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Instruments' Validation of Access to Motivation, Skills, and Use of Digital Technology: EFL Context in Indonesia

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Abstract

The purpose of this study was to validate instruments regarding digital technology access among Indonesian English as a Foreign Language (EFL) faculty members during the Corona Virus Disease 2019 (COVID-19). An EFL Faculty member's Access to Digital Technology (EFL-FADT) scale was adopted from previous relevant studies consisting of Motivation, Skills, and Use. A total of 235 EFL faculty members from three public and three private universities in Indonesia participated in this study, selected through cluster random sampling. A survey design was applied to examine the factor structure of the EFL-FADT. The survey data were computed through the steps of Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) with IBM SPSS 23 and SPSS AMOS 23. Through the EFA with Varimax rotation, two factors emerged from Motivation, three from Skills, and two from Use. The result successfully mapped the proposed model. The CFA approach verified the instrument which was satisfactory for Indonesian EFL faculty members. The findings informed 25 valid and reliable indicators. The measured scale achieves psychometric properties. It

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can provide future studies with a tool to capture EFL faculties' access to digital technology.

Keywords: EFL-FADT, survey, EFA, CFA, access, COVID-19, digital technology.

1. INTRODUCTION

Since the great Spanish flu epidemic, humanity has faced many difficult times (Gries, 2005; Taubenberger et al., 2019). However, the Corona Virus Disease 2019 (COVID-19) pandemic is undoubtedly unprecedented. With more than three billion people in quarantine since its beginning, the levels of magnitude and impact are unimaginable in the world's modern history ("WHO names novel coronavirus", 2020). However, the technology fundamentally differentiates the current situation from the past, changing the history of quarantine.

In this COVID-19 situation, the needs to engage technology for any aspect of life are unavoidable. Some studies have addressed the use of technology in the educational environment during the outbreak (Mailizar et al., 2020; Kerres, 2020; Wang et al., 2020). However, the empirical reports of access to technology for students, teachers, and other educational stakeholders are still limited. Ramsetty and Adams (2020) reported a brief review of the impact of the digital divide during COVID-19. Since not everyone possesses equal access to technology that causes a digital divide, limited technology access leads to participation in society as less effective than those with better technology access during the COVID-19. Therefore, more studies regarding the digital divide in technology integration during COVID-19 should be encouraged, especially in developing countries.

Previously, the issue of the digital divide was merely limited to physical access to technologies, such as computers and the Internet (van Dijk, 2006). In today's conditions, the digital divide is not only about physical access, but a concern of other aspects of access. In his regard, van Dijk (2006) reported a very comprehensive theory in understanding the digital divide phenomenon. In brief, his theory included four successive aspects of access: motivational, physical, skills, and usage access (see Figure 1). The personal and positional category of inequality would result in unequal distributions of technological resources in a plural society. It can cause unequal access to technology by limiting participation. Therefore, comprehending the digital divide more appropriately at all levels of society is necessary.

Even though the digital divide has been reported in education, it has been elaborated in a few ways. Studies on the digital divide have been focusing on technological physical access either in schools or at homes (Dolan, 2016; Riel & Schwarz, 2002; Ritzhaupt et al., 2016; Zuppa & Rezzano, 2016). Especially, studies with various aspects of higher education faculties of digital technology are still few (Peña-López, 2010; Soomro et al., 2018). Even fewer studies exist concerning EFL faculty members (Allo, 2020). Therefore, this study is offered to fill the gap in the existing literature, establishing instruments in measuring scales of the digital divide among EFL Faculty's Access of Digital Technology (EFL-FADT) that focuses on three out of the four dimensions of successful access to technology: Motivation, Skills, and Use during COVID-19. In the questionnaire, all involved faculty members reported that they have been provided with material or physical access to technology,

especially smartphones, laptops, and internet access during COVID-19 supporting their instructional activities during COVID-19. Thus, material access was excluded from this study.

