MODELLING THE INTERPLAY OF ACADEMIC PROCRASTINATION AND TECHNOSTRESS TOWARDS TOURISM AND HOSPITALITY STUDENTS' ENGAGEMENT: MEDIATING ROLE OF TECHNOLOGICAL, PEDAGOGICAL, AND CONTENT KNOWLEDGE (TPACK)

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INTRODUCTION

For educational institutions and students, the abrupt shift to online learning has been seen as both useful and problematic (Ayebi-Arthur, 2017). It is said that adolescent media and technology use leads to academic procrastination, which has a negative impact on student's academic progress (Türel. & Dokumacı, 2022). Academic procrastination is a growing concern in the educational sector, particularly in light of the current pandemic. Prior research has demonstrated that academic procrastination is strongly associated with low self-efficacy, disorganization, low intrinsic motivation, ineffective effort regulation, and poor time management. Prior research on online and distance learning reveals that the needs for self-regulation are greater in remote education settings, where students tend to be deficient in self-regulation, effort regulation, and motivation. Further, it is argued that academic procrastinators are less likely to self-regulate, which negatively impacts their success in online courses. Similarly, research indicates that the level of procrastination may be enhanced in a digital learning environment since students prefer to postpone more when no particular behavior is expected of them (Melgaard et al, 2022).

According to Fitzgerald (2021), platforms and methods for information, submission of tasks, and acquisition of documents, as well as schedules and booking of lecture halls or classrooms, are frequently required. More buildings on campus, professors, and lecturers frequently expect to be contacted by email, highlighting the move toward digital technologies that revealed various technological attributes were linked. Some were technostress, while others were not. Technostress covers any unpleasant state caused by attempts to adapt to modern technology including stress. Possible stresses include insufficient self-efficacy, professional uncertainty, work-home conflict, information overload, and privacy issues. In turn, technostress affects users' performance and intent to continue using various technologies (Chou & Chou,2021). Thus, in this study, we will look into how technostress affects students' engagement in online learning and provide recommendations on how to cope with it. Through applications such as student life cycle management (Wang et al., 2018), technology is being employed for academic administration and student self-service.

In addition, It is also explained that procrastinators' academic performance, inclination to study, and online student engagement were all negatively influenced by online learning during the pandemic self-discipline (Melgaard, 2021). Moreover, student engagement refers to the quality of effort students put forth to perform well and accomplish desired results (Peng et al, 2022) and faculty can change their practices to boost student motivation, involvement, and attitudes about their learning and successes by measuring the efficacy of engagement strategies (Elshami et al, 2022).

Student engagement is also seen in relation to Technological Pedagogical Content Knowledge (TPACK). Studies have been studied in numerous educational institutions to study the interaction between technology and pedagogy, according to Goradia (2018), with opportunities and problems highlighted in the process. TPACK is a pervasive conceptual framework for describing teachers' professional technology integration knowledge (Lachner,

2021). It simply serves as the model of the effectiveness of the delivery of the lesson with technology (Santos & Castro, 2021) and in the context of this study, will be used as an intervening variable that causes mediation between academic procrastination and student engagement; and technostress and student engagement.

OBJECTIVES OF THE STUDY

Today, it may appear that procrastination, or the illogical delay of work to complete it, is more prevalent than ever before, and is becoming a more harmful tendency in our society. While procrastination affects a vast number of individuals around the world, and there is still a lot of literature on the issue, there is less information accessible on the behavior than one might assume. The interaction between technology and procrastination is one of these areas where research is limited. Hence, this study can provide recommendations on how to lessen, if not eliminate, procrastination in online learning. Despite the seemingly large part that technology plays in modern procrastination perceived by popular culture, there is little existing research and much of what does exist is outdated with the continued development of technology. Moreover, this study aims to describe the mediating effect of TPACK between procrastination and technostress on students' engagement during online learning.

