

# The Influence of Digital Collection and Research Support in Information Literacy on the Level of Student's Critical Thinking Disposition Inventory

Fadila Fitria Wulandari<sup>1,\*</sup>, Tri Kuncoro<sup>1</sup>, Tuwoso<sup>1</sup>

<sup>1</sup>Vocational Education Program, State University of Malang, Indonesia

\*Corresponding author : [fadilawulandari@gmail.com](mailto:fadilawulandari@gmail.com)

Information literacy and critical thinking are part of the 21<sup>st</sup> century skills that must be had by every person in knowledge society, especially in the academic program for identifying and finding information sources that support in research activities. This research is focused on knowing the effect of student information literacy on critical thinking disposition inventory. Data was obtained using a quantitative non-experiment with survey methods analysed using simple linear regression. Study sample consisted of 54 students from total population of 90 students at the last level Building Engineering Education Bachelor Program in State University of Malang. Data collection used questionnaire instruments that were published by ACRL Information Literacy Assessment and California Critical Thinking Disposition Inventory (CCTDI) on a scale of 4. The results showed that the students had good information literacy and very poor critical thinking. But information literacy has a significant effect on critical thinking by 31% and the rest is influenced by other factors. The level of information literacy and critical thinking of students are purposed in writing scientific papers for the last year of students. Exploration factors that influence students' critical thinking

disposition inventory in addition to information literacy are recommended for further research because it is useful to accelerate the study period.

**Keywords:** Information literacy, critical thinking, 21<sup>st</sup> century skills

## 1. Introduction

In the knowledge society, a person is required to have 21<sup>st</sup> century skills consisting of: learning skills, critical thinking and problem solving skills, creativity, collaborative and leadership skills, adaptability, integration, encouragement, citizenship, productivity, and literacy skills [1–4]. Critical thinking is defined as the goal process, self-regulatory, focusing on consideration, making decisions and formulating conclusions [5, 6]. In another words, someone who has critical thinking skills is characterised as someone who shows confidence in their abilities, intellectual curiosity, open mindedness for different worldviews, honesty about themselves, complexity, and flexibility to make alternatives. Critical thinking has a multidimensional characteristic, one of the characteristics is a critical thinking dispositions inventory which is categorised as skills that include individual willpower and internal motivation to use critical thinking skills [7]. In the vocational study, specifically Building Engineering, a critical thinking disposition inventory is useful for the application of skills to support the professional field.

Critical thinking is important because it is the goal of education in the realm of formal education (school/university) [8]. Students are manifested to have critical thinking at all levels of education that are expected to help solve problems with different perspectives [9]. Critical thinking has an important role in logical research, making decisions, and solving problems if it can be done involving researchers in research that have good information literacy [9, 10]. Considering critical thinking and information literacy in 21<sup>st</sup> century skills, shows that some studies have been carried out on educational students and the results indicate that there is a significant contradiction between information literacy to critical thinking about and writing ability [11–14].



The development of information literacy can be the foundation for achieving success in school, as well as success in life [16]. One application of information literacy is in teacher education programs that will create different teaching, learning styles and training in the creative workforce [17], [18]. However, information literacy can also be approved in education, completion of a thesis, and academic support that has been approved in university [18, 19]. This statement was supported by Dika [21], where his research showed that a students' research title submission was rejected, because it wasn't complete at the level of research, so students needed to attach literacy from reputable and up to date journals in research proposals as a benchmark measuring renewal assessment. The problems led to the extension of the study period, as it was seen that there were still 38% of 2013 Building Engineering Education students who had not graduated in the academic year 2018/2019.

Based on the explanation above, it is necessary to prepare information literacy skills and critical thinking on the last semester students as provisions for preparing research proposals. Therefore, the objectives of this study are: 1) to know the level of information literacy in Building Engineering Education Bachelor students; 2) to know the level of critical thinking in Building Engineering Education Bachelor students; 3) to know the effect of information literacy on critical thinking in Building Engineering Education Bachelor students.

## **2. Methodology**

This study used a quantitative non-experimental approach, where this type of research is a correlational study which was analysed using simple linear regression. The independent variable in this study is information literacy, while critical thinking disposition inventory is the dependent variable.

The population in this study was 90 students in the Engineering Building Education Bachelor study program of the 2015 generation. Samples of 54 students were taken using simple random sampling, so that all respondents had the same opportunity to become samples. Data was received by a survey method using the ACRL instrument that can be published by the Division of the American Library Association to measure student information literacy [22]. The critical thinking disposition inventory is measured by the California Critical Thinking Disposition

Inventory (CCTDI) [23] based on the American Philosophical Association (APA) developed by Wang [24]. All instruments used a 4 point likert scale.

