

## The analysis of critical thinking skills of guidance and counseling students: A pilot study using RASCH model analysis

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### Abstract

This study identified the critical thinking skills of Guidance and Counseling students. The analysis of this capability was illustrated in the scalogram resulted from the RASCH model analysis. The respondents were Guidance and Counseling students at a public University, in Bandung, Indonesia. The data obtained was used as a pilot study in measuring the critical thinking skill test constructed by the author. The results showed that the students' critical thinking skills were in the low category, with a percentage of 44%. The scalogram picture showed that there were three students who gave inconsistent patterns for several questions which showed that the result was still valid. The result of this study could be a reference for giving group counseling to some students who had inconsistent response patterns. In conclusion, counseling with a cognitive approach needed to be held in improving the critical thinking skills of Guidance and Counseling students who had low levels of critical thinking skill as a follow-up to this research. The implication of this study was that the research data could be used as a reference in the preparation of the guidance and counseling service program related to critical thinking skills.

**Keywords:** Critical thinking, guidance and counseling, RASCH model

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## Introduction

In this global competition, education still becomes the main tool in the dissemination of knowledge. The spread of knowledge would be more effective and efficient if it is strengthened by the development of technology and information. One of efforts to support the use of appropriate information technology is preparing human resources with balanced cognitive abilities (Avgerou & Walsham, 2017; Noe, Hollenbeck, Gerhart, & Wright, 2017; Valmohammadi & Ahmadi, 2015). A balanced and adequate cognitive ability in each individual becomes a milestone in facing the challenges of education in the era of the industrial revolution 4.0.

Educational challenges in the industrial revolution 4.0 require individuals to develop their cognitive skills in examining problems and information from digital sources (Erol, Jäger, Hold, Ott, & Sihm, 2016; Hariharasudan & Kot, 2018; Kivunja, 2015). Cognitive skills of adolescents at the level of higher education should be in the formal operational stage or above, at which this age is ready to be forged at the tertiary level (Douglas, 2012; Forawi, 2016; Shahroom & Hussin, 2018). In the formal operational stage, it can be said that adolescence is considered capable of thinking abstractly and logically. Information from several sources needs to be considered for its truth and validity, so recipients of information do not need to be hasty in deciding the follow-up of information that has just been received (Ganapathy, 2017; Maclean, Jagannathan, & Sarvi, 2012). It needs a high and sufficient cognitive ability to sort out which information is true and false.

The selection of information and the investigation of its validity are the parts of the adaptation efforts in addressing the digitalization of information. The industrial revolution 4.0 requires human to adapt with machines (Cotet, Balgiu, & Zaleschi, 2017; Lu, 2017; Romero et al., 2016). Unfortunately, it reduced social interaction between individuals. Information authorization could only be done in the same direction

without any clarification that occurs two-way between individuals (Hedge, Powell, & Sumner, 2018; Martincová & Lukešová, 2015). This would also affect the quality and impact of individuals' behavior in the community.

The quality of individuals' behavior, both positive and negative, becomes a social impact due to the lack of a literacy culture and the limitation of media producing credible information (Kim, Lim, & Park, 2015; Storksdieck, 2016). If the individuals' behavior is negative, it would disturb people in their community. These facts illustrate the importance of thinking critically of information gotten, so individuals' self-regulation could be applied.

The facts showed that several counselors used inappropriate counseling techniques to solve problems. The impact of it was the counselee was not satisfied after the getting counseling because the counselor was considered "malpractice" (Hidayah & Ramli, 2017; Tay, 2015). Counselors need to identify, interpret, analyze problems, and continue evaluations in providing guidance and counseling services to counsees. Some of the following counseling stages are related to the level of critical thinking of the counselor in deciding the counseling service that would be used to overcome a particular problem (Cottrell, 2017; Geldard, Geldard, & Foo, 2017; McPeck, 2016). Therefore, it is important to prepare counselors in the 4.0 revolution era who are media literate and able to think critically in addressing some global problems or issues (Bloch & Spataro, 2014; Harjo, Kartowagiran, & Mahmudi, 2019; Haron, 2018). Some of these phenomena make the reason for the need to identify the critical thinking skills of guidance and counseling students as prospective counselors.

The students' critical thinking skill needs to be assessed with data analysis through modern statistics method namely RASCH analysis (Nirwana, Rochman, & Zukmadini, 2019). RASCH analysis is a simple analysis and has some advantages that could not be found in other method (Boone, 2016; Goh, Marais, & Ireland, 2017; Hagquist & Andrich, 2017). In the analysis process, it does not only pay attention to the raw score to assess the respondents' ability, but it also pay attention to the pattern of respondents' answers and the level of difficulty of the problem (Goyder, 2019; Marfu'i, Ilfiandra, & Nurhudaya, 2018). The RASCH Model, which is a 1-PL model, could use a sample of population that is not as large as the 2PL or 3PL analysis model (Istiyono, Mardapi, & Suparno, 2014; Othman, Asshaari, Bahaludin, Nopiah, & Ismail, 2012; Thomas et al., 2014). Analysis of IPL parameters makes it easy for researchers to analyze data to find out the quality of items in the instrument constructed in terms of the level of difficulty, different power, and effectiveness of the distractor in a very simple one-time analysis using the RASCH Model.

