contained" for the Zoom session duration. Along with not being able to see what is happening when the user is off-screen, some students may feel left out, which is believed to contribute to the overall online learning dissatisfaction in the intra- and extra-virtual experience of the students (Søraker, 2012). Also, off-camera students tend to shun other learners' real-time, extra-virtual experiences (Darshana, 2021), which may translate to reduced satisfaction levels.

The study extends the theoretical implications of Media Richness theory to online teaching-learning environments in nursing education. According to the study findings, the theory can be useful in explaining nurse educators' media choices in online courses, particularly how to use Zoom videoconferencing effectively. When evaluated for potential richness and merged with best practices such as timely feedback, mes-

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sage personalization, language use and variety, and the balanced use of the online platform's communication channels and cues, videoconferencing tools such as Zoom can be considered rich media, as defined in the model (Daft, & Lengel, 1986). Although most of the theory's assumptions can be applied to online environments, its breadth in the context of the nursing education landscape may still be limited. Hence, the findings of the study may broaden the Media Richness theory in terms of its connections with multidimensional aspects and repercussions of media use (whether positive or negative), such as Zoom fatigue, which may influence satisfaction among message recipients (i.e., student nurses). Further, the results support the argument of Shoshan and Wehrt (2022) that the characteristics of videoconferences can be shaped by the experiences of its users. Individual factors such as gender may also be used as indicators in developing policy-related insights and consequences as an offshoot of this study. Overall, the identified correlation between Zoom fatigue and satisfaction has important implications for understanding the Media Richness hypothesis. Furthermore, the study findings advocate the mindful use of videoconferencing in the context of online nursing education.

5. CONCLUSIONS

This study is among the earliest to investigate the likely impact of Zoom fatigue on learning satisfaction with online education among nursing students. We conclude in this study that online learning and videoconferencing have a likely negative impact on students' learning experiences. Moreover, this study highlights that Zoom fatigue negatively contributes to students' satisfaction with online learning and that female students experience higher levels of fatigue.

It is recommended that nursing schools revisit the current teaching and learning approaches and look into the possible overuse of virtual communication platforms, particularly videoconferencing, that may negatively impact students' online learning experiences in virtual learning spaces amid the time of global health crisis. Nursing faculty members may focus on improving online academic learning environments and curricula to alleviate unnecessary stress and deliver more productive theoretical and clinical learning experiences. Emphasis may be given to female students who are likely to experience a greater impact of online fatigue.

Moreover, it may also be necessary to understand students' goals, motivations, and experiences and how to keep students engaged in learning and prevent negative effects in online learning environments. Additionally, universities may offer academic breaks within semesters and consider having rests between lengthy virtual meetings to support students in maintaining their mental health and well-being. This study underscores that measures that foster more positive and meaningful learning experiences for students may be initiated.

5.1. Limitations and future lines of research

Regardless of the valuable findings, several limitations apply to this study. The study used a sample of students from a single private university in the Philippines, limiting the generalizability of results to larger, more diverse populations. Also, the data were collected using an online approach, which likely included people interested in the subject. Those who did not participate may have different perspectives from the

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study participants. Self-report bias in the use of questionnaires is also a limitation of this paper. Despite the limitations, our research expands the literature on virtual meeting fatigue in the field of education. Future researchers may conduct similar research and address the limitations presented in this study.

6. FUNDING

7. REFERENCES

Abbasi, S., Ayoob, T., Malik, A., & Memon, S. I. (2020). Perceptions of students regarding e-learning during Covid-19 at a private medical college. *Pakistan Journal of Medical Sciences*, *36*(CO-VID19-S4), S57-S61. http://dx.doi.org/10.12669/pjms.36.COVID19-S4.2766

Amponsah, S., van Wyk, M., Kolugu, M. (2021). Academic experiences of "Zoom Fatigue" as a virtual streaming phenomenon. *International Journal of Web-based Learning and Teaching Technologies,* *17*(6), 1-16. http://dx.doi.org/10.4018/IJWLTT.287555

Atmaca, Ç., Rızaoğlu, F., Türkdoğan, T., & Yaylı, D. (2020). An emotion focused approach in predicting teacher burnout and job satisfaction. *Teaching and Teacher Education*, *90*, 103025. https://doi.org/10.1016/j.tate.2020.103025

