Using Exploratory Factor Analysis to Validate Students' Independence Learning Scale in Indonesia

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Abstract
The advantages of learning to be independent are significant. As a result, creating an independent learning instrument for university students is necessary. This study constructs a new scale for measuring student independence, integrating theories of self-directed learning to better understand and support autonomous educational behaviors. Several phases were involved in the creation of this instrument: a review of the literature, an initial draft, a first trial, revisions, and a final draft. To demonstrate the validity, exploratory factor analysis (EFA) was employed. 436 respondents who were Indonesian students taking online classes received the questionnaire immediately. Ages of the respondents ranged from 17 to 29. They are mostly freshmen. Through Google Form, they received an independent learning scale. 29 of the 34 elements were found to be genuine and credible, according to the results. This tool was based on three factors: planning, student responsibility, and self-evaluation. Educators can use the validated scale to tailor interventions that foster students' learning independence, adapting teaching strategies based on individual or group assessments. In order to determine whether the reliability and validity patterns, particularly the model fit, are the same across different populations, future researchers must perform as many validations as they can.
Keywords: independence learning, EFA, college students, scale.

Использование эксплораторного факторного анализа для проверки шкалы самостоятельного обучения студентов в Индонезии

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Аннотация
Преимущества и важность самостоятельного обучения весьма значительны. В связи с этим необходимо создать инструмент самостоятельного обучения для студентов университетов. В данном исследовании построена новая шкала для измерения независимости студентов, объединяющая теории саморегулируемого обучения для лучшего понимания и поддержки автономного поведения в образовании. Создание этого инструмента проходило в несколько этапов: обзор литературы, первоначальный проект, первая апробация, пересмотр и окончательный вариант. Чтобы продемонстрировать валидность, был применен эксплораторный факторный анализ (EFA). Опросник получили 436 респондентов – индонезийских студентов, посещающих онлайн-занятия. Возраст респондентов варьировался от 17 до 29 лет, в основном это первокурсники. Через Google Forms они получили шкалу независимого обучения. Согласно результатам опроса, 29 из 34 элементов предложенной шкалы были признаны достоверными. В основе этого инструмента лежат три фактора: планирование, ответственность студента и самооценка. Педагоги могут использовать валидированную шкалу для разработки мероприятий, способствующих развитию самостоятельности учащихся в обучении, адаптируя стратегии обучения на основе индивидуальных или групповых оценок. Для того чтобы определить, одинаковы ли показатели надежности и валидности, особенно соответствие модели разным группам населения, будущие исследователи должны провести как можно больше валидаций.
Ключевые слова: самостоятельное обучение, эксплораторный факторный анализ, студенты, шкала.

Introduction

In Indonesia, the rise of online education in higher education has been rapid during the previous decade. Over the past three years, there has been a notable and expeditious shift in the landscape of online education as a direct consequence of the global Covid-19 pandemic (Polat et al., 2022). Distance learning offers students increased flexibility in their study schedules, allowing them to engage in educational activities at their own convenience. Furthermore, it enables students to engage in digital interactions with both peers and instructors, facilitating communication and collaboration (Sarkam et al., 2022).

However, transitioning from the conventional in-person classroom setting to online or remote learning presents a challenge. The field of online distance learning presents a range of hurdles, including technological limitations, internet connectivity issues, the dynamics of lecturer-student interactions, psychological factors, evaluation methods, and the need for effective self-management (Ghani et al., 2022). The primary challenge associated with learning in the online environment is not solely comprehending the subject matter, but rather the greater challenge lies in fostering students' autonomy in the learning process. One of the challenges encountered in the context of online learning pertains to student self-monitoring, encompassing activities such as self-evaluation, self-reflection, progress indicators, and group projects that rely on student motivation. Moreover, it is imperative for students to possess self-management skills in order to effectively establish study schedules (Crawford et al., 2020; Zhu et al., 2022). In addition, students reported the major difficulty is staying motivated in online learning. Moreover, it has been observed by students that a significant challenge they encounter in the context of online learning pertains to maintaining motivation (Means & Neisler, 2021). During this period, educators engage in a competitive effort to establish an enjoyable learning atmosphere, inadvertently neglecting to address the development of students' learning independency.