### 3. Results

From the results taken through an analysis of students' information literacy skills it was found that 54 students had an average literacy information value of 25.39 with a maximum value of 32, and a minimum of 19, a mode equal of 24 with a mean of 24. The distribution of data had a standard deviation value of 2.6. Furthermore, it was categorised using the Sturges rule [25] and found seven categories used. The results showed that 31% of students' information literacy of Engineering Education Bachelor Program in the 8<sup>th</sup> semester State University of Malang have a rather good predicate as shown in Table 1.

Table 1. Literacy Information Criteria for students' Engineering Education Bachelor Program in State University of Malang.

No	Range	Criteria	Frequency	Percentage
1	$X < 20.90$	Poor	1	2%
2	20.91 – 22.70	Very Bad	6	11%
3	22.71 – 24.60	Bad	15	28%
4	24.61 – 26.40	Rather Good	17	31%
5	26.41 – 28.30	Good	10	19%
6	28.31 – 30.10	Better	2	4%
7	$X > 30.11$	Best	3	6%

From the results analysis of the critical thinking disposition inventory ability, it showed that the average critical thinking value of 58.2 has a maximum value of 72, and a minimum of 51, a mode equal to 56 with a mean of 58.2. The distribution of the data had a standard deviation value of 4.78. Based on seven range categories it showed that 28% of information literacy students of Engineering Education Bachelor Program in the 8<sup>th</sup> semester State University of Malang have a very bad predicate as shown in Table 2.

Table 2. Critical thinking disposition inventory criteria for students' Engineering Education Bachelor Program in State University of Malang.

No	Range	Criteria	Frequency	Percentage
1	X < 54.0	Poor	12	22%
2	54.01 – 57.00	Very Bad	15	28%
3	57.01 – 60.00	Bad	12	22%
4	60.01 – 63.00	Rather Good	7	13%
5	63.01 – 66.00	Good	4	7%
6	66.01 – 69.00	Better	2	4%
7	X > 69.01	Best	2	4%

Furthermore, the results of a simple regression analysis between information literacy variables and critical thinking disposition inventory in students' Building Engineering Education Bachelor Program can be seen in Table 3.

Table 3. Results of Regression Analysis between Independent Variables on Dependent Variables.

Model	R	R Square	F	t	sig
1	.569 <sup>a</sup>	.324			
Regression			24.902		.000
Information Literacy				4.990	0.00

From Table 3, it showed that the sig. (0.000) < Alpha (0.05), so that it can be said that information literacy had a significant linear correlation to critical thinking disposition inventory of 0.569. Besides that, the sig. value in the coefficients<sup>a</sup> table is 0.000 so that Ho is rejected and information literacy had a significant effect on critical thinking of 0.311 or 31%, furthermore is influenced by other variables of 69%.

#### 4. Discussion

Based on the results, it can be seen that the hypothesis in the first formula showed that the level of students' information literacy in 8<sup>th</sup> semester of Engineering Education Bachelor Program in State University of Malang that 31% percent of students had a rather good information literacy skills. This shows that the information literacy competency possessed by the 8th semester of Bagunan Engineering Education in the State University of Malang is sufficient. The importance of information literacy in completing the academic needs of students, especially to support examinations, research and fulfillment of information in various aspects of life. Information needs appear when a person's knowledge is less than needed, thus encouraging someone to seek information [26]. When someone needs information, they will look for information needed from the many available resources. In research activities, Mukhadis explained the literacy activities that were applied in the study of references were useful for obtaining relevant, up to date and credible references [27]. So in the final study, this ability is needed to support the completion of scientific work (thesis). According to Eisenberg, students who have information literacy are considered more: competent, independent in learning, able choose the information needed and actively involved in developing ideas [28]. This will encourage self-confidence in solving problems and making decisions that are part of critical thinking.

The use of research instruments published by the California Critical Thinking Disposition Inventory (CCTDI) focused on measuring dispositions of critical thinking attitude, because basically critical thinking is categorised into knowledge, skills, and attitudes / values / ethics [1]. Fell and Lukianova said that critical thinking skills can create rational thinkers, assertiveness and empathy for others [29]. In testing the second hypothesis, it showed that a critical thinking disposition inventory of Building Engineering Education Bachelor Program students in semester 8<sup>th</sup> State University of Malang showed that 28% percent of students had very bad critical thinking disposition inventory skills. The value of critical thinking will increase if someone has good literacy information as announced by Soleymani and Schield [20], [30]. While the results of the study indicated that the average students' critical thinking disposition inventories is lower than the information literacy ability. Ideally, vocational students need to have high critical thinking disposition inventory in this field and students are

required to know the cognitive field and apply their skills to support their professionalism. This is supported by Ennis who stated that a person must be able to use and apply critical thinking into skills, to be people who have critical thinking [31].

