

# Adaptation of the Academic Digital Literacy Scale for College Students: A Validity and Reliability Study

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Today's students can also be called "Generation Z", which cannot be separated from their digital life. Generation Z, "digital natives", very comfortable using digital devices in their social media life. Even though students as a whole are comfortable with digital technologies for entertainment, they are still learning how to incorporate digital devices into their academic lives. The aim of the research is to adapt a digital literacy to Indonesian version of student academic digital literacy. Adaptation methods include translation, synthesis, expert committee review, and pretesting. A total of 364 students in the province of East Java, Indonesia, were recruited for this study. Data analysis used confirmatory factor analysis with M-Plus software. The results showed that the loading factor values ranged from 0.47 to 0.87 and met the minimum criteria, so they could be considered valid. The reliability is indicated by the value  $\alpha = 0.87$  and  $CR = 0.89$ , which has met the minimum criteria, so it is reliable, while the  $AVE = 0.74$  has met the minimum criteria, so it shows good convergence.

**Keywords:** Adaptation of measuring instruments, academic digital literacy, validity, reliability, students.

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# Адаптация шкалы академической цифровой грамотности для студентов колледжей: исследование валидности и надежности

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Сегодняшних студентов можно назвать «поколением Z», они плотно встроены в мир цифровых технологий. Основная характеристика поколения Z, «цифровых аборигенов» они очень комфортно себя чувствуют в использовании цифровых устройств в жизни и в социальных сетях. Несмотря на то, что учащимся комфортно пользоваться цифровыми технологиями для коммуникации, они все еще не до конца умеют включать цифровые технологии в свою академическую жизнь. Цель исследования — адаптировать инструмент измерения цифровой грамотности в контексте Индонезии, создать свою версию инструмента измерения академической цифровой грамотности учащихся. Методы адаптации включают перевод, синтез, рассмотрение экспертной комиссией и предварительное тестирование. В исследовании участвовали 364 студента из провинции Восточная Ява, Индонезия. При анализе данных использовался подтверждающий факторный анализ с программным обеспечением M-Plus. Результаты показали, что значения коэффициента загрузки варьировались от 0,47 до 0,87 и соответствовали минимальным критериям, поэтому их можно было считать валидными. На надежность указывают значения  $\alpha = 0,87$  и  $CR = 0,89$ , которые соответствуют минимальным критериям,  $AVE = 0,74$  и соответствует минимальным критериям, что показывает хорошую конвергентность.

**Ключевые слова:** Адаптация средств измерений, академическая цифровая грамотность, валидность, надежность, студенты.

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## Introduction

In the current digital era, students are required to have a new form of academic literacy, so called academic digital literacy, which help them effectively assist in completing their academic assignments. It's not only about a traditional academic literacy, but also about an academic digital literacy, which helps students learn faster and complete their assignments [1; 2; 3]. In other words, academic literacy in today's all-digital educational environment is very important in the form of mastery of digital literacy that supports their academics.

Every student needs an academic digital literacy because it is an important aspect of functioning successfully in an academic environment, which is reading, writing, research, and communication. This involves high-level reading and writing skills, critical thinking, articulate writing, and discipline-specific skills for reading and writing [4; 5; 40].

There are several researches which reveal that digital literacy, self-control, and learning motivation can predict the academic achievement. Apart from that, digital literacy also contributes to increasing academic success, improving research skills, and boosting self-confidence [3; 5; 6; 41].

The results of the research explain that metacognitive knowledge, resource management, and motivational beliefs have a significant positive influence on digital literacy [7; 45]. By systematic literature mapping study on the basis of 298 articles published in two databases, Scopus and Web of Science (WoS), we found out, that the largest proportion of articles in Scopus in most of the cases frequently mentioned topic digital pedagogy. This provides a perspective on digital transformation studies in higher education, particularly related to academic digital literacy [8].

Students nowadays can also be called "Generation Z", the ones who cannot be separated from their digital life. Generation Z or "digital natives" are very comfortable using digital devices such as smartphones, iPads, and laptops in their online social lives. Although students feel comfortable using technology for social interaction in the virtual world, they are still learning how to incorporate digital devices into their academic lives [9; 42; 44].

Therefore, it is important to adapt the academic digital literacy scale measurement tool

for college students so that it can be used to determine students' abilities in mastering digital technology in completing their academic tasks.

## Academic digital literacy

Digital literacy is defined as the ability and awareness of using digital technology to perform tasks while demonstrating the right attitude in a learning environment by utilizing digital technology [10]. Following the model developed by [10], digital literacy includes cognitive, technical, and socio-emotional learning perspectives.

Digital literacy has also been identified as a key competency because it is considered the 'backbone' of current educational pedagogy, as it plays an important role in the world of education. Digital literacy significantly increases the employability of graduates because it empowers them to achieve more in the digital economy. In fact, even in the world of work, 90% of jobs require excellent digital literacy competencies [7; 11; 43].

Digital literacy is the ability to read and understand information in the form of hypertext or multimedia. It is different from traditional literacy because digital sources can produce various forms of information, including text, images, sound, and other formats [12; 13; 14; 15; 16]. Based on this explanation, it can be concluded that academic digital literacy is the ability and awareness to use digital technology as a learning resource and complete academic tasks in the correct manner, encompassing cognitive, technical, and socio-emotional dimensions.