METHODS

Respondents were bona fide tourism and hospitality management students of a Commission on Higher Education (CHED) recognized and PACUCOA-accredited school in Region IV-A (CALABARZON). Philippine Association of Colleges and Universities Commission on Accreditation (PACUCOA) is a private accrediting agency that formally recognizes an educational institution by attesting that its academic program maintains excellent standards in its educational operations in the context of its aims and objectives. The mentioned criterion assured that the institution has provisions for technological learning such as online platforms and a high level of instruction in terms of technological content and teaching methods. Furthermore, stratified sampling was utilized in this study.

In addition, the study used an a priori and posteriori way of determining sample size. Based on the list of schools and their number of students in the Hospitality and Tourism Management program, the researcher used the Raosoft sample size calculator to have an initial sample size. Afterward, the researchers performed an analysis for sample size sufficiency and adequacy using the inverse square root and gamma-exponential methods in the WarpPLS software (Kock & Hadaya, 2018).

Respondents were recruited by requesting permission from the Deans of the Commission on Higher Education (CHED) recognized and PACUCOA-accredited academic institutions in Region IV-A (CALABARZON) offering Tourism and Hospitality Management programs to conduct a survey. Regional professional organizations and student organizations were also considered as a medium or channel to reach their perspective accredited academic institutions. Consent forms were provided to ensure the willingness of the students in participating in the study. With the signatures of all researchers conducting the study, the researchers included a letter on the first page of the survey questionnaire informing respondents that all information obtained will be treated with strict confidentiality in accordance with the Data Privacy Act 2012 and will be used exclusively for academic purposes. In addition, they ensured that the Data Privacy Act of 2012 is followed to the letter to avoid any problems during the research.

Due to the pandemic, data were collected with the use of google forms, the easiest and simplest way to gather data provided the respondents agreed to complete the survey. The

researchers conducted the survey online as a precaution against the COVID-19 situation. The researchers communicated with their target respondents through different deans of the universities and colleges with accredited HM and Tourism programs through email and social media sites such as Facebook, believing that this is the most effective approach to reach them. The form was distributed through regional student organizations participated by different school representatives of the Philippines. The survey respondents were led to the Microsoft form by scanning the QR code or clicking the link. On the first page, the researchers' statement appeared, along with an accept button that must be clicked to proceed to the survey question. They received instructions on how to complete the questionnaire after agreeing to participate in the survey.

After data gathering, the analysis came next, and different methodologies and software were utilized in this study. Descriptive statistics were used to explain the result and answer objectives 1 to 5 of the study using the SPSS software. While Partial Least Square Structural Equation Modeling (PLS-SEM) using WarpPLS 8.0 was used to analyze the mediation model of the constructs. PLS-SEM has two phases: the measurement model and the structural model. The measurement model includes the reliability test (Cronbach's alpha and Composite reliability) and validity test (Convergent and discriminant validity). While the structural model will be analyzed using the path coefficients, effect size, collinearity, predictive relevance, and coefficient of determination (Dimaunahans & Amora, 2016; Lacap, 2019).

Result and Discussion

Table 1
Demographic Table

	Frequency	%
Province		
Cavite	87	21.8
Laguna	221	55.3
Batangas	65	16.3
Rizal	1	0.3
Quezon	26	6.5
Program		
BS International Travel and Tourism Management	176	44
BS International Hospitality Management	50	12.5
BS International Hospitality Management Specializing in Culinary Arts and Kitchen Operations	53	13.25
BS International Hospitality Management Specializing in Hotel and Restaurant Administration	18	4.5
BS International Hospitality Management Specializing in Cruise Line Operations and Culinary Arts	28	7
BS International Hospitality Management Specializing in Cruise Line Operations and Hotel Services	70	17.5

BS International Culinary Management	1	0.3
Others	4	1.0
Year Level		
1st year	134	33.5
2nd year	33	8.3
3rd year	101	25.3
4th year	132	33.0
Student Status		
Regular	350	87.5
Irregular	50	12.5
Sex		
Male	116	29
Female	284	71
Age		
17-18 y.o	12	3
19-20 y.o	145	36.25
21-22 y.o	200	50
23-24 y.o	34	8.5
25 and above	9	2.3

Table 1 shows a total of 400 respondents who willingly answered the survey questionnaire. It can be gleaned that most of them were tourism and hospitality regular students (87.5%) and more than half of the respondents were studying in PACUCOA-accredited institutions in the Laguna area (55.3%). The students were enrolled in the Tourism Management program (44%) and almost three-fourths (71%) of the students were female and currently in their first year (33%) and fourth year (33%) level who were between 19-20 years old (36.25).