Several studies have examined the extent of learning independence in Indonesia; however, no research has been conducted specifically on the construction of a scale to measure this construct. Therefore, it is imperative to acquire proficiency in utilizing assessment tools that gauge students' level of self-directed learning, as this will facilitate the implementation of appropriate interventions. In order to do factor analysis, it is necessary to ensure that the data is appropriate for this statistical technique. Once this is confirmed, the factor structure of the scale may be discovered (Limon & Dilekçi, 2020).

Purpose and Objective of the Study

This study aimed to construct a robust and accurate tool for assessing the degree of students' independence learning.

Literature Review

Arista et al., (2018, p. 3) defined that "learning independence is defined as a form of awareness that arises from within themselves who want to receive information, manage it, and connect one part of information with another." Students can diagnose learning challenges and find the best solution to them by developing independent attitudes about learning. According to Hodis (2020), an effective learning environment facilitates the fulfilment of students' educational requirements. As online learning continues to evolve, there is an increasing imperative for students to cultivate and sustain their capacity for independent learning. The digital learning environment offers enhanced avenues for accessing complimentary assistance. Consequently, it is imperative for students to cultivate and enhance their self-reliance in the pursuit of knowledge, as this will enable them to effectively harness the potential of the online learning milieu (Papamitsiou & Economides, 2019).

The acquisition of independence can be seen as a variable that has the potential to influence the educational achievements of students. The significance of independent learning in students' academic and professional endeavours is widely acknowledged. It is imperative for individuals to possess the ability to function autonomously, display initiative, and effectively address challenges and obstacles (Maslihah et al., 2021). The development of independence can be conceptualized as a manifestation of self-awareness that emerges from a personal inclination to assimilate knowledge, effectively handle it, and establish connections between various pieces of information (Arista et al., 2018). The

development of student independence encompasses various aspects, such as the capacity to proactively engage in tasks, self-assurance, the aptitude to exercise critical thinking, the capability to assume accountability, and the adaptability to effectively navigate their immediate context. This multifaceted process aims to reduce students' reliance on the instructor, thereby transforming the teacher's role into that of a facilitator (Nugroho & Maulana, 2021). Arista et al. (2018) mentioned six indicators namely planning, responsibility, initiative, self-confidence, discipline, and self-evaluation. Maslihah et al. (2021) include capable behavior, take initiative, be able to overcome obstacles/problems, have self-confidence and can-do things yourself without the help of others as the indicators of learning independence.

According to a recent study conducted by Makur et al. (2021), there is evidence suggesting that distant learning has the potential to enhance students' capacity for independent learning. This finding aligns with the research conducted by Mulyono et al. (2019), which indicated that the utilization of mobile learning can enhance the level of self-directed learning among junior high school students. Students have the potential to cultivate independence in their learning when they demonstrate the ability to effectively self-manage during the online learning process. Several studies have highlighted the significance of cultivating independence in the learning process. However, it is worth noting that a considerable number of students still struggle to attain a sufficient level of independence. According to Sa'adah et al. (2022), a significant proportion of pupils rely on their professors and peers for assistance in resolving their difficulties. Another study has revealed that pupils at higher academic levels exhibit a greater degree of independent learning. The aforementioned outcome was derived from the qualitative data, which was subjected to descriptive analysis (Rahmad et al., 2019).

A good quality instrument can reduce the bias. Thus, a valid and reliable instrument is needed. To validate the instrument, there are many ways that can be done. Rasch model was used to validate the self-regulated learning instrument for high school student (Ramadhani et al., 2024). This study considered to use Rasch model to know the information on the individual student abilities and the difficulty of SRL statement items. The Rasch analysis revealed several shortcomings in the instrument and indicated possible areas for improvement, such as the addition or removal of items to improve the test targeting of the instrument (Aghekyan, 2020). An instrument of Chinese version of Motivated Strategies for Learning Questionnaire (MSLQ) used both Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) (Tong et al., 2020). The instrument was first translated and adapted to the culture before factor analysis done. This study implied that instrument adaptation must be done based on each culture. It is in line with Taghizade et al. (2020) who did backward-forward translation in order to adapt to the available questionnaire. Since it is the instrument adaptation, then, it uses CFA to confirm the hypothesis factor.

Methods

General Background of Research

This was a developmental study of independence learning scale by using quantitative method. The survey method was used to collect data by distributing instruments to participants.

Sample of Research

This study was done in the pandemic era where all of activities in university were online based. Thus, the instrument was given directly to 436 respondents by using Google Form. The respondents were university students who were conducting online lectures.