## Factors influencing academic digital literacy

Digital literacy is influenced by several factors including; 1) use of online media, 2) academic achievement 3) role of parents or family, 4) intensity of reading [17; 18]. Digital literacy skills are influenced by many factors, but the most important according to [19] is related to the drive or desire of individuals to understand digital literacy by reading and applying it.

Research results from Rosalina found that there are three factors that affect the level of students' digital literacy competence, including: 1) Environmental support factors consisting of the campus environment and family roles, 2) Socioeco-

conomic conditions factors, which include individual financial conditions and the criticality of the media, and 3) The intensity factor of media use, which includes the use of digital media in daily activities and the completion of academic assignments [20].

Thus, the main factor that can affect digital literacy skills in using technology is a skill that needs to be honed with daily activities. This emphasizes that the ability is a continuous process that is carried out consistently in the utilization and use of digital technology in literacy [21; 22].

### Academic digital literacy dimension

The dimensions of digital literacy are the same as the model developed by [10] that digital literacy has three dimensions as shown in Figure 1 below.

The cognitive dimension of digital literacy relates to the ability to think critically when searching, evaluating, and creating digital information handling cycles. It also means being able to eval-

uate and select appropriate software programs to study or perform a particular task. This dimension of digital literacy requires individuals to have knowledge of related ethical, moral, and legal issues, and understand content that uses digitally based resources (e.g., copyright and plagiarism). This dimension involves the ability to intelligently navigate through a hypermedia environment to construct knowledge and synthesize new understandings using appropriate digital tools, which will understand and find meaning in the best sense [10]. Thus, the cognitive dimension is the ability to choose technology, search, assess, and select information using critical thinking skills.

The technical dimension generally means having technical and operational skills to use. This dimension can be applied to learning and daily activities. It involves being able to connect and use input devices and peripherals such as earphones/headsets, external speakers, smartboards, and more. This assumes knowledge of

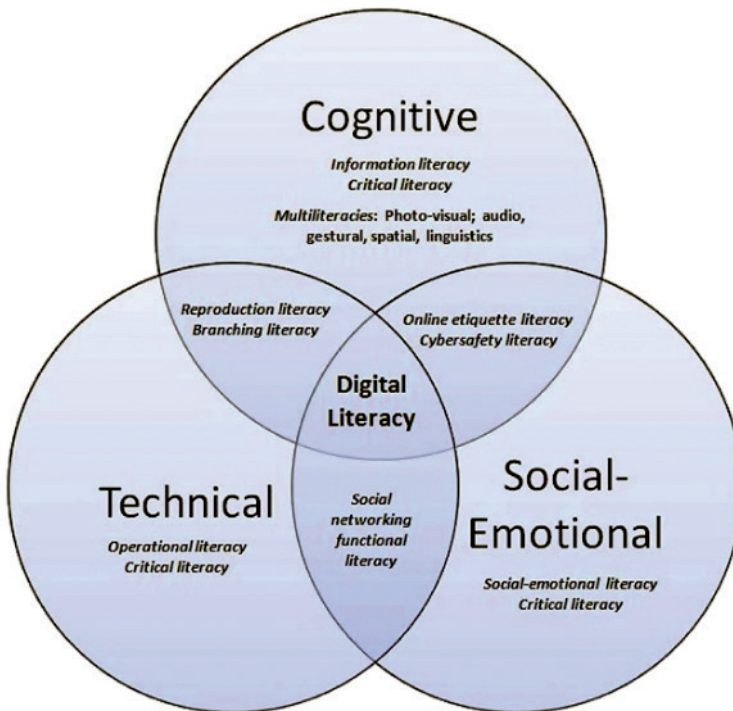


Fig. 1. Dimensions of digital literacy

working parts, file protection, and the ability to solve problems by reading manuals or via the “Help” function and other web-based resources, such as YouTube or other digital media. A digitally savvy individual should be able to adequately operate technology by understanding file structure, managing data transfer, including understanding file size and space required for storage, finding, downloading and installing applications, and uninstalling them when not needed. They should know how to use infrared and/or Bluetooth for mobile devices, understand data charges associated with downloading data, set up and use communication tools and social networks, update/change user account information on the Internet, send and retrieve attachments via email and/or Dropbox, and open them with a suitable application, such as opening a folder, and know about the main features of software programs [10]. Thus, this dimension is a major component of digital literacy, which includes the skills needed to operate digital technology for learning.

The social-emotional dimension involves the responsible use of the Internet in order to communicate, socialize, and learn by observing applying certain rules. These rules are similar to face-to-face communication, require respect and the use of appropriate language and words to avoid misinterpretation and misunderstanding. One should maintain safety and privacy/keep personal information as confidential as possible, not disclosing more personal information than necessary. One should also understand when a threat is received and know how to deal with it, such as whether to ignore, report, or respond to it [10]. Thus, this socio-emotional dimension relates to individual behavior in the use of digital technology.

### **Academic digital literacy measurement**

Measurements of digital literacy have been developed according to research objectives and contexts, and is based on certain theories. The measurement of digital literacy was first developed by [10] with three dimensions, namely technical, cognitive, and social-emotional.