As reflected on the official page of PACUCOA as of February 2022, 30% of the accredited institutions for hospitality and tourism programs are from the Laguna area. It is also noted on CHED statistics that tourism and hospitality management programs have one of the highest first-year program enrollment and female enrollees (CHED, 2020).

Table 2
Model Fit and Quality Indices

Indices	Coefficients
Average Path Coefficient (APC)	0.281, P<0.001
Average R-squared (ARS)	0.293, P<0.001
Average Adjusted R-squared (AARS)	0.290, P<0.001
Average block variance inflation factor (AVIF)	1.124
Average Full Collinearity Variance Inflation Factor (AFVIF)	1.793
Tenenhaus Goodness of Fit (GoF)	0.417

Note: p-value < 0.05 - Significant / acceptable; ≤ 5 - Significant / acceptable (Hair et al. & Kock)

As shown in table 2, the average path coefficient (.291) and the average R squared (.293) were both significant at 0.001 level. Using Hair et. al (2011) and Kock (2015), the results are reasonably consistent and no discrepancies were identified in the model and data.

Measurement Model (Outer Model)

Table 3
Item Loading, AVE, and Reliability of the Variables

Construct	Item Loading	AVE	CR	CA
Procrastination				
Procrastination Q1	(0.752)			
Procrastination Q2	(0.788)			
Procrastination Q3	(0.793)			
Procrastination Q4	(0.741)			
Procrastination Q6	(0.775)	0.548	0.916	0.896
Procrastination Q7	(0.790)			
Procrastination Q11	(0.611)			
Procrastination Q12	(0.725)			
Procrastination Q13	(0.660)			
Engagement				
Engagement Q2	(0.667)			
Engagement Q3	(0.646)			
Engagement Q4	(0.721)			
Engagement Q5	(0.687)			
Engagement Q6	(0.671)			
Engagement Q7	(0.722)			
Engagement Q8	(0.752)			
Engagement Q9	(0.700)			
Engagement Q10	(0.661)			
Engagement Q11	(0.767)			
Engagement Q12	(0.812)			
Engagement Q13	(0.778)			
Engagement Q14	(0.760)	0.611	0.978	0.976
Engagement Q15	(0.812)			
Engagement Q16	(0.774)			
Engagement Q17	(0.785)			
Engagement Q18	(0.833)			
Engagement Q19	(0.792)			
Engagement Q20	(0.825)			
Engagement Q21	(0.854)			
Engagement Q22	(0.862)			
Engagement Q23	(0.830)			
Engagement Q24	(0.851)			
Engagement Q25	(0.875)			
Engagement Q26	(0.852)			

Engagement Q27	(0.838)			
Engagement Q28	(0.846)			
Engagement Q29	(0.824)			
Technostress				
Techno-overload	(0.814)			
Techno-invasion	(0.792)	0.603	0.858	0.779
Techno-complexity	(0.783)			
Techno-uncertainty	(0.713)			
TPACK				
Technology Knowledge	(0.758)			
Content Knowledge	(0.884)			
Pedagogical Knowledge	(0.865)			
Pedagogical Content Knowledge	(0.914)	0.757	0.956	0.946
Technological Content Knowledge	(0.915)			
Technological Pedagogical Knowledge	(0.917)			
Technological Pedagogical Content Knowledge	(0.891)			

Note: Item Loading - >0.5 or >0.6 – Acceptable; Average variances extracted (AVE) - >0.5 – Acceptable; Composite Reliability(CR) & Cronbach's Alpha (CA) - >0.7 – Acceptable (Fornell & Larcker, & Kock)

Based on the coefficients of Composite Reliability(CR) & Cronbach's Alpha (CA), as shown in Table 3, all latent variables are within the acceptable range. Both convergent and discriminant validity tests were used to assess the validity of the data. Table 3 also, shows the result of the validity test using the factor loading and average variance extracted, implying that the results are within the limit.