Respondents' age ranged from 17 to 29 years (mean age = 20, SD = 1.63), 349 respondents were female (80%) and the rest were male (20%). If based on the year of study at the university, 184 respondents (42%) were still in their first year (semester 1 and semester 2).

Table 1. *Demography of respondents*

Variable	*Categories*	*Frequencies/ Statistics*	*Percentage*
Gender	Male	87	20
	Female	349	80
Age	Minimum	17	-
	Maximum	29	-
	Mean	20	-
Year	First Year	184	42
	Second Year	118	27
	Third Year	39	9
	Fourth Year	51	12
	More than Fourth Year	44	10

Instrument and Procedures

In constructing the instrument, there were five steps namely review literature, the early draft of instrument, the first trial, revise, and the last is final draft. The literature which was chosen for this instrument should contain autonomous learning definition, students' characteristic in independent learning, and also some researchers related to independent learning. The final draft of instrument was then given to higher students to collect their response.

Data collection was carried out using an online survey system because of the Covid-19 pandemic. The informed consent was filled out first to provide an explanation about the research. The identity of the respondent was confidential.

Data Analysis

As known in instrument development, there are two ways in doing the factor analysis, namely Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). Both factor analyses are aimed to reduce the large amount of variable (Retnawati et al., 2015). CFA is used when researcher has the strong theory about variable (Finch & French, 2019). Additionally, CFA also offers a strong analytical framework for evaluating the equivalence of measuring methods across different populations (Brown, 2015). Since the sample of the study is aimed to explore the factor of independence learning and only Indonesian context, thus, the EFA is more suitable to be applied.

Exploratory factor analysis (EFA) is employed to identify the underlying dimensions or factors within the assessment tool, crucial for validating the scale's effectiveness. Besides, it is also used to prove validity, both content validity and construct validity. Factor analysis is a statistical procedure used to group correlated items where these grouped items indicate that these items measure the same trait. The number of factors is an important element when evaluating the internal structure of an instrument when considering construct validity.

Data were collected using an instrument with like Likert-scale (1 = "Strongly Disagree"; 2 = "Disagree"; 3 = "Agree"; 4 = "Strongly Agree"). Univariate and multivariate descriptive analysis was conducted to determine whether the data could be treated as an interval scale when the EFA analysis was performed. Based on table 2, it is known that the

data are not normally distributed univariate or multivariate (kurtosis p-value <0.05) so that the data is treated as an ordinal scale.

Results

The data obtained was analyzed univariate and multivariate descriptive statistic. The result can be seen in table 2. Based on the table, it can be concluded that the data did not distribute normally neither univariate nor multivariate. Thus, data was treated as ordinal scale.

Table 2. *Univariate and Multivariate Descriptive Statistics*

UNIVARIATE DESCRIPTIVE						
Item	*Mean*	*CI (95%)*		*Variance*	*Skewness*	*Kurtosis (Zero Center)*
		Lower	*Upper*			
IT01	3.00	2.94	3.06	0.20	0.00	1.97
IT02	3.31	3.25	3.38	0.27	0.25	-0.77
IT03	3.39	3.33	3.46	0.28	0.05	-1.17
IT04	3.04	2.95	3.12	0.49	-0.25	-0.34
IT05	2.27	2.19	2.35	0.39	0.17	0.01
IT06	3.19	3.12	3.26	0.30	0.07	-0.11
IT07	3.18	3.11	3.25	0.33	-0.10	0.09
IT08	2.98	2.91	3.04	0.27	-0.14	1.14
IT09	2.95	2.89	3.01	0.25	-0.10	0.95
IT10	3.11	3.05	3.17	0.25	0.22	0.77
IT11	3.09	3.03	3.16	0.29	-0.28	1.99
IT12	3.40	3.33	3.47	0.29	-0.08	-1.03
IT13	2.81	2.74	2.88	0.35	0.02	-0.24
IT14	2.56	2.48	2.65	0.43	-0.12	-0.18
IT15	2.44	2.36	2.52	0.43	0.09	-0.20
IT16	3.06	2.99	3.12	0.28	0.06	0.57
IT17	3.24	3.18	3.3	0.25	0.25	0.42
IT18	3.23	3.16	3.29	0.27	0.24	-0.15
IT19	2.89	2.82	2.97	0.41	-0.32	0.44
IT20	3.03	2.97	3.1	0.26	-0.05	1.30
IT21	2.39	2.30	2.47	0.44	0.36	0.02
IT22	2.77	2.70	2.84	0.36	-0.43	0.54
IT23	2.78	2.71	2.86	0.40	-0.07	-0.13
IT24	3.06	3.00	3.13	0.27	-0.02	1.01
IT25	3.05	2.99	3.11	0.25	-0.12	1.98
IT26	2.66	2.58	2.75	0.48	-0.26	-0.04
IT27	2.88	2.81	2.95	0.32	-0.26	0.65