Pala and Başıbüyük research on digital literacy skills uses a digital literacy scale measurement based on the four dimensions they developed, namely information processing, communi-

cation, security and problem solving [5]. Nabhan measures digital literacy using digital academic writing skill questionnaires which he developed, they consist of several dimensions, namely critical thinking, online safety skills, digital culture, collaboration and creativity, finding information, communication, and functional skills [23]

Mercado in his research, used qualitative case studies to explore academic digital literacy skills. This involved conducting semi-structured interviews and collating data from various sources, such as digital academic notes, informal conversations with facilitators, online activities on institutional platforms, interactions with research seminar facilitators, supervisors, and researchers, as well as drafts and final versions of academic manuscripts [24]. Anthonysamy [7] using a digital literacy scale in the form of a likert scale with a three-dimensional structure based on the instruments used by [10] and [11] [11] consisting of technical (6 items), cognitive (2 items), and social-emotional (2 items) to measure the use of technology in learning for students at the University of Auckland New Zealand.

In addition, the digital literacy scale instrument has also been adapted to various countries and one of them was adapted by [25] into Turkish. There are around 10 items based on the digital literacy scale developed by [10], the item scale factor loading varies between 0.46 — 0.74 and the Cronbach Alpha reliability is 0.86. Burçin Hamutoğlu also adapted a digital literacy scale for college students with an internal consistency coefficient (Cronbach Alpha) for the technical dimension = 0.88, the cognitive dimension = 0.89, and the social-emotional dimension = 0.79. [26].

Esfandiari [27] and Işık [13] determine the level of digital literacy using the digital literacy scale from the model [10]. Durak and Seferoğlu [28] in their research also used the digital literacy scale from [10] model which was adapted by [26]. Thus, referring to the study of previous research results, it is recommended to measure academic digital literacy using digital literacy scale instruments based on the dimensions of the [10]. The dimensions are the most appropriate for psychological variables and have been adapted to many countries. The digital literacy scale instrument consists of dimensions that can be scored individually or combined for a total score.

## Method

The Ethics Commission of Research of the Faculty of Psychology at the University of Muhammadiyah Malang has approved the study (approval number for research ethics: E.6.m/161/FPsi-UMM/III/2023). The authors have assured the participants that their study data would be presented anonymously, and the participants signed a written agreement to participate.

### Participants

The participants of this research were second, fourth, and sixth-semester students who had a GPA  $\geq 2.00$  and were currently studying at public and private universities in East Java, Indonesia, during May 2023. There were 283 female respondents and 81 male respondents, making a total of 364 students.

### Adaptation procedure

The process of adapting measuring instruments in this study begins with a request for permission from the owner of the measuring instrument. The measuring instrument adaptation procedure in this study refers to [29] as shown in Figure 2 below.

Figure 2 describes the adaptation procedure according to the stages. *The first stage* involves translations by two linguists and experts in the field of educational psychology who graduated abroad and understand the context of measuring instruments for Indonesian students. The translations are done through the language center at the University of Muhammadiyah Malang. *The second stage* is synthesis, where the results of the translations from both translators are brought together to find similarities and differences until an agreed-upon translation is obtained. This translation is referred to as the draft translation measuring instrument scale. *The third stage* involves back translation and juxtaposition with the original measurement tool to find differences in meaning so that the meaning can be adjusted. The back translation is done by linguists and experts in the field of educational psychology who are foreign graduates and understand the context of measuring instruments through the language center at the University of Muhammadiyah Malang.

*The fourth stage*, the expert committee review, is to ensure there is a correlation of the

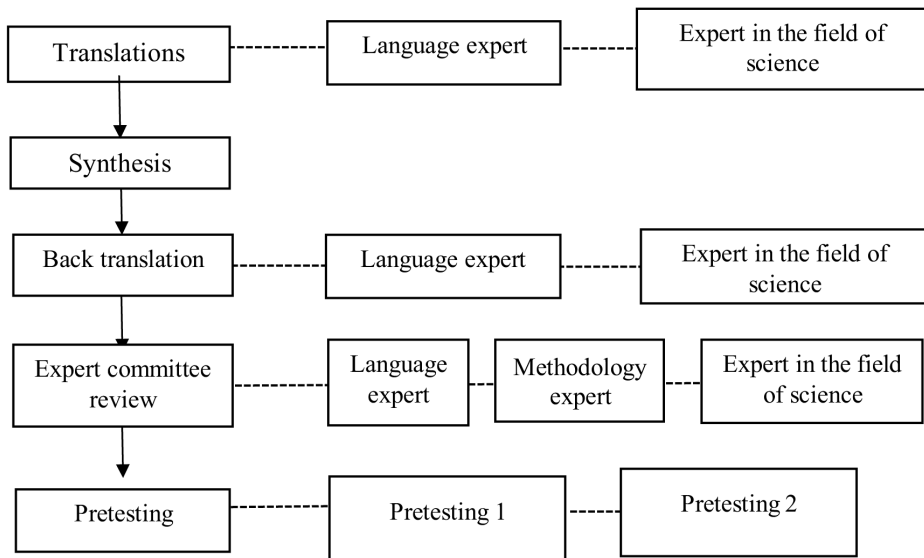


Fig. 2. Procedure for adapting an academic digital literacy scale

meaning and sociocultural context between between the original measuring instrument and the translated measuring instrument. The reviewers from the expert committee were linguists, methodologists, and educational psychologists, five experts in total. They were asked to provide assessments and corrections for improvements to ensure whether the adapted instruments were equal in measuring constructs and suitability for the cultural context of students in Indonesia. The results of the assessment were quantified using Aiken's V formula. The results of the analysis on each academic digital literacy scale instrument item obtained a minimum value of the Aiken's V index ranging from 0.81 to 0.94 with a minimum criterion of 0.040 based on the Aiken table ( $P > 0.05\%$ ). Thus, it can be concluded that all instrument items can be declared valid or equal in measuring the academic digital literacy scale construct in students in the context of Indonesian culture.