Baber, H. (2020). Determinants of students' perceived learning outcome and satisfaction in online learning during the pandemic of COVID19. *Journal of Education and E-Learning Research*, *7*(3), 285-292. https://doi.org/10.20448/journal.509.2020.73.285.292

Badia, A., Garcia, C., & Meneses, J. (2019). Emotions in response to teaching online: Exploring the factors influencing teachers in a fully online university. *Innovations in Education and Teaching International*, *56*(4), 446-457. https://doi.org/10.1080/14703297.2018.1546608

Bailenson, J. (2021). Nonverbal overload: A theoretical argument for the causes of zoom fatigue. *Technology, Mind, and Behavior, 2*(1). https://doi.org/10.1037/tmb0000030

Bailey, D. (2021). Interactivity during Covid-19: mediation of learner interactions on social presence and expected learning outcome within videoconference EFL courses. *Journal of Computers in Education*, *9*, 291-313. https://doi.org/10.1007/s40692-021-00204-w

Bennett, A. A., Campion, E. D., Keeler, K. R., & Keener, S. K. (2021). Videoconference fatigue? Exploring changes in fatigue after videoconference meetings during COVID-19. *Journal of Applied Psychology*, *106*(3), 330-344. http://dx.doi.org/10.1037/apl0000906

Bowser, A. S., Kazakoff, M. A., Scott, P. W., & Dunbar-Jacob, J. (2022). Nursing students' dissatisfaction with course organization and student engagement in remote learning 1 year Post-COVID-19 restrictions. *Nurse Educator*, *47*(3), 68-72. https://doi.org/10.1097/NNE.0000000000001175

Cantero Téllez, R., Romero Galisteo, R. P., & Rodriguez Bailón, M. (2022). Personal and teaching factors related to university professors' stress levels in the face of COVID-19. *Innoeduca. International Journal of Technology and Educational Innovation*, *8*(1), 102-110. https://doi.org/10.24310/innoeduca.2022.v8i1.11920

Chogo, P. J. (2020). An evaluation of higher education students online learning experience. *International Journal of Scientific and Research Publications*, *10*(6), 926-933. https://doi.org/10.29322/IJSRP.10.06.2020.p102111

Colomo Magaña, E., Cívico Ariza, A., Ruiz Palmero, J., & Sánchez Rivas, E. (2021). Problematic use of ICTs in trainee teachers during COVID-19: A sex-based analysis. *Contemporary Educational Technology*, *13*(4), ep314. https://doi.org/10.30935/cedtech/10988

Corell-Almuzara, A., López-Belmonte, J., Marín-Marín, J. A., & Moreno-Guerrero, A. J. (2021). COVID-19 in the field of educa-

Innoeduca. International Journal of Technology and Educational Innovation
Amboy, M.K.Q., Habaña, M.P., Ramirez, L.M.M. Sotelo, M.G., Penuela, A. C., Oducado, R.M.F.

63

tion: State of the art. *Sustainability*, *13*(10), 5452. https://doi.org/10.3390/su13105452

Daft, R. L., & Lengel, R. H. (1986). Organizational information requirements, media richness and structural design. *Management Science*, *32*(5), 554-571. https://doi.org/10.1287/mnsc.32.5.554

Darshana, J. D. (2021). *Dissonance of the self: applying the philosophy of Patañjali's Yogasūtra to the effects of prolonged engagement in virtual synchronous platforms* (Master's thesis). Oregon State University. https://ir.library.oregonstate.edu/concern/graduate_thesis_or_dissertations/8k71nq857

de Oliveira Kubrusly Sobral, J. B., Lima, D. L. F., Lima Rocha, H. A., de Brito, E. S., Duarte, L. H. G., Bento, L. B. B. B., & Kubrusly, M. (2022). Active methodologies association with online learning fatigue among medical students. *BMC Medical Education*, *22*, 74. https://doi.org/10.1186/s12909-022-03143-x

Deniz, M. E., Satici, S. A., Doenyas, C., & Griffiths, M. D. (2022). Zoom fatigue, psychological distress, life satisfaction, and academic well-Being. *Cyberpsychology, Behavior, and Social Networking*, *25*(5), 270-277. http://doi.org/10.1089/cyber.2021.0249