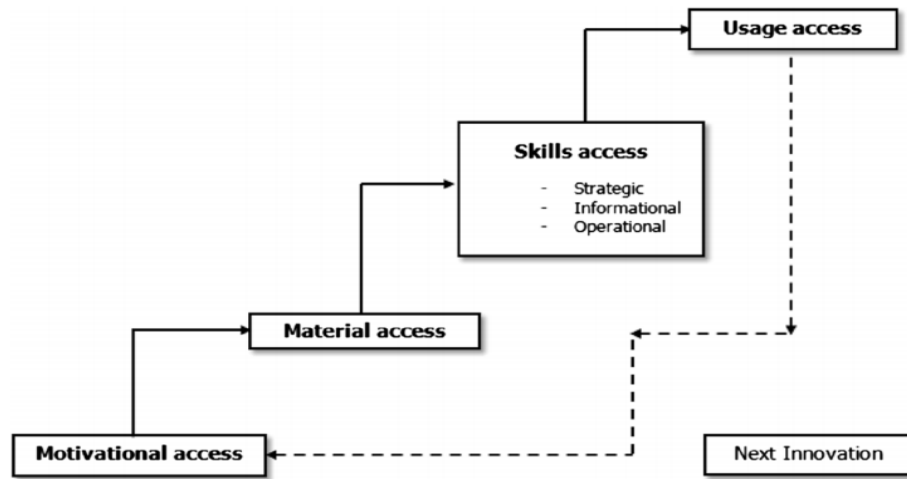


Figure 1. A model of access to digital technologies (van Dijk, 2005, p. 22).

2. LITERATURE REVIEW

Among the most important findings offered in van Dijk’s theory of access to digital technology (van Dijk, 2006) is a correction of the understanding of access to technology. He ratified the understanding of access to technology by conceptually separating the theory into four aspects. Successive dimension levels of access to technology based on van Dijk’s theory are shown in Figure 1. The levels consisted of motivational access, material or physical access, skills access, and usage access. He argued that access problems of technology have shifted from the first two stages, motivational and material access, to the last two stages, skills, and usage access. This model recommends that the digital divide can occur at each stage or all stages at one time. In the current study, we adapted the van Dijk’s theory by eliminating one of the accesses, that is material access, since all involved participants reported that they have already had the material access of technology, such as smartphones, laptop, and internet for their instructional activities during COVID-19. Therefore, we focused on the access to Motivation, Skills, and Use as shown in Figure 2.

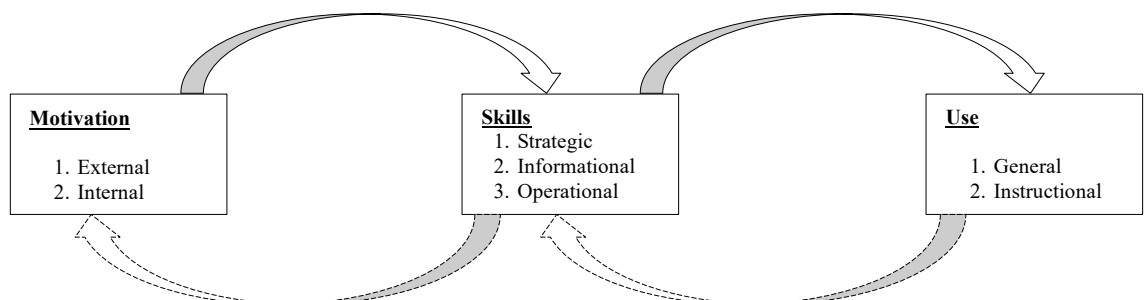


Figure 2. EFL Faculty’s Access to Digital Technology (EFL-FADT).

2.1 Access to Motivation

Access of motivation in this study refers to van Dijk's motivational access that is defined as an intention of a person to use, obtain, learn, and implement digital technologies (van Dijk, 2006). Using digital technology needs mental readiness on the part of the person. Having limited motivation has been informed to be the problems faced in technology integration (Parasuraman & Colby, 2015). In this study, two types of access to motivation were included; external and internal. External access to motivation is defined as committing to doing something since it will lead to a separable outcome (Ryan & Deci, 2000) while internal access of motivation means committing to do something for its own needs (Ahn et al., 2007).