The fifth stage, pretesting, is to test the measuring instrument on a small number of subjects beforehand in order to find out whether the measuring instrument is well understood by the subjects or not. If the measuring instrument can be understood, then a trial is carried out with a larger number of subjects. Testing the measuring instrument on a small scale was done by giving it to 40 students as a pilot test to determine whether the instructions and statements on each item could be understood properly before being tested on a large scale. Based on the results of the small-scale trials using the pilot tests, the respondents stated that the instructions were easy to understand, and the items of all scales were also clear and well-understood. Thus, they were able to proceed with trials of measuring

instruments on a large scale. The testing of the measuring instruments on a large scale was done by collecting data from 364 students to test their validity and reliability using CFA analysis.

### Data analysis

Data analysis used Confirmatory Factor Analysis (CFA) with the help of M-Plus software, which gave rise to fit index values in the form of Chi-Square, RMSEA, CFI, TLI, and SRMR [30]. According to [31], what must be reported in the fit model analysis are the Chi-Square, RMSEA, CFI, and SRMR tests.

### Results and Discussion

Based on the final modeling results from the CFA analysis that has been carried out in the form of the results of the fit model from the model feasibility parameters of the academic digital literacy scale as shown in Table 1 below.

Based on Table 1, we know that the output value of RMSEA = 0.07, SRMR = 0.04, CFI = 0.95, and TLI = 0.93 according to the criteria, so that it fulfills the feasibility parameters of the model fit (goodness of fit) which means there is no difference in measurements developed with empirical models or those which obtain data support. While the index in the form of Chi Square (P-Value) = 0.00 does not meet the criteria  $\geq 0.05$ , it is not fit, but can be ignored because the respondents or samples are large.

The results of the reliability test for this scale use Cronbach's Alpha and the Construct reliability (CR) value and the Average variance extracted (AVE) value. See the results of the confirmatory factor analysis of the validity and reliability tests as in Table 2 below.

Table 1

**The final results of the fit model based on the feasibility parameters of the academic digital literacy scale model (N=364)**

Fit parameters	Output	Criteria	Information
Root mean square error of approximation (RMSEA)	0,07	$\leq 0,08$	Fit
Standardized root mean square residual (SRMR)	0,04	$< 0,08$	Fit
Comparative fit index (CFI)	0,95	$\geq 0,90$	Fit
Tucker-Lewis Index (TLI)	0,93	$\geq 0,90$	Fit

Table 2 and Figure 3 show that the loading factor values range from 0.47 to 0.87 and have met the minimum criteria of construct validity. Meanwhile, the reliability indicated by the value

$\alpha = 0.87$  and  $CR = 0.89$  met the minimum criteria, so the scale was reliable, while the  $AVE = 0.74$  met the minimum criteria so it indicated a good convergence.

Table 2

**Validity and reliability of the academic digital literacy scale (N=364)**

No	Dimensions	Item	Factor Loading	Alpha		CR		AVE	
1	Technical	adl1	0,47	0,83	0,87	0,83	0,89	0,46	0,74
		adl2	0,65						
		adl3	0,72						
		adl4	0,71						
		adl5	0,72						
		adl6	0,76						
2	Cognitive	adl7	0,76	0,64		0,64		0,48	
		adl8	0,62						
3	Socio-Emotional	adl9	0,87	0,72		0,73		0,58	
		adl10	0,64						

