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Modification of the Indonesian Academic Cyberloafing Scale (IACS): A tool for assessing online deviance in educational contexts

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ABSTRACT

The initial ease of internet use has led to new challenges, one of which is the phenomenon of cyberloafing. Cyberloafing refers to the activity of accessing the internet during learning processes. The aim of this study is to modify the cyberloafing scale within an educational setting in Indonesia using the dimensions of sharing, shopping, real-time updating, accessing online content, and gaming/gambling. The modifications include contextualizing the original and adding new relevant items. Data collection was conducted using purposive sampling, involving 235 university students from various higher education institutions in Indonesia. The method used to test the validity of the cyberloafing model was confirmatory factor analysis. The results showed that out of 65 items, 20 were found to be valid, with a satisfactory total Cronbach's alpha of 0.73-0.93 and McDonald's omega of 0.71-0.93 for measuring reliability for each dimension of cyberloafing. The practical implication of this measurement tool is that it can be used to assess the intensity of cyberloafing among higher education students in Indonesia.

Introduction

The phenomenon of cyberloafing is closely tied to technological advancements. The presence of digital devices such as laptops and smartphones enables individuals to easily access the internet and engage in cyberloafing (Metin-Orta & Demirtepe-Saygılı, 2023). Furthermore, the simultaneous rise of various social media platforms, including Facebook, Twitter, YouTube, Instagram, and TikTok, has accelerated the growth of the cyberloafing phenomenon (Keser et al., 2016; Yildiz & Yildiz, 2022). Social media platforms facilitate individuals in passing their leisure time or simply communicating with one another through text, audio, or even visual messages (Marangoz et al., 2012).

Initially, cyberloafing behavior was employed as a coping mechanism to relieve stress. However, this purpose has gradually shifted, and cyberloafing has started to exert a negative influence on individuals. Various forms of cyberloafing manifest in activities such as using social media, online shopping, personal email usage, online gaming, news browsing, and even accessing inappropriate websites (Toker & Baturay, 2021). These behaviors have significant consequences for individuals in various contexts, especially in educational

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setting, ranging from decreased performance and productivity (Desnirita & Sari, 2022; Saleh et al., 2018) lower academic achievement (Wu et al., 2020), academic procrastination (Durak, 2020), reduced focus and attention (Li et al., 2022; Zhang et al., 2022), to diminished motivation (Mei et al., 2021) and a reduced sense of life meaning (Krishna & Agrawal, 2023). These negative impacts arise from students being distracted during class by their gadgets, neglecting to engage with the lecture or learning activities (Widiastuti & Margaretha, 2016).

Research on cyberloafing initially emerged within organizational settings. Lim (2002) suggested that cyberloafing behavior stems from three theories: social exchange theory, organizational justice, and neutralization. Social exchange theory refers to the motivation of individuals to engage in social exchanges that maximize rewards and minimize costs. Organizational justice pertains to perceptions of fairness and the quality of treatment received by individuals within their environment. Neutralization, on the other hand, refers to a theoretical perspective that rationalizes and justifies deviant behavior. Later, Anandarajan et al. (2004) explored the personal use of the web in workplace settings using the dimensions of opportunities versus threats and organizational versus interpersonal contexts.

Further development was made by Blanchard & Henle (2008), who categorized cyberloafing into minor and serious types. Their study aimed to examine whether cyberloafing could be considered tolerable behavior or if it constituted serious misconduct. Minor cyberloafing involves engaging in deviant behavior with limited impact, such as checking sports scores while at work, whereas serious cyberloafing entails extreme impacts, such as online gambling or accessing adult websites during work. However, this research has not yet definitively categorized minor and serious behaviors, as the classification of cyberloafing depends heavily on the intent behind the behavior.

The phenomenon of cyberloafing has also garnered attention in the field of education, not just within organizational settings. Kalayci (2010) conducted the first study on cyberloafing behavior in an educational context, proposing three new factors: personal works, socialization, and news-reading. Akbulut et al. (2016) then developed a cyberloafing scale targeting high school and university students, identifying five dimensions: sharing, shopping, real-time updating, gaming/gambling, and accessing online content. Akbulut et al. (2016) study critiqued the content validity of Kalayci's (2010) modifications, pointing out that despite the adaptation for educational settings, the original scale remained too focused on workplace environments. Additionally, Kalayci's (2010) modifications removed too many items, resulting in a loss of essential information from the original scale.

