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Risk factors of student failure in a blended learning instruction during COVID-19 pandemic

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ABSTRACT

With the advent of COVID-19, universities abruptly shifted to blended learning instruction to suit the necessity of education despite the pandemic. This emerging course design has led to an increase in the number of blended courses in higher education. It came with advantages, especially in the time of the pandemic. However, this type of instruction has brought risk factors of student failure. In this study, through exploratory factor analysis, it was identified that four factors had affected the students at risk of failure in a blended learning instruction, they were: i) Virtual environment; ii) Degree of intrinsic motivation; iii) Virtual classroom conduct; and iv) Perceived inability. Students were found to be experiencing these factors, which hinder their performance in the blended learning modality. These students have needs that must be attended to. Therefore, there is a need to modify existing teaching approaches that best suit and cater to these needs in a blended or virtual classroom setup.

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1. INTRODUCTION

The rise of the scientific and industrial revolution affected the paradigms in the educational system. According to Lalima and Dangwal [1], it led to a transition stage of the educational paradigm from traditional to technologically-aided teaching approaches especially in the advent of COVID-19. This transition paved the way for the emergence of blended learning instruction. Tucker [2] posited that blended learning Instruction combines face-to-face learning with online learning in which learners can control the time, pace, and place of their learning process. Borys *et al*. [3] stated that universities often utilize traditional teaching methods with electronic learning approaches. Porter *et al*. [4] added that the number of blended courses in higher education continues to increase as it is considered by many scholars to be the emerging default course design. Eren [5] continued that with the dominance of technology in human behavior, the educational system must utilize it.

Szadziewska and Kujawski [6] defined blended learning as an instruction that has advantages such as more accessibility to the teaching materials, better focus during the lectures, faster and more efficient communication with the teacher resulting in quicker and more efficient mastering of the lessons. Shand and Farrelly [7] shared that it also allows learners to work at their own pace. Hall and Villareal [8] stated that students' independence in learning in the blended learning instruction setup can also contribute to their success. However, it has its disadvantages, as stated by Chen and Lu [9], such as overworking on both the teachers' and learners' part, difficulty in choosing the proper learning, cognitive load, learning styles, and working conditions. Pérez, López, and Rodríguez-Ariza [10] added that it poses a challenge in sustaining the

learners' engagement which may fail the course. Gedik [11] specified hindrances in blended learning such as the unsimplified details of the work, staying disciplined, and staying updated with the online activities and technological issues. When these challenges are not addressed, the learners' academic productivity may be hindered.

However, Georgakopoulos *et al*. [12] expressed that the risk factors that can be identified vary among courses, making it challenging to develop a risk model suitable for many academic courses. Thus, this research identified the possible factors affecting the students of Southern Leyte State University-Tomas Oppus, Philippines at risk of failure in a blended learning instruction during the COVID-19 pandemic. The results of this study may serve significantly in the development of interventions that can address the challenges and make the blended learning instruction a more efficient approach to teaching and learning.

2. RESEARCH METHOD

This study utilized an exploratory factor analysis (EFA) method to reduce dimensions of the factors affecting students of Southern Leyte State University-Tomas Oppus, Philippines. They are at risk of failure in a blended learning instruction used while in a pandemic. The indicators in the survey questionnaire concerning the factors affecting students' at-risk of failure in a blended learning instruction were adapted from the collection of varied related literature. There were 75 indicators from the common possible reasons, namely blended learning instruction/virtual class, teacher factor, content difficulty, parent factor, availability of gadgets, availability of Internet connection, learners' study habits/learning styles, socio-economic status of learners, technological literacy, and other possible barriers to online learning (e.g., distraction to mobile games, social media, household chores, health conditions, communicative competence in English, and personal problems). The 75-item survey was pilot-tested among all bachelor of secondary education college students (N=224). The survey was sent to the respondents through an online platform. Each item indicated in the checklist was rated using the Likert scale (4=very much, 3=much, 2=sometimes, 1=never).