2.2 Access to Skills

Access to skills in this study refers to people's ability to adopt and manage as well as understand digital technology. In the current study context, the emphasized levels of digital technology skills consist of strategic, informational, and operational skills (van Dijk, 2006). Operational skills refer to someone's capability of operating digital technology, such as computers, smartphones, and the internet. Informational skills are skills to acquire the ability to deal with information search, selection, and processing through computer and other resources like the internet and data sharing. Strategic skills are defined as an individual's ability to apply digital technology to promote his/her position within the society.

2.3 Access of Use

Adopting the term "usage access" (van Dijk, 2006), the access to use in this study refers to the outcome combination of motivational, material, and skills access. The term can also be defined as the implementation of digital technology use in every activity of lives including in education (Habibi et al., 2020b).

2.4 Technology Use during COVID-19

Online technology is currently a special tool for governments and other parties such as the World Health Organization to inform their recommendations and advice. From online shopping to e-learning, online-based technology refers to a major tool to deal with economic consequences (Akmaliyah et al., 2020). More significantly, technology is very essential to maintain social contribution. COVID-19 results in a digital divide; the differences between individuals or social groups emerge regarding not only the access to technology but also the capacity to technological benefits (Büchi et al., 2019; Lusk, 2010). Even though coexisting, the digital divide emerges and is crystalized as the differences in actual access to technology and digital literacy. The digital divide socially and economically decreased people at a better risk for COVID-19 (Ramsetty & Adams, 2020).

2.5 Technology Integration and EFL

In this section, the studies about integrating technology in EFL classrooms are elaborated. [Habibi et al. \(2018\)](#) focused on pre-service teachers' perspectives on social media technology use in classrooms. Two important themes emerged in the study: 1) social interaction (peer discussion and platform to interact with supervisors or lecturers) and 2) learning motivation and experience support (self-directed learning, promotes critical thinking, and content engagement) ([Habibi et al., 2018](#)). Meanwhile, [Obaidullah and Rahman \(2018\)](#) informed the results of their studies on learners' perspectives; the findings revealed that students spend more time on electronic media than on reading books.

Some other specific studies have addressed various integration of technology in EFL instruction ([Chen et al., 2019](#); [Hsieh et al., 2017](#); [Triana et al., 2020](#)). [Triana et al. \(2020\)](#) informed the use of social media among students in higher education on Facebook conducted in three ways: creating their own text, informing other people's texts shared from the site, and producing text adapted from other texts. Meanwhile, [Hsieh et al. \(2017\)](#) reported the positive effects of the mobile-based flipped approach over the conventional lecture-based and the role of attitude on the LINE use in learners' subsequent behavioral intention regarding technology integration in language learning. [Chen et al. \(2019\)](#) informed that gender interaction was significantly related to learning performance through i-Map in EFL learning; the female group outperformed the male English-caption group. Regarding this study context, several findings also promote technology-based teaching among EFL faculty members ([Alkahtani, 2011](#); [Liu, 2013](#); [Mei, 2019](#)). Female EFL faculty members' beliefs about computer-assisted language learning (CALL) were discussed in Saudi Arabian context ([Alkahtani, 2011](#)) and a practical framework was reported to measure the effect of EFL teacher education programs to prepare pre-service teachers for CALL ([Mei, 2019](#)).

2.6 Need for an Instrument

Studies have addressed statistical data on technology integration, commonly perceived by teachers ([Dong et al., 2015](#); [Habibi et al., 2020b](#); [Liu et al., 2015](#)) and students ([Dasig & Pascua, 2016](#); [Lisenbee & Ford, 2017](#)). However, limited studies reported sufficient information on faculty members' access to digital technology ([Soomro et al., 2018](#)), especially in developing countries. Some previous studies adopted van Dijk's theory, building their measurement to examine access to technology. For example, teachers' ICT access level was examined in the USA ([Goh & Kale, 2016](#)). They focused on Web 2.0 as technology use. In their report, they excluded exogenous or external motivation. In another study, the focus was on ICT implementation among faculty members in general ([Soomro et al., 2018](#)). Both studies did not specifically address their reports on specific participants. Therefore, this study's objective is to examine the validity and reliability of the instrument in the context of EFL perceived by EFL faculty members during COVID-19. Instrument development should include a sufficient number of indicators to fit the setting and context. It aims at capturing critical aspects of the constructs of the study. This study refers to the context and setting in the Indonesian scope. Specifically, the study was framed by the following research question: How valid and reliable the proposed

instruments regarding digital technology access among Indonesian EFL faculty members during COVID-19?