IT28	2.86	2.80	2.93	0.27	-0.39	0.98
IT29	2.77	2.70	2.84	0.34	-0.28	0.25
IT30	2.58	2.50	2.66	0.40	0.14	-0.33
IT31	2.93	2.87	2.99	0.26	-0.54	2.18
IT32	3.06	2.99	3.12	0.28	-0.31	2.06
IT33	3.15	3.08	3.22	0.33	-0.08	0.18
IT34	3.19	3.11	3.26	0.38	-0.26	0.03
MULTIVARIATE DESCRIPTIVE						
Mardia analysis for multivariate asymmetry skewness and kurtosis						
			Coefficient	*Statistics*	*df*	*P-value*
Skewness			194.686	14147.200	7140	1.000
Skewness corrected for small sample			194.686	14250.133	7140	1.000
Kurtosis			1504.654	59.221		0.000**
** Significant at 0.05						

Once the minimal prerequisites have been met, an assumption test must be performed before beginning the EFA analysis. The correlation matrix serves as the foundation for component analysis. This implies that for a factor to form, there has to be a sufficient connection between the items (variables). Given this, it is essential to determine if there is sufficient correlation between the data items (variables) to allow factor analysis. Bartlett's sphericity test and analysis utilizing the Kaiser-Meyer-Olkin Measure of Sample Adequacy (KMO-MSA) are two methods that are frequently used to ascertain this.

The Kaiser-Meyer-Olkin (KMO) test should yield a result above 0.6 to affirm the data's suitability for factor analysis. The initial KMO result for this study was 0.764. In addition to looking at the total KMO, the adequacy of the sample for the item level is also considered. There were 5 items that had an MSA value of less than 0.6 so that the 5 items (IT15, IT22, IT26, IT30, IT32) were excluded from the analysis and re-analyzed. After re-analysis KMO rose to 0.807. Bartlett's Test of Sphericity was significant ($p < 0.005$) and an EFA analysis could be performed.

Table 3. *Kaiser-Meyer-Olkin (KMO) value*

Item	*MSA*	
	1st Analysis	*2nd Analysis*
Overall	0.764	0.807
IT01	0.692	0.731
IT02	0.729	0.737
IT03	0.763	0.774
IT04	0.615	0.681
IT05	0.737	0.717
IT06	0.725	0.776
IT07	0.751	0.783
IT08	0.874	0.889

Item	*MSA*	
	1st Analysis	*2nd Analysis*
IT09	0.719	0.763
IT10	0.861	0.868
IT11	0.841	0.828
IT12	0.803	0.846
IT13	0.702	0.809
IT14	0.606	0.667
IT15	0.4	Out
IT16	0.912	0.9
IT17	0.863	0.876
IT18	0.847	0.867
IT19	0.745	0.785
IT20	0.705	0.69
IT21	0.737	0.726
IT22	0.543	Out
IT23	0.808	0.79
IT24	0.819	0.82
IT25	0.828	0.829
IT26	0.349	Out
IT27	0.731	0.818
IT28	0.793	0.847
IT29	0.821	0.881
IT30	0.457	Out
IT31	0.697	0.782
IT32	0.508	Out
IT33	0.852	0.847
IT34	0.857	0.85

Because the research instrument cannot be treated as an interval scale, the data were analyzed as ordinal data. Therefore, polychoric correlation was used for the raw data. Parallel Analysis (PA) on polychoric correlation matrix with Minimum Rank Factor Analysis (MRFA) estimation, this method is abbreviated PA-MRFA (Timmerman & Lorenzo-Seva, 2011), done using the FACTOR software (Lorenzo-Seva & Ferrando, 2006) (version 11.02.04) to determine the number of factors formed. PA-MRFA is the standard method used in EFA (Chiarotto et al., 2018). In PA-MRFA, the proportion of the empirical value of the explained common variance (ECV) is compared with the factor corresponding to the ECV derived from random data (Timmerman & Lorenzo-Seva, 2011) performed for each factor separately. Random data is generated based on the original data sample size with the assumption of independence between items (Timmerman et al., 2017). To determine the optimal number of factors, the observed ECV is associated with comparable factors to the mean or 95th percentile of the sample distribution associated with the corresponding factor. We use the standard configuration

for PA-MRFA available in the FACTOR program: 500 random correlation matrices are generated based on "random permutation of sample values" (Timmerman & Lorenzo-Seva, 2011, p. 213).

