

Development and Validation of Instruments for Lifelong Learning Evaluation in the Context of Community Learning Centers

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ABSTRACT

This study aims to develop and validate an authentic evaluation instrument for lifelong learning in the context of Community Learning Centers (CLCs). The quantitative method with a survey approach was used on 120 CLCs tutors as respondents using a purposive sampling technique. The instrument was compiled based on literature and developed to form a construct to measure lifelong learning. Data analysis was conducted using exploratory factor analysis (EFA) to explore the factor structure and confirmatory factor analysis (CFA) to test construct validity using the AMOS 24.0 application. The test results confirmed the existence of four main dimensions: learning motivation, critical thinking, information literacy, and adaptability and independent learning, which consisted of 19 items measured with high factor loading items. The instrument demonstrated strong internal reliability with Cronbach's alpha values and adequate construct reliability, as well as convergent validity through mean variance extraction. The respondent profile reflects representative demographic diversity. This instrument is relevant for use in CLCs program evaluation and non-formal education curriculum development, which supports strengthening a culture of lifelong learning. This research provides theoretical and practical contributions to measuring and developing the capacity of lifelong learners in non-formal institutions. Future research recommendations include expanding validation with a more diverse population to increase the generalizability of the results.

Keyword: *lifelong learning; authentic evaluation; community learning center; non-formal education*

INTRODUCTION

The concept of lifelong learning has long been a topic of discussion, but there is still disagreement in defining the terms (Hager, 2020; Morris & Rohs, 2021; Van Nieuwenhove & De Wever, 2024). This happens because lifelong learning itself has a wide scope, covering the learning process that takes place from birth to death, without being limited by age or the form of its implementation, both formal, informal, or informal (Scott, 2014; Thwe & Kálmán, 2024). This difference in interpretation leads to gaps in the understanding and application of the concept as a whole in various educational and societal contexts. As an idea, lifelong learning requires continuous awareness and motivation to develop knowledge, skills, and attitudes throughout life so that individuals are able to adapt to the changing times and improve their quality of life in a sustainable manner (Owusu-Agyeman, 2024).

The urgency of lifelong learning is increasing in line with the rapid development of technology and global dynamics that demand adaptability and continuous competency development (Akdere & Egan, 2020; Mhlongo et al., 2023). Lifelong education is one of the main pillars in the development of competent, innovative, and competitive human resources, which contribute positively to social and economic progress (Harney & Gubbins, 2024). In the Indonesian context, this idea is in line with the philosophy of national education, which emphasizes the right and obligation of every citizen to learn throughout his life as the basic capital for the development of the nation and state (Marfu'ah, 2022; Suryadi et al., 2020). Therefore, the development of lifelong learning is not only an individual need, but also a national strategy in facing the challenges of the 21st century.



As a place for continuous professional development and lifelong learning, Non-Formal Education Institutions (NFEs) play an important role in the development process (Latifa & Personal, 2022). NFE provides a wide range of educational programs and services that are flexible and accessible to all walks of life, including those who do not follow formal education pathways (Iis Prasetyo et al., 2024). By offering continuous learning that meets the needs of learners, NFE is able to fill the gap in formal education and open up lifelong learning opportunities for individuals (Aghna Abdillah, 2025). Through an inclusive approach, NFE supports the development of practical skills, new knowledge, and positive attitudes that support success in both personal and professional life (Gervacio & Xhomaqi, 2025). Therefore, the role of NFE is very strategic in improving the quality of human resources and encouraging the creation of a lifelong learning society that is adaptive to changing times and global needs.

At present, NFE institutions in Indonesia, which are the object of this research, tend to focus on the implementation of education aimed at obtaining credentials (Pramudia, 2018). However, as awareness of the urgency of lifelong learning increases, many companies and organizations are urging these institutions to provide programs for their employees. One of the tangible forms of non-formal educational institutions that play a role in supporting lifelong learning is the Community Learning Centre (CLC) (Agyekum et al., 2024). CLC is a community-rooted institution with the principle of "from, by, and for the community," which provides a variety of non-formal education programs that are inclusive, flexible, and close to local needs (Bahri et al., 2024). Lifelong learning itself means a continuous learning process, without age, place, or media limitations, which aims to develop knowledge, skills, and attitudes throughout one's life in order to improve the quality of life and ability to adapt to change (Neak & Charungkaittikul, 2023). With this meaning, the role of CLC is very important in empowering communities to access lifelong education, improve literacy culture, and develop skills that are relevant to the needs of the times.