3. METHOD

3.1 Instrumentation

An initial instrument data of twenty-nine indicators were adapted from Goh and Kale (2016), Soomro et al. (2018), and van Dijk (2005). Five educational experts were invited to a discussion to assess the instruments to fulfill the cultural and context adjustment as part of content validity (Habibi et al., 2020a). The constructs, sub-constructs, and the statement samples are presented in Table 1.

Table 1. Sample of each sub-construct.

Construct	Sub-construct	Sample
Access to Motivation	Internal	Using digital technologies in teaching English during COVID-19 can provide me with information that will lead to better decisions (IN1).
	External	I want to use digital technologies during COVID-19 in teaching English because my students think that I should use it (EX2).
Access to Skills	Strategic	I can benefit from using a computer and the Internet for English teaching during COVID-19 (ST2).
	Operational	I can save images and text from the internet for my English teaching during COVID-19 (OP1).
	Informational	I can easily choose from browsers' search results for my English teaching during COVID-19 (INF3).
Access of Use	General	During COVID-19, I use digital technology to watch movies, music, etc. (GN2).
	Instructional	During COVID-19, I use technology to improve student English learning (INS4).

3.2 Data Collection

The current research uses a survey design suggested by Groves et al. (2004) which consists of procedures for quantitative approaches of studies that provide researchers with the opportunity to administer a questionnaire to a sample or a whole population to present their attitudes, perceptions, behaviors, or characteristics (Creswell, 2014). The population of the current research consists of all Indonesian EFL Faculty members teaching in English education study programs. Researchers carried out a cluster random sampling since it presents the study of the selection of groups rather than individuals (Fraenkel & Wallen, 2006). Online-based survey instruments were distributed to 250 EFL Faculty members from six universities (three public and three private). A total of 235 participants voluntarily responded (94%). The instruments were written in participants' native language, Indonesian language, to have an in-depth understanding of the data.

3.3 Data Analysis

Before the main data analysis, the current study included some issues that are related to data screening, such as missing data, multicollinearity, outliers, and normality. We used SPSS 23.0 to compute the statistical outcomes. We computed outliers with a box plot for each sub-construct. For the normality of the data, skewness and kurtosis values for each item was computed, which should be in the range of -1.96 to +1.96 at $p < 0.05$ significance level suggested by [Hair et al. \(2010\)](#). Multicollinearity was informed when the matrix of the study's correlation was more than .900 as the cut off value proposed by [Hidayat et al. \(2018\)](#) and [Tabri and Elliott \(2012\)](#).

Subsequently, data were analyzed in two steps: Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) for each construct. EFA, computed in SPSS 23., was undertaken to determine the structure of the proposed model. CFA, executed in SPSS AMOS 23., was conducted to investigate whether the established dimensionality and factor-loading pattern fitted the Indonesian context.

The EFA included the Kaiser-Meyer-Olkin (KMO) value, Bartlett's value, factor loading, eigenvalue, scree plot, and Varimax rotation. The KMO index should be greater than .500. A KMO value of smaller than .500 reflects insufficient sample size for EFA procedure; the results might not be reliable or the argument is not adequately strong. Bartlett's Test of Sphericity was significant at $p < .050$. Factor loading for each indicator should exceed .500. An eigenvalue shows the proportion of variance contribution extracted by each factor through factor analysis, an eigenvalue of smaller than 1.0 must be dropped, and communality should be greater than .3 ([Hair et al., 2010](#); [Prasojo et al., 2020a](#)).