Table 4
Square Roots of AVE Coefficients and Correlation Coefficients

	Procrastination	Engagement	Technostress	TPACK
Procrastination	**(0.740)**			
Engagement	0.047	**(0.781)**		
Technostress	0.496	-0.043	**(0.7763)**	
TPACK	-0.001	736	-0.075	**(0.870)**

Note: Diagonal elements are the square of AVE of constructs & dimensions, while the off-diagonal elements are correlational between constructs.

Table 4 reflects in diagonal the AVE square root of the given variables showing each content construct variable is not related to one another. It was suggested that the square root of each variable should be greater than the correlations among the latent variables (Wong, 2013). The result clearly shows that the instrument is clear and well understood by the respondents with an excellent construct with satisfactory reliability and validity since each latent construct's AVE value is substantially higher than any correlation between any latent constructs.

Structural Model (Inner Model)

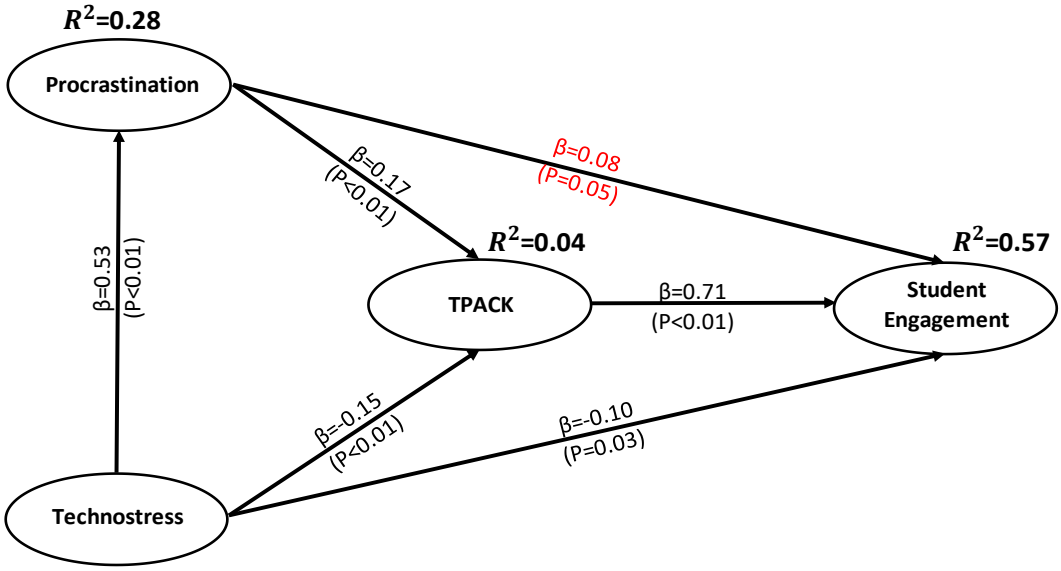

Figure 1. PLS Path Model

Table 5
Direct Effects of the PLS Path Model

	β	SE	p-value	f2
Technostress→Procrastination	0.533	0.046	<0.001	0.284
Technostress→TPACK	-0.138	0.049	0.003	0.027
Procrastination→TPACK	0.170	0.049	0.006	0.023
Technostress→Students Engagement	-0.096	0.049	0.026	0.025
Procrastination→Students Engagement	0.083	0.049	0.051	0.021
TPACK→Students Engagement	0.710	0.045	<0.001	0.527

Note: The effect sizes (f^2) were measured using the following: 0.02 = small, 0.15 = medium, 0.35 = large; SE = standard error (Cohen, 1988), β = standardized path coefficient.