Most recently, , Polat (2018) developed the Smart Phone Cyberloafing Scale in Classes (SPCSC), which consists of three dimensions: browsing-related cyberloafing, interactive cyberloafing, and entertainment cyberloafing, with an internal consistency coefficient of 0.88 (Alanoğlu & Karabatak, 2021; Ozdamli & Ercag, 2021). Polat's scale adapts Blau et al. (2006) framework, focusing on cyberloafing via smartphones, based on the assumption that cyberloafing in the classroom primarily occurs through smartphone usage. However, this scale overlooks other digital devices commonly used today, both for learning and non-learning purposes, such as tablets and laptops (Koay, 2018).

This study focuses on Akbulut et al.'s (2016) theory, as it accurately reflects current internet usage and provides detailed explanations of its theoretical foundations. Akbulut et al. (2016) define cyberloafing in the educational context as internet activities performed for non-educational purposes during learning processes. In Indonesia, Pratama and Satwika (2022) adapted this measurement using Pearson's product-moment correlation. However, the adaptation is largely a literal translation, which may lead to cultural discrepancies. Meanwhile, the modifications in this study attempt to contextualize the original items from Akbulut et al. (2016) and add other items that are relevant to the current students'

cyberloafing behaviour. Therefore, this study aims to modify Akbulut et al.'s (2016) cyberloafing scale to better align with Indonesian academic settings and cultural nuances.

Method

This study employed a quantitative method to modify the cyberloafing scale developed by Akbulut et al. (2016) to fit the context of participants in Indonesia. Participants were selected based on predetermined criteria (purposive sampling). Eligible participants were asked to complete all items of the survey after providing informed consent.

Participants

This study involved 250 participants, consisting of university students from various institutions across Indonesia. However, after data cleaning, only 235 participants were included in the final analysis. This sample size aligns with the minimum number of participants recommended by Plichta and Kelvin (2013), which suggests at least 200 participants for conducting confirmatory factor analysis (CFA). The inclusion criteria for participants were: (a) aged 18–35 years; (b) enrolled in a diploma (D3), applied bachelor's (D4), bachelor's (S1), master's (S2), or doctoral (S3) program; (c) had been enrolled in their studies for at least one month. The exclusion criteria were: (a) incomplete questionnaire responses; (b) refusal to complete the informed consent form; (c) duplicate identities. As shown in Table 1, the majority of participants were female (73.62%), enrolled in undergraduate programs (76.17%), and attending public universities (83.83%).

Table 1
Demographic Data of Participants (N=235)

Demographic		N	Percentage	Cumulative
Gender				
	Male	62	26.38 %	26.38 %
	Female	173	73.62%	100 %
Age				
	18-21	120	51.06 %	51.06 %
	22-35	115	48.94%	100 %
Educational Level				
	Post Graduate	56	23.83 %	23.83 %
	Undergraduate	179	76.17 %	100 %
Type of University				
	Public	197	83.83 %	83.83 %
	Private	38	16.17 %	100 %
Field of Study				
	Science	87	37.02 %	37.02 %
	Social	148	62.98 %	100 %
Region				
	Java, Bali, & Nusa Tenggara	133	56.60%	56.60 %
	Kalimantan	18	7.66%	64.30 %
	Sulawesi, Maluku, & Papua	53	22.55%	86.81 %
	Sumatra	31	13.19%	100 %

Construction and Establishment of the Blueprint

The cyberloafing scale by Akbulut et al. (2016) originally consisted of 30 items with five dimensions. The researchers then modified the scale by adding items relevant to the context of Indonesian participants, resulting in a total of 65 items. Afterward, a readability test was conducted with five graduate students in psychology. The results of this test were used to revise the items to ensure linguistic clarity, align them with the context of the blueprint, and

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minimize social desirability bias. Table 2 presents the blueprint that served as the foundation for the modification process of the scale.

Data Collection

Data was collected through a Google Forms survey by distributing the modified cyberloafing scale. The primary reason for choosing a survey method was the need to test the measurement tool in a confirmatory manner, aligned with the real conditions of the participants, without requiring in-depth elaboration on the phenomenon (Sugiyono, 2018). The Google Forms platform was chosen for its practicality, allowing researchers to reach a larger number of participants within a relatively short time frame. To fill out the cyberloafing scale, participants were instructed to read the instructions at the beginning. The following are several statements regarding "internet access behavior carried out during learning in the last month." The scale used a five-point Likert scale (1: never; 2: rarely; 3: sometimes; 4: often; 5: always) to measure the intensity of cyberloafing behavior during learning activities over the past month.