CFA indicated that goodness of fit was evaluated by employing chi-square at $p > .05$, Comparative Fit Index or CFI of $> .900$, Tucker Lewis Index, or TLI of $> .900$ and Root Mean-Square Error of Approximation or RMSEA of $< .080$). Reliability is defined as the stability of the values obtained ([Pallant, 2011](#)). For the reliability of the data, the values of Cronbach's alpha, Construct Reliability (CR), and Average Variance Extracted (AVE) were computed. The Cronbach's alpha should be valued of greater than .700; CR values should exceed .600; and AVE values should be $> .500$ ([Hair et al., 2010](#)).

4. FINDINGS

4.1 Preliminary Analysis

The amount of missing data of the current study ranged between 0% and 0.5% on each item. Multiple imputations were used to deal with the missing data, an iterative form of stochastic imputation. However, instead of replacing with a single value, the distribution of the observed data was applied in estimating multiple values reflecting the uncertainty of the true value ([de Goeij et al., 2013](#)). The correlation matrix, skewness, and kurtosis are presented in Table 2. The results of the preliminary analysis of the measures of access to Motivation, Skills, and Use reached univariate normality (skewness and kurtosis values are from -0.974 to 1.583). Regarding multicollinearity, inter-correlations among the three constructs varied from .484 to .702. As a result, the

discriminant validities were obtained due to correlations of less than .900 (Hidayat et al., 2018; Tabri & Elliott, 2012).

Table 2. Correlation matrix, skewness, and kurtosis.

	Motivation	Skills	Use
Motivation	1	.542**	.484**
Skills		1	.702**
Use			1
Skewness	-.759	-.945	-.529
Kurtosis	1.583	1.369	.431

4.2 Exploratory Factor Analysis

The EFA began with the measurement of all indicators of each access construct; Motivation (seven indicators), Skills (13 indicators), and Use (nine indicators). Having been computed in SPSS 23 for the EFA process, two indicators that have loading values of below .500 were dropped (Hair et al., 2010), namely ST2 (.403) and GN2 (.343). One indicator GN5 was detected for a highly cross-loading value; therefore, it was also dropped. All KMO values for Motivation, Skills, and Use were above the threshold index of .500 and all values of each construct were significant at $p < .005$. With an eigenvalue of greater than 1.0, two factors emerged for both Motivation and Use while three factors were achieved for Skills. The factor loadings of Motivation ranged between .528 and .898, Skills varied from .520 to .811, and Use from .526 to .842. All communality values exceed .300 (Hair et al., 2010; Prasajo et al., 2020a)

Table 3. Communalities, eigenvalues, cross-loadings for Motivation.

Sub-construct	Indicator	Communality	Eigenvalue	Cross-loading	
				1	2
Internal	IN2	.761	3.347	.898	
	IN3	.816		.878	
	IN1	.782		.854	
External	EX3	.558	1.519		.870
	EX4	.430			.861
	EX2	.759			.572
	EX1	.760			.528

Table 4. Communalities, eigenvalues, cross-loadings for Skills.

Sub-construct	Indicators	Communality	Eigenvalue	Cross-loading		
				1	2	3
Informational	INF2	.697	4.487	.811		
	INF1	.710		.772		
	INF5	.656		.714		
	INF3	.726		.699		
	INF4	.728		.616		
Operational	OP4	.807	1.434		.776	
	OP1	.656			.764	
	OP2	.725			.751	
	OP3	.626			.665	
Strategic	ST3	.852	1.058			.879
	ST4	.690				.842
	ST1	.641				.520

Table 5. Communalities, eigenvalues, cross-loadings for Use.

Sub-construct	Indicators	Communality	Eigenvalue	Cross-loading	
				1	2
Instructional	ISN2	.743	3.274	.842	
	ISN3	.898		.821	
	ISN1	.652		.795	
	ISN4	.691		.716	
General	GN3	.778	1.053		.526
	GN1	.756			.803
	GN4	.790			.729

4.3 Confirmatory Factor Analysis

As elaborated earlier, CFA procedures were done to verify the factorial validity of the three constructs of the EFL-FADT. The measurement model of Motivation resulted in satisfactory results after one of the indicators (EX2) was dropped since the loading values were smaller than .500. Figure 3 depicts the standardized coefficients acquired from the CFA, addressing the correlation between factors and items for Motivation: $\chi^2 = 120.35$, $\chi^2/df = 1.60$ CFI = .910, TLI = .920 and RMSEA = .070. All loading values of items ranged between .720 and .860, exceeding the common cut-off value of .500 (Hair et al., 2010).