As shown in Table 5, technostress directly affects procrastination with an f^2 of 0.284. This is an argument in the study of Kader et al. (2022), which states that Generation Y does not require a lengthy period to understand and utilize online learning technology because all are knowledgeable about technology and IT. Therefore, it is not difficult for them to utilize technology for they are well versed on how technology is used in online learning work but on the results of the study, it's the other way around.

Second, technostress directly affects TPACK with f2 of 0.027 on which in research that sought to determine the relationship between TPACK and technostress, it was discovered that an increase in teachers' TPACK competence reduced the stress associated with the use of technological equipment in the educational process (Ozgur, 2020). The results of this study conflict with those of He et al. (2019), who have no statistically significant relationship between teaching and even though instructors should consider associated elements and technological

stress to help students become accustomed to the online learning environment to reduce technological stress, they use.

Third, procrastination directly affects TPACK with an f^2 of 0.023. Some studies have identified procrastination as a maladaptive technique for mood management. According to this view, procrastination happens to escape task-related bad effects by pursuing another, more desirable activity instead (Koppenborg & Klingsieck, 2022).

Fourth, technostress directly affects student engagement with f2 of 0.25 which in an earlier study on academics found that technostress may contribute to problems like learning challenges, poor engagement with learning, and performance problems (Jena, 2015; Chou & Chou,2021).

Fifth, TPACK directly affects student engagement with f2 of 0.527 which supports the claim of Santos & Castro (2021) that the use of TPACK in teaching and learning is now widespread. It heightened the students' awareness of the need to be more effective thinkers and inventive in approaching their studies. These facilitate access to conversations and increase students' participation in the teaching-learning process. In addition, Yeh et al (2021) stated that successfully integrating technology into the teaching of specific subjects is a complex endeavor as it supports and enhances student learning. On the other hand, procrastination does not affect student engagement. Procrastinators' academic performance and online student engagement were all negatively affected by online learning during the pandemic self-discipline (Melgaard, 2021).

CHED (2020) had given all higher educational institutions to formulate decisions and regulations on student attendance, reporting, and updating of student-teacher involvement, grading system, and teaching supplement as long as it will all be aligned with the outcomes-based education approach which includes teaching delivery and assessment.

Table 6
Direct and Indirect Effects of the PLS Path Model

	β	SE	p-value	f2
Total effect(c1)	0.498	0.051	<0.001	0.183
Direct Effect (c1'): Procras→Student Engagement	-0.096	0.035	0.006	0.022
Path a: Procrastination→TPACK	0.120	0.051	<0.001	0.247
Path b: TPACK→ Student Engagement	0.710	0.047	<0.001	0.727
Indirect Effect (a*b): PC→TPACK→Student Engagement	0.594	0.036	<0.001	0.161
Total effect(c2)	0.002	0.055	<0.001	0.103
Direct Effect (c2'): Technostress→Student Engagement	-0.100	0.050	0.0139	0.014
Path a:Technostress→TPACK	-0.138	0.035	0.031	0.013
Path b: TPACK→Student Engagement	0.710	0.047	<0.001	0.527
Indirect Effect (a*b): Technostress→TPACK→SS_Engmt	0.102	0.037	<0.001	0.089

*Note: The effect sizes (f^2) were measured using the following: 0.02 = small, 0.15 = medium, 0.35 = large; SE = standard error (Cohen, 1988), β = standardized path coefficient. Total effect c is equal to the sum of direct effect c' and indirect effects; i.e. c = c' + (a*b)*

Table 7
Collinearity, Coefficient of Determination, and Predictive Relevance

Construct	Full collinearity VIF	R2	Q2
Technostress	1.337		
Procrastination	1.336	0.280	0.284
Engagement	2.191	0.573	0.574
TPACK	2.190	0.040	0.049

Note: For R^2: 0.19-weak, 0.33-moderate, 0.67-substantial (Lacap, 2021). For Q^2: The values measured must be greater than zero to recommend that the conceptual model can predict the endogenous latent constructs. For FCVIF: $\leq$5 is acceptable (Hair et al. & Kock).