However, in its implementation, the difficulty of measuring lifelong learning is one of the main challenges in the effective implementation of this concept (Verkooijen et al., 2024). This characteristic of lifelong learning which is not tied to a particular time, place, or method, leads to difficulties in formulating proper indicators and valid measuring tools (Park et al., 2016). In addition, aspects measured in lifelong learning are not only limited to knowledge and skills, but also include attitudes, motivation, the ability to manage independent learning, and the ability to adapt to change (Mwaikokesya et al., 2014). Therefore, lifelong learning measurement instruments often use a combination of methods, such as questionnaires, competency scales, and self-evaluation and reflection, to obtain a comprehensive picture of behavior and competence as lifelong learners. This difficulty is an important concern in developing an effective evaluation system so that lifelong learning can be measured and improved on an ongoing basis.

The enhanced Effective Lifelong Learning Inventory (ELLI) instrument was developed with 65 items based on research Crick et al., (2004). The instrument is designed to identify lifelong learning capacity in students aged 6 to 18 years. Similarly, a scale consisting of 14 items has also been created by Kirby et al., (2010), which is used specifically to measure the tendency toward lifelong learning in university and vocational students. However, these instruments are still not fully adapted to the learning context in NFE Institutions, especially CLCs, which have unique characteristics and needs. Therefore, the aims of this study are to develop and validate adaptive and relevant lifelong learning instruments for use in the CLC environment, as an effort to provide a more accurate and applicable measurement tool in assessing the capacity of lifelong learners in non-formal institutions.

RESEARCH METHOD

This study uses a quantitative approach with a survey method to develop and validate authentic evaluation instruments for lifelong learning. The design of this study focuses on statistical analysis to test the validity and reliability of the developed instruments. The subjects of this study are tutors who actively teach in various CLCs either independently or privately and in the government in the Semarang Residency area. The selection of tutors as respondents was based on their key role as learning facilitators and their understanding of learners' characteristics and learning processes in the CLC environment. The total respondents who participated in this study was 120 people, who were selected through purposive sampling techniques.

The procedure for developing an authentic evaluation instrument for lifelong learning begins with a literature study and identification of theoretical indicators based on existing concepts (Dwivedi et al., 2006). This stage is crucial to ensure the instrument has a strong scientific foundation. After the indicators are identified, the next step is to prepare a draft instrument in the form of question items or statements (Cohen, 2006) relevant to the context of the research, in this case, CLC. The initial questionnaire was designed on a continuous scale. The score is calculated on a five-point Likert scale, where each response category has a numerical value assigned. The answer options include 1= never, 2= rarely, 3= sometimes, 4= often, and 5= always.



The research instrument was in the form of a questionnaire consisting of 20 statement items. These items are designed to measure four key indicators that reflect the dimensions of lifelong learning: learning motivation, critical thinking, information literacy, and adaptability and independent learning (Van den Broeck et al., 2024). This instrument grid was developed based on a literature study and adapted to the learning context at CLC (Crick et al., 2004; Kirby et al., 2010). Before use, this instrument has gone through a content validation stage by experts to ensure its relevance and suitability.

In this study, the analysis began with an exploratory factor analysis (EFA) stage to explore the factor structure of the data and identify which indicator groups empirically form the construct of lifelong learning. EFA is used when researchers do not yet have a definitive theoretical model regarding the placement of indicators within specific factors. This analysis helps identify patterns of relationships and configurations between variables that best fit the data obtained.

After the factor structure generated by the EFA is considered valid and reflects empirical data, the next step is to carry out Confirmatory Factor Analysis (CFA) using the AMOS 24.0 program. The CFA aims to test the validity of constructs by establishing a theoretical model that has been formulated after EFA. The CFA analysis confirmed whether the indicators developed appropriately measured latent factors of lifelong learning according to the initial concept of the study (Nye, 2023). The CFA analysis is carried out for two main purposes:

1. Testing the Validity of the Construct: Confirms whether the developed items appropriately measure the latent factors (indicators of lifelong learning) that have been determined.
2. Testing Reliability: Assess the internal consistency of the instrument through testing reliability values such as Construct Reliability (CR) and Average Variance Extracted (AVE).

This test ensures that the developed instrument is not only valid but also consistent in its measurements, so that it can provide accurate and reliable results.

RESULT AND DISCUSSION

Respondent Profile

The study respondents consisted of 120 active tutors in Community Learning Centres (CLC) with a more dominant proportion of women, namely 64.17% compared to 35.83% men. The most tutor age group is in the 26-35 year range (39.17%), followed by 36-45 years old (30%), over 45 years old (17.5%), and the young age range of 17-25 years old at 13.33%. In terms of education, the majority of tutors have a bachelor's degree (82.5%) and the rest have a master's degree (17.5%). Regarding work experience, the distribution is relatively even, with 34.17% having a working period of 5-10 years, 26.67% less than 5 years, 20% more than 15 years, and 19.17% working for 11-15 years.