The result served as the basis for content revisions and item reduction using EFA. Using the EFA, 20 items were derived from the 75 items with a Cronbach alpha of 0.859. The 20-item questionnaire was used to collect bachelor of science in information technology and bachelor of science in business administration students (N=154) through an online platform. Using principal component extraction method of exploratory analysis, six factors were generated, but six factors seemed numerous. Further analysis was made using parallel analysis to determine if the number of factors can be simplified. With the use of parallel analysis, four factors were retained from the previous six generated factors.

3. RESULTS AND DISCUSSION

The results of both using factor and parallel analyses and the four factors generated are presented in this section. This is a statistical method used to determine the number of components to keep in a principal component analysis or factors to keep in an exploratory factor analysis. The discussions are provided as well per data presentation.

3.1. Risk factors of student failure

The data were computed using the Kaiser Meyer Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity to measure whether it merits to continue to factor analysis. In KMO, it requires that the high values are closer to 1.0 and not less than 0.50. Through this test, the sampling of this study was adequate for further analysis with a 0.635 result. Likewise, to reduce the variables to fewer components, an adequate correlation between variables should be evident. The data were tested through Bartlett's test of sphericity with less than 0.05 for factor analysis to be recommended suitably. The KMO and Bartlett's test is shown in Table 1.

Table 1. KMO and Bartlett's test

Kaiser-Meyer-Olkin measure of sampling adequacy		.635
Bartlett's test of sphericity	Approx. Chi-square	1565.910
	Df	190
	Sig.	.000

There are many ways of identifying the number of factors to retain in a factor solution. These include, among others, the Kaiser's [13] criterion, the Horn's [14] parallel analysis method, the scree plot method, and the percent variance explained by the factors. The Kaiser criterion retains factors with eigenvalues greater than 1. In the parallel analysis method, only factors with eigenvalues from principal components analysis (PCA) are significantly greater than parallel analysis (PA) eigenvalues are retained. The scree plot method suggests retaining the number of factors corresponding to the "elbow" in the scree plot. The eigenvalues and percent variance explained by factors extracted using both PCA and PA are presented in Table 2. As indicated in the table, the eigenvalues generated from PCA of the first six factors are greater than 1. Thus, six factors must be retained based on the Kaiser criterion.

Table 2. Eigenvalues and percent variance explained by factors extracted using PCA and PA methods

No. of components	Eigenvalues			% of variance	Cumulative % variance
	PCA	PA	Difference		
1	5.6985	1.6394	4.0591	28.492	28.492
2	2.6692	1.5873	1.0818	13.346	41.838
3	1.7846	1.4871	0.2975	8.923	50.761
4	1.5808	1.3483	0.2325	7.904	58.665
5	1.3087	1.3059	0.0028	6.544	65.209
6	1.0589	1.2434	-0.1845	5.294	70.503
7	0.8485	1.1669	-0.3184	4.242	74.746
8	0.7727	1.1012	-0.3286	3.863	78.609
9	0.7215	1.061	-0.3395	3.607	82.216
10	0.5891	0.9975	-0.4083	2.946	85.162
11	0.5507	0.9711	-0.4204	2.753	87.915
12	0.4785	0.9028	-0.4244	2.392	90.308
13	0.3749	0.8201	-0.4452	1.874	92.182
14	0.3665	0.7486	-0.382	1.833	94.015
15	0.332	0.7267	-0.3947	1.66	95.675
16	0.2519	0.6772	-0.4252	1.26	96.934
17	0.2124	0.6241	-0.4117	1.062	97.996
18	0.1718	0.5567	-0.3849	0.859	98.855
19	0.1537	0.5358	-0.3821	0.769	99.624
20	0.0753	0.4989	-0.4236	0.376	100

On the other hand, it is shown in the scree plot in Figure 1 that the "elbow" (no more significant change in the eigenvalue) is observed at component 5, and this observation suggests retaining five factors. Also indicated in Table 2 is that the eigenvalues generated from PCA are significantly higher than the eigenvalues generated from parallel analysis up to component 4. This result suggested that only four factors must be retained. Since parallel analysis is reliable to use in determining the threshold for significant components [15], we retained the four-factor solution in this study. These four components explained 58.665% of the total variance in the data.