The VIF values in table 7 are all less than 5.0 suggesting that the collinearity is acceptable. In theory, VIF should be less than 5 to prevent collinearity issues (Wong, 2013). If there is a chance of collinearity, one variable should be removed, or the others should be combined into one. The inner model's latent variable sets are examined to determine collinearity. The VIF values in Table 4 are all less than 5 reflecting that collinearity is therefore not a concern.

In terms of the SRMR, the values shown are all acceptable with values less than 0.10. Standardized Root Mean Square Residual (SRMR) is analyzed to investigate model fit. An SRMR value of less than 0.10 is acceptable (Hu & Bentler, 1998). The fit summary showed that SRMR is 0.079. Thus, the model is acceptable.

Framework

The figure below is the structural model drafted from the findings of the study. Interestingly, it was noted that procrastination has a negative effect on engagement based on the result of the study which means that there is no significant relationship between the two variables. Students seem to be confident that they tend to manage regardless of their engagement in an online class. Learners adopted quickly the sudden change of academic platform since flexibility in teaching delivery and assessment was implemented by CHED. The tourism and hospitality students managed the compliances required by the professors. This is with an argument with the study of Melgaard et.al (2020) that both procrastination and non-procrastination result in a low level of engagement in an online class which results mainly in distraction and delivery of online class lectures. While on the other hand, technostress has a direct effect on student engagement in that when students face difficulties in technology-related work, fewer students will be engaged in an online class.

However, this can be both variables can be mediated by TPACK. This can be supported by Farrell and Brunton (2020) that successful online student engagement is influenced by psychological components like peer communities, an engaging online instructor, confidence or self-efficacy, as well as structural variables like course design.