Respondent profiles show that most tutors have a good formal education background, productive age, and varied experience that support their ability to carry out their role as learning facilitators at CLC effectively and sustainably.

Table 1. Respondent profile

Characteristic	Frequency	%
<i>Gender</i>		
Female	77	64.17
Male	43	35.83
<i>Age (in years)</i>		
17-25	16	13.33
26-35	47	39.17
36-45	36	30
>45	21	17.5
<i>Education level</i>		
Bachelor's degree	99	82.5
Master's degree	21	17.5
<i>Working Period (in years)</i>		
Under 5	32	26.67
5-10	41	34.17
11-15	23	19.17
Above 15	24	20

Notes: n:120 respondents

Exploratory Factor Analysis



Based on table 2. The results of the Kaiser-Meyer-Olkin (KMO) and Bartlett's Test shown in the figure, can be interpreted that the data tested is very feasible to proceed to factor analysis. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy value is 0.882, which is well above the threshold of 0.600, indicating that the sample used is adequate (Selickaitė et al., 2019). In addition, the results of Bartlett's Test of Sphericity also showed strong significance with a Sig. (p-value) of 0.000. Since this significance value is less than 0.05, it can be concluded that the correlation between variables is significant enough that factor analysis is the appropriate procedure for identifying the latent structure of the data.

Table 2. KMO and Bartlett Test

Test	Result
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.882
Bartlett's Test of Sphericity	Approx. Chi-Square
	1389.709
	Df
	190
	Sig.
	.000

Figure 1. A total of 20 items were analyzed using Exploratory Factor Analysis (EFA) to identify the factors underlying authentic evaluation of lifelong learning. Based on the scree plots presented, this analysis generates an eigenvalue plot and identifies four main factors, each of which has an eigenvalue greater than 1.

