KOLOKIUM
Jurnal Pendidikan Luar Sekolah
http://kolokium.ppj.unp.ac.id/
Jurusan Pendidikan Luar Sekolah
Fakultas Ilmu Pendidikan
Universitas Negeri Padang
Sumatera Barat, Indonesia

Volume 13, Nomor 2, Tahun 2025
DOI: 10.24036/kolokium.v13i2.1152

Received 01 September 2025
Approved 31 Oktober 2025
Published 01 November 2025

Validity of Adult Learning Motivation Measurement Instruments: A Psychometric Analysis

Ahmad[1,4], Mariano Dos Santos[2], Salman Rashid[3]
[1] University of Bumigora, Mataram, Indonesia
[2] Instituto Católico para a Formação de Professores (ICFP) Baucau, Timor - Leste
[3] University of Turbat, Pakistan
[4] ahmad@universitasbumigora.ac.id

ABSTRACT

Learning motivation is an important factor in the success of adult education, both in non-formal programs, training, and community development. However, many existing motivation measurement instruments still come from formal education adaptation and have not gone through adequate psychometric tests. This study aims to analyze the validity of the instrument for measuring adult learning motivation. The method used was a quantitative survey involving 72 respondents aged 20-50 years from non-formal education and training programs in Central Lombok and West Lombok Regencies. The instrument consists of 25 statements with a five-point Likert scale. The validity of the content was tested using Aiken's V, while the validity of the construct was analyzed by Exploratory Factor Analysis (EFA) through the MSA test and Bartlett's Test using the R studio application. The results of the study showed that most of the items had medium to high category content validity. MSA values range from 0.64–0.88 and the Bartlett test yields $\chi^2 = 1369.036$; $df = 300$; $p < 0.001$ which confirms the feasibility of the data. The EFA analysis found five factors with an eigenvalue of > 1, but four main factors were maintained with a total variance of 60.4%. These findings confirm that the instrument has adequate construct validity and can be used in adult education evaluation.

Keywords: Adult Learning Motivation, Aiken's V, EFA

INTRODUCTION

Learning motivation is one of the psychological aspects that greatly determines the success of the educational process, especially in the context of adult education (Cardona et al., 2024; Goldfarb et al., 2023; Lukianova, 2016). In contrast to students at the formal education level of children and adolescents, adults have distinctive learning characteristics as described in the theory of andragogy by (Margolis, 1970). According to Margolis, adults learn based on practical needs, past experiences, an orientation to problem solving, and a strong intrinsic motivation to develop themselves. Therefore, understanding adult learning motivation is key in designing community education, training programs, extension education, and human resource development. In practice, adult education is often found in various contexts, such as job skills training, community empowerment, literacy programs, to open and distance higher education (Andersson & Muhrman, 2022; Biney, 2023; Mufic & Fejes, 2022). However, the success rate of these programs is greatly influenced by the extent to which students are motivated to learn. Learning motivation not only encourages active participation, but also

affects the sustainability of engagement, perseverance in facing challenges, and the achievement of optimal learning outcomes (A. Ahmad et al., 2019; D. Ahmad, 2021). Thus, instruments that are able to accurately measure adult learning motivation are an urgent need in the field of education and community development.

However, until now there are still fundamental challenges related to measuring adult learning motivation. Many of the instruments used are still adapted from the context of children and adolescents, so they are not fully in accordance with the unique characteristics of adult learners (Cobos-Sanchiz et al., 2022; Okide et al., 2020; Patterson, 2018). In addition, existing instruments often have not gone through an adequate psychometric validation process, both in terms of content validity, construct, and reliability (Berlian et al., 2021; Shrotryia & Dhanda, 2019; Whitaker et al., 2022). This results in the measurement of adult learning motivation to be less accurate and has the potential to cause bias in decision-making, both in designing community education policies and training programs. The development of modern psychometric approaches, such as exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and item response theory, has opened up opportunities to produce more valid, reliable, and contextual instruments. By applying this approach, an instrument for measuring adult learning motivation can be developed according to actual needs, reflecting the complexity of the psychological aspects involved, and providing more meaningful information for educational practitioners and researchers. Therefore, research that focuses on the validity of adult learning motivation measurement instruments is very relevant to be carried out, both from a theoretical and practical perspective.

