Frontiers in Health Informatics
ISSN-Online: 2676-7104
www.healthinformaticsjournal.com
2024; Vol 13: Issue 3
Open Access

From Watson-Glaser to 'A2DIK': Validating a New Framework for Assessing Higher Education Students' Critical Literacy Skills

Nur Hidayah[1],*, Lutfi Fauzan[1], Nur Eva[2], Fitri Wahyuni[1], Mohamad Aziz Shah Bin Mohamed Arip[3], Fifi Khoirul Fitriyah[4], Husni Hanafi[1], Nanda Alfan Kurniawan[1], Mila Yunita[1], Ikmalun Natiq[5], and Machmudah[4]

[1]Department of Guidance and Counseling, Faculty of Science Education, Universitas Negeri Malang, Indonesia

[2]Department of Educational Psychology, Faculty of Educational Psychology, Universitas Negeri Malang, Indonesia

[3]Department of Psychology and Counseling, Faculty of Human Development, Universiti Pendidikan Sultan Idris (UPSI), Malaysia

[4]Department of Early Childhood Education, Faculty of Teacher Training and Education, Universitas Nahdlatul Ulama Surabaya, Indonesia

[4]Mandalika Hospital Lombok, Indonesia

Corresponding author: nur.hidayah.fip@um.ac.id

Cite this paper: Nur Hidayah, Lutfi Fauzan, Nur Eva, Fitri Wahyuni, Mohamad Aziz Shah Bin Mohamed Arip, Fifi Khoirul Fitriyah, Husni Hanafi, Nanda Alfan Kurniawan, Mila Yunita, Ikmalun Natiq,Machmudah (2024) From Watson-Glaser to 'A2DIK': Validating a New Framework for Assessing Higher Education Students' Critical Literacy Skills.*Frontiers in Health Informatics, 13* (3), 6566-6573

Abstract

Literacy skills are a major concern in the Indonesian national education system, particularly among adolescents and young adults. Critical literacy skills involve the objective analysis of information to draw proper conclusions during literacy activities. This study aims to develop and adapt the Watson-Glaser Critical Thinking Appraisal as the primary construct for a Critical Literacy Skills Assessment for higher education students in Indonesia. The research employed an instrument development model based on the Psychometric Development Model. A total of 303 higher education students in Indonesia participated in the assessment. Data analysis focused on measuring the reliability and item validity of the assessment. The results indicated that the Critical Literacy Skills Assessment was fairly reliable and valid for use as a psychological assessment. Additionally, the overall critical literacy skills of higher education students in Indonesia were found to be at a moderate level. This developed assessment can be implemented as a psychological measurement tool in universities, particularly to design academic programs that support students' development of higher-order thinking skills, especially critical literacy skills.

Keywords: critical thinking, critical literacy, higher-students, watson-glaser critical thinking appraisal,

1. Introduction

Literacy skills are still a highlighted issue in Indonesia's national education system. Indonesian students' performance was below the world average in numeric and literacy skills based on PISA results (Nugrahanto & Zuchdi, 2019). As the results were done in 2018, most respondents were at a higher education level. Related to this argument, previous research indicates that higher students in Indonesia mostly had average and low literacy skills (Defit et al., 2019; Rahmah, 2015). In other words, literacy skills are crucial for the junior to higher educational system.

In higher education, literacy skills involve various types of literacy (Lee & Jey, 2019; Rahmah, 2015; Soules & Jafralie, 2021). The more complex information and literacy in higher students as adults made them need a higher level of analysis. Critical Literacy Skills is one of the literacy skills that supports them in information processing (Aguilera & Pandya, 2021). These skills focused on a critically responsive literacy perspective to draw objective conclusions and meaning. Critical Literacy was initially a competence defined by Freiere (Pandya, 2019; Takaki, 2021). Critical literacy was a thinking appraisal which focuing on how people could analyze the subjective reasoning behind the literacy driven by political issues. There was limited access to information spread and control, so this critical literacy focused on exploring political issues (Luke, 2012; Yunita et al., 2024). Specifically, the primary purpose of this vital literacy skill was to define and draw the correct conclusions objectively and examine any subjective reasoning related to the information given.