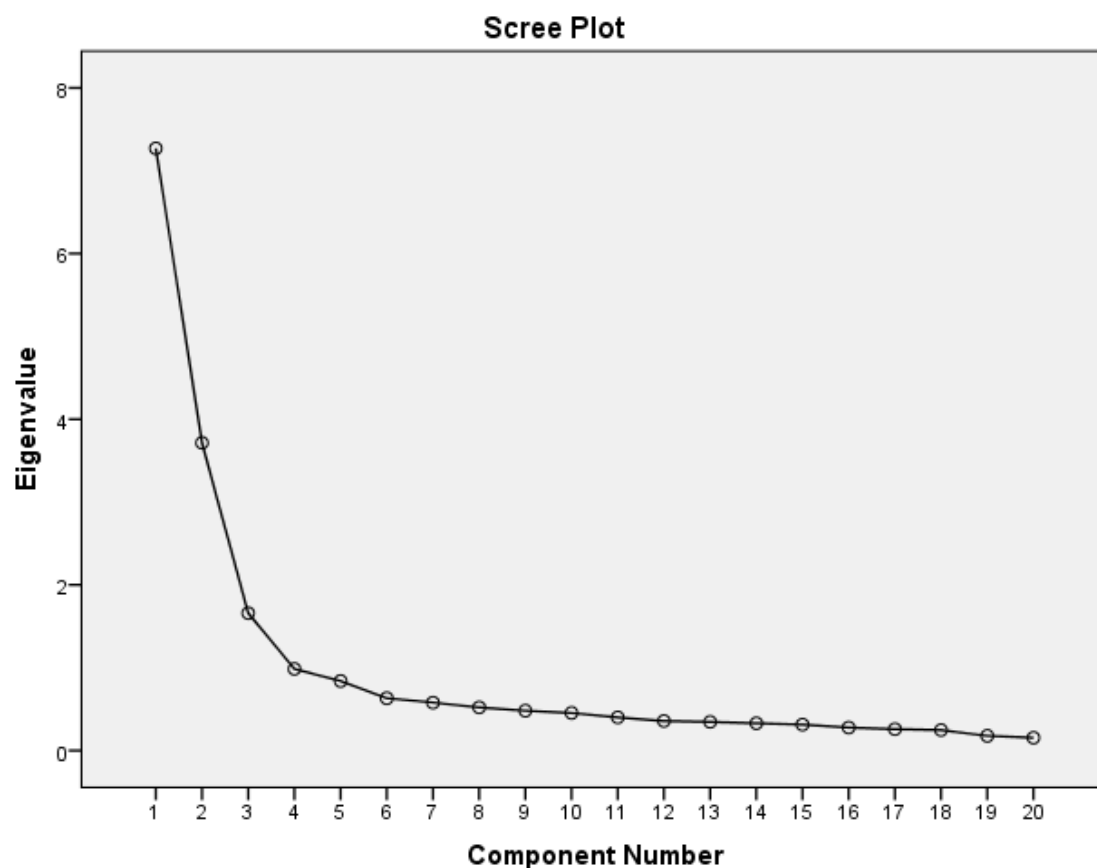


Figure 1. Scree Plot

In table 3. analysis of the exploration factors, each item had an adequate loading factor value (> 0.60) on the predetermined factors, which showed a strong relationship between the items and the measured lifelong learning dimension (Field A., 2016). For example, in the learning motivation dimension, items such as "Tutors are able to motivate students to develop interest and curiosity about learning" have a loading value of 0.800, and the item "Tutor instills belief that learning brings direct benefits to participants' quality of life" has a loading value of 0.856. This indicates that these items are very accurate in measuring the dimension of learning motivation.

In the critical thinking dimension, the value of the loading factor ranges from 0.601 to 0.702, which shows sufficient strength in measuring the critical thinking aspects of students. Meanwhile, in the information



literacy dimension, the loading factor value ranged from 0.709 to 0.731 indicating that information literacy items were able to measure participants' ability to search, assess, and utilize information effectively. The dimensions of adaptability and self-study also show a high loading value in most items, such as in the item "Tutor teaches participants to learn from mistakes and reflection on learning experiences" with a loading value of 0.813, showing that the item is very relevant and has a significant contribution to the measurement of this dimension.

However, one item in the adaptability and self-learning dimensions had a very low loading value (0.112) indicating that the item was less relevant and may need elimination in the final instrument. Overall, the results of this test support that the developed authentic lifelong learning evaluation instrument has good construct validity based on the results of the exploration factor analysis, with well-measured indicators for each measurement dimension. To ensure a valid and reliable scale, the study followed the advice of experts by including a minimum of three items for each construct, in order to accurately represent the concept (Tavakol & Wetzel, 2020).

Table 3. Loading items from the EFA

No.	Measurement Scale of Authentic Evaluation of Teaching Well	Loading factor before elimination			
		1	2	3	4
Learning Motivation					
1	Tutors are able to motivate students to develop an interest and curiosity towards learning.	0.800			
2	Tutors help learners set meaningful personal and professional learning goals.	0.826			
3	Tutors encourage learners to see learning as an important investment for self-development.	0.763			
4	Tutors are able to trigger the motivation of independent learning without dependence on formal tasks.	0.841			
5	Tutors instill the belief that learning brings direct benefits to the quality of life of participants.	0.856			
Critical Thinking					
6	Tutors guide learners to distinguish fact from opinion in a variety of information.		0.694		
7	Tutors encourage learners to ask questions critically for deep understanding.		0.684		
8	Tutors teach participants to analyze problems from various points of view logically.		0.702		
9	The tutor directs learners to identify information biases and weaknesses.		0.601		
10	Tutors integrate logical thinking in the solution of relevant practical problems.		0.644		
Information Literacy					
11	Tutors teach techniques of finding accurate and relevant information from a variety of sources.			0.709	
12	The tutor guides the students to assess the credibility and reliability of the information source.			0.731	
13	Tutors facilitate participants to systematically select and organize information for understanding.			0.716	
14	Tutors direct the use of information in the context of a real task or project.			0.728	
15	Tutors encourage the use of information technology as the main learning resource.			0.722	
Adaptability and Independent Learning					
16	The tutor directs participants to adjust their learning strategies according to changing situations and needs.				0.798
17	Tutors foster participants' independence in finding learning resources without continuous supervision.				0.776
18	Tutors teach participants to learn from mistakes and reflections of learning experiences.				0.813
19	Tutors help participants effectively manage time and study strategies to achieve goals.				0.725

Confirmatory Factor Analysis

To evaluate the model assessment, it was carried out using Confirmatory Factor Analysis (CFA) in Amos version 24.0 with an adequate sample size of 120 tutors. The evaluation of the model fit was achieved based on the model fit criteria that had been set in the range $\chi^2 \leq 5$; CFI ≥ 0.90 to ≥ 0.95 ; TLI ≥ 0.90 to ≥ 0.95 ; RMSEA ≤ 0.10 to ≤ 0.05 , and SRMR ≤ 0.10 to ≤ 0.06 (Dash & Paul, 2021; Hapsari & Widhiarso, 2023; Alamer, 2025). Figure 2. demonstrate a CFA lifelong learning model using the AMOS program. In the model, there are four main latent variables: learning motivation, critical thinking, information literacy, and adaptability and independent learning, which are measured by four and five indicators, respectively.