Measuring adult learning motivation requires a valid and reliable instrument to provide an accurate picture of the factors that affect their involvement in the learning process. Invalid instruments have the potential to generate bias and mislead decision-making in designing learning strategies. A number of previous studies have emphasized the importance of validity and reliability in the development of learning motivation instruments. For example An & Zhang, (2018) Develop *College Students' Health Motivation Questionnaire (CSHM-Q)* which demonstrate adequate content and construct validity, as well as strong reliability based on the framework of Self-Determination Theory. Moreover Yusoff, (2011) Validate *Adult Learning Inventory (AL-i)* in medical students with a high level of confirmatory and reliability factor analysis (Cronbach's $\alpha = 0.87$ for andragogy; $\alpha = 0.86$ for pedagogy), indicating that AL-i is a good psychometric instrument for measuring adult learning. Furthermore, Nur et al., (2021) investigated the Physical Education learning motivation questionnaire in junior high school students and found a reliability coefficient of Cronbach's α of 0.906, so the instrument was considered very valid and reliable. Based on these findings, it can be concluded that theoretically and empirically strong motivational instruments are essential to strengthen the foundations of research and practice in adult education.

Although many learning motivation instruments have been developed, there are still gaps in their psychometric validity, particularly those used in the context of adult education. Most of the instruments that exist are developed for formal education, so they are less able to capture the unique characteristics of adults, such as practical goal orientation, previous learning experience, and linkage to the needs of the world of work. This raises a fundamental problem: how to ensure that the instruments used truly reflect the learning motivation of adults with high accuracy. Thus, there is an urgent need to conduct a psychometric analysis of learning motivation measurement instruments in order to answer the knowledge gap.

This study aims to analyze the validity of the instrument for measuring adult learning motivation through a psychometric approach. In particular, this study seeks to test the internal consistency, factor structure, and accuracy of instrument items in measuring learning motivation constructs. With this step, it is hoped that instruments will be obtained that are not only theoretically valid, but also reliable and applicable in various contexts of adult education, training, and community development. This study is limited to the analysis of the validity of adult learning motivation instruments with a psychometric approach. The study focused on respondents involved in non-formal education programs, training, and community courses, without discussing in depth the motivational dimension in children or adolescents. In addition, this research emphasizes more on the development and validation aspects of instruments, rather than on the implementation of specific curriculum or learning interventions.

METHOD

This study uses a quantitative approach with a survey design focused on the development and validation of adult learning motivation measurement instruments. The research participants are adults who are undergoing non-formal and formal education at the higher education or professional training level in the Central Lombok and West Lombok Regencies. The selection of participants was carried out by purposive sampling technique to ensure that respondents were truly included in the category of adult learners with an age range of 20-50 years. The number of respondents involved in this study was 72 people, which is considered quite adequate for psychometric analysis, especially *Exploratory Factor Analysis* (EFA).

Data were collected using a likert scale questionnaire developed by the researcher based on the study of adult learning motivation theory and the analysis of previous instruments. The questionnaire consisted of 25 statements with five answer choices, ranging from "Strongly Disagree" to "Strongly Agree". The distribution of questionnaires was carried out online through digital survey platforms, as well as offline using printed questionnaires to reach respondents who had limited internet access. The purpose of using this questionnaire method is to obtain a broader, objective, and standardized quantitative picture of the variation in adult learning motivation, thereby allowing researchers to accurately test the validity and reliability of the instruments.

The collected data is analyzed in several stages. First, a content validity analysis was carried out to determine the quality of the instrument based on expert opinions. Second, the construct validity test was carried out with *Exploratory Factor Analysis* (EFA) using the help of the R studio device, with the aim of identifying the underlying factor structure of the statement items in the instrument. Before factor analysis was performed, the data feasibility test was examined through *the Kaiser-Meyer-Olkin Measure of Sampling Adequacy* (KMO) and *Bartlett's Test of Sphericity*. Third, the reliability of the instrument was tested using *Cronbach's Alpha* coefficient to ensure the internal consistency of the items composed. This analysis aims to guarantee that the resulting instrument is truly reliable in measuring adult learning motivation.