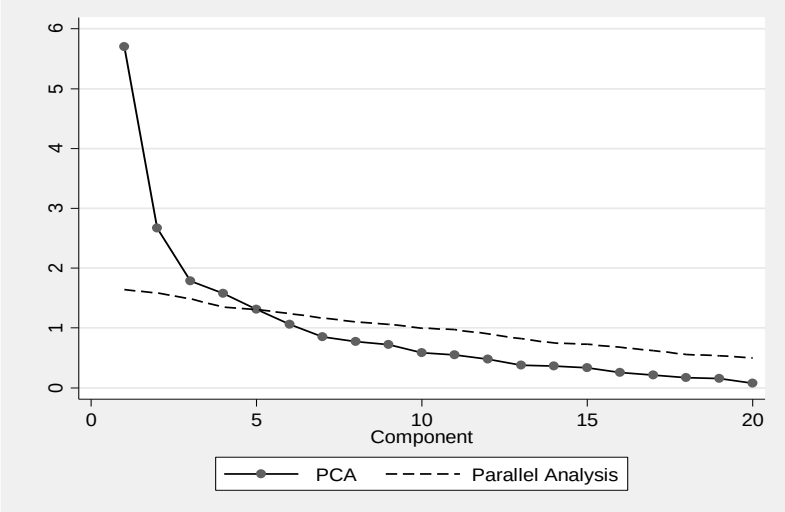

Figure 1. The scree plot result of the 20 indicators of students at risk of failure

The data in Table 3 shows the component matrix of the rotated factor loadings of the four-factor solutions using parallel analysis. This table contains component loadings which are the correlations between the variable and the component. In addition, this is based on random data simulation to determine the number of factors.

Table 3. Component matrix of the rotated factor loadings of the four-factor solutions using parallel analysis

Indicators		Components			
		1	2	3	4
Item 7	I am afraid that I might fail the exams because I get easily attracted to social media platforms like Facebook, Instagram, and Messenger.	.698			
Item 14	I cannot focus on my virtual classes because of my household chores and my noisy environment.	.656			
Item 15	I am not motivated to study because my friends are not in my virtual class.	.646			
Item 10	I skip classes because my parents give priority more to the family's daily needs.	.640			
Item 2	I find difficult to comprehend the module's content and accomplish the tasks because there is insufficient time for the teacher's discussion virtually.	.625			
Item 9	I lose interest in going to internet cafes because of financial problems and their distance from my home.	.591			
Item 13	My parents argue over financial problems, and it affects my studies.	.578			
Item 3	I skip online classes because of the unavailability of internet connection due to bad weather, power interruption, and internet cost.	.557			
Item 4	I lose interest in my online classes because of my part-time job and health issues (e.g., eyesight problem).	.515			
Item 8	I do not perform well in online class activities because the course is not my preference.		.754		
Item 6	I am not interested in studying and participating in online tasks because of my poor intellectual ability.		.728		
Item 11	I am not interested in my online classes because it is introduced using a traditional approach and no remedial class is conducted virtually.		.707		
Item 1	I am hesitant to participate in virtual classes because of my English language's inefficient communication and comprehension skills.		.637		
Item 19	I am not motivated to participate in virtual class activities/tests because of the passing score requirement.		.564		
Item 17	Questions on the Google forms or any online platforms are not accessible.			.775	
Item 5	The teacher is inconsiderate and fails to manage the misbehaving students in the virtual class.			.740	
Item 12	I come unprepared for my virtual classes.			.616	
Item 16	I do not know how to manipulate information and communications technology (ICT).				.804
Item 18	I am not encouraged to participate in class because I feel inferior.				.732
Item 20	I prefer group activities for individual activities.				.554

Extraction method: Principal component analysis. Rotation method: Varimax with kaiser normalization

Notice that indicators' groupings indicated in Table 3 were the basis of identifying factors' names for the students at risk of failure. With PCA, the dimensionality of such datasets was reduced while increasing interpretability but at the same time minimizing information loss. Moreover, the identified factors extracted from this process were virtual environment, degree of intrinsic motivation, virtual classroom conduct, and perceived inability.