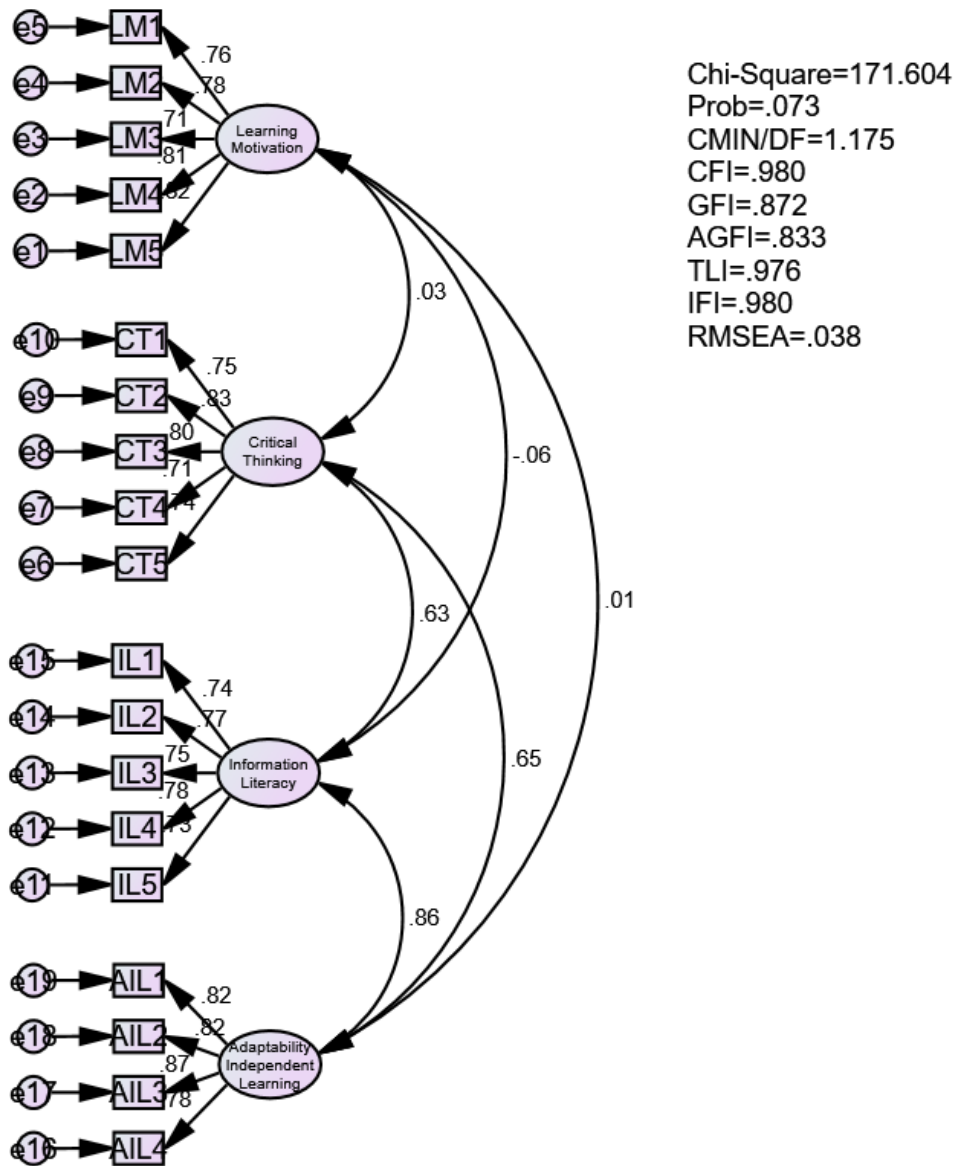


Figure 2. Final confirmatory factor analysis model for lifelong learning scale

An interpretation of the attached file, which displays the CFA output of the measurement model, shows that the model has an excellent match. Based on the fit model parameters, values such as Chi-Square (171,604, p=0.073), CMIN/DF (1.175), CFI (0.980), TLI (0.976), IFI (0.980), and RMSEA (0.038) are all within the range indicating the model is statistically accepted and empirically consistent with the data. The four main



constructs: learning motivation, critical thinking, information literacy, and adaptability and independent learning were measured by five and four indicators, respectively, all of which had a high standard loading weight value (>0.6), proving the contribution of the strong indicators to each latent factor. The correlation between latent factors was relatively low to moderate, indicating the uniqueness and independence of each dimension in measuring different aspects of lifelong learning. Overall, these results provide strong support that the measured tools tested have met construct validity and are reliable for assessing lifelong learners' competencies in a nonformal setting.