RESULT AND DISCUSSION

Aiken'V

To assess the extent to which the instrument items correspond to the measured construct, a content validity test was carried out using the Aiken's V index. Aiken's V value is then calculated to determine the level of validity of each item's content. The complete calculation results are shown in Table 1 below.

Table 1
Results of the Validity of the Content of the Adult Learning Motivation Instrument Based on Aiken's V

No Butir	Rater 1	Rater 2	Rater 3	Rater 4	S1	S2	S3	S4	Σs	V	Criterion
1	3	4	4	3	2	3	3	2	10	0.625	Keep
2	4	5	4	5	3	4	3	4	14	0.875	Tall
3	5	2	4	3	3	1	3	2	9	0.5625	Keep
4	5	2	3	3	4	1	2	2	9	0.5625	Keep
5	4	4	5	4	3	3	4	3	13	0.8125	Tall
6	2	4	3	3	1	3	2	2	8	0.5	Keep
7	3	4	5	4	5	3	4	3	15	0.9375	Tall
8	4	3	4	4	4	2	3	3	12	0.75	Keep
9	2	2	3	3	5	1	2	2	10	0.625	Keep
10	4	4	4	4	3	3	3	3	12	0.75	Keep
11	5	2	3	4	4	1	2	3	10	0.625	Keep
12	2	3	4	5	1	2	3	4	10	0.625	Keep
13	5	2	2	4	4	1	1	3	9	0.5625	Keep
14	4	3	3	3	3	2	2	2	9	0.5625	Keep
15	3	2	2	3	2	1	1	2	6	0.375	Less
16	3	5	4	4	2	4	3	3	12	0.75	Keep
17	5	5	3	3	4	4	2	2	12	0.75	Keep
18	5	2	3	4	4	1	2	3	10	0.625	Keep
19	2	2	2	1	1	1	1	0	3	0.1875	Less
20	3	4	5	4	2	3	4	3	12	0.75	Keep
21	4	2	4	3	3	1	3	2	9	0.5625	Keep
22	4	2	3	5	3	1	2	4	10	0.625	Keep
23	3	4	4	3	2	3	3	2	10	0.625	Keep
24	4	3	3	3	3	2	2	2	9	0.5625	Keep
25	3	3	4	5	2	2	3	4	11	0.6875	Keep

The results of the validity test of the content of the adult learning motivation instrument based on the Aiken's V index in table 1 show a varied distribution between items. Of the 25 items analyzed, there are three items that are in the high category, namely item 2 (V = 0.875), item 5 (V = 0.8125), and item 7 (V = 0.9375). This value indicates that the three

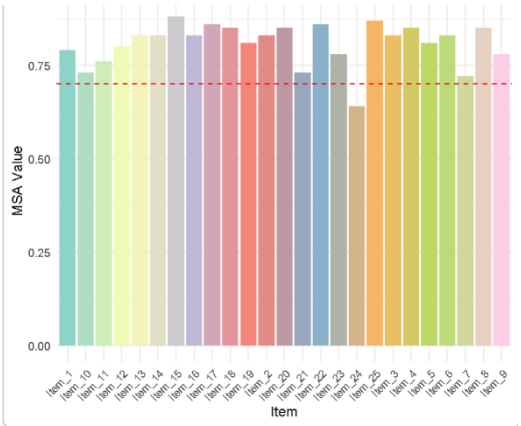
items are very relevant and representative in measuring the construct of adult learning motivation according to experts. Most of the items, which are as many as 20 items, are in the medium category with Aiken's V values ranging from 0.50 to 0.75. This shows that the item is still quite suitable for use, but still needs editorial improvement or sharpening of substantive aspects to be more optimal in representing the measured construct.