The general objective of this study was to analyzed the critical thinking skills of Guidance and Counseling students at a public University in Bandung, Indonesia as prospective 4.0 generation counselors. While the specific objectives of this study were analyzed the level of students' critical thinking skills, determining the categorization of students' critical thinking skills, interpreting or analyzing the results of the scalogram of students' critical thinking skills and analyzing the pattern of students' answers. Based on some of the research objectives above, it could be concluded that the purpose of this research as a preliminary study was to determine what guidance and counseling programs need to be prepared for prospective counselors in the revolutionary 4.0 era regarding their critical thinking performance.

## Method

This research used quantitative approach with survey method. This research was conducted on Guidance and Counseling major students at a public University, in Bandung, Indonesia. This research instrument measured the students' ability of interpretation, analysis, evaluation, inference, explanation, and self-regulation in critical thinking. The research instrument used was a test of critical thinking skills with moderate reliability. This critical thinking skills test is valid. Data collection was carried out once scattered tests on Guidance and Counseling major students. The data analysis technique used was RASCH modeling analysis using the Winsteps application (Mohamad, Sulaiman, Sern, & Salleh, 2015; Yan & Sin, 2015). This analysis included ranking analysis of the scores of students' critical thinking skills test resulting from the scalogram. The results of this analysis were supported by the results of the categorization gotten through Ms. Excel. The students' answer patterns were analyzed from the results of the RASCH analysis.

## Results and Discussion

The results were discussed in detail based on the analysis obtained from Ms. Excel and RASCH modeling analysis. This section discusses some items included the level of students' critical thinking skills, the interpretation and analysis of results of students' ability based on scalograms, the analysis of the pattern of students answers on critical thinking tests presented with good enough validity. This analysis still needed

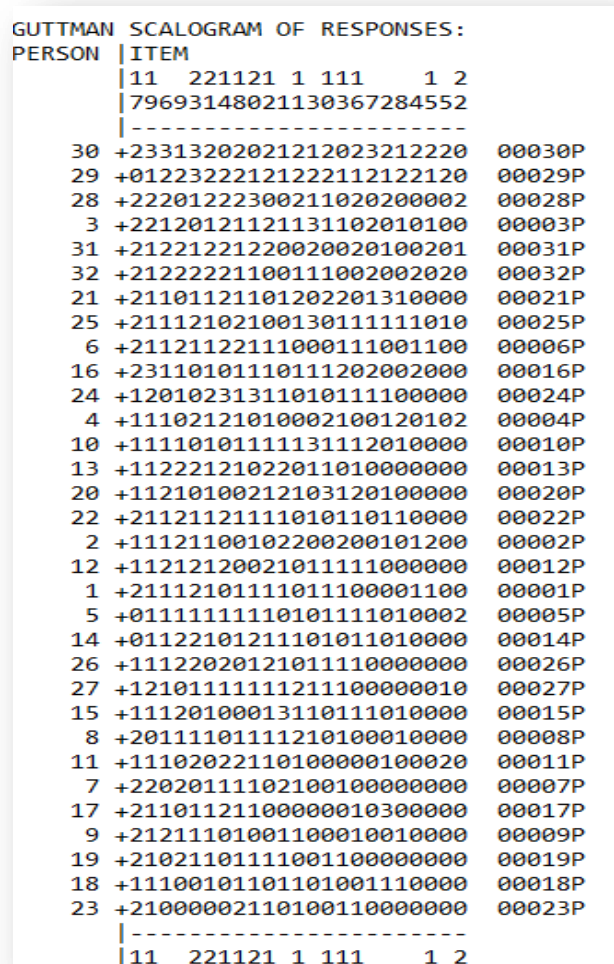
to be followed up with an even distribution of critical thinking skills test instruments to students throughout the class, because in this study the writer only used one batch.

The table below showed the results of the categorization of students' critical thinking skills tests.

**Table 1 The Categorization of Critical Thinking**

Level	Categorization	
	Frequency	Percentage
Low	14	44
Moderate	7	22
High	11	34
Total	32	100

The table 1 represented that the critical thinking skills of Guidance and Counseling students were in the low category at a percentage of 44%. The results of this analysis were supported by the results of field observations that there were still some students who were working less seriously and didn't think deeply because the work time required by the Guidance and Counseling students was quite short and they were in a hurry to collect answer sheets without paying attention to the final result. This was supported by the results of a scalogram analysis that showed the ability of students illustrated below.