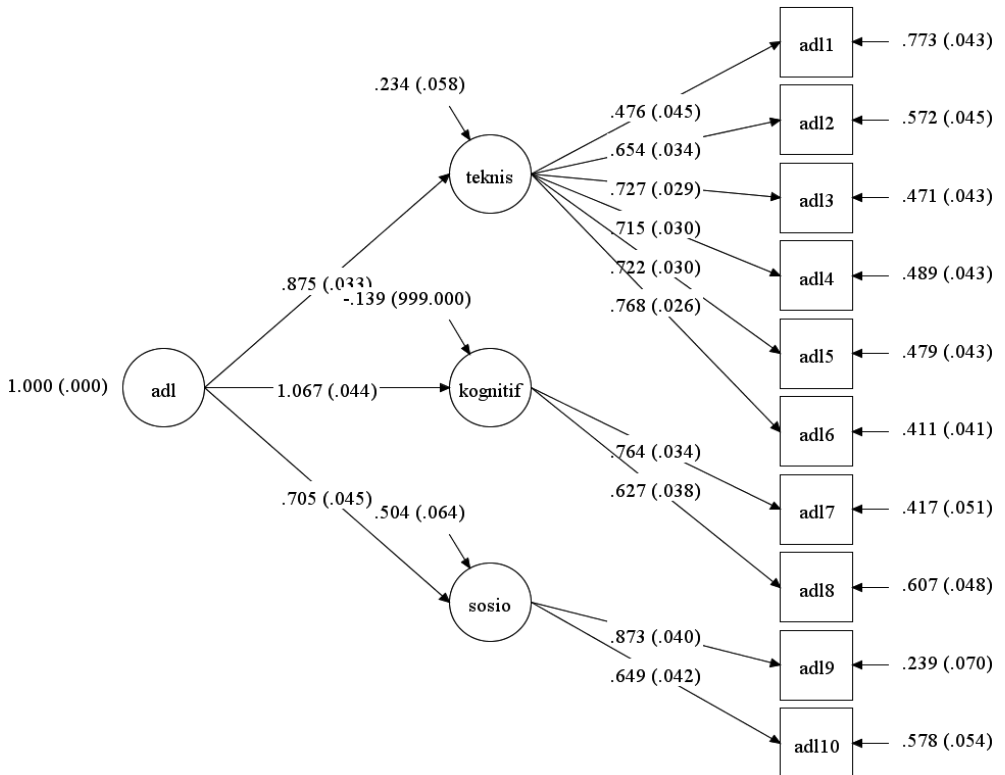


Fig. 3. Final model of the academic digital literacy scale



Academic digital literacy is measured using a digital literacy scale from [10] as many as ten items (academic digital literacy scale, see appendix) developed by researchers in an academic context based on technical, cognitive, and social-emotional dimensions. The blue print of the academic digital literacy scale before and after the try out is as shown in Table 3 below.

The construct validity of this research is based on internal structure evidence analyzed through CFA, as explained by the American Education Research Association (AERA) that construct validity can be demonstrated through five pieces of evidence, namely 1) test content, 2) cognitive/response test, 3) internal structure, 4) relations to other variables, and 5) consequences of testing [32]. The CFA test was carried out to determine the feasibility of the model and the size of the factor loading of each item as evidence of construct validity based on the

internal structure. The overall model feasibility parameters are as described by [33; 31; 34] as it is shown below:

A model can be said to be feasible if it fulfills one or more feasibility parameters. The more the better. According to [35] if 4 — 5 parameters are met, the model is considered sufficient to assess the feasibility. After fulfilling the feasibility parameters of the model, we can see the size of the factor loading or factor loading of the CFA. Factor loading with a value between 0.4 — 0.6 is categorized as sufficient validity and if the factor loading value is  $\leq 0.7$ , it's categorized as high validity. However, if all items in one indicator are used up or do not represent the factor loading value it can be lowered to a value of 0.30 to 0.40, provided that there were at least 250 respondents [36].

In addition, to determine the reliability or consistency of the instrument, there was an instrument reliability test carried out. Instru-

Table 3

**Blue print of academic digital literacy scale**

No	Dimensions	No. Item	
		Before try out	After try out
1.	Technical	1, 2, 3, 4, 5, 6	1, 2, 3, 4, 5, 6
2.	Cognitive	7, 8	7, 8
3.	Social-emotional	9, 10	9, 10
	Total item	10	10

Table 4

**Model feasibility parameters**

No	Fit parameters	Criteria
	<i>Absolute Fit</i>	
1	Chi square P-Value	$\geq 0,05$
2	Goodness of fit index (GFI)	$\geq 0,90$
3	Root mean square error of approximation (RMSEA)	$\leq 0,08$
4	Normed fit index (NFI)	$\geq 0,90$
5	Standardized root mean square residual (SRMR)	$< 0,08$
	<i>Incremental Fit</i>	
6	Comparative fit index (CFI)	$\geq 0,90$
7	Tucker-Lewis Index (TLI)	$\geq 0,90$
8	Adjusted goodness of fit index (AGFI)	$\geq 0,90$
	<i>Parsimonius Fit</i>	
9	Parsimonious Normal Fit Index (PNFI)	0,60 — 0,90

ment reliability relates to the instrument's ability to consistently measure instrument attributes [37]. Instrument reliability in this study was measured by calculating composite reliability or construct reliability (CR), and Average Variance Extracted (AVE) was used to determine how large the indicator size described its theoretical latent construct.

Hair explains that the calculation of CR is the square of the total value (sum) of standard loading divided by the square of the total standard loading value plus the sum error value. Meanwhile, the AVE calculation is the sum (total) squared value of the standard loading divided by the sum of the squared standards of loading plus the sum error value [35].

The reliability of a construct is said to be good if the CR value  $\geq 0.70$ , but if the CR value is in the range of 0.60 — 0.70, then reliability is still in the good category. While the AVE value is more than 0.50 which is a good measure of reliability, but this AVE is usually an option (optional) in research [35; 38; 39].

This study aims to adapt the digital literacy scale to Indonesian in an academic context

and to determine the validity and reliability of the construct to suit Indonesian culture. This scale consists of 10 items and three dimensions (Table 2). All of these scale items meet the minimum criteria so that this instrument can be declared valid and reliable and meets the standards for adapting measuring instruments and measuring psychometric properties, so this instrument is suitable for use in Indonesia.

### Conclusion

The results of this study show that the academic digital literacy scale instrument for college students is suitable for use in Indonesia and has been adapted to the culture of students in Indonesia with the same number of items. The psychometric properties show that the loading factor value ranges from 0.47 — 0.87 which meets the minimum criteria, so it can be considered valid. While reliability is indicated by the value  $\alpha = 0.87$  and CR = 0.89 which have met the minimum criteria, they are reliable, while the AVE = 0.74 has met the minimum criteria, and it shows a good convergence.