Table 4. *Extract Factor Based on PA-MRFA*

Factor	*Real-data % of variance*	*Mean of Random % of variance*	*95 percentiles of % random of variance*
1	34.4754**	7.0585	7.6741
2	6.6500*	6.5867	7.0917
3	6.4462*	6.2464	6.6683
4	5.7042	5.9537	6.3358
5	4.7584	5.6839	6.0463
6	4.6738	5.4377	5.7634
7	3.8694	5.1918	5.4705
8	3.3872	4.9683	5.2149
9	3.2492	4.7471	5.007
10	2.9832	4.5188	4.7477
11	2.7364	4.3067	4.5316
12	2.6615	4.0934	4.2929
13	2.2832	3.8737	4.0742
14	2.0608	3.6616	3.8754
15	2.0369	3.4421	3.6603
16	1.8987	3.2217	3.4362

** advised number of dimensions when 95 percentiles is considered
* Advised number of dimensions when mean is considered

PA-MRFA resulted in 2 optimal factor recommendations. The first recommendation is 1 factor (based on the 95th percentile) and the second recommendation is 3 factors (based on the mean). Because there are 2 recommendations, the determination of the optimal number of factors is based on the cumulative proportion of variance derived from the eigenvalues of the reduced correlation matrix. Based on the cumulative proportion of variance, the second recommendation is 3 optimal factors, which are used because the cumulative of variance is more than 50%. Furthermore, the oblique robust Oblimin rotation method is used to assist in interpreting the formed factors. A loading factor above 0.3 is maintained while below 0.3 is excluded. Items number 14, 21, and 31 were excluded from the analysis because the factor loading was less than 0.3. Factor 1 has 8 items (IT05, IT13, IT19, IT23, IT25, IT27, IT28, IT29), Factor 2 has 13 items (IT01, IT02, IT03, IT04, IT11, IT12, IT16, IT17, IT18, IT20, IT24, IT33, IT34), and Factor 3 has 5 items (IT06, IT07, IT08, IT09, IT10).

A name for each factor was given at the next step. The name was given based on the literature analysis for each item. Factor 1 is named as students' planning. This factor contains an item related to how students do their learning process with or without teacher. Factor 2 is named as students' responsibility. This factor contains items related to the students' responsibility in doing the learning process. Factor 3 is named as self-evaluation. This factor contains an item related to how students control their learning process.

Table 5. *Eigenvalues of the reduced correlation matrix*

Factors	*Factor(s) = 1*			*Factor(s) = 3*		
	Eigenvalue	*Proportion of Common Variance*	*Cumulative Proportion of Variance*	*Eigenvalue*	*Proportion of Common Variance*	*Cumulative Proportion of Variance*
1	8.93967	0.39019	0.39019	8.94014	0.39002	0.39002
2	1.67907	0.07329		1.68485	0.0735	0.46353
3	1.63191	0.07123		1.64501	0.07177	0.53529
4	1.32164	0.05769		1.31848	0.05752	
5	1.1207	0.04891		1.11912	0.04882	
6	1.08135	0.0472		1.08117	0.04717	
7	0.85101	0.03714		0.85107	0.03713	
8	0.75127	0.03279		0.74967	0.03271	

Table 6. *Robust Oblimin Rotated Loading*

Item	*F1 Students' planning*	*F2 Students' responsibility*	*F3 Self-evaluation*
Solving problem in learning	-	**0.408**	-
Obey the classroom rules	-	**0.761**	-
Do the assignment	-	**0.615**	-
Learn to fulfil a lecturer's assignment	-	**0.356**	-
Find any excuse to put off the assignment	**-0.434**	-	-
know both strengths and weaknesses in the learning process	-	-	**0.837**
Understand an appropriate learning style	-	-	**0.805**
Realize any mistake in an assignment	-	-	**0.434**
Understand the learning steps	0.425	-	**0.583**
Realize a material that should be improved	-	-	**0.492**
Enjoy the learning process	-	**0.648**	-
Doing the self-development	-	**0.734**	-
Put a detail on learning steps	**0.663**	-	-
Prefer an assignment from lecturer than choose by myself	-	**0.405**	-
Waiting for the turn when doing the assignment	-	**0.717**	-
Propose an assignment plan for any group member	-	**0.603**	-
Find the suit learning source	**0.738**	-	-
Find newest learning source	-	**0.495**	-
Manage learning time	**0.792**	-	-