Dhir, A., Yossatorn, Y., Kaur, P., & Chen, S. (2018). Online social media fatigue and psychological wellbeing—a study of compulsive use, fear of missing out, fatigue, anxiety and depression. *International Journal of Information Management*, *40*, 141-152. https://doi.org/10.1016/j.ijinfomgt.2018.01.012

Döring, N., Moor, K. D., Fiedler, M., Schoenenberg, K., & Raake, A. (2022). Videoconference fatigue: A conceptual analysis. *International Journal of Environmental Research and Public Health*, *19*(4), 2061. https://doi.org/10.3390/ijerph19042061

Duke, N. N., Gross, A., Moran, A., Hodsdon, J., Demirel, N., Osterholm, E., Sunni, M., & Pitt, M. B. (2020). Institutional factors associated with burnout among assistant professors. *Teaching and Learning in Medicine*, *32*(1), 61-70. https://doi.org/10.1080/10401334.2019.1638263

Dutta, S., Ambwani, S., Lal, H., Ram, K., Mishra, G., Kumar, T., & Varthya, S. B. (2021). The satisfaction level of undergraduate medical and nursing students regarding distant preclinical and clinical teaching amidst COVID-19 across India. *Advances in Medical Education and Practice*, *2*(12), 113-122. https://doi.org/10.2147/AMEP.S290142

Egcas, R. A., Oducado, R. M. F., Visperas, J., Cleofas, J. S. R., & Lausa, S. M. (2021). After over a year of pandemic: Mental well-being and life satisfaction of Filipino college students. *Pertanika Journal of Social Sciences & Humanities*, *29*(4), 2401-2416. https://doi.org/10.47836/pjssh.29.4.17F

Elshami, W., Taha, M. H., Abuzaid, M., Saravanan, C., Al Kawas, S., & Abdalla, M. E. (2021). Satisfaction with online learning in the new normal: perspective of students and faculty at medical and health sciences colleges. *Medical Education Online*, *26*(1), 1920090. https://doi.org/10.1080/10872981.2021.1920090

Fan-Chen, T., Cheng, T., Pei-Ling, Y., Huang, T., & Teng, C. (2019). Media richness, social presence and loyalty to mobile instant messaging. *Industrial Management & Data Systems, 119*(6), 1357-1373. http://dx.doi.org.ezproxy.liberty.edu/10.1108/IMDS-09- 2018-0415

Fauville, G., Luo, M., Queiroz, A. C. M. and Bailenson, J. N., & Hancock, J. (2021a). Zoom exhaustion & fatigue scale. *Computers in Human Behavior Reports*, *4*, 100119. https://doi.org/10.1016/j.chbr.2021.100119

Fauville, G., Luo, M., Queiroz, A. C. M., Bailenson, J. N., & Hancock, J. (2021b). Nonverbal mechanisms predict zoom fatigue and explain why women experience higher levels than men. *SSRN Electronic Journal.* https://doi.org/10.2139/ssrn.3820035

Galván Orozco, A., López Pérez, O., Chávez López, J. K., & Contreras López, E. X. (2022). Virtual learning environments: Social networks for learning at university. *Innoeduca. International Journal of Technology and Educational Innovation*, *8*(1), 91-101. https://doi.org/10.24310/innoeduca.2022.v8i1.12340

Gopal, R., Singh, V., & Aggarwal, A. (2021). Impact of online classes on the satisfaction and performance of students during the pandemic period of COVID 19. *Education and Information Technologies, 26*(6), 6923-6947. https://doi.org/10.1007/s10639-021-10523-1

Guillasper, J. N., Soriano, G. P., & Oducado, R. M. F. (2020). Psychometric properties of 'attitude towards e-learning scale' among nursing students. *International Jour-*

Innoeduca. International Journal of Technology and Educational Innovation

Amboy, M.K.Q., Habaña, M.P., Ramirez, L.M.M. Sotelo, M.G., Penuela, A. C., Oducado, R.M.F.