The low critical thinking disposition inventory will impact on the increase in the study period due to lack of ability in completing thesis which includes critical thinking skills. That skills include decision making, problem solving, and finding evidence in thesis activities. In addition, the education process is hampered due to a lack of critical thinking attitude and empathy for the environment, especially peers in the academic sphere. This is according to Aybek's statement, that someone's critical thinking is useful to find evidence and support the writing of research proposals [9].

In testing the third hypothesis obtained, there was a linear relationship and a significant effect between information literacy on students' critical thinking disposition inventory. Information literacy variables had a significant influence on critical thinking disposition inventory students with a large influence of 0.311 or 31%. The strength of the relationship between two variables is quite sufficient, and had a positive relationship direction. So that the higher level of information literacy that students had, the critical thinking disposition inventory is higher too. But seen from the average critical thinking disposition inventory that is lower than the average information literacy, causing a large influence is low. Besides that, other factors that might influence critical thinking must be very concerning. Exploratory factors that influence critical thinking disposition inventory are suggested for further research, considering that matter is very useful especially for the last year students. Thus, literacy activities are very important to build critical thinking skills that the last year students are needed as a provision in research writing.

## **5. Conclusion**

Based on the results, it showed that there was a significant linear relationship where there was an influence between information literacy and critical thinking. The influence of information literacy on critical thinking is 31% and the rest was influenced by other factors. The low influence was caused by the average literacy ability of students possessed lower than their



critical thinking. So further exploration is needed about the factors that influence critical thinking to optimise abilities in the last level students.

## References

- [1] M. Binkley, O. Erstad, J. Herman, S. Raizen, and M. Ripley, “Draft White Paper 1 Defining 21st century skills,” *The University of Melbourne*, p. 71, (2010)
- [2] E. van Laar, A. J. A. M. van Deursen, J. A. G. M. van Dijk, and J. de Haan, “The relation between 21st-century skills and digital skills: A systematic literature review,” *Computers in Human Behavior*, **vol. 72**, pp. 577–588, Jul. (2017)
- [3] A. R. Saavedra and V. D. Opfer, “Learning 21st-Century Skills Requires 21st-Century Teaching,” *Phi Delta Kappan*, **vol. 94**, no. 2, pp. 8–13, Oct. (2012)
- [4] J. Voogt and N. P. Roblin, “A comparative analysis of international frameworks for 21<sup>st</sup> century competences: Implications for national curriculum policies,” *Journal of Curriculum Studies*, **vol. 44**, no. 3, pp. 299–321, Jun. (2012)
- [5] D. F. Halpern, *Thought and knowledge: an introduction to critical thinking*, Fifth Edition. New York: Psychology Press, (2014)
- [6] M.-L. Yeh, “Assessing the reliability and validity of the Chinese version of the California Critical Thinking Disposition Inventory,” *International Journal of Nursing Studies*, **vol. 39**, no. 2, pp. 123–132, Feb. (2002)
- [7] R. D. Renaud and H. G. Murray, “A comparison of a subject-specific and a general measure of critical thinking,” *Thinking Skills and Creativity*, **vol. 3**, no. 2, pp. 85–93, Aug. (2008)
- [8] N. Bahr, “Thinking Critically about Critical Thinking in Higher Education,” *International Journal for the Scholarship of Teaching and Learning*, **vol. 4**, no. 2, Jul. (2010)
- [9] B. Aybek and S. Aslan, “The Relationship between Prospective Teachers’ Critical Thinking Dispositions and Their Educational Philosophies,” *Universal Journal of Educational Research*, **vol. 5**, no. 4, pp. 544–550, Apr. (2017)
- [10] H. A. Butler, “Halpern Critical Thinking Assessment Predicts Real-World Outcomes of Critical Thinking: Real-world outcomes of critical thinking,” *Applied Cognitive Psychology*, **vol. 26**, no. 5, pp. 721–729, Sep. (2012)
- [11] S. Sabzwari, S. Kauser, and A. K. Khuwaja, “Experiences, attitudes and barriers towards research amongst junior faculty of Pakistani medical universities,” *BMC Medical Education*, **vol. 9**, no. 1, Dec. (2009)