Once the suitability of the authentic lifelong learning evolution model is confirmed, the analysis of the reliability of the internal consistency to the total and subscale scales is evaluated using Cronbach's alpha (α), Construct Reliability (CR), and Average Variance Extracted (AVE) (Izah et al., 2024).

Table 4. Subscale reliability test authentic evaluation of lifelong learning

Subscale	Cronbach's alpha	CR	AVE
Learning Motivation	0.883	0.883	0.602
Critical Thinking	0.875	0.876	0.587
Information Literacy	0.866	0.868	0.568
Adaptability and Independent Learning	0.893	0.895	0.681

The results presented in Table 4 generally indicate that the authentic lifelong learning evaluation instrument has excellent reliability and convergent validity. Therefore, this instrument is considered suitable for use in measuring lifelong learning competencies in non-formal educational settings. The four dimensions of lifelong learning: learning motivation, critical thinking, information literacy, and adaptability and independent learning—can be measured independently but are mutually reinforcing, making this instrument valid for measuring competencies in non-formal educational settings. These findings align with a systematic literature review of lifelong learning and the CFA model development of learning (Tungkunan, 2020; Van den Broeck et al., 2024), and several other lifelong learning instrument developments that certainly do not offer measurement in the context of CLC (Crick et al., 2004; Kirby et al., 2010; Sproule et al., 2019; Assefa et al., 2024).

The instrument developed in this study provides a theoretical contribution by reinforcing the notion that lifelong learning is a multidimensional construct. The four identified dimensions: learning motivation, critical thinking, information literacy, and adaptability, represent core competencies highly relevant in the digital era and rapid global change. Practically, this instrument can be used to evaluate CLC programs and develop more effective non-formal education curricula, supporting efforts to improve the quality of non-formal education services.

CONCLUSION

This study successfully developed a valid and reliable 19-item authentic lifelong learning assessment instrument for the Indonesian CLC context. The developed instrument has a multidimensional structure consisting of four main indicators: learning motivation, critical thinking, information literacy, and adaptability and independent learning. Validation results showed that the measurement model had excellent fit based on various statistical indices in CFA, confirming that the instrument can measure the lifelong learning construct in accordance with its underlying theory. The four dimensions were proven to be measured independently but correlated with each other, indicating that lifelong learning is a complex and multifaceted construct and was proven through reliability testing. This indicates that the instrument can provide consistent results in similar contexts. The diversity of respondents reflects the heterogeneity of Indonesia's non-formal education ecosystem, making this instrument widely applicable across various CLC environments. This study strengthens the understanding of lifelong learning as an empirically measurable construct. The four identified dimensions reflect core competencies needed in the digital era and dynamic global change. This instrument can be used for evaluating CLCs programs, developing non-formal education curricula, and improving the quality of continuous learning services. The limitations of this study lie in its limited geographic coverage and the relatively low factor loadings of several items. Future research should expand geographic coverage and conduct cross-validation with a more diverse population to increase the instrument's generalizability. Therefore, the developed authentic lifelong learning evaluation instrument has met the required validity and reliability standards and can be a reliable measuring tool for assessing lifelong learner competencies in non-formal educational institutions, particularly Community Learning Centers in Indonesia.

REFERENCE

Aghna Abdillah, A. (2025). Peranan Pendidikan Formal Dan Non-Formal Dalam Menunjang Karir Santri. *Jurnal Bilqolam Pendidikan Islam*, 6(1), 24–37. <https://doi.org/10.51672/jbpi.v6i1.555>