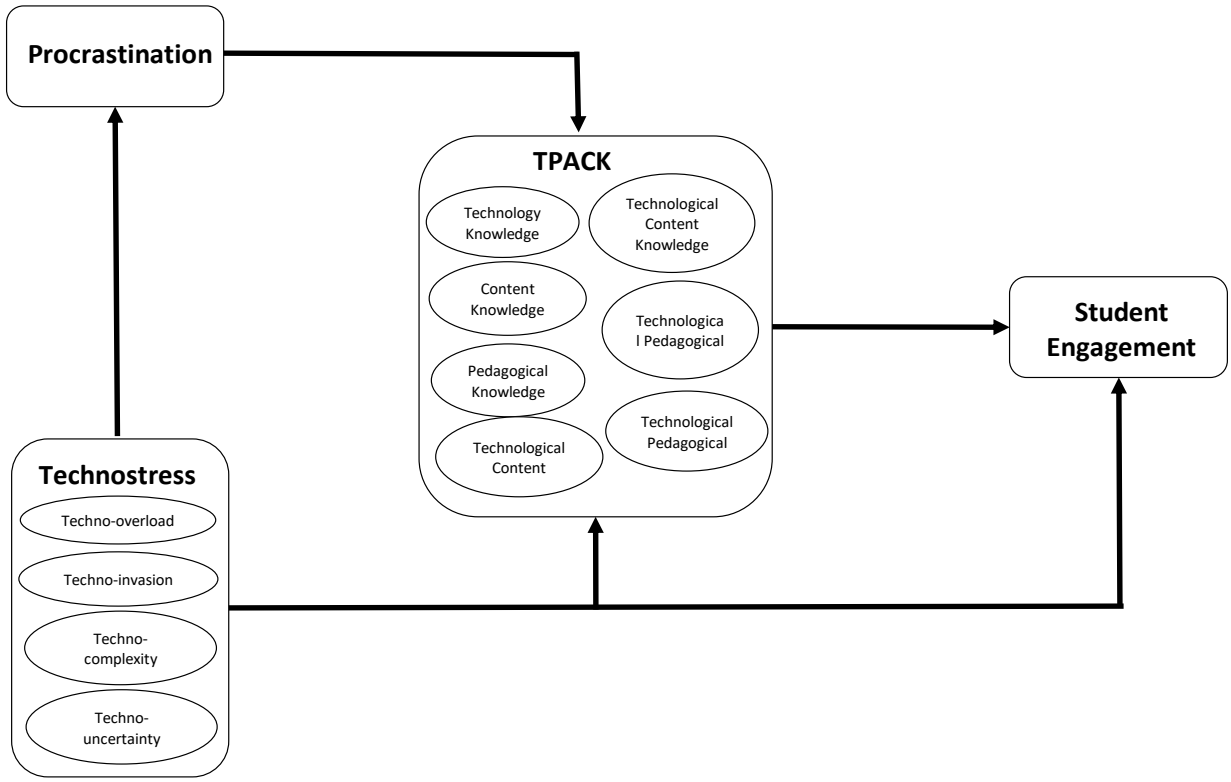

Figure 2. Mediating framework of TPACK between procrastination, technostress, and student engagement

CONCLUSION AND RECOMMENDATION

The survey covered a wide range of issues relating to online learning, such as students' experiences in terms of technostress, procrastination, and student engagement in the online platform. The findings of this research are likely to offer new information in an online class as the body of knowledge, as constructs labeling TPACK's mediating role to procrastination and technostress towards students' engagement. Using the PLS-SEM, it is well noted that variables have a direct relationship except for procrastination to student engagement due to adjustments of classroom policies implemented by the academic institutions and self-discipline during the pandemic. On the proposed structural model, TPACK has a significant role in mediating technostress and procrastination towards student engagement. This effect can be the basis for educational institutions to strategize on TPACK to ensure an increase in student engagement despite technostress and procrastination. This significant result indicates that knowledge of content, pedagogy, and technology should be given more attention and improvement by higher educational institutions to provide additional assistance, encouragement, and direction, creative teaching, and learning to students. This will be a contributory factor in addressing students' issues and concerns associated with student engagement. In terms of the implication of the study, it is suggested that future studies should include students from different programs from government academic institutions so that the findings can be generalized.

REFERENCES

Ayebi-Arthur, K. (2017). "E-learning, resilience and change in higher education: Helping a university cope after a natural disaster"." E-learning and Digital Media". 14: 259-274.

Chou, H.L. & Chou, C. A multigroup analysis of factors underlying teachers' technostress and their continuance intention toward online teaching. Computers & Education, Vol. 175, 104335. https://doi.org/10.1016/j.compedu.2021.104335

Commission on Higher Education (2020). Higher education facts and figures. https://ched.gov.ph/2020-higher-education-facts-and-figures/

Commission on Higher Education (2020). Guidelines on the implementation of flexible learning. *CHED Memo Order No. 4 Series of 2020*. https://ched.gov.ph/wp-content/uploads/CMO-No.-4-s.-2020-Guidelines-on-the-Implementation-of-Flexible-Learning.pdf

Dimaunahan, D. V., & Amora, J. T. (2016). Critical Success Factors (CSFs) for TQM Implementation: Current Status and Challenges in Libyan Manufacturing Companies. GSTF Journal on Business Review, 2(1), 71–79. https://doi.org/10.5176/2010-4804

Farrell, O., Brunton, J. A balancing act: a window into online student engagement experiences. *Int J Educ Technol High Educ* **17**, 25 (2020). https://doi.org/10.1186/s41239-020-00199-x

Franke, G. & Sarstedt, M. (2019). Heuristics versus statistics in discriminant validity testing: a comparison of four procedures. *Internet Res*. 2019;29(3): 430–447. doi: 10.1108/IntR-12-2017-

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, 19, 139-151. doi:10.2753/MTP1069-6679190202

He, Y., Lu, J., Huang, H., He, S., Ma, N., & Sha, Z. (2019). The effects of flipped classrooms on undergraduate pharmaceutical marketing learning: A clustered randomized controlled study. PLoS ONE, 14(4): e0214624. https://doi.org/10.1371/ journal. pone.0214624

Hu LT, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Struct Equ Model 1999;6: 1–55. doi: 10.1080/10705519909540118 Wong, K.K.K. (2013). Partial least squares structural equation modeling (PLS-Sem) techniques using SmartPLS. *Marketing Bulletin*, *24* (1), 1-32

Elshami W, Taha MH, Abuzaid M, Saravanan C, Kawas SA, Abdalla ME. Satisfaction with online learning in the new normal: perspective of students and faculty at medical and health sciences colleges. *Med Educ Online*. 2021;26(1):1920090.