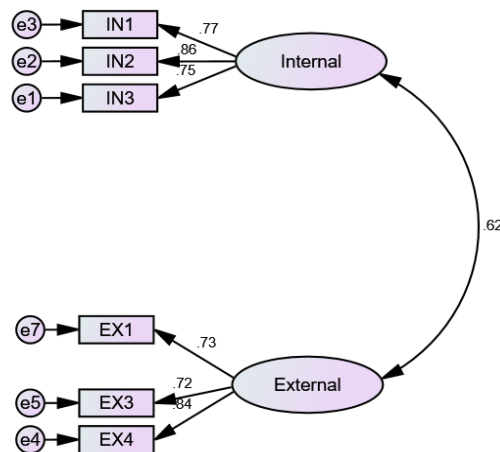
**Figure 3.** Confirmatory factor analysis path diagram for Motivation.

Figure 4 illustrates all Skills' loading values of indicators varying between .710 and .900. This result exceeded the threshold value of .500 (Hair et al., 2010). The measurement model of Skills indicated satisfactory model fit; $\chi^2 = 251.916$, $\chi^2/df = 1.30$ CFI = .921, TLI = .932 and RMSEA = .065. The relationships between factors and items for Skills were achieved.

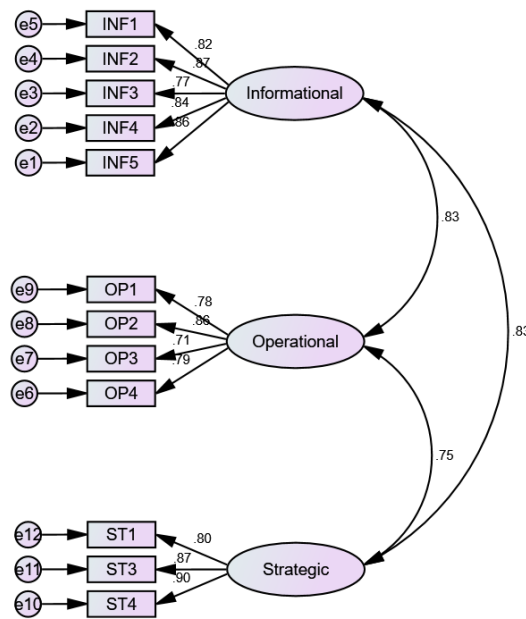


Figure 4. Confirmatory factor analysis path diagram for Skills.

Similarly, Figure 5 shows all loading values of Skills' indicators ranging between .600 and .910 exceeding the value of .500, of which no value was dropped. The measurement model of Skills indicated satisfactory model fit, $\chi^2 = 251.916$, $\chi^2/df = 1.30$ CFI = .901, TLI = .912 and RMSEA = .073. Figure 4 confirmed standardized coefficients obtained from the CFA indicating the relationships between factors and items for Skills.

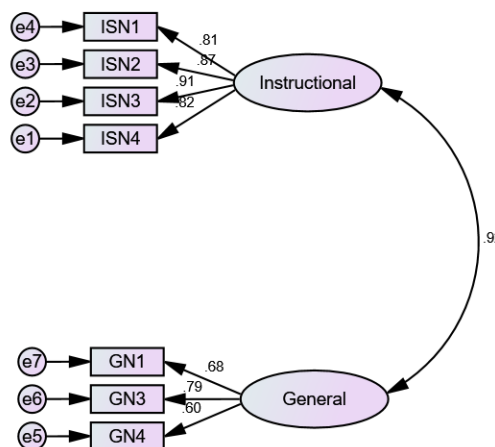


Figure 5. Confirmatory factor analysis path diagram for Use.