The definition of critical literacy skills expanded as digital information became more visible and accessible to everyone (Aguilera & Pandya, 2021; Warnick, 2001). Critical literacy has more coverage than political issues as subjective reasoning behind the information. Freedom of access and dissemination allows everyone to provide their perspective on information (Rahmah, 2015). Low skills in processing information then develop into hoaxes and misunderstandings (Georgiadou et al., 2018; Kurniawan et al., 2024). As indicated by previous research, the spread of hoax information in Indonesia is relatively high, and low literacy supports the increase in hoaxes (Afdal et al., 2023). Critically responsive to every piece of information in digital literacy has become one of the ways to define Critical literacy skills for the last decade. Critically responsive analysis requires critical thinking as a basic form of thinking and information processing (Hidayah, Ramli, et al., 2020; Hidayah, Yuliana, et al., 2020). There are many constructs of critical thinking related to various ways of thinking. The Watson-Glaser Critical Thinking Appraisal (WGCTA) (Zulmaulida et al., 2018)is an essential thinking construct related to information processingClick here to enter text.. The WGCTA was developed based on the critical response of information and statements. The WGCTA involves various forms of information such as Arguments, Assumptions, Deductions, Interpretations, and Inference/ Conclusions and analyzes them objectively (Possin, 2014; Sternod & French, 2016).

Based on these ideas, this research aims to adopt the Watson-Glaser Critical Thinking Appraisal as a measurement tool of Critical Literacy Skills for Higher-students in Indonesia. The adoption focused on using the construct and made the questions and statements related to higher students' academic, personal, and social lives in college. The research question for this purpose is "How is the feasibility of Watson Glaser Critical Thinking Adaptation as a Critical Literacy skill for Indonesian higher students?".

2. Materials and methods

This research focused on the assessment development of Critical Literacy Skills based on the Watson-Glaser Critical Thinking Appraisal construct (Gadzella et al., 2006; Sternod & French, 2016). This research used a quantitative method for instrument development and testing. The research involves three main procedures: (a) Construct Development, (b) Instrument development, (c) instrument field test, and (d) instrument analysis.

Participants involved in this research were 303 higher students from various regions in Indonesia. The selection procedures used cluster random sampling of Indonesian areas, the West, Middle, and East Areas. All participants voluntarily agreed to the informed consent for data collection of this research.

The Critical literacy skills assessment was developed according to the Watson-Glaser Critical Thinking Appraisal construct and format. There were five sub-tests of WGCTA adaptations: (i) Arguments, (ii) Assumptions, (iii) Deductions, (iv) Interpretations, and (v) Conclusions/Inferences. Each sub-test had several questions, and each had main statements followed by some responses. The total questions of this assessment are 12, with 38 statements. The higher students analyzed the response related to the primary statement based on each sub-test criteria.

The data analysis used in this research focused on describing the participants' demographic and test results. This analysis stage used descriptive statistics and graphical presentations of the data. The following analysis stage tests the Critical Literacy assessment using reliability, validity, and construct-difficulty tests. The reliability test used in this research is the Guttman λ-2 reliability test, as the assessment was a multiple-choice model. The validity test used the Pearson product-moment analysis. The construct-difficulty test used the average score of item difficulty on each sub-test.

3. Results and discussion

3.1 Participant Demographic

The first results focused on describing the participants' demographic and descriptive statistic results of the test. The detailed descriptions identify the subject demographic based on gender and year level of the study. Based on those descriptions, the analysis explores the basic statistics as the participant results. The detailed results are explained in Table 1 as follows.

Based on Table 1, the participants' level of critical literacy was moderate on average. Moreover, there is some increasing score on each year's experience. The overall highest scores for each year were at an intermediate level, and in the first year, the students' max score was below half of the maximum scores

Table 1. Demographical Results (by students' years).