Item	*F1 Students' planning*	*F2 Students' responsibility*	*F3 Self-evaluation*
Use various learning source	-	**0.672**	-
Have no learning target	**0.43**	-	-
Learn only there is assignment from lecturer	**0.498**	-	-
Plan both short- and long-term learning activities	**0.712**	-	-
Re-correct the assignment	**0.616**	-	-
Know the position of learning target	-	**0.498**	-
Compare result of assignment to others	-	**0.408**	-
Reliability			
Cronbach's alpha	0.677	0.797	0.722
Mcdonald's omega	0.731	0.798	0.730

From table 6 we see that the item *understand the learning steps* included in both students' planning and self-evaluation. However, it should be in self-evaluation factor. Beside the score is greater than students' planning factor, from the context we know that it is more appropriate to be included in self-evaluation factor.

The result showed that Internal reliability consistency overall and for each factor was calculated using Cronbach' alpha and McDonald's omega. Overall, the developed instrument has good reliability (α = 0.86; = 0.87). This means that the instrument is ready to be used to measure students' autonomous learning. Factor 2 and Factor 3 have acceptable reliability, both alpha and omega estimation results (F2 = 0.797, 0.798; F3 = 0.722, 0.730). Unlike the previous 2 factors, factor 1 has less reliability than the cut score. This is due to factor 1, there are items that have a negative loading factor value.

Discussion

This study examined the reliability and validity aspects of the questionnaire, which aimed at investigating students' learning independence in Indonesia. The development of instrument started by finding relevant literature. The literature helped us in finding the appropriate items. This study revealed that there are only three factors namely students' planning, students' responsibility, and self-evaluation. Alkhasawnh & Alqahtani (2019) stated that understanding oneself in learning is important for students to learn and acquire knowledge. When students know each step in learning, they will know better whether the chosen strategy is right or not.

The instrument was adjusted to the samples' characteristic. This is in line with Nguyen & Habok (2021) that the development of the instrument must be adjusted to the context and sample, then validated with as much intensity as possible so that the pattern of reliability can be seen. The quality of the instrument is credible. Furthermore, using the appropriate study tool can demonstrate the goals attained (Joanna & Mitzi, 2015). Valid and reliable instruments can be used to collect and represent each data (Shroff et al., 2019).

Learning during the pandemic has changed many things and has become a catalyst for changes in the field of education. Educational strategies in this era allow students to be able to learn independently (Broad, 2006). Jahari (2020) believes that the latest educational developments carry the concept of independent learning. Independent learning provides a new learning experience for students (Deepwell & Malik, 2008).

Before starting learning with various strategies, the teacher must first understand the students' condition. According to Apriani et al. (2020), educators in the current era must be able to make quality learning activities with various challenges faced. The challenges of learning today are certainly different from before. Online learning has many problems. Independent learning is a challenge for students (Jackson & Shenton, 2010). Students who study independently must be able to encourage students to explore knowledge (Jacobs, 2014). Independent study skills affect the cognitive abilities of each student (Kopzhassarova et al., 2016). Sitzmann et al. (2016) stated that cognitive ability becomes the determinant of students in interpreting knowledge during independent learning. Therefore, with independent learning one can construct their own knowledge obtained after studying (Neo & Kian, 2003).

Conclusion

The current study intended to survey students' learning independence and most importantly to estimate both validity and reliability of the instrument of students' learning independence among students in higher education. Overall, the instrument can be employed instantly by researchers and teachers or lecturers after adjusting the sample. Before using this tool, there are a few things future researchers should be aware of. First, researchers should exercise caution while translating instruments. The goal of instrument translation is to lessen prejudice. Secondly, adapting the study's sample background to the intended sample.

Despite the promising results, the limitation of study must be shown off. This study only used EFA as the analysis factor. The confirmatory factor analysis (CFA) must be done by further research. Hence, researchers must iterate as many validations as possible.

Statements On Open Data, Ethics and Conflict of Interest

The research data can be accessed through an email by lathifarosianadewi@gmail.com. Respondents' information would not be given to anyone because we make it anonymized. This work does not grant any funding thus all authors declare no conflict of interest.

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