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## DIGITAL LITERACY COMPETENCE LEVELS OF INDONESIAN JUNIOR HIGH SCHOOL STUDENTS BASED ON ACTIVITIES THROUGH THE 5M APPROACH

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**Abstract.** Students' competence to utilize digital technology to access information as learning sources has become a necessity as experienced during the covid-19 pandemic. Students should have the digital literacy competence to support the students' learning processes. This research was conducted to reveal the digital literacy competence levels covering internet searching, hypertextual navigation, content evaluation, and knowledge assembly based on activities made by the students of Junior High Schools in Singkawang. The samples were selected using a proportional random sampling technique and 75 respondents were selected representing the students of Junior High Schools in Singkawang. The collected data were then processed using a descriptive statistical analysis with a quantitative approach. The statistical test was conducted using mini-step Program with Rasch modeling to measure the students' digital literacy competence levels at Junior High Schools in Singkawang. The research results showed that the digital literacy competence level test measuring instrument was considered valid and reliable. The digital literacy competence level with high logit value of +3.78 logit also showed high problem-solving competence level. The students' digital literacy competence level based on activities was classified into high category. Meanwhile, the activities made by the students included 5M: searching and selecting information (M1), managing information (M2), analyzing information (M3), utilizing information (M4), and sharing information (M5).

**Keywords:** Digital Literacy; 5M Approach; Students Competence

### I. INTRODUCTION

National Digital Literacy Movement (GNLD) known as Siberkreasi has four pillars to support the Indonesian digital transformation. Those four digital literacy pillars covering digital skills, digital ethics, digital culture and digital safety. Those have become a part to realize Indonesia into digital nations (Kemkominfo, 2021).

Digital skills should be started from the basic level to digital ethics. Ethics are greatly required in digital room, to prevent people from attacking each other, disseminating false news, hoax, hate speech, and others. Digital culture has an important role in building a healthy digital culture, clean, and safe (digital safety). The Covid-19 pandemic has also impacted the education world, which eventually obliged the students to learn online from home as well as the teachers using various online learning platforms. The teachers suddenly have to adapt with the recent conditions, providing either synchronous or asynchronous online learning platforms (Barbosa, V. S., Lima, V., Silva, R., Silva, W.,

Soares, A. C., & de Sousa, A., 2012). The students really wanted to use technology to improve their learning processes since technology has become a part of students' and teachers' life, yet they have realized the difficulties in using online platforms and lack of competence to use the computer.

The teachers' minimum competence to develop the online-learning platform and unavailability learning modules in the related platforms, the teachers let the students to independently (independent learning) find any information related to the learning, materials, and digitally use the internet access. The challenges and risks which should be avoid include disinformation, mall information, misinformation, radicalism, hate speech, cyberbullying, pornography, online deception, hoax, and discrimination (ethnicity, religion, race, and inter-group relations). The formation of digital literacy competence involves some conceptual shifts, moving from the teacher-centered pedagogy to heutagogy or student-centered pedagogy (Luckin et al., 2010; Mursidi, A., et al., 2019). Thus, reinforcement and understanding on digital literary are

greatly required by the students. Literacy skill is one of skills required in the 21st century, along with learning skills and life skills. Multiliteracy shows the richness of literacy sources, including digital literacy (Pratolo, B. W., & Solikhati, H. A. (2021)). To overcome the challenges, digital literacy which function is to improve the students' cognitive competences, attitudes, and skills not only related to operating the gadget (smart phone and laptop), but also have four digital literacy pillars. Based on the explanations above, this research developed a digital literacy competence of students based on activities supporting the independent learning. Based on needs analysis as written on background, the research problem was related to how to realize four digital literacy pillars covering internet searching, hypertextual navigation, content evaluation, and knowledge assembly based on activities of Junior High School Students in Singkawang?

According to Paul Gilster in his book entitled *Digital Literacy* (1997), Digital Literacy is defined as the ability to understand and utilize information in various forms of sources widely accessed through computer devices. Competence is defined as the ability of someone to observe knowledge, skills, and working attitudes in completing a job or duty based on the previously established performance standards (Kemedikbud, 2010:9).

Paul Gilster explained in his book entitled *Digital Literacy* (1997) that digital literacy is defined as ability to understand and use information in various forms of sources widely accessed through computer devices. Hanelahi, D., & Atmaja, K. (2020) also defined digital literacy as knowledge and competence to use digital media, communication devices, or networks to figure out, evaluate, use and create information for healthy, wise, smart, precise, accurate, and obedience to laws to maintain communication and interactions in our daily life.

Gilster (1997:3) classified digital literacy into four main competences (4 M) should be possessed by someone including a) Searching (searching information through internet or Internet Searching), b) Hypertextual Navigation, c) Information Content Evaluation, and d) Knowledge Assembly. The four pillars of Digital Literacy covered digital skills, digital ethics, digital culture, and digital safety (Eynon, R., 2021). The efforts to support the development of digital skills were seen at schools, higher education institutions, vocational schools, libraries, and learning objectives to support people in developing the digital competences for the daily life and jobs (Hunter, J. D., Silvestri, K. N., & Ackerman, M. L., 2018). The digital competence practices productively supported the literacy learning management, in this case, serving Junior High School students and literacy specialist candidates. Digital literacy does not mean only having the basic competences related to the utilization of digital devices but also complex skills including cognitive, motoric, social, and emotional skills to support the students (Demirbag, M., & Bahcivan, E. (2021).