4.4 Reliability of the Scales

Cronbach's alpha values of all sub-constructs were found to be satisfactory of above .700, ranging between .713 and .905. The CR values of all scales were greater than the common cut-off value of .700: internal, $\alpha = .836$; external = .808; informational = .918; operational = .866; strategic = .892; general = .730; instructional = .914. In addition, the AVE for all the sub-constructs exceeded the desirable threshold

value of .500, denoting that this study had acceptable discriminant validity (Table 6). Through the examination and elaboration of EFA and CFA in measuring the scale, the finding elaboration suggested the establishment of the validity and reliability of the survey instrument, a scale to measure a range of factors related to access to digital technology among Indonesian EFL Faculty Members during COVID-19.

Table 6. CFA results of all constructs.

Construct	Sub construct	Indicators	Loading	CR	AVE	α			
Motivation	Internal	IN1	.770	.836	.793	.864			
		IN2	.860						
		IN3	.750						
	External	EX1	.730				.808	.763	.726
EX3		.720							
EX4		.840							
Skills	Informational	INF1	.820	.918	.832	.899			
		INF2	.870						
		INF3	.770						
		INF4	.840						
		INF5	.860						
	Operational	OP1	.780				.866	.785	.857
		OP2	.860						
		OP3	.710						
		OP4	.790						
	Strategic	ST1	.800				.892	.856	.808
		ST3	.870						
		ST4	.900						
Use	General	GN1	.680	.730	.690	.713			
		GN3	.790						
		GN4	.600						
	Instructional	ISN1	.810				.914	.852	.905
		ISN2	.870						
		ISN3	.910						
		ISN4	.820						

5. DISCUSSION

The process of developing the scale of the current study (EFL-FADT) was conducted within some stages. It aims at producing a scale with examined validity and reliability. After obtaining responses from 235 EFL faculty members from three public and three private universities in Indonesia, EFA was conducted using Varimax rotation with principal component analysis. Through this process, three indicators were dropped. The dropping indicator process did not result in removing any important content of the scale. The dropping process helped improve the reliability and validity of the scale, leaving the scale with twenty-six indicators for the CFA process. Similar studies of measuring scales through the EFA process for technology integration in education have been reported (Prasojo et al., 2020b; Soomro et al., 2018). The procedure is an attempt to disclose the undefined factors that influence the co-variation among multiple observations of EFL-FADT in the Indonesian context.

Further, the procedure continues with CFA to verify the factorial validity of the constructs of the EFL-FADT during COVID-19. Using SPSS AMOS 23.0., the EFA-based data were computed for CFA; only one item was dropped due to having a smaller

loading value than its cut-off value (Hair et al., 2010). The remaining 25 indicators were analyzed for their reliability. In this process, Cronbach's alpha, AVE, and CR values are satisfactory informing a valid and reliable scale. Previous studies with similar procedures have also addressed the CFA process in confirming EFA (Habibi et al., 2020b; Hidayat et al., 2018). This procedure is important to establish measures of the sub-constructs; they are consistent with our understanding of their nature. The scale fits the measurement model based on previous studies for Indonesian EFL faculty members (Goh & Kale, 2016; Soomro et al., 2018; van Dijk, 2005).

6. CONCLUSION

The current study aims at developing and validating the EFL-FADT scale to assess EFL faculty members' access to digital technology. The final-measured scale consists of 25 indicators with the constructs (Motivation, Skills, and Use). The measured scale achieves appropriate psychometric properties and facilitates future studies a tool capturing EFL faculty members access to digital technology as well as a help guide to the studies regarding the issue of the digital divide among higher education stakeholders. The reliability and validity of the scale were limited only for the Indonesian EFL faculty members during COVID-19. Therefore, the hypothesis about a reliable and valid instrument for elementary and secondary EFL teachers in Indonesia should also be tested in the future since it has different settings. A wider range of samples and testing the relationship are also important to be included in studies regarding the digital divide. Other settings and context of the study were also recommended.

In addition, more concrete and applied definitions of extended constructs and sub-constructs to measure technology integration among EFL teachers during COVID-19 will help develop more consistent and precise survey instruments. Such instruments might also consider including valid and reliable indicators related to technology integration during a similar outbreak in the future highlighted by a similar theory. Besides, it is necessary to develop more meaningful definitions of technology integration during the pandemic outbreak, both at the conceptual and practical levels. Modeling the use of technology within this context will shift attention to teaching contents from only the way of how to teach.

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