Interestingly, there are two items that have received a lack category, namely item 15 (V = 0.375) and item 19 (V = 0.1875). These two items show a low level of conformity so they are not considered valid enough to represent the dimension of adult learning motivation. Therefore, items 15 and 19 are recommended to be revised in depth or removed from the instrument so as not to weaken the overall quality. In general, these results show that the majority of instrument items already have content validity in the medium to high category, so that the instrument is feasible to proceed to the construct validity testing stage through factor analysis. These findings also confirm the importance of the involvement of expert assessors in the validation process, as they are able to provide a critical evaluation of the strengths and weaknesses of each instrument item (Aiken, 1985; Polit & Beck, 2006; Zamanzadeh et al., 2015).

Kaiser-Meyer-Olkin (KMO)

To ensure the feasibility of each item in the factor analysis, *a Measure of Sampling Adequacy* (MSA) test was performed. The MSA value is used to evaluate the extent to which each item fits the factor analysis. Figure 1 below presents the results of the calculation of the MSA value for all the items of the instrument analyzed.

Figure 1.
MSA Histogram by Item



The results of the Measure of Sampling Adequacy (MSA) analysis of the 25 items of the adult learning motivation instrument statement in Figure 1 show that most of the items have an MSA value that is above the minimum limit of 0.70, so it can be categorized as feasible for further analysis using factor analysis. In detail, the MSA value ranges from 0.64 to 0.88. The items with the highest MSA values were item_15 (0.88), item_25 (0.87), and item_22 (0.86), indicating that the three items had an excellent degree of compatibility with the expected

factor structure. This confirms that the statements in these items are able to capture the construct of adult learning motivation consistently.

On the other hand, there is one item, namely item_24 with an MSA value of 0.64, which is slightly below the ideal threshold (0.70). This condition indicates that the item does not contribute to optimal factor formation, although it can still be considered to be maintained if it has strong theoretical relevance. Several researchers (Hair et al., 2019; Tabachnick & Fidell, 2014) emphasized that the decision to retain or discard an item does not depend solely on statistical indicators, but must also consider the conceptual basis and substance of the item's content. Thus, item_24 needs to be revisited at the next stage of validation to ensure its fit with the adult learning motivation dimension.

Overall, these results show that the instrument has met the eligibility requirements for Exploratory Factor Analysis (EFA). The dominance of the MSA value above 0.80 indicates a strong connection between items in measuring the same construct. This is in line with previous research that confirms that high MSA values reflect the instrument's ability to generate stable factors that can be interpreted theoretically (Chapman, 2018; Kaiser, 1974). These findings reinforce the belief that the developed adult learning motivation instruments not only have good content validity through expert assessment, but also demonstrate the potential for solid construct validity.

Bartlett Test

Bartlett's Test of Sphericity is performed to ensure the feasibility of the data in factor analysis, specifically to test whether the correlation matrix between items differs significantly from the identity matrix. The test results showed a Chi-Square value (χ^2) = 1369.036 with a degree of freedom (df) = 300 and a significance of p-value = 5.19×10^{-136}. A p-value that is much smaller than the significance limit of 0.05 indicates that the correlation matrix is not an identity matrix, so there is a fairly strong relationship between the items in the instrument used. Thus, the data is declared feasible for factor analysis.

These findings show that constructs measured through instruments have good internal linkages, so further analysis using Exploratory Factor Analysis (EFA) can be performed to test the validity of constructs. In addition, the results of this Bartlett test reinforce the evidence that the instrument not only qualifies for content validity based on expert judgment (with Aiken's V), but also has a strong statistical basis for testing the underlying latent structure (Sigudla & Maritz, 2023; Statology, 2019). Thus, these results provide a solid foundation for the construct validation process, ensuring that the factors extracted from the EFA truly represent the conceptual dimensions measured by the instrument.