- [12] H. Soodmand Afshar, H. Movassagh, and H. Radi Arbabi, "The interrelationship among critical thinking, writing an argumentative essay in an L2 and their subskills," *The Language Learning Journal*, vol. 45, no. 4, pp. 419–433, Oct. (2017)
- [13] S. L. McMullin, "The Correlation between Information Literacy and Critical Thinking of College Students: An Exploratory Study," *Dissertation Prepared for the Degree of Doctor of Philosophy University of North Texas*, p. 147, (2018)
- [14] A. N. Bulgurcuoglu, "Relationship between critical thinking levels and attitudes towards reading habits among pre-service physical education teachers," *Educational Research and Reviews*, vol. 11(8), p. 5, (2016)
- [15] A. Ahdika, "Improvement of Quality, Interest, Critical, and Analytical Thinking Ability of Students through the Application of Research Based Learning (RBL) in Introduction to Stochastic Processes Subject," *Organisation for economic co-operation and development*, vol. 1, p. 25, (2007)
- [16] C. Bitter, J. O'Day, P. Gubbins, and M. Socias, "What Works to Improve Student Literacy Achievement? An Examination of Instructional Practices in a Balanced Literacy Approach," *Journal of Education for Students Placed at Risk (JESPAR)*, vol. 14, no. 1, pp. 17–44, Feb. 2009.
- [17] A. Raeis, S. Bahrami, and M. Yousefi, "Relationship Between Information Literacy and Creativity: A Study of Students at the Isfahan University of Medical Sciences," *Materia Socio Medica*, vol. 25, no. 1, p. 28, (2013)
- [18] J. M. Ward, "Tarleton Spot Light in Teacher Education: Digital Literacy Development in Teacher Education Programs," *The Journal of the Effective Schools Project*, vol. 23, pp. 72–74, (2016)
- [19] A. A. L. Putri, "Relationship of Emotional Intelligence with Thesis Anxiety in Mathematics Education Students of the Teaching and Education Faculty of Satya Wacana Christian University," Thesis, Satya Wacana Christian University, Salatiga, (2016)
- [20] M. R. Soleymani, "Investigating the relationship between information literacy and academic performance among students," *J Educ Health Promot*, vol. 3 (95), (2014)
- [21] J. W. Dika, "Contribution of the Mini Research Experience and Analysis Experience to the Level of Urgency Research through Student Research Based Learning Activities," Magister Degree State University of Malang, Malang, (2018)



- [22] Division of the American Library Association, “ACRL Project Outcome for Academic Libraries,” *ACRL (Association of College and Research Libraries)*, (2018)
- [23] N. C. Facione, P. A. Facione, and C. A. Giancarlo, “The Disposition Toward Critical Thinking as a Measure of Competent Clinical Judgment: The Development of the California Critical Thinking Disposition Inventory,” **vol. 33**, p. 14, (1994)
- [24] X. Wang, X. Sun, T. Huang, R. He, W. Hao, and L. Zhang, “Development and validation of Critical Thinking Disposition Inventory for Chinese medical college students (CTDI-M),” *Cornell University*, p. 13, (2018)
- [25] W. M. Sari, O. Darnius, and P. Sembiring, “Comparison of the Accuracy of the Group Frequency Distribution Table Model Between the Sturges Method and the Scott Method,” *Talenta Conference Series Science and Technology (ST)*, **vol. 1**, no. 1, pp. 001–009, Oct. (2018)
- [26] M. Garg, “Information Seeking Behaviour Models: A Brief Introduction,” *International Journal of Library and Information Studies*, **vol. 6**, no. 1, pp. 161–168, (2016)
- [27] A. Mukhadis, *Kiat Menulis Karya Ilmiah Bentuk, Anatomi, Isi Esensial dan Contoh Aplikasinya*. Malang: Aditya Media Publishing, (2015)
- [28] M. B. Eisenberg, “Information Literacy: Essential Skills for the Information Age,” *DESIDOC Journal of Library & Information Technology*, **vol 28**, issue 2, pp. 39-47, (2008)
- [29] E. V. Fell and N. A. Lukianova, “British Universities: International Students’ Alleged Lack of Critical Thinking,” *Procedia - Social and Behavioral Sciences Publisher by Elsevier Ltd*, **vol. 215**, pp. 2–8, (2015)
- [30] M. Schield, “Statistical Literacy: An Evangelical Calling for Statistical Educators,” *nvited paper at conference sponsored by the International Statistical Institute (ISI) in Sydney*, (2005).
- [31] R. H. Ennis, “Critical Thinking Dispositions: Their Nature and Assessability,” *Informal Logic*, **vol. 18**, no. 2, pp. 165-182. (1996)