Table 2
Cyberloafing Blueprint for Indonesian Version

Dimension	Definition	Weight	Target
Sharing (SHAR)	Behavior related to accessing the internet to share, check, and interact with others through social media during learning activities.	27.69 % (18 items)	20% (4 items)
Shopping (SHOP)	Behavior related to accessing the internet for online shopping activities, including selecting products, purchasing products, and tracking product deliveries during learning activities.	23.08 % (15 items)	20% (4 items)
Real Time Updating (REAL)	Behavior related to accessing the internet to obtain the latest information through social media during learning activities.	15.38 % (10 items)	20% (4 items)
Game / Gambling (GAME)	Behavior related to accessing the internet for gaming or online gambling activities during learning activities.	12.31 % (8 items)	20% (4 items)
Accessing Online Content (ACCE)	Behavior related to accessing the internet for listening to music, watching videos, reading articles, or other references outside the context of the ongoing learning activities.	21.54 % (14 items)	20% (4 items)
Total		100 % (65 items)	100% (20 items)

Data Analysis

Before analyzing the data, the researchers conducted a normality test by examining the skewness (acceptable range = $-2 < x < 2$) and kurtosis (acceptable range = $-7 < x < 7$(Kim, 2013). The researchers then performed confirmatory factor analysis (CFA) to test and confirm whether the constructs aligned with the theory. Factor loadings were analyzed to determine which items were valid in measuring each dimension. The criteria used were CFI (0.90), TLI (0.90), SRMR (0.08), and RMSEA (0.08), as recommended by Brown (2006). The estimation method for this interval (continuous) data was maximum likelihood (ML) (Umar & Nisa, 2020), using JASP version 0.18.1.0. To determine the model, researchers use a model with a smaller AIC, BIC information size as a model with a better fit (Kline, 2023; Wang & Wang, 2019). In addition, the researchers conducted multigroup confirmatory factor analysis (MG-CFA) to examine measurement invariance.

Results

The Normality Assumption

After conducting a descriptive analysis on the 65 items of the cyberloafing scale, skewness and kurtosis values were obtained for normality testing. The results indicated that 61 items fell within the skewness range of +2 and the kurtosis range of +7, while 4 items related to gambling did not meet these criteria. Once the normality assumption was satisfied, the next step was to conduct confirmatory factor analysis.

Confirmatory Factor Analysis

In this section, the researchers performed confirmatory factor analysis in two steps. First, analysis process included the multidimensional (61 items) that met the normality assumption. Second, the researchers did residual correlation based on modification indices to drop the items that have many correlations with other items per dimensions (Umar & Nisa, 2020). After that, items with highest factor loading for each dimension had been chosen to adjust with the blueprint. Moreover, researchers also consider the goodness of fit indices (GoF), resulting in 20 items.

Table 3
Goodness of Fit

Model	χ^2	*df*	*p*	CFI	TLI	RMSEA	SRMR	AIC	BIC
Multidimensional (61 items)	4589.65	1759	< .001	0.70	0.69	0.08	0.09	37684.93	38141.59
Multidimensional (20 items)	286.24	160	< .001	0.96	0.95	0.06	0.05	11469.21	11642.19
Second-order (20 items)	306.89	165	< .001	0.96	0.95	0.06	0.06	11479.86	11635.54

Based on the goodness of fit results in Table 3, the multidimensional model with 61 items exhibited poor fit, with CFI, TLI, and RMSEA values of 0.70 < 0.90, 0.69 < 0.90, and 0.08 > 0.08. The model showing satisfactory fit indices was the multidimensional (20 items) model, which indicated fit with CFI at 0.96, TLI at 0.95, and RMSEA at 0.06. Although the second order model also shows satisfactory fit indices with CFI= 0.96, TLI= 0.95, RMSEA= 0.06, the multidimensional model has a better fit although the difference with the second order model is relatively small, and both can be considered quite good depending on the context. Furthermore, Table 4 shows that the correlation between dimensions is vary (some are too small). Therefore, researchers recommend using this scale in a multidimensional model.