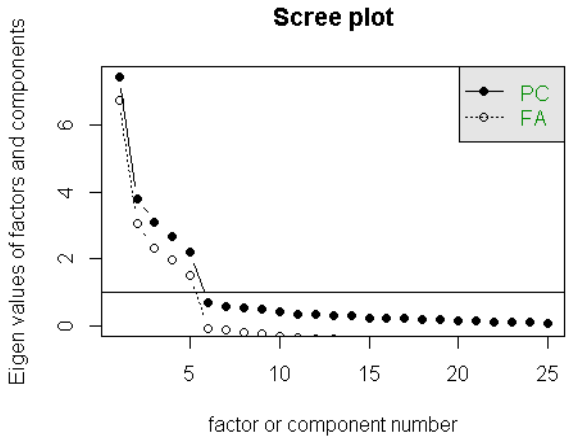
PCA Analysis to See Eigenvalues

Before determining the number of factors that can be maintained in the analysis of exploratory factors, testing is carried out through eigenvalues. The principle used is the Kaiser criterion, which is that only factors with an eigenvalue greater than 1 are considered worthy of retention. The results of the calculation show a striking difference between factors that have an eigenvalue of > 1 and a factor with an eigenvalue of < 1. Details of the results of the calculation of the eigenvalue can be seen in Table 2 below.

Table 2.
Results of Analysis of Eigenvalue Instruments of Adult Learning Motivation

Component Categories	Component of	Nilai Eigen
Own > 1 (Eligible)	1 - 5	7.433, 3.808, 3.087, 2.671, 2.218
Eigen < 1 (Not Eligible)	6 - 25	0.675, 0.580, 0.545, 0.489, 0.411, 0.354, 0.344, 0.321, 0.289, 0.241, 0.228, 0.219, 0.196, 0.182, 0.153, 0.147, 0.129, 0.108, 0.099, 0.072

Figure 2
Scree Plot Own Values



Exploratory factor analysis (EFA) was performed to test the validity of the instrument construct. The results of the analysis in table 2 and figure 2 show that there are five main components that have an eigenvalue greater than 1, namely 7,433, 3,808, 3,087, 2,671, and 2,218. Based on Kaiser's criteria (eigenvalue > 1), the five components were declared feasible and maintainable as factors representing the research construct. This indicates that the developed instrument is able to identify the five latent dimensions underlying the items of the proposed statement.

Meanwhile, the 6th to 25th components have an eigenvalue below 1, with a range between 0.675 to 0.072. In accordance with the principle of factor analysis, components with eigenvalues below 1 are considered not to contribute significantly to the factor structure and are therefore not maintained. These findings show the clarity of factor structure, where only five main factors have the power of representation of the constructs studied.

These findings are in line with previous research, where the selection of factors based on eigenvalues above 1 was proven to be able to produce a more parsimonious and stable instrument structure (Watkins, 2018). Further, these results reinforce the evidence that the instrument not only has good content validity through Aiken's V assessment, but also meets the construct validity criteria through EFA. This means that the indicators developed are able to measure the relevant dimensions consistently with the theory that underlies them.

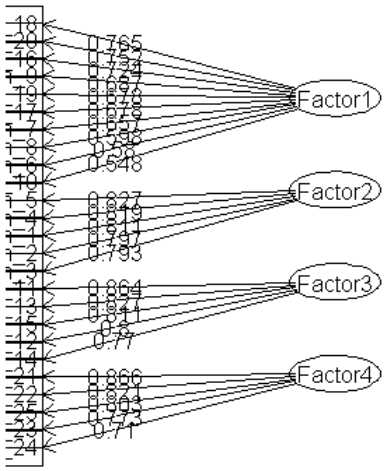
Exploratory Factor Analysis (EFA)

Factor analysis was then carried out to determine the amount of contribution of each factor in explaining the diversity of data. The results obtained showed variations in different proportions of each factor. These factors are considered important if they are able to make a significant contribution to the total variance. Details regarding the value of SS Loadings, proportion of variants, and cumulative variants are shown in Table 3 and Figure 3 below.

Table 3.
Results of Total Analysis of Variants Described by Adult Learning Motivation Instruments

Factor	SS Loadings	Proportion of Variants	Cumulative Variants
Factor 1	4.712	0.188	0.188
Factor 2	3.853	0.154	0.342
Factor 3	3.164	0.126	0.468
Factor 4	3.394	0.136	0.604