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nal of Educational Sciences, 30(1-3), 1-5. https://doi.org/10.31901/24566322.2020/30.1-3.1135

Guillasper, J. N., Oducado, R. M. F., & Soriano, G. P. (2021). Protective role of resilience on COVID-19 impact on the quality of life of nursing students in the Philippines. *Belitung Nursing Journal*, 7(1), 43-49. https://doi.org/10.33546/bnj.1297

Hacker, J., vom Brocke, J., Handali, J., Otto, M., & Schneider, J. (2020). Virtually in this together – how web-conferencing systems enabled a new virtual togetherness during the COVID-19 crisis. *European Journal of Information Systems*, 29(5), 1-22. https://doi.org/10.1080/0960085x.2020.1814680

Halupa, C., & Bolliger, D. U. (2020). Technology fatigue of faculty in higher education. *Journal of Education and Practice*, 11(18). https://doi.org/10.7176/JEP/11-18-02

Jiang, M. (2020). *The reason Zoom calls drain your energy.* https://www.bbc.com/worklife/article/20200421-why-zoom-video-chats-are-so-exhausting

Johnson, B. (2021). *Video meetings in a pandemic era: Emotional exhaustion, stressors, and coping* (Doctoral dissertation). Antioch University. https://aura.antioch.edu/cgi/viewcontent.cgi?article=1635&context=etds

Kingsley-Westerman, C. Y., Reno, K. M., & Heuett, K. B. (2015). Delivering Feedback: Supervisors' Source Credibility and Communication Competence. *International Journal of Business Communication*, 55(4), 526-546. https://doi.org/10.1177/2329488415613338

Kobayashi, M. (2017). Students' media preferences in online learning. *Turkish Online Journal of Distance Education*, 18(3), 1. https://doi.org/10.17718/tojde.328925

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607-610. https://doi.org/10.1177/001316447003000308

Lawson, S. (2020). *Are schools forcing students to install spyware that invades their privacy as a result of the Coronavirus lockdown?* https://www.forbes.com/sites/seanlawson/2020/04/24/are-schools-forcing-students-to-install-spyware-that-invades-their-privacy-as-a-result-of-the-coronavirus-lockdown/?sh=675a3662638d

Massner, C. K. (2021). The use of videoconferencing in higher education. In F. Pollák, J. Soviar & R. Vavrek (Eds.), *Communication Management*. IntechOpen. https://doi.org/10.5772/intechopen.99308

Montag, C., Rozgonjuk, D., Riedl, R., & Sindermann, C. (2022). On the associations between videoconference fatigue, burnout and depression including personality associations. *Journal of Affective Disorders Reports, 10*, 100409. https://doi.org/10.1016/j.jadr.2022.100409

Moralista, R. B., Oducado, R. M. F., Robles, B. R. G., & Rosano, D. A. (2022). Determinants of zoom fatigue among graduate students of teacher education program. *International Journal of Emerging Technologies in Learning*, 17(13), 176-185. https://doi.org/10.3991/ijet.v17i13.31511

Moreno Guerrero, A. J., Marín Marín, J. A., Parra González, M. E., & López Belmonte, J. (2022). Computer in education in the 21st century. A scientific mapping on the literature in Web of Science. *Campus Virtuales: Revista Científica Iberoamericana De Tecnología Educativa*, 11(1), 201-223. https://doi.org/10.54988/cv.2022.1.1019

Moreno-Guerrero, A. J., Soler-Costa, R., Marín-Marín, J. A., & López-Belmonte, J. (2021). Flipped learning and good teaching practices in secondary education. *Comunicar*, 29(68), 107-117. https://doi.org/10.3916/C68-2021-09

Nambiar, D. (2020). The impact of online learning during COVID- 19: Students' and teachers' perspective. *The International Journal of Indian Psychology*, 8(2), 783-793. https://doi.org/10.25215/0802.094

Nurhidayati, T., Rahayu, D., & Alfiyanti, D. (2021). Nursing students' coping for burnout and fatigue online learning during coronavirus disease 2019 pandemic. *Open Access Macedonian Journal of Medical Sciences*, 9(T4), 92-96. https://doi.org/10.3889/oamjms.2021.5857

Oducado, R. M. F., Amboy, M. K. Q., Penuela, A. C., Dela Rosa, R. D., Fajardo, M. T. M., & Temelo, D. R. F. (2022a). Instructor's caring behaviors, burnout, satisfaction, and academic performance of nursing students in online education and pandemic era. *Frontiers of Nursing*.