## APPENDIX: Instruments of the academic digital literacy scale for college students

### Digital literacy scale versi asli

- 1= Strongly Disagree
- 2= Moderately Disagree
- 3= Neutral
- 4= Moderately Agree
- 5= Strongly Agree

No	Statement	1	2	3	4	5
1	I know how to solve my own technical problems.					
2	I can learn new technologies easily.					
3	I keep up with important new technologies.					
4	I know about a lot of different technologies.					
5	I have the technical skills, I need to use ICT for learning and to create artefacts (e.g. presentations, digital stories, wikis, blogs) that demonstrate my understanding of what I have learnt					
6	I have good ICT skills					
7	I am confident with my search and evaluate my skills in regards to obtaining information from the Web					
8	I am familiar with issues related to web-based activities e.g. cyber safety, search issues, plagiarism					

No	Statement	1	2	3	4	5
9	ICT enables me to collaborate better with my peers on project work and other learning activities					
10	I frequently obtain help with my university work from my friends over the Internet e.g. through Skype, Facebook, Blogs					

**Academic digital literacy scale versi Indonesia**

**PETUNJUK PENGISIAN**

Pilihlah pernyataan dibawah ini yang sesuai dengan diri Saudara dengan memberikan tanda centang (√) sesuai dengan ketentuan berikut:

- 1= Sangat Tidak Setuju
- 2= Tidak Setuju
- 3= Ragu-Ragu
- 4= Setuju
- 5= Sangat Setuju

No	Pernyataan	1	2	3	4	5
1	Saya tahu cara mengatasi masalah-masalah teknis saat menggunakan perangkat digital					
2	Saya mudah mempelajari teknologi digital terbaru					
3	Saya mengikuti perkembangan teknologi digital terbaru yang penting untuk keperluan akademik					
4	Saya mengetahui tentang berbagai jenis teknologi digital dalam menunjang akademik					
5	Saya memiliki keterampilan dasar menggunakan teknologi digital untuk pembelajaran dan membuat berbagai produk digital, seperti slide presentasi, yang menunjukkan pemahaman tentang apa yang telah saya pelajari					
6	Saya memiliki kemampuan teknologi digital yang baik dalam menunjang kegiatan akademik					
7	Saya sangat yakin mampu mencari dan menilai informasi dari internet terkait dengan keperluan akademik					
8	Saya cukup familiar dengan isu-isu terkait dunia digital seperti keamanan siber, <i>searching</i> dan <i>plagiarism</i>					
9	Teknologi digital membantu saya untuk berkolaborasi dengan teman-teman dalam berbagai tugas dan aktivitas pembelajaran					
10	Saya sering berinteraksi dengan teman-teman menggunakan media <i>online</i> seperti zoom, googlemeet, google drive atau lainnya untuk menyelesaikan tugas-tugas kuliah					

**References**

1. Ebiefung R. CLN, Onah E. CLN. Digital Literacy Skills As Correlate of Electronic Information Resources' (EIRs) Use by University Undergraduates In Southsouth, Nigeria. *Libr. Philos. Pract.*, vol. 5629, no. 13, pp. 1—16, May 2021, [Online]. Available: <https://www.proquest.com/scholarly-journals/digital-literacy-skills-as-correlate-electronic/docview/2552130663/se-2>.
2. Singh U.G. "Academic digital literacy — A journey we all need to take," *University World News*, pp. 1—6, 2020.
3. Abbas Q., Hussain S., Rasool S. Digital literacy effect on the academic performance of

- students at higher education level in Pakistan. *Glob. Soc. Sci. Rev.*, vol. 4, no. 1, pp. 154—165, 2019, [Online]. Available: <https://gssrjournal.com/jadmin/Author/31rv1oIA2LALJouq9hkR/wXMzEaBAUq.pdf>.
4. Mulcahy-Ernt P., Caverly D.C. Academic literacy learning strategies for print and digital texts. In *Handbook of college reading and study strategies*, Routledge, 2018.
5. Pala Ş.M., Başıbüyük A. The Predictive Effect of Digital Literacy, Self-Control and Motivation on the Academic Achievement in the Science, Technology and Society Learning Area/ *Technol. Knowl. Learn.*,