3.2. Name of risk factors of student failure

The naming of each factor was based on the items that load in each factor. The names of each factor, as well as the corresponding discussions are provided. These factors are what contributed to the risk factors of student failure. Each factor was discussed thoroughly to analyze its effects to the students' academic performance.

3.2.1. Factor 1: Virtual environment

Phungsuk, Viriyavejakul, and Ratanaolarn [16] stated that virtual environment distinctively encapsulates those that surround the students as they engage in virtual learning, including their experiences inside and outside the virtual class. Bower, Lee, and Dalgarno [17] added that virtual learning, used by universities during the COVID-19 pandemic, allows the students to join their classes regardless of their location. With the aid of digital technologies, the students are equipped with all forms of technology and social media sites. Therefore, as expressed by Chen [18] and Prensky [19], the students invest substantial time online by frequently browsing the web and social networking spheres like Facebook, Instagram, and Messenger. These web and social networking spheres further attract them towards multitasking – attending online classes, emailing, texting, and playing online games.

These multitasking gears students trapped within distractions and time constraints during virtual classes, further pushing the students to fear failure during exams. This challenges the students to decide on

their learning styles following the concept of "self-study". This view means students have to be responsible in managing their time and be focused in all the learning processes. The teacher, in turn, plays the role of an adviser, encouraging students to think independently.

Teachers are also guilty of these time constraints. Barmaki and Hughes [20] posited that students, in reality, were vocal in admitting they find difficulty in comprehending the content of the module and in accomplishing the tasks because there is insufficient time for the teacher's virtual discussion, which has both advantages and disadvantages on student comprehension and student learning. For teachers to become more effective in the virtual classroom, they should pay attention to the cues transmitted by the students which could help them identify if the students are already experiencing difficulties. Furthermore, the students become demotivated when they feel alone and away from their peers, even in virtual classes. Students learn when they are in groups and with classmates they trust; thus, in the absence of their peers, they become less eager to study. Some students have part-time jobs to cope with their family's financial worries in these times. These students face heavy challenges on their time and resources. Taylor, Snyder, and Lin [21] perceived stress to have an interaction with psychological detachment from school.

Another inclusion of the virtual environment is the students' ambiance at home their responsibilities, and their family's priorities and financial worries. Information and communications technology (ICT), on the other hand, plays a vital role in virtual classes. Ratheeswari [22] proposed that this role includes the use of internet connection, wireless networks, mobile phones, and other communication mediums. A lack of any of these could provoke students to skip their classes. The students are experiencing unavailability of the internet connection resulting from power interruption, bad weather, high internet cost, and proximity of internet cafés from home. These factors further hinder the students from attending their virtual classes.

3.2.2. Factor 2: Degree of intrinsic motivation

The degree of intrinsic motivation refers to the student's internal motivation to attend their virtual classes. Their course preference, communication and comprehension skills, teacher's teaching approach, and course requirements have something to do with intrinsic motivation as a contributory factor affecting students at risk of failure. Phanich [23] asserted that students need the right to choose on how they want to express their personal opinions and individualities. However, most parents demand and choose their children's courses as stated by Kazi and Ahklaq [24]. In other words, the students get demotivated to perform well because they are enrolled in a class, not of their liking. If this is the case, parents must ensure that their children choose their career paths. If not, then the simultaneous need for play, work, learning, and socialization must be considered.

Students can perform well if armed with enough motivation. Logan *et al*. [25] highlighted that individuals with lower intellectual capacity and willingness might likely need assistance in their learning processes to improve the efficiency of their distance education performance and experience. These students need an increase in their motivation level to continue learning without losing any interest. Undeniably, Faber, Luyten, and Visscher [26] added that the use of digital learning tools has increased significantly during these times, and such devices impact teaching and learning processes in classrooms. Thus, teachers must know how to adapt to these tools and make learning more fun and engaging. The student's intellectual ability and communication and comprehension skills are necessary to make teaching more effective. The role of teachers is to help motivate the students to attend and perform well in their virtual classrooms. Therefore, Greenhow, Robelia, and Hughes [27] asserted that there is a need for rapid communication, the capacity to look for information and answer queries, and the creation of innovation for everything in life, further linking social network learning and 21st-century skills.