Figure 3.
Factor Analysis



The results of factor analysis based on the total variants in table 3 and figure 3 show that there are four main factors formed. The first factor has SS Loadings of 4,712 with a proportion of variants of 0.188 or 18.8%. The second factor contributed a variant of 0.154 or 15.4% with SS Loadings of 3,853, so that the cumulative variant obtained reached 34.2%. Furthermore, the third factor accounted for the proportion of variants of 0.126 or 12.6% with SS Loadings of 3,164, which increased the cumulative variant to 46.8%. The fourth factor contributed a variance of 0.136 or 13.6% with an SS Loadings of 3,394, so that the total cumulative variance described by the four factors reached 60.4%. These findings suggest that the four factors formed are able to explain more than 60% of the total variance of data, which in social and educational research is considered quite adequate. This indicates that the structure of the factors formed has a good explainer power for the analyzed indicators. Thus, these four

factors are worthy of being maintained and used as a basis in the process of further interpretation of factors (Nasidi et al., 2022; Sürücü et al., 2024).

CONCLUSION

The results of the analysis show that the developed instrument has met the criteria of content and construct validity. The validity of the content through Aiken's V calculation indicates that most of the items are in the medium to high category, making them suitable for measuring adult learning motivation. Furthermore, the data feasibility test using the Measure of Sampling Adequacy (MSA) and Bartlett's Test of Sphericity confirmed that the instrument has a strong internal relationship between items, so that it can be continued to the factor analysis stage. The results of the Exploratory Factor Analysis (EFA) showed that there were five factors with eigenvalues above 1, which were then deepened through cumulative variance analysis. Four main factors were formed with the total variant described reaching 60.4%, an achievement that is quite adequate in social and educational research. This proves that the structure of the resulting factors is stable and in accordance with the expected learning motivation construct. Thus, this instrument can be considered constructively valid for use in the context of adult education. Practically, these findings make an important contribution in providing a valid instrument for evaluating learning motivation in non-formal education, training, and community development programs.

REFERENCES

Ahmad, A., Habib Ratu Perwira Negara, Kiki Riska Ayu Kurniawati, & Farah Heniati Santosa. (2019). Increasing Students' Motivation and Achievement in Mathematics Learning through Tutoring Activities. *JPMB : Journal of Community Empowerment with Character*, *2*(2), 189–198. https://doi.org/10.36765/jpmb.v2i2.14

Ahmad, D. (2021). *Increasing Student Learning Motivation Through Providing Rewards and Punishments for Madrasah Tsanawiyah Students*. *4*(2), 267–278.

Aiken, L. R. (1985). Three Coefficients for Analyzing the Reliability and Validity of Ratings. *Educational and Psychological Measurement*, *45*(1). https://doi.org/10.1177/0013164485451012

An, M., & Zhang, X. (2018). Identifying the validity and reliability of a self-report motivation instrument for health-promoting lifestyles among emerging adults. *Frontiers in Psychology*, *9*(JUL). https://doi.org/10.3389/fpsyg.2018.01222

Andersson, P., & Muhrman, K. (2022). Swedish Vocational Adult Education in the Wake of Marketisation. *International Journal for Research in Vocational Education and Training*, *9*(1). https://doi.org/10.13152/IJRVET.9.1.1

Berlian, M., Vebrianto, R., & Thahir, M. (2021). Development of webtoon non-test instrument as education media. *International Journal of Evaluation and Research in Education*, *10*(1). https://doi.org/10.11591/ijere.v10i1.21007

Biney, I. K. (2023). Adult education and entrepreneurship: getting young adults involved. *Journal of Innovation and Entrepreneurship*, *12*(1). https://doi.org/10.1186/s13731-023-

00277-0

Cardona, J. S., Lopez, J. A., Vela, F. L. G., & Moreira, F. (2024). Meaningful learning: motivations of older adults in serious games. *Universal Access in the Information Society*, *23*(4). https://doi.org/10.1007/s10209-023-00987-y

Chapman, S. J. (2018). Review of Discovering Statistics Using IBM SPSS Statistics, 4th Edition . *Journal of Political Science Education*, *14*(1). https://doi.org/10.1080/15512169.2017.1366328

Cobos-Sanchiz, D., Perea-Rodriguez, M. J., Morón-Marchena, J. A., & Muñoz-Díaz, M. C. (2022). Positive Adult Education, Learned Helplessness and the Pygmalion Effect. *International Journal of Environmental Research and Public Health*, *19*(2). https://doi.org/10.3390/ijerph19020778