Oducado, R. M. F., Dequilla, M. A. C. V., & Villaruz, J. F. (2022b). Factors predicting videoconferencing fatigue among higher

Innoeduca. International Journal of Technology and Educational Innovation
Amboy, M.K.Q., Habaña, M.P., Ramirez, L.M.M. Sotelo, M.G., Penuela, A. C., Oducado, R.M.F.

65

education Faculty. *Education and Information Technologies*, *27*, 9713-9724. https://doi.org/10.1007/s10639-022-11017-4

Oducado, R. M. F., Fajardo, M. T. R., Parreño-Lachica, G. M., Maniago, J. D., Villanueva, P. M. B., Dequilla, M. A. C. V., Montaño, H. C., & Robite, E. E. (2022c). Is videoconference "Zoom" fatigue real among nursing students? *Journal of Loss and Trauma*, *27*(5), 490-492. https://doi.org/10.1080/15325024.2021.1950987

Oducado, R. M. F., Villaruz, J. F., Dequilla, M. A. C. V., & Parreño-Lachica, G. M. (2022d). Zoom fatigue and mental well-being among school executives. *Journal of Loss and Trauma*, *27*(4), 393-394. https://doi.org/10.1080/15325024.2021.2002617

Oducado, R. M. (2021). New normal in nursing education: Sophomore students' expectations of and readiness for online learning in the era of COVID-19 pandemic. *International Journal of Caring Sciences*, *14*(2), 1170-1177. https://doi.org/10.31219/osf.io/uyda6

Oducado, R. M. F., & Estoque, H. (2021). Online learning in nursing education during the COVID-19 pandemic: Stress, satisfaction, and academic performance. *Journal of Nursing Practice*, *4*(2), 143-153. https://doi.org/10.30994/jnp.v4i2.128

Oducado, R. M. F., Fajardo, M. T. R., Parreño-Lachica, G. M., Maniago, J. D., Villanueva, P. M. B., Dequilla, Ma. A. C. V., Montaño, H. C., & Robite, E. E. (2021). Predictors of videoconference fatigue: Results from undergraduate nursing students in the Philippines. *Asian Journal for Public Opinion Research*, *9*(4), 310-330. https://doi.org/10.15206/ajpor.2021.9.4.310

Oducado, R. M. F., & Soriano, G. P. (2021). Shifting the education paradigm amid the COVID 19 pandemic: Nursing students' attitude to E learning. *Africa Journal of Nursing and Midwifery*, *23*(1). https://doi.org/10.25159/2520-5293/8090

Organization for Economic Cooperation and Development. (2009), "Gender matters?" in *Equally prepared for life?: How 15-year-old boys and girls perform in school*. OECD Publishing. https://doi.org/10.1787/9789264064072-2-en

Öztürk, G., Karamete, A., & Çetin, G. (2020). The relationship between pre-service teachers' cognitive flexibility levels and techno-pedagogical education competencies. *International Journal of Contemporary Educational Research, 7*, 40-53. https://doi.org/10.33200/ijcer.623668

Pettersson, F. (2018). On the issues of digital competence in educational contexts – a review of the literature. *Educational Informational Technology*, *23*, 1005-1021. https://doi.org/10.1007/s10639-017-9649-3

Peytcheva-Forsyth, R., Yovkova, B., & Aleksieva, L. (2018, December). Factors affecting students' attitudes towards online learning-The case of Sofia University. *AIP conference proceedings*, *2048*(1), 020025. AIP Publishing LLC. https://doi.org/10.1063/1.5082043

Ranadewa, D. U. N., Gregory, T. Y., Boralugoda, D. N., Silva, J. A. H. T., & Jayasuriya, N. A. (2021). Learners' satisfaction and commitment towards online learning during COVID-19: A concept paper. *Vision: The Journal of Business Perspective*, *0*(0), 097226292110567. https://doi.org/10.1177/09722629211056705

Reisinger, T. (2020). *Zoom security: I've researched problems with video conferencing for years – here's what you need to know.* https://theconversation.com/zoom-security-ive-researched-problems-with-video-conferencing-for-years-heres-what-you-need-to-know-136330

Romero Andonegui, A., Tejada Garitano, E., López de la Serna, A., & Bilbao Quintana, N. (2021). Diversity of technological use in university students; the academic vs. the personal. *Innoeduca. International Journal of Technology and Educational Innovation, 7*(1), 19-30. https://doi.org/10.24310/innoeduca.2021.v7i1.7868