3.2.3. Factor 3: Virtual classroom conduct

Virtual classroom conduct refers to the accessibility of the virtual learning materials, teacher's classroom management, and students' preparedness for the virtual class. When it comes to providing learning materials, teachers must ensure that these are accessible and easily understandable. This way, it avoids instances where students blame the platform and learning materials used for their failures or lack of success. Martin and Bolliger [28] stated that diverse learning opportunities can motivate students' willingness to learn. The internet provides students with avenues to interact with their teachers and classmates, which eliminates challenges posed by place and time. Dalgarno and Lee [29] asserted that teachers should then acknowledge these strengths by believing that teaching strategies would accrue through the ability of the students to explore the benefits of the virtual world. Furthermore, students acknowledge that their unpreparedness during virtual classes puts them at risk of failure. To avoid this, teachers should create and design learning courses and materials in addition to arranging plans for students to be ready for class.

Classroom management also affects the students' demotivation to learn; thus, teachers should ensure a light and friendly atmosphere during virtual classes. Siemens [30] explained that the educators' support for learning is instrumental in students' learning management. Ortega and González-Lloret [31] crafted a

framework to actualize task-based design in the virtual world to brace experiential learning that surpasses the classroom. Several researchers [32]–[34] proposed that this framework assists in setting up comfortable, conducive, and seamless classroom experiences among students.

3.2.4. Factor 4: Perceived inability

Perceived inability includes the students' perceived inability to manipulate ICT, perceived inferiority, and preferences. Nader-Grosbois [35] stated that when students perceive themselves with inabilities, they perform with less success in learning. Because of this perceived inability, they prefer to work in groups because they think they cannot perform well alone. Therefore, educators should provide various engaging breakout sessions where learners can interact with classmates from culturally and linguistically diverse orientations as if they were in the real world. Hrastinski [36] said that active participation is essential to student learning and satisfaction in online courses because technology has evolved so much with the rise of smartphones and fifth-generation/5G standards.

Along with these changes, discussion boards are substituted with real-time, interactive learning management systems. Because of this fast-paced evolution, Bonk *et al*. [37] stated that the students become hesitant in manipulating ICT, especially now that the students are self-directed to learn these things. With this, the students feel inferior fearing that they might fail the classes because of their inabilities and inferiorities. As influenced by one's sense of inferiority, a student is afraid of leaving a wrong impression; thus, teachers should persuade and motivate the students to continue learning and consider the students' perceived inability.

4. CONCLUSION

The original eigenvalues for components 1-4 were greater than the eigenvalues obtained using the parallel analysis, retaining the established factors for students at risk of failure, which were identified to be virtual environment, degree of intrinsic motivation, virtual classroom conduct, and perceived inability. The most contributing risk factor to students' failure is the virtual environment while the most negligible contributing factor is the perceived inability. Thus, these identified risk factors should be considered by the educators to achieve more efficient learning experiences. However, these findings are only applicable to the selected students in Southern Leyte State University-Tomas Oppus.

The concluded risk factors of student failure in a blended-learning instruction during the pandemic included the following: firstly, the virtual environment which requires the need for multitasking and time allotment. Secondly, the degree of intrinsic motivation which necessitates the teachers to utilize the technology and virtual classroom setting in a more engaging way. Thirdly, the virtual classroom conduct which requires the teachers to prepare the virtual learning materials more accessible and establish an approachable atmosphere to assist the students' efficient learning experiences. Fourthly, the perceived inability which demands the teachers to ensure engaging sessions that allow the students to interact in a virtual classroom to eliminate the perception of inabilities among them. Thus, it is a must to balance the content delivery and interaction sessions among the students in a virtual classroom setting to best suit and cater to the demands of the learners.

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