- Agyekum, B., Ali, W., & Afutu-Kotey, R. L. (2024). Continuing Education and Perception of Community Learning Centres: A Case Study of the University of Ghana Community Learning Centres, Ghana. *Journal of Adult and Continuing Education*, 30(1), 193–215. <https://doi.org/10.1177/14779714231189617>
- Akdere, M., & Egan, T. (2020). Transformational leadership and human resource development: Linking employee learning, job satisfaction, and organizational performance. *Human Resource Development Quarterly*, 31(4), 393–421. <https://doi.org/10.1002/hrdq.21404>
- Alamer, A. (2025). Structural equation modeling (SEM) in L2 writing research: Simple tutorial and useful recommendations. *Research Methods in Applied Linguistics*, 4(2), 100202. <https://doi.org/10.1016/j.rmal.2025.100202>
- Assefa, Y., Moges, B. T., & Tilwani, S. A. (2024). Lifelong learning measurement scale (LLMS): development and validation in the context of higher education institutions. *Journal of Applied Research in Higher Education*, 16(3), 693–705. <https://doi.org/10.1108/JARHE-04-2023-0164>
- Bahri, E. S., Aslam, M. M. M., & Hermawan, Y. (2024). Innovation in Non-formal Education in Indonesia. *Journal of Psychology and Sustainable Education*, 1(2), 51–56. <https://doi.org/10.62886/jpse.v1i2.7>
- Cohen, T. (2006). Instrument Design Standards and Guidelines. In *Travel Survey Methods* (pp. 161–173). Emerald Group Publishing Limited. <https://doi.org/10.1108/9780080464015-008>
- Crick, R. D., Broadfoot, P., & Claxton, G. (2004). Developing an effective lifelong learning inventory: The ELLI Project. *Assessment in Education: Principles, Policy and Practice*, 11(3), 247–272. <https://doi.org/10.1080/0969594042000304582>
- Dash, G., & Paul, J. (2021). CB-SEM vs PLS-SEM methods for research in social sciences and technology forecasting. *Technological Forecasting and Social Change*, 173(August), 121092. <https://doi.org/10.1016/j.techfore.2021.121092>
- Dwivedi, Y. K., Choudrie, J., & Brinkman, W. P. (2006). Development of a survey instrument to examine consumer adoption of broadband. *Industrial Management and Data Systems*, 106(5), 700–718. <https://doi.org/10.1108/02635570610666458>
- Field A. (2016). Exploratory Factor Analysis. In *Principles of Applied Research Methods* (pp. 513–567). SAGE Publications Ltd. <https://doi.org/10.4135/9781529682823.n17>
- Gervacio, J. L. M., & Xhomaqi, B. (2025). The Role of Nonformal and Informal Learning in Strengthening a Culture of Lifelong Learning. *New Directions for Adult and Continuing Education*, 2025(185), 54–58. <https://doi.org/10.1002/ace.20557>
- Hager, P. J. (2020). Concepts and Definitions of Lifelong Learning. In M. London (Ed.), *The Oxford Handbook of Lifelong Learning, Second Edition*. Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780197506707.013.2>
- Hapsari, A. D., & Widhiarso, W. (2023). The effectiveness of item parceling to increase the model fit: A case study of PAPs. *Jurnal Penelitian Dan Evaluasi Pendidikan*, 27(1), 26–38. <https://doi.org/10.21831/pep.v27i1.49012>
- Harney, B., & Gubbins, C. (2024). Human Resource Development (HRD) Meets Human Resource Management (HRM): A Skills Based Agenda for a FRAGILE World Order. *Advances in Developing Human Resources*, 26(4), 160–178. <https://doi.org/10.1177/15234223241267922>
- Iis Prasetyo, Tohani, E., & Adeoye, M. A. (2024). Current Study of Nonformal Education Program in The Era of The Industrial Revolution 4.0. *Journal of Nonformal Education*, 10(2), 446–456. <https://doi.org/10.15294/jone.v10i2.7402>
- Izah, S. C., Sylva, L., & Hait, M. (2024). Cronbach's Alpha: A Cornerstone in Ensuring Reliability and Validity in Environmental Health Assessment. *ES Energy and Environment*, 23, 1–14. <https://doi.org/10.30919/esee1057>
- Kirby, J. R., Knapper, C., Lamon, P., & Egnatoff, W. J. (2010). Development of a scale to measure lifelong learning. *International Journal of Lifelong Education*, 29(3), 291–302. <https://doi.org/10.1080/02601371003700584>
- Latifa, I., & Pribadi, F. (2022). Peran Lembaga Pendidikan Nonformal Dalam Mengatasi Pengangguran Di Era Digital. *Jurnal Pendidikan Sosiologi Undiksha*, 3(3), 137–146. <https://doi.org/10.23887/jpsu.v3i3.45781>
- Marfu'ah, H. (2022). Pendidikan Sepanjang Hayat dan Berbagai Implikasinya. *Jurnal Pendidikan Dan Kajian Asnjaja*, 7(2), 87–100. <https://doi.org/10.56013/jpka.v7i2.1159>
- Mhlongo, S., Mbatha, K., Ramatsetse, B., & Dlamini, R. (2023). Challenges, opportunities, and prospects of adopting and using smart digital technologies in learning environments: An iterative review. *Heliyon*, 9(6), e16348. <https://doi.org/10.1016/j.heliyon.2023.e16348>
- Morris, T. H., & Rohs, M. (2021). Digitization bolstering self-directed learning for information literate adults—A systematic review. *Computers and Education Open*, 2, 100048. <https://doi.org/10.1016/j.caeo.2021.100048>
- Mwaikokesa, M. J. D., Osborne, M., & Houston, M. (2014). Mapping Lifelong Learning Attributes in the