Additionally, Figure 1 shows positive factor loading values ranging from 0.51 to 0.97. The overall data indicated z-values greater than 1.96 and p-values less than 0.05, meaning all 20 items support construct validity, with all items being valid for measuring each dimension. Table 5 is presented the 20 items based on the goodness of fit indices (GoF) that exhibited the highest factor loadings according to the results of the confirmatory factor analysis.

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Figure 1
Multidimensional Model

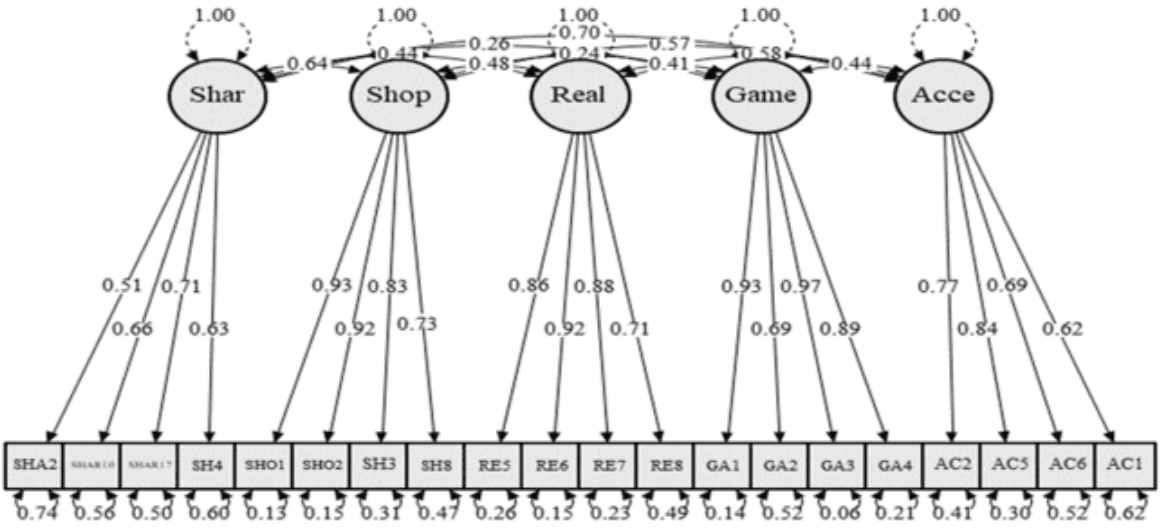

Table 4
Interdimensional Correlation

Dimension	ACCE	GAME	REAL	SHOP	SHAR
SHAR	0.71	0.27	0.44	0.64	-
SHOP	0.57	0.24	0.48	-	
REAL	0.59	0.41	-		
GAME	0.45	-			
ACCE	-				

Reliability

After identifying the valid items, the researchers reviewed the Cronbach's alpha values to assess the reliability or consistency of an instrument or test in measuring a specific concept or characteristic. Cronbach's alpha is used to measure the internal consistency of a set of questions or indicators designed to assess the same construct. Based on the analysis, the Cronbach's alpha values were as follows: 0.73 for sharing, 0.92 for shopping, 0.91 for real-time updating, 0.93 for gaming, 0.81 for accessing online content.

However, some research also suggests considering the use of McDonald's omega to estimate reliability. This is because in some cases, Cronbach's alpha is often very sensitive with sample size (Hayes & Coutts, 2020; Malkewitz et al., 2023). Therefore, the value of McDonald's omega for each dimension presented as follows: 0.71 for sharing, 0.91 for shopping, 0.91 for real-time updating, 0.93 for gaming, 0.83 for accessing online content. According to Cronbach's alpha and McDonald's omega criterion of 0.70, which indicates good internal consistency, all dimensions of cyberloafing demonstrated satisfactory consistency (Cortina, 1993).

Measurement Invariance

According to Putnick and Bornstein (2016), measurement invariance assesses whether a construct exhibits consistent psychometric properties across various groups or over different time periods. This is to determine whether the measurement tool yields consistent and valid results that are not influenced by group differences. In this study, the researcher conducts a

measurement invariance test on postgraduate and undergraduate groups because these two groups have different academic experiences that may impact their cyberloafing behaviors.