**Figure 1. Scalogram of Students' Critical Thinking Skills**

Based on the Figure 1, it could be interpreted that students who had critical thinking skills with the highest score were students with numbers 30 and 29. Furthermore, a student who got the lowest score was a student with number 23. In figure 1, it could be seen that some students gave inconsistent patterns of

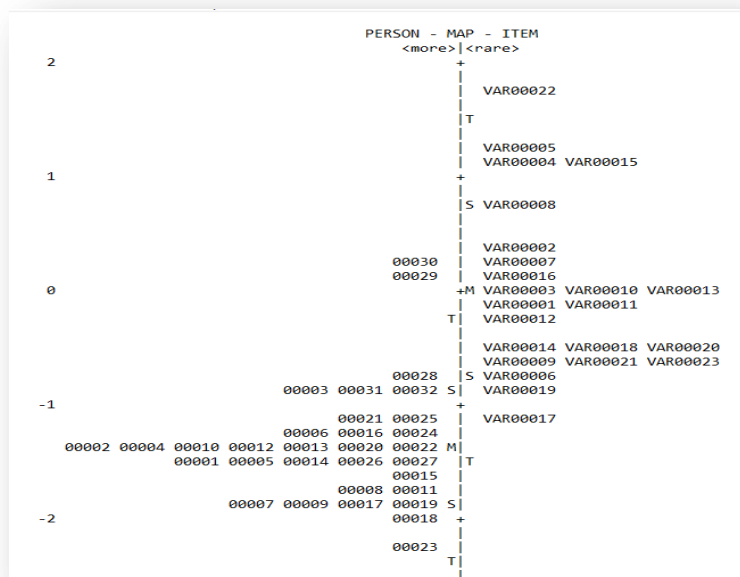
answers. These students were numbers 28, 04, and 05. These students had inconsistent answer patterns because they got score 0 and 1 for the easiest questions, whereas for the most difficult questions, they got 2 points. Based on the results of the scalogram, it could be concluded that most students answered the questions consistently. The pattern of students' answers that were inconsistent could affect the quality of the questions and the reliability of the questions that showed a moderate category with a reliability coefficient of 0.68 as shown in the figure below.

SUMMARY OF 32 MEASURED PERSON								
	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	19.2	23.0	-1.34	.31	.99	.0	1.04	.1
S.D.	5.9	.0	.52	.02	.32	1.2	.39	1.3
MAX.	38.0	23.0	.23	.36	1.76	2.4	1.91	2.7
MIN.	10.0	23.0	-2.29	.28	.43	-2.6	.43	-2.5
REAL RMSE	.33	TRUE SD	.41	SEPARATION	1.25	PERSON RELIABILITY	.61	
MODEL RMSE	.31	TRUE SD	.42	SEPARATION	1.38	PERSON RELIABILITY	.65	
S.E. OF PERSON MEAN = .09								
PERSON RAW SCORE-TO-MEASURE CORRELATION = 1.00								
CRONBACH ALPHA (KR-20) PERSON RAW SCORE "TEST" RELIABILITY = .68								
SUMMARY OF 23 MEASURED ITEM								
	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT		OUTFIT	
					MNSQ	ZSTD	MNSQ	ZSTD
MEAN	26.8	32.0	.00	.27	1.06	.0	1.04	-.1
S.D.	10.3	.0	.74	.04	.37	1.7	.36	1.6
MAX.	46.0	32.0	1.72	.41	1.93	2.7	1.83	2.7
MIN.	7.0	32.0	-1.18	.23	.26	-4.9	.26	-4.9
REAL RMSE	.30	TRUE SD	.68	SEPARATION	2.26	ITEM RELIABILITY	.84	
MODEL RMSE	.27	TRUE SD	.69	SEPARATION	2.54	ITEM RELIABILITY	.87	
S.E. OF ITEM MEAN = .16								
MEAN=.0000 USCALE=1.0000								
ITEM RAW SCORE-TO-MEASURE CORRELATION = -.99								
136 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 1432.09 with 680 d.f. p=.0000								
Global Root-Mean-Square Residual (excluding extreme scores): .6849								

**Figure 2. Reliability of Critical Thinking Skills Test**

Based on the Figure 2, it could be interpreted that the reliability of the questions was in a high category with a reliability coefficient of 0.84 and the reliability of the person showed a value of 0.61 with a moderate category. Person reliability was also influenced by the pattern of students' answers to the tests given, so that the reliability of the person was not much different from the value of the overall test reliability coefficient.

Students who had low critical thinking skills had a percentage of 44%. It could be influenced by internal factors such as the level of difficulty represented in the picture below. These results might also be affected by the distribution of items varying in the degree of difficulty. These items were dominated by items that had difficult categories like the image below.



**Figure 3. Item Maps of Critical Thinking Skills Test**

Based on the Figure 3, the items were dominated with moderate and low difficulty levels. The results of the distribution of difficulty levels in the medium category lie in questions number 02, 07, 16, 03, 10, 13, 01.11, and 12.

## Conclusion

Based on the findings empirically and analyzed through the RASCH Model, the conclusions obtained from this study were critical thinking skills of the Guidance and Counseling study program students had a low category with a percentage of students 44%, while students who had critical thinking skills in the moderate category were 22%, and in the high category, there were 34% students. Based on the scalogram on the RASCH analysis, the highest score was achieved by students with number 30 and the lowest score was achieved by number 23. Based on the results of the analysis obtained, 44% students had low critical thinking skills. The data needed to be recommended as a reference data in further research regarding respondents' considerations that required follow-up in the form of group counseling using cognitive approaches.

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