- vol. 26, no. 2, pp. 1—17, 2021. DOI:10.1007/s10758-021-09538-x
6. Shariman T.P.N.T., Razak N.A., Noor N.F.M. Digital literacy competence for academic needs: An analysis of Malaysian students in three universities. in *Procedia-Social and Behavioral Sciences*, 2012, vol. 69, pp. 1489—1496. DOI:<https://doi.org/10.1016/j.sbspro.2012.12.090>
7. Anthonysamy L., Koo A.C., Hew S.H. Self-regulated learning strategies in higher education: Fostering digital literacy for sustainable lifelong learning. *Educ. Inf. Technol.*, vol. 25, no. 3, pp. 2393—2414, 2020. DOI:<https://doi.org/10.1007/s10639-020-10201-8>
8. Farias-Gaytan S., Aguaded I., Ramirez-Montoya M.-S. Transformation and digital literacy: Systematic literature mapping.” *Educ. Inf. Technol.*, vol. 26, no. 4, pp. 3593—3606, 2021. DOI:10.1007/s10639-021-10624-x
9. Caverly D.C., Payne E.M., Castillo A.M., Sarker A., Threadgill E., West D. Identifying Digital Literacies to Build Academic Literacies. *J. Coll. Read. Learn.*, vol. 49, no. 3, pp. 170—205, Sep. 2019. DOI:10.1080/10790195.2019.1638218
10. Ng W. Can we teach digital natives digital literacy?. *Comput. Educ.*, vol. 59, no. 3, pp. 1065—1078, 2012. DOI:<https://doi.org/10.1016/j.compedu.2012.04.016>
11. Parera U., Muthupoltotage, L. Whitehead, Gardner, Peiris A. Investigating the interrelationship between undergraduates’ digital literacy and self-regulated learning skills. In *International Conference on Information Systems*, 2016, pp. 1—13, [Online]. Available: <https://core.ac.uk/download/pdf/301370261.pdf>.
12. Acarturk C. Information and Communication Technologies in Education & Digital Literacy Implications for Universities and Academic Rankings. *third-mission.org*, 2018.
13. Işık B., Özdemir N., Kuşlu S. Digital literacy status of academic staff in the light of transformation in information and communication technologies. *J. Hum. Sci.*, vol. 18, no. 3, pp. 374—389, 2021. DOI:<https://doi.org/10.14687/jhs.v18i3.6131>
14. Prihandoko L.A. The Interplay between Digital Competencies and Information Literacy in Academic Writing Online Class during COVID-19 Pandemic (PLS-SEM Approach). *Eralingua J. Pendidik. Bhs. Asing dan Sastra*, vol. 5, no. 1, pp. 234—249, 2021, [Online]. Available: <https://ojs.unm.ac.id/eralingua/article/view/18843>.
15. Rafi M., JianMing Z., Ahmad K. Technology integration for students’ information and digital literacy education in academic libraries. *Inf. Discov. Deliv.*, vol. 47, no. 4, pp. 203—217, 2019. DOI:10.1108/IDD-07-2019-0049
16. Zaborova E. Internet information and academic literacy in the digital age. In *XXIII International Conference Culture, Personality, Society in the Conditions of Digitalization: Methodology and Experience of Empirical Research Conference*, 2021, pp. 1—7, [Online]. Available: <https://knepublishing.com/index.php/KnE-Social/article/view/8328>.
17. Kuo N.-C. Promoting Family Literacy through the Five Pillars of Family and Community Engagement (FACE). *Sch. Community J.*, vol. 26, no. 1, pp. 199—222, 2016, [Online]. Available: <https://eric.ed.gov/?id=EJ1104402>.
18. McDougall J., Readman M., Wilkinson P. The uses of (digital) literacy. *Learn. Media Technol.*, vol. 43, no. 3, pp. 263—279, Jul. 2018. DOI:10.1080/17439884.2018.1462206
19. Phuapan P., Viriyavejakul C., Pimdee P. An Analysis of Digital Literacy Skills among Thai University Seniors. *Int. J. Emerg. Technol. Learn.*, vol. 11, no. 03 SE-Papers, pp. 24—31, Mar. 2016. DOI:10.3991/ijet.v11i03.5301
20. Rosalina D., Yuliari K., Setianingsih D., Zati M.R. Faktor—Faktor Yang Berpengaruh Terhadap Kompetensi Literasi Digital Mahasiswa di Era Revolusi Industri 4.0. *EKONIKA J. Ekon. Univ. Kadiri*, vol. 6, no. 2, pp. 294—306, 2021. DOI:<http://dx.doi.org/10.30737/ekonika.v6i2.1996>
21. Kaufman S.B., DeYoung C.G., Gray J.R., Jiménez L., Brown J., Mackintosh N. Implicit learning as an ability. *Cognition*, vol. 116, no. 3, pp. 321—340, 2010. DOI:<https://doi.org/10.1016/j.cognition.2010.05.011>
22. Syah R., Darmawan D., Purnawan A. Analisis faktor yang mempengaruhi kemampuan literasi digital. *J. Akrab*, vol. 10, no. 2, pp. 60—69, 2019. DOI:<https://doi.org/10.51495/jurnalakrab.v10i2.290>
23. Nabhan S. Pre-Service Teachers’ conceptions and Competences on Digital Literacy In an EFL Academic Writing Setting. *Indones. J. Appl. Linguist.*, vol. 11, no. 1, pp. 187—199, 2021. DOI:<https://doi.org/10.17509/ijal.v11i1.34628>
24. Mercado P.N. Academic Digital Literacy trajectories of online senior undergraduate ELT students in Mexico. *eprints.soton.ac.uk*, 2021.
25. Ustundag M.T., Gunes E., Bahçivan E. Turkish adaptation of digital literacy scale and investigating pre-service science teachers’ digital literacy. *J. Educ. Futur.*, no. 12, pp. 19—29, 2017, [Online]. Available: <http://openaccess.ahievran.edu.tr/xmlui/handle/20.500.12513/1728>.
26. BurçinHamutoğlu N., Uyanık G., Erdoğan D., Güngören Ö. Dijital Okuryazarlık Ölçeği: Türkçe ‘ye Uyarlama Çalışması. *Journal*, vol. 18, no. 1, pp. 408—429, 2017. DOI:<https://doi.org/10.12984/egeefd.295306>
27. Esfandiari R. Iranian EFL Teachers’ Digital Literacy in Academic Settings: Teacher Professionalism in the Digital Age. *Foreign Lang. Res. J.*, vol. 9, no. 3, pp. 691—720, 2020. DOI:<https://doi.org/10.22059/jflr.2019.266987.556>