	N	**Total Mean**	**St. Deviation**	**Max. Total (%)**
1st year	84	51.14	5.77	55.26
2nd year	70	52.13	7.86	63.15
3rd year	77	52.08	8.57	73.68
4th year	72	54.61	8.74	71.05

Based on Table 1, the participants' level of critical literacy was moderate on average. Moreover, there is some increasing score on each year's experience. The overall highest scores for each year were at an intermediate level, and in the first year, the students' max score was below half of the maximum scores.

3.2 Reliability and Validity Test Results

The primary analysis stage focused on measuring the reliability and validity test of the critical literacy assessment. The test measures the overall participant test results. The detailed reliability and validity test results are explained in Table 2 as follows.

Table 1. Reliability and Validity results.

	A2DIK
N Sample	303
N Item	38
Mean (%)	53.285
Std. Deviation	8.46
Max Score (%)	73.684
Reliability (Guttman λ-2)	0.653
Reliability Category	Fairly Reliable
Pearson's r range*	0.182 – 0.313
*significant at p<0.001	

Based on Table 2, the critical literacy assessment was reliable as a psychological assessment. This reliability was supported by the item significantly correlated with the total score at p<0.001. These results mean that the assessment was reliable enough to be used as a critical literacy assessment, and each item gave a valid contribution to the measurement results.

3.3 Descriptive results of Participants Critical Literacy Skills Level

The following analysis of the data was measured the critical literacy skills level of the participant. This initial measurement provide the limited data sampling of the higher students critical literacy skills. The detailed of these descriptive results provided in Figure 1 and Figure 2.

Based on Figure 1, most participants indicated a moderate level of critical literacy skills. Specifically, only below 1% of participants achieve high-level critical literacy skills. In Figure 2, the descriptive results provide the specific score range of the participants, which indicates that most participants are in the 50-60 score range. As indicated at the high level, only 3 participants achieved scores above 70. However, these descriptive results can't be generalized data for overall Indonesian higher students' critical literacy skills level.

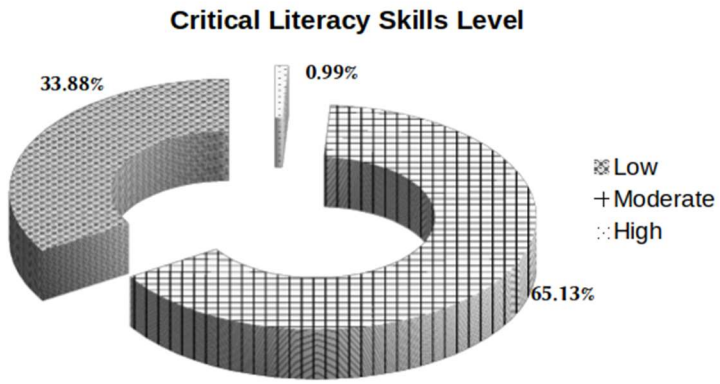

Figure 1. Critical Skills Level of Participants.

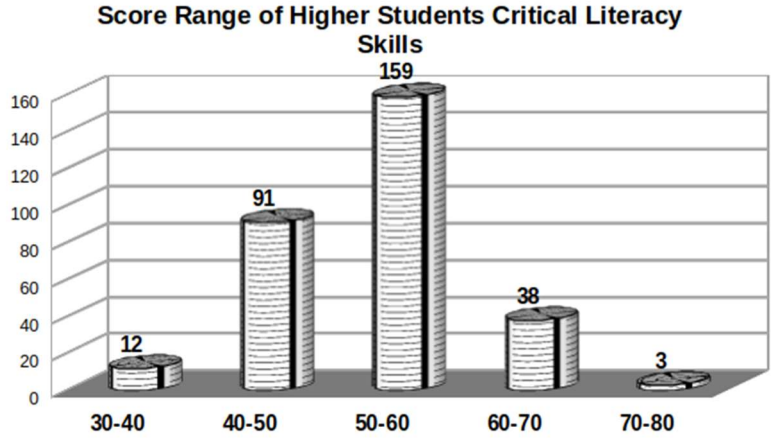

Figure 1. Participant score range of the test results.