- Context of Higher Education Institutions. *Journal of Adult and Continuing Education*, 20(2), 21–36. <https://doi.org/10.7227/jace.20.2.3>
- Neak, P., & Charungkaittikul, S. (2023). Guidelines to enhance community participation in Community Learning Centres in the Kingdom of Cambodia. *Journal of Adult and Continuing Education*, 29(2), 659–682. <https://doi.org/10.1177/14779714221131893>
- Nye, C. D. (2023). Reviewer Resources: Confirmatory Factor Analysis. *Organizational Research Methods*, 26(4), 608–628. <https://doi.org/10.1177/10944281221120541>
- Owusu-Agyeman, Y. (2024). How lifelong learning shapes the professional development of staff in higher education institutions. *Quality Education for All*, 1(2), 134–150. <https://doi.org/10.1108/QEA-01-2024-0013>
- Park, J. H., Lee, K., & Dabelko-Schoeny, H. (2016). A Comprehensive Evaluation of a Lifelong Learning Program: Program 60. *International Journal of Aging and Human Development*, 84(1), 88–106. <https://doi.org/10.1177/0091415016668352>
- Pramudia, J. R. (2018). The Study on Lifelong Learning Programmes in Non-formal Education in Indonesia. *Journal of Modern Education Review*, 8(3), 217–226. [https://doi.org/10.15341/jmer\(2155-7993\)/03.08.2018/005](https://doi.org/10.15341/jmer(2155-7993)/03.08.2018/005)
- Selickaitė, D., Hutzler, Y., Pukėnas, K., Block, M. E., & Rėklaitienė, D. (2019). The Analysis of the Structure, Validity, and Reliability of an Inclusive Physical Education Self-Efficacy Instrument for Lithuanian Physical Education Teachers. *SAGE Open*, 9(2), 1–17. <https://doi.org/10.1177/2158244019852473>
- Sproule, R., Drewery, D., & Pretti, J. (2019). Development of a Rubric to Assess Lifelong Learning in Work-Integrated Learning Reflection Assignments. *Collected Essays on Learning and Teaching*, 12, 94–105. <https://doi.org/10.22329/celt.v12i0.5376>
- Suryadi, A., Budimansyah, D., Solehuddin, M., Shantini, Y., & Yunus, D. (2020). Microcredit Provision, Lifelong Learning, and Productivity of Poor Women in Indonesian Villages. *Adult Education Quarterly*, 70(4), 360–376. <https://doi.org/10.1177/0741713620918525>
- Talati, J. J. (2014). Lifelong learning: Established concepts and evolving values. *Arab Journal of Urology*, 12(1), 86–95. <https://doi.org/10.1016/j.aju.2013.11.001>
- Tavakol, M., & Wetzal, A. (2020). Factor Analysis: a means for theory and instrument development in support of construct validity. *International Journal of Medical Education*, 11, 245–247. <https://doi.org/10.5116/ijme.5f96.0f4a>
- Thwe, W. P., & Kálmán, A. (2024). Lifelong Learning in the Educational Setting: A Systematic Literature Review. *The Asia-Pacific Education Researcher*, 33(2), 407–417. <https://doi.org/10.1007/s40299-023-00738-w>
- Tungkunan, P. (2020). Learning Model of Undergraduate Students: Confirmatory Factor Analysis. *International Journal of Instruction*, 13(3), 665–678. <https://doi.org/10.29333/iji.2020.13345a>
- Van den Broeck, L., De Laet, T., Dujardin, R., Tuybaerts, S., & Langie, G. (2024). Unveiling the competencies at the core of lifelong learning: A systematic literature review. *Educational Research Review*, 45(October), 100646. <https://doi.org/10.1016/j.edurev.2024.100646>
- Van Nieuwenhove, L., & De Wever, B. (2024). Psychosocial Barriers to Adult Learning and the Role of Prior Learning Experiences: A Comparison Based on Educational Level. *Adult Education Quarterly*, 74(1), 62–87. <https://doi.org/10.1177/07417136231147491>
- Verkooijen, M. H. M., van Tuijl, A. A. C., Calsbeek, H., Fluit, C. R. M. G., & van Gurp, P. J. (2024). How to evaluate lifelong learning skills of healthcare professionals: a systematic review on content and quality of instruments for measuring lifelong learning. *BMC Medical Education*, 24(1). <https://doi.org/10.1186/s12909-024-06335-9>