Jena, R. (2015). Technostress in ICT enabled collaborative learning environment: An empirical study among Indian academician. *Computers in Human Behavior*, 51, 1116-1123.

Kader, M. A. R. A., Abd Aziz, N. N., Zaki, S. M., Ishak, M., & Hazudin, S. F. (2022). The effect of technostress on online learning behaviour among undergraduates. *Malaysian Journal of Learning & Instruction, 19*(1), 183- 211. https://doi.org/10.32890/mjli2022.19.1.7

Kock, N. (2016) 'Hypothesis testing with confidence intervals and P values in PLS-SEM', *International Journalof e-Collaboration*, 12(3), pp. 1–6. doi: 10.4018/IJeC.2016070101

Kock, N., & Hadaya, P. (2018). Minimum sample size estimation in PLS-SEM: The inverse square root and gamma-exponential methods. Information Systems Journal, 28(1), 227–261. https://doi.org/10.1111/isj.12131

Koh, J.H.L. & Chai. C.S. (2016). Seven design frames that teachers use when considering technological pedagogical content knowledge (TPACK). Computers & Education, 102, 244-257. https://doi.org/10.1016/j.compedu.2016.09.003

Koppenborg, M. & Klingsieck, K. (2022). Groupwork and student procrastination. Learning and Individual Differences, 94, 102117. https://doi.org/j.lindif.2022.102117

Lacap, J. P. G. (2019). The mediating effect of employee engagement on the relationship of transformational leadership and intention to quit: Evidence from local colleges in pampanga, Philippines. Asia-Pacific Social Science Review, 19(1), 33–48.

Lachner, A. et al. (2021). Fostering pre-service teachers' technological pedagogical content knowledge (TPACK): A quasi-experimental field study. Computers & Education, 174, 104304. https://doi.org/10.1016/j.compedu.2021.104304

Melgaard J, Monir R, Lasrado LA, Fagerstrøm A. (2022). Academic procrastination and online learning during the COVID-19 pandemic. Academic procrastination and online learning during the COVID-19 pandemic. *Procedia Computer Science, 196*, 117-114. doi: 10.1016/j.procs.

Ozgur, H. (2020). Relationships between teachers' technostress, technological pedagogical content knowledge (TPACK), school support and demographic variables: A structural equation modeling. Computers in Human Behavior, 112, 106468. https://doi.org/10.1016/j.chb.2020.106468

Peng, Y. et al. (2022). Effects of group awareness tools on students' engagement, performance, and perceptions in online collaborative writing: Intergroup information matters. The Internet and Higher Education, 52, 100845. https://doi.org/10.1016/j.iheduc.2022.100845

Philippine Association of Colleges and Universities Commission on Accreditation Inc. (2022). Accredited programs institution. https://www.pacucoa.com/accredited-institutions-programs

Santos, J.M. & Castro, R.D.R. (2021). Technological Pedagogical Content Knowledge (TPACK) in action: Application of learning in the classroom by pre-service teachers (PST). Social Sciences and Humanities Open 3. https://doi.org/10.1016/j.ssaho.2021.100110

Türel, Y. K. & Dokumacı, O. (2022). Use of media and technology, academic procrastination, and academic achievement in adolescence . Participatory Educational Research , 9 (2) , 481-497 . DOI: 10.17275/per.22.50.9.2

Wang, K., Shu, Q., & Tu, Q. (2008). Technostress under different organizational environments: An empirical investigation. Computers in Human Behavior, 24(6), 3002–3013. https://doi.org/10.1016/j.chb.2008.05.007.

Yeh, Y. et al (2021). Toward a framework that connects individual TPACK and collective TPACK: A systematic review of TPACK studies investigating teacher collaborative discourse in the learning by design process. Computers & Education, 171, 104238. https://doi.org/10.1016/j.compedu.2021.104238