3.4 Discussions

These research results have determined that the critical literacy assessment developed is reliable and valid as a psychological measurement. In other words, the Watson-Glaser Critical Thinking Appraisal construct had an appropriate construct and format related to the critical literacy skills construct. Moreover, the research successfully adopted the Watson-Glaser Critical Thinking Appraisal content in a higher-educational context. The results indicate that the higher students involved in this research had moderate critical literacy skills. Overall, all participants' average and highest scores were in the middle. Although these results were still poorly generalized for Indonesian higher students overall, they results indicate that literacy skills have become a crucial issue in Indonesia. Furthermore, this measurement results aligned with previous exploration, showing the moderate and low levels of Indonesian young adult high order thinking skills.

Critical literacy skills measured in this research was one of the higher-order thinking skills of young adults. Critical literacy involves critical thinking and analytic thinking on the related information given (Brown et al., 2014; Wong et al., 2021). The objective description process and examining the subjective reasoning behind the information. Here, Watson-Glaser Critical Thinking Appraisal came with the complex analytic thinking model. Previous research has proven the reliability and validity of WGCTA as a critical thinking measurement (Gadzella et al., 2006; Zulmaulida et al., 2018). In advance, this research extends the WGCTA reliability as a Critical Literacy skills assessment.

The Watson-Glaser critical thinking appraisal was previously used as a critical thinking test, specifically on adults (Cloete, 2018). The WGCTA has complex analysis that involves high-level analysis thinking. In this adaptation, the test focused on statement analysis as a reasonable argument, proven assumptions, thorough deduction, proper interpretation, or comprehensive conclusions in each sub-test of WGCTA (Talman et al., 2021; Zenker, 2018). Moreover, this adaptation adds another layer of statement relationship analysis. This test's analysis thinking includes the relationship between the response and the main statements.

Specifically, the thinking process involved in WGCTA was determined by the complexity level of statement analysis. This is related to the five sub-tests of Arguments, Assumptions, Deductions, Interpretations, and Conclusions (Andrews, 2015; Gadzella et al., 2005; Hidayah, Ramli, et al., 2020). Those sub-tests were not the

fixed model of the thinking process. However, each thinking process could occur in various ways and different order. In most literacy frameworks, this model supports recognizing assumptions, evaluating arguments, and Drawing Conclusions (Butterworth & Thwaites, 2013; Li et al., 2021).

This research results successfully developed a critical literacy assessment test based on the WGCTA construct for higher students in Indonesia. The practical implication of this research focused on making a feasible format of the test and manual, especially for both online and offline test forms. The practical use of this assessment might be focused on the academic directorate or guidance and counseling unit in each university. This assessment could be used for every grade year of the students. Theoretically, this research implication could be focused on further development and testing. Further development could be made to various tests, including the cultural-fair criteria for the critical literacy assessment. Other tests could explore the test-retest essential reliability of literacy assessment and the involvement of a broader range of participants.

4. Conclusion

This research aims to develop and adopt the WGCTA as a Critical Literacy Skills assessment tool for Indonesian higher students. The research results indicate that the developed assessment was relatively reliable and valid as a psychological assessment. Further results describe Indonesian higher students' critical literacy skills level at a moderate level. Based on the research purpose and results, this research had some limitations on (a) detailed exploration of each subtest score level, (b) further exploration of the cultural-fair validity of the test, and (c) further analysis as the standardized test. This research suggests implementing the Critical Literacy skills assessment developed by the university as one of the psychological assessments of their students .

Acknowledgment

This research was supported by Universitas Negeri Malang, represented by the Research and Community Service Department (LPPM UM).

Conflict of interest

There is no conflict of interest in this research data collection and publication.