28. Durak H.Y., Seferoğlu S.S. Antecedents of social media usage status: examination of predictiveness of digital literacy, academic performance, and fear of missing out variables. *Soc. Sci. Q.*, vol. 101, no. 3, pp. 1056—1074, 2020. DOI:<https://doi.org/10.1111/ssqu.12790>
29. Beaton D.E., Bombardier C., Guillemin F., Ferraz M.B. Guidelines for the Process of Cross-Cultural Adaptation of Self-Report Measures. *Spine (Phila. Pa. 1976)*, vol. 25, no. 24, pp. 3186—3191, 2000, [Online]. Available: [https://journals.lww.com/spinejournal/Fulltext/2000/12150/Guidelines\\_for\\_the\\_Process\\_of\\_Cross-Cultural.14.aspx](https://journals.lww.com/spinejournal/Fulltext/2000/12150/Guidelines_for_the_Process_of_Cross-Cultural.14.aspx).
30. Wang J., Wang X. Structural equation modeling: Applications using Mplus. Chichester: John Wiley & Sons, 2019.
31. Kline R.B. Principles and practice of structural equation modeling, 4th ed. New York, NY, US: Guilford Press, 2016.
32. AERA. Standards for educational and psychological testing. American Educational Research Association, 2018.
33. Hu L., Bentler P.M. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Struct. Equ. Model.*, vol. 6, no. 1, pp. 1—55, 1999. DOI:10.1080/10705519909540118
34. Hoyle R.H. Handbook of structural equation modeling. Hoyle, Rick H.: rhoyle@duke.edu: The Guilford Press, 2012.
35. Hair J.F., Black W.C., Babin B.J., Anderson R.E., Black W.C., Anderson R.E. Multivariate data analysis, 8th ed. 2019.
36. Hair J.F., Ringle C.M., Sarstedt M. PLS-SEM: Indeed a Silver Bullet. *J. Mark. Theory Pract.*, vol. 19, no. 2, pp. 139—152, Apr. 2011. DOI:10.2753/MTP1069-6679190202
37. DeVon H.A., et al. A Psychometric Toolbox for Testing Validity and Reliability. *J. Nurs. Scholarsh.*, vol. 39, no. 2, pp. 155—164, Jun. 2007. DOI:<https://doi.org/10.1111/j.1547-5069.2007.00161.x>
38. Davey A., Savla J. Statistical power analysis with missing data: A structural equation modeling approach. New York, NY, US: Routledge/Taylor & Francis Group, 2010.
39. McDonald R.P., Ho M.-H.R. Principles and practice in reporting structural equation analyses. *Psychological Methods*, vol. 7. American Psychological Association, McDonald, Roderick P.: U Illinois Urbana-Champaign, Dept of Psychology, 603 East Daniel Street, Champaign, IL, US, 61820, rmdonal@spsych.uiuc.edu, pp. 64—82, 2002. DOI:10.1037/1082-989X.7.1.64
40. Dewi D.K., Ardhana W., Irtadji, Chusniyah T., Sulianti A. Inquiry-Based Learning Implementation to Improve Critical Thinking of Prospective Teachers. *Int. J. Inf. Educ. Technol.*, vol. 11, no. 12, pp. 638—645, 2021. DOI:10.18178/ijiet.2021.11.12.1575
41. Hidayat H.G., Hanurawan F., Chusniyah T., Rahmawati H. Why I'm Bored in Learning? Exploration of Students' Academic Motivation. *Int. J. Instr.*, vol. 13, no. 3, pp. 119—136, 2020. DOI:<https://doi.org/10.29333/iji.2020.1339a>
42. Yusdiana F., Hanurawan I. Hitipeuw, Chusniyah T. Fear of Failure: The Paranoia Of Academically Gifted Students. *Development*, vol. 2002, no. 96, pp. 7—26, 2002, [Online]. Available: <https://www.ijstr.org/final-print/oct2019/Fear-Of-Failure-The-Paranoia-Of-Academically-Gifted-Students.pdf>.
43. Setiyowati N., Razak bin A.R.Z.A. Perceived Leadership Styles and Academicians'job Performance: Teaching, Research, and Community Services In Indonesia. *MOJPC Malaysia Online J. Psychol. Couns.*, vol. 7, no. 1, pp. 11—26, 2020, [Online]. Available: <https://jupidi.um.edu.my/index.php/MOJPC/article/view/24179>.
44. Arofah L., Hanurawan F., Ramli M., Chusniyah T., Hidayah N. Predicting student engagement and mental health issues in the metaverse environment. *J. Public Health (Bangkok)*, p. fdad077, Jun. 2023. DOI:10.1093/pubmed/fdad077
45. Dewaruci B.A., Hanurawan F. The Relationship Between Social Support and Learning Motivation of Overseas Students at the State University of Malang. *KnE Soc. Sci.*, vol. 7, no. 18 SE-Articles, Nov. 2022. DOI:10.18502/kss.v7i18.12397

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