Table 5
Item & Factor Loading

Item	Factor Loading
Factor 1 – Sharing (Alpha: 0.73; Omega: 0.71)	
Saya memosting foto di media sosial (SHAR2)	0.51
Saya menandai teman pada foto yang saya bagikan di media sosial (SHAR4)	0.63
Saya membuka media sosial (SHAR10)	0.66
Saya mem-*follow* akun media sosial teman saya (SHAR17)	0.71
Factor 2 – Shopping (Alpha: 0.92; Omega: 0.91)	
Saya mengunjungi situs belanja online (SHOP1)	0.94
Saya menelusuri beberapa produk pada situs belanja online (SHOP2)	0.92
Saya menambahkan produk ke keranjang (SHOP3)	0.83
Saya melakukan pembelanjaan online (SHOP8)	0.73
Factor 3 – Real Time Updating (Alpha: 0.91; Omega: 0.91)	
Saya memastikan jadwal rilis tayangan favorit (REAL5)	0.86
Saya menunggu tayangan favorit di *channel* tujuan (REAL6)	0.92
Saya me-*reload* halaman *channel* untuk menonton tayangan favorit (REAL7)	0.88
Saya memastikan jadwal *live streaming* (REAL8)	0.71
Factor 4 – Gaming (Alpha: 0.93; Omega: 0.93)	
Saya bermain *game online* (GAME1)	0.93
Saya membeli item terbaru pada game online yang saya mainkan (GAME2)	0.69
Saya membuka aplikasi game online (GAME3)	0.97
Saya meng*update* fitur terbaru pada game online yang saya mainkan (GAME4)	0.89
Factor 5 - Accessing Online Content (Alpha: 0.81; Omega: 0.83)	
Saya mendengarkan lagu (ACCE2)	0.77
Saya menonton video (ACCE5)	0.84
Saya membaca berita (ACCE6)	0.69
Saya men-*download* aplikasi (ACCE11)	0.62

Invariance testing or CFA based on specific demographic groups was conducted for postgraduate and undergraduate groups. Table 6 presents the results of invariance criteria testing, including configural, metric, scalar, and strict invariance, indicating equal variance. This allows for an accurate comparison in the analysis of cyberloafing behaviors between the two groups. The researchers used CFI (0.90), SRMR (0.08), and RMSEA (0.08) according to Brown (2006).

Table 6
Measurement Invariance

Description		χ^2	*df*	*p*	CFI	TLI	RMSEA	SRMR
Model	Invariance Testing							
Multidimensional (20 items)	Configural	527.37	320	< .001	0.94	0.92	0.07	0.06
	Metrics	548.42	335	< .001	0.93	0.93	0.07	0.07
	Scalar	577.95	350	< .001	0.93	0.92	0.07	0.07
	Strict	632.97	370	< .001	0.92	0.92	0.08	0.08

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First, configural invariance yielded CFI, TLI, and RMSEA values of 0.94, 0.92, and 0.07, respectively. This indicates that the factor structure is similar between postgraduate and undergraduate groups. Second, metric invariance resulted in CFI, TLI, and RMSEA values of 0.93, 0.93, and 0.07, respectively, suggesting that the factor loadings are comparable between the two groups. Third, scalar invariance yielded CFI, TLI, and RMSEA values of 0.93, 0.92, and 0.07, indicating that scalar parameters, such as factor loadings and intercepts of the structural equation model, are constant across both groups. Lastly, strict invariance provided CFI, TLI, and RMSEA values of 0.92, 0.92, and 0.08, indicating that the parameters, including factor loadings, intercepts, and residuals, maintain a consistent model structure between the postgraduate and undergraduate groups.

Discussion

The measurement instrument for cyberloafing was initially developed and pioneered by Lim (2002) in a work setting. The loafing behavior that disrupted productivity in the workplace eventually spread to the educational field, leading Akbulut et al. (2016) to construct a cyberloafing scale within an educational setting. In the context of Indonesia, the development of cyberloafing is unique not only because Indonesia ranks among the largest internet users with 212.9 million internet users and 167 million social media users as of early 2023, but also due to the shift in educational media trends (Kemp, 2023). This study focuses on developing a cyberloafing scale with strong validity and reliability based on the perspectives of Indonesian students.

The theoretical framework of cyberloafing within an educational setting in Indonesia shows similarities to the model developed by Akbulut et al. (2016). The five-dimensional multidimensional model is also applicable in the Indonesian context with minor modifications. These modifications include (1) the elimination of items related to real-time updates via Twitter; and (2) the removal of items representing gambling as part of the gaming/gambling dimension. This suggests that Indonesian students no longer engage in cyberloafing via Twitter, and gambling behaviors are not well represented by these items.