References

- Afdal, A., Fikri, M., Neviyarni, N., Iswari, M., Sukmawati, I., Firman, F., Karneli, Y., Mardianto, M., & Hariko, R. (2023). Hoax behavior tendencies among Indonesian students: An analysis during the COVID-19 pandemic. *International Journal of Evaluation and Research in Education (IJERE)*, *12*(1), 59–68. https://doi.org/10.11591/ijere.v12i1.23632
- Aguilera, E., & Pandya, J. Z. (2021). Critical literacies in a digital age: current and future issues. *Pedagogies: An International Journal*. https://doi.org/10.1080/1554480X.2021.1914059
- Andrews, R. (2015). Critical Thinking and/or Argumentation in Higher Education. In *The Palgrave Handbook of Critical Thinking in Higher Education* (pp. 49–62). Palgrave Macmillan US. https://doi.org/10.1057/9781137378057_3
- Brown, N. J. S., Afflerbach, P. P., & Croninger, R. G. (2014). Assessment of Critical-Analytic Thinking. *Educational Psychology Review*, *26*(4), 543–560. https://doi.org/10.1007/s10648-014-9280-4
- Butterworth, J., & Thwaites, G. (2013). *Thinking Skills : Critical Thinking and Problem Solving*. Cambridge University Press.
- Cloete, M. (2018). The impact of an integrated assessment on the critical thinking skills of first-year university students. *Accounting Education*, *27*(5), 479–494.

https://doi.org/10.1080/09639284.2018.1501717

- Defit, S., Zefriyenni, Novia Dewi, Y., & Yarman. (2019). Effectiveness of the Indonesian literacy school program in improving the quality of basic education for marginal communities in the Indonesian border area. *IOP Conf. Ser.: Earth Environ. Sci.*, *314*(1), 12043. https://doi.org/10.1088/1755-1315/314/1/012043
- Gadzella, B. M., Hogan, L., Masten, W., Stacks, J., Stephens, R., & Zascavage, V. (2006). Reliability and Validity of the Watson-Glasere Critical Thinking Appraisal-Forms for Different Academic Groups. *Journal of Instructional Psychology*, *33*(2), 141–143.
- Gadzella, B. M., Stacks, J., Stephens, R. C., & Masten, W. G. (2005). Watson-Glaser Critical Thinking Appraisal, Form-S for Education Majors. *Journal of Instructional Psychology*, *32*(1), 9–12.
- Georgiadou, E., Rahanu, H., Siakas, K. V, McGuinness, C., Edwards, J. A., Hill, V., Khan, N., Kirby, P., Cavanagh, J., & Knezevic, R. (2018, June). Fake news and critical thinking in information evaluation. *Western Balkan Information Literacy Conference WBILC 2018*. https://doi.org/10.5860/crl.79.1.10
- Hidayah, N., Ramli, M., Mappiare-AT, A., Hanafi, H., Yuliana, A. T., Kurniawan, N. A., & Eva., N. (2020). Developing Critical Thinking Skills Test In Indonesia. *Palarch's Journal Of Archaeology Of Egypt/Egyptology*, *17*(3), 815–826. https://doi.org/10.48080/jae.v17i3.178
- Hidayah, N., Yuliana, A. T., & Hanafi, H. (2020). Theoretical Validity of Problem Focused-Coping Skill Guideline to Develop Students' Critical Thinking Skills. *JKBK*, *5*(4), 183–191. https://doi.org/10.17977/um001v5i42020p183
- Kurniawan, N. A., Hidayah, N., Akbar, S., Ramli, M., Ngussa, B. M., Fitriyah, F. K., & Hanafi, H. (2024). Exploring Postponing Career Decisions of Indonesian Vocational Students from Biopsychososial Dimension: A Path Analysis. *South Eastern European Journal of Public Health*, *SE-Articles*, 375–385. https://doi.org/10.70135/seejph.vi.863
- Lee, G., & Jey, C. (2019). Two plus four dimensions of critical literacy. *Educational Philosophy and Theory*, *52*(1), 79–87. https://doi.org/10.1080/00131857.2019.1605898
- Li, J., Brar, A., & Roihan, N. (2021). The use of digital technology to enhance language and literacy skills for Indigenous people: A systematic literature review. *Computers and Education Open*, *2*, 100035. https://doi.org/10.1016/j.caeo.2021.100035
- Luke, A. (2012). Critical Literacy: Foundational Notes. *Theory Into Practice*, *51*(1), 4–11. https://doi.org/10.1080/00405841.2012.636324
- Nugrahanto, S., & Zuchdi, D. (2019). Indonesia PISA Result and Impact on The Reading Learning Program in Indonesia. *International Conference on Interdisciplinary Language, Literature and Education (ICILLE 2018)*, 373–377. https://doi.org/10.2991/ICILLE-18.2019.77
- Pandya, J. Z. (2019). In the weeds: Critical literacy conversations with Allan Luke. *Curriculum Inquiry*, *49*(2), 191–202. https://doi.org/10.1080/03626784.2019.1584732
- Possin, K. (2014). Critique of the Watson-Glaser Critical Thinking Appraisal Test: The more you know, the lower your score. *Informal Logic*, *34*(4), 393–416. https://doi.org/10.22329/il.v34i4.4141
- Rahmah, A. (2015). Digital Literacy Learning System for Indonesian Citizen. *Procedia Computer Science*, *72*, 94–101. https://doi.org/10.1016/j.procs.2015.12.109
- Soules, K. E., & Jafralie, S. (2021). Religious Literacy in Teacher Education. *Religion & Education*,