Goldfarb, Y., Golan, O., & Gal, E. (2023). A Self-Determination Theory Approach to Work Motivation of Autistic Adults: A Qualitative Exploratory Study. *Journal of Autism and Developmental Disorders*, *53*(4). https://doi.org/10.1007/s10803-021-05185-4

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika*, *39*(1). https://doi.org/10.1007/BF02291575

Lukianova, L. (2016). Motivation factors of adult learning. *New Educational Review*, *44*(2). https://doi.org/10.15804/tner.2016.44.2.18

Margolis, J. (1970). The Modern Practice of Adult Education (Book). In *Training & Development Journal* (Vol. 24).

Mufic, J., & Fejes, A. (2022). 'Lack of quality' in Swedish adult education: a policy study. *Journal of Education Policy*, *37*(2). https://doi.org/10.1080/02680939.2020.1817567

Nasidi, Q. Y., Ahmad, M. F., & Dahiru, J. M. (2022). Exploring Items for Measuring Social Media Construct: An Exploratory Factor Analysis. *Journal of Intelligent Communication*, *2*(1). https://doi.org/10.54963/jic.v2i1.53

Nur, L., Ginanjar, A., Malik, A. A., & Pingon, L. (2021). Validity and Reliability of Elementary School Students' Learning Motivation Instruments in Physical Education. *Maenpo Journal: Journal of Physical Education Health and Recreation*, *11*(2). https://doi.org/10.35194/jm.v11i2.1843

Okide, C. C., Eseadi, C., Koledoye, U. L., Mbagwu, F., Ekwealor, N. E., Okeke, N. M., Osilike, C., & Okeke, P. M. D. (2020). Challenges facing community-dwelling adults with hemophilia: Implications for community-based adult education and nursing. In *Journal of International Medical Research* (Vol. 48, Issue 1). https://doi.org/10.1177/0300060519862101

Patterson, M. B. (2018). The Forgotten 90%: Adult Nonparticipation in Education. *Adult Education Quarterly*, *68*(1). https://doi.org/10.1177/0741713617731810

Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's being reported? Critique and recommendations. *Research in Nursing and Health*, *29*(5). https://doi.org/10.1002/nur.20147

Shrotryia, V. K., & Dhanda, U. (2019). Content Validity of Assessment Instrument for Employee Engagement. *SAGE Open*, *9*(1).

https://doi.org/10.1177/2158244018821751

Sigudla, J., & Maritz, J. E. (2023). Exploratory factor analysis of constructs used for investigating research uptake for public healthcare practice and policy in a resource-limited setting, South Africa. *BMC Health Services Research*, *23*(1). https://doi.org/10.1186/s12913-023-10165-8

Statology. (2019). A Guide to Bartlett's Test of Sphericity - Statology. *Statology.Org*.

Sürücü, L., Yıkılmaz, İ., & Maşlakçı, A. (2024). Exploratory Factor Analysis (EFA) in Quantitative Researches and Practical Considerations. *Gümüşhane üniversitesi sağlık bilimleri dergisi*, *13*(2). https://doi.org/10.37989/gumussagbil.1183271

Watkins, M. W. (2018). Exploratory Factor Analysis: A Guide to Best Practice. *Journal of Black Psychology*, *44*(3). https://doi.org/10.1177/0095798418771807

Whitaker, D., Bolch, C., Harrell-Williams, L., Casey, S., Huggins-Manley, C., Engledowl, C., & Tjoe, H. (2022). *The search for validity evidence for instruments in statistics education: preliminary findings*. https://doi.org/10.52041/iase.obaue

Yusoff, M. S. B. (2011). Reliability & Validity of the Adult Learning Inventory among Medical Students. *Education in Medicine Journal*, *3*(1). https://doi.org/10.5959/eimj.3.1.2011.or3

Zamanzadeh, V., Ghahramanian, A., Rassouli, M., Abbaszadeh, A., Alavi-Majd, H., & Nikanfar, A.-R. (2015). Design and Implementation Content Validity Study: Development of an instrument for measuring Patient-Centered Communication. *Journal of Caring Sciences*, *4*(2). https://doi.org/10.15171/jcs.2015.017