In the sharing dimension, Indonesian students' cyberloafing behavior is represented by items indicating content sharing, checking social media, and interacting on social media. This is highly relevant to the current situation, where many students cannot disengage from sharing activities on social media, even during learning sessions. This claim is supported by data from Kemp (2023), showing that the social media penetration rate for the age group of 18-35 years is 26.3%, significantly higher than other age groups. Furthermore, the shift to online learning during the Covid-19 pandemic has transformed the culture and habits of learning activities from paper-based to digital-based formats. This shift has persisted even after the resumption of offline lectures in the post-pandemic period.

Next, online shopping activities are observed through behaviors such as searching for and purchasing products. These items are relevant to the end-to-end process of online shopping today through various marketplace platforms. Considering the high level of consumption, especially among Indonesian students, these items are highly applicable to their daily lives (Databoks, 2018). Furthermore, the behavior of accessing the internet to obtain real-time information on social media is represented by actions such as waiting for favorite shows and live streaming. This differs from Akbulut et al.'s (2016) original items, which specifically referenced Twitter for real-time updates. This shift is due to the relatively low number of Twitter users in Indonesia, especially among students, with only 24 million users. In contrast, Instagram has 89.15 million users, and TikTok has 109.9 million users (Kemp, 2023).

The gaming/gambling dimension is represented solely by items indicating online gaming behavior. This finding is noteworthy because all gambling-related items were

eliminated. This can be attributed to cultural factors, as Indonesian society, particularly students, exhibits high levels of religiosity and attributes gambling as an activity that is prohibited and contradicts both religious and social norms (Choirina et al., 2021). This cultural context led to poor data distribution and low factor loading values, resulting in the removal of the gambling items. Lastly, accessing online content is represented by behaviors such as listening to music, watching videos, reading online articles, and accessing various applications. This is relevant to the daily habits of Indonesian students, who frequently use music streaming platforms like Spotify, video streaming platforms like YouTube, and other applications to access news.

The researcher acknowledges that this study has several limitations related to the demographic characteristics of the participants, which are unevenly distributed, specifically (1) the number of female participants exceeds that of males; (2) postgraduate students are overrepresented compared to undergraduate and diploma students; and (3) the majority of participants are concentrated in the Java and Bali regions. These disparities may affect the research findings, as internet access habits can vary between genders. Similarly, postgraduate students, who are generally more mature, may exhibit different online behaviors compared to undergraduate and diploma students. Additionally, differences in culture and telecommunications infrastructure between Java and Bali and other regions may influence participants' internet usage patterns.

Conclusion

The process of modifying the cyberloafing measuring instrument in the Indonesian context was carried out by providing contextualization to the original items and adding new relevant items. Based on the goodness of fit indices (GoF), the multidimensional model with 61 items was not satisfactory in terms of psychometric properties. On the other hand, the multidimensional model with 20 items demonstrated a satisfactory fit, with all items being valid in measuring each dimension. Although the second-order model with 20 items also showed satisfactory fit, the multidimensional model had smaller AIC and BIC scores, so researchers recommend administering this scale in multidimensional form. Additionally, reliability testing using Cronbach's Alpha and McDonald’s Omega indicated that the cyberloafing dimensions have satisfactory internal consistency. The practical implication of this study is that the modified scale can be used to measure the intensity of cyberloafing among higher education students in Indonesia.

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Declarations

Author contribution. MNF: Idea Conceptualization, Review Literature, Data Collection, Data Analysis, Method, Result and Discussion, Revision and Finishing. RGP: Idea Conceptualization, Review Literature, Data Collection, Method, Result and Discussion, Revision and Finishing. MB: Idea Conceptualization, Review Literature, Data Collection, Introduction, Revision and Finishing. FF: Idea Conceptualization, Review Literature, Data Collection, Introduction, Revision and Finishing. KNM: Idea Conceptualization, Review Literature, Data Collection, Introduction, Revision and Finishing. SR: Idea

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Conceptualization, Review Literature, Data Collection, Method, Revision and Finishing. AFH: Idea Conceptualization, Method, Revision, Finishing, and Supervision and Guidance throughout the research process. WW: Idea Conceptualization, Method, Revision, Finishing and Supervision and Guidance throughout the research process.

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