48(1), 37–56. https://doi.org/10.1080/15507394.2021.1876497

- Sternod, L., & French, B. (2016). Test Review: Watson, G., & Glaser, E. M. (2010). Watson-Glaser™ II Critical Thinking Appraisal. *Journal of Psychoeducational Assessment*, *34*(6), 607–611. https://doi.org/10.1177/0734282915622855
- Takaki, N. H. (2021). Critical Literacy with (Freire) and for the Other (Levinas): Ethics/Social Justice as Enigmatic Becoming. *Revista Brasileira de Linguística Aplicada*, *21*(2), 627–655. https://doi.org/10.1590/1984-6398202117392
- Talman, K., Vierula, J., Kanerva, A.-M., Virkki, O., Koivisto, J.-M., & Haavisto, E. (2021). Instruments for assessing reasoning skills in higher education: a scoping review. *Assessment & Evaluation in Higher Education*, *46*(3), 376–392. https://doi.org/10.1080/02602938.2020.1776212
- Warnick, B. (2001). Critical Literacy in A Digital Era : Technology, Rhetoric, and the Public interest. *Critical Literacy in A Digital Era*. https://doi.org/10.4324/9781410603838
- Wong, S. S. H., Kim, M., & Jin, Q. (2021). Critical Literacy Practices Within Problem-Based Learning Projects in Science. *Interchange*, *52*(4), 463–477. https://doi.org/10.1007/S10780-021-09426-4/METRICS
- Yunita, M., Hidayah, N., Atmoko, A., Ramli, M., Fitriyah, F. K., & Hanafi, H. (2024). Examining Counselor's Executive Function Skills Across Career Phase: Comparing Preservice, Novice and Experienced in Healthcare Performance . *South Eastern European Journal of Public Health*, *SE-Articles*, 310–320. https://doi.org/10.70135/seejph.vi.853
- Zenker, F. (2018). Introduction: Reasoning, Argumentation, and Critical Thinking Instruction. *Topoi*, *37*(1), 91–92. https://doi.org/10.1007/s11245-016-9416-x
- Zulmaulida, R., Wahyudin, & Dahlan, J. A. (2018). Watson-Glaser's Critical Thinking Skills. *Journal of Physics: Conference Series*, *1028*(1), 1–6. https://doi.org/10.1088/1742-6596/1028/1/012094