Salhab, R. (2022). Zoom or not to zoom: Students' attitudes towards using zoom at PTUK. *Journal of Southwest Jiaotong University*, *57*(1), 488-50. https://doi.org/10.35741/issn.0258-2724.57.1.45

Sasmal, S., & Roy, M. (2021). Perception of undergraduate nursing students regarding e-learning during COVID-19 pandemic in West Bengal. International *Journal of Community Medicine and Public Health, 8*(4), 1892-1898. http://dx.doi.org/10.18203/2394-6040.ijcmph20211251

Shoshan, H. N., & Wehrt, W. (2022). Understanding "Zoom fatigue": A mixed-method approach. *Applied Psychology*, *71*(3), 827-852. https://doi.org/10.1111/apps.12360

Stevenson, D. (2022). Academic burnout in nursing school. *Nursing*, *52*(3),60-61. https://doi.org/10.1097/01.nurse.0000820056.95100.26

Innoeduca. International Journal of Technology and Educational Innovation
Amboy, M.K.Q., Habaña, M.P., Ramirez, L.M.M. Sotelo, M.G., Penuela, A. C., Oducado, R.M.F.

66

Sveinsdóttir, H., Flygenring, B. G., Svavarsdóttir, M. H., Thorsteinsson, H. S., Kristófersson, G. K., Bernharðsdóttir, J., & Svavarsdóttir, E. K. (2021). Predictors of university nursing students burnout at the time of the COVID-19 pandemic: A cross-sectional study. *Nurse Education Today*, *106*, 105070. https://doi.org/10.1016/j.nedt.2021.105070

Sánchez, S. P., Lampropoulos, G., & López-Belmonte, J. (2022). Comparing gamification models in higher education using face-to-face and virtual escape rooms. *NAER: Journal of New Approaches in Educational Research*, *11*(2), 307-322. https://doi.org/10.7821/naer.2022.7.1025

Søraker, J. H. (2012). Virtual worlds and their challenge to philosophy: understanding the "intravirtual" and the "extravirtual". *Metaphilosophy*, *43*(4), 499-512. https://doi.org/10.1111/j.1467-9973.2012.01755.x

Strong, R., Irby, T. L., Wynn, J. T., & McClure, M. M. (2012). Investigating students' satisfaction with eLearning courses: The effect of learning environment and social presence. *Journal of Agricultural Education*, *53*(3), 98-110. https://doi.org/10.5032/jae.2012.03098

Tang, Y., & Hew, K. (2019). Emoticon, emoji, and sticker use in computer-mediated communication: A review of theories and research findings. *International Journal of Communication*, 13(2019), 1-27. https://doi.org/10.1007/978-981-10-8896-4_16

Tanupabrungsun, S., & Hemsley, J. (2018). Studying celebrity practices on Twitter using a framework for measuring media richness. *Social Media + Society*, *4*(1), 205630511876336. https://doi.org/10.1177/2056305118763365

Torras Virgili, M. E. (2021). Emergency Remote Teaching: ICT applied to education during confinement by COVID-19. *Innoeduca. International Journal of Technology and Educational Innovation*, *7*(1), 122-136. https://doi.org/10.24310/innoeduca.2021.v7i1.9079

Vandenberg, S., & Magnuson, M. (2021). A comparison of student and faculty attitudes on the use of Zoom, a video conferencing platform: A mixed-methods study. *Nurse Education in Practice*, *54*, 103138. https://doi.org/10.1016/j.nepr.2021.103138

Wang, Q., Sun, W., & Wu, H. (2022). Associations between academic burnout, resilience and life satisfaction among medical students: a three-wave longitudinal study. *BMC Medical Education*, *22*(1), e248. https://doi.org/10.1186/s12909-022-03326-6

Wei, H.-C., & Chou, C. (2020). Online learning performance and satisfaction: do perceptions and readiness matter? *Distance Education*, *41*(1), 48-69. https://doi.org/10.1080/01587919.2020.1724768

Williams, N. (2021). Working through COVID-19: "Zoom" gloom and "Zoom" fatigue. *Occupational Medicine*, *71*(3), 164. https://doi.org/10.1093/occmed/kqab041