This research developed the reinforcement of digital literacy competences based on activities adapted from that

conducted by Gilster (1997) with the following activity stages: [searching and selecting information] (M1), [managing information] (M2) [analyzing information] (M3), [utilizing information] (M4), and [sharing information] (M5). The content of 5M activities were adapted from that belonging to Mardiana (2022), Candrasari (2020), Setiawan (2020) starting from searching to sharing information safely and healthily. It was shown that the activities based on 5M are cycles which should be passed by the students when making interactions with internet and selectively sharing information by avoiding false news and discriminative (ethnicity, religion, race, and inter-group relations) issues. In relation with the students' learning activities using internet sources, these 5M steps are greatly important to be internalized in the students' learning activities either at school or home.

The first stage of M1 is that students must be literate in determining the keywords for searching information through internet. From the written keywords, google will display many information choices, so that the next stage is selecting information in accordance with the students' duties (M1). The selected information is commonly more than one source, so that some information should be made into one called the temporary information conclusion (M2). The temporary information should be analyzed to obtain the information truth by comparing with the other relevant sources, confirming to the experts /teachers/parents or related units (M3). This M3 stage requires the students' critical thinking. After the information was considered right, the students can use the information to complete their school duties (M4). Only the right information may be shared to the other students (M5). Thus, it is expected that all students' activities through internet or google have been based on 5M as an indication that the students have already had a good digital literacy.

## II. METHODS

### *Research Questions*

To prepare the students in facing the development of technology in Singkawang, West Kalimantan, Indonesia, poor digital literacy limited the students' opportunities to learn. Their opportunities to engage in learning processes required technology to master. With digital literacy competence, it is expected that the education world, especially in Singkawang will develop. By considering those problems, this research questioned how are the digital literacy competence covering internet searching, hypertextual navigation, content evaluation, and knowledge assembly based on activities made by the Junior High School students in Singkawang?

### *Participants*

75 students involved in this research were given treatments with activities in the learning processes in the classes within the Academic Year of 2022. The respondents were selected through two-tier, stratified, and random sampling techniques. Four schools were involved in this research according to Table 1.

Table 1  
 Participants Distribution

No	School	Samples (20%)
1	Junior High School Torsina III	20
2	Junior High School 20 Singkawang	18
3	Junior High School 8 Singkawang	21
4	Junior High School Al-fatah	16
Total		75

The research data were taken using a proportional random sampling technique. This technique was used to take the samples by paying attention to some population elements or categories (Creswell, 2008).

*Data Analysis*

Data analysis is the next stage after data collection and data processing. This research analyzed the digital literacy competence levels of students after learning processes consisting of internet searching, hypertextual migration, content evaluation, and knowledge assembly. The data analysis technique used in this research was a descriptive-statistical data analysis with a quantitative approach. The research data were analyzed by describing the collected data without making any generalized conclusion using a statistical test with a ministep program to measure the digital literacy competence level of Junior High School students in Singkawang. The ministep program was used to analyze the data using Rasch modeling. The research data were taken using a proportional random sampling technique. This technique was used to take the samples by paying attention to some population elements or categories (Creswell, 2008).

III. RESULTS AND DISCUSSION

*Person Fit Order*

Person fit order in Table 2 provides information related to person fit ranked from the most inappropriate one. Not only mapping the students' competence in accordance with their high-achievement grouping interest, Rasch modelling can also detect the students' inappropriate responses due to the inappropriate given answers to their competences.

INPUT: 75 Person 25 Item REPORTED: 75 Person 25 Item 2 CATS WINSTEPS 3.73  
 Person: REAL SEP.: .00 REL.: .00 ... Item: REAL SEP.: .00 REL.: .00

Person STATISTICS: MISFIT ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	OUTFIT ZSTD	PT-MEASURE CORR.	EXACT MATCH%	EXACT MATCH%	Person			
17	24	25	3.13	1.04	1.10	4.2	1.1	A-.05	.17	95.0	95.0	17PK	
29	24	25	3.13	1.04	1.10	4.2	1.1	B-.05	.17	95.0	95.0	29PT	
63	24	25	3.13	1.04	1.10	4.2	1.1	C-.05	.17	95.0	95.0	63LR	
73	24	25	3.13	1.04	1.10	4.2	1.1	D-.05	.17	95.0	95.0	73PR	
67	23	25	2.36	.76	1.19	5.2	2.00	1.3	E-.07	.23	90.0	90.0	67LR
38	22	25	1.87	.64	1.17	5.1	1.50	1.0	F-.07	.29	85.0	85.0	38LT
1	23	25	2.36	.76	1.02	2.1	1.25	6	G-.18	.23	90.0	90.0	01PK
2	24	25	3.13	1.04	1.05	4.1	1.02	4	H-.12	.17	95.0	95.0	02LK
9	24	25	3.13	1.04	1.05	4.1	1.02	4	I-.12	.17	95.0	95.0	09LK
22	24	25	3.13	1.04	1.05	4.1	1.02	4	J-.12	.17	95.0	95.0	22LT
36	24	25	3.13	1.04	1.05	4.1	1.02	4	K-.12	.17	95.0	95.0	36LT
48	24	25	3.13	1.04	1.05	4.1	1.02	4	L-.12	.17	95.0	95.0	48PQ
49	24	25	3.13	1.04	1.05	4.1	1.02	4	M-.12	.17	95.0	95.0	49PQ
57	24	25	3.13	1.04	1.05	4.1	1.02	4	N-.12	.17	95.0	95.0	57PR
20	23	25	2.36	.76	1.02	2.1	.83	0	O-.24	.23	90.0	90.0	20LT
14	24	25	3.13	1.04	.99	3.1	.66	0	P-.22	.17	95.0	95.0	14LK
74	24	25	3.13	1.04	.99	3.1	.66	0	Q-.22	.17	95.0	95.0	74LR
5	24	25	3.13	1.04	.93	2.1	.48	-2	R-.30	.17	95.0	95.0	05PK
11	24	25	3.13	1.04	.93	2.1	.48	-2	S-.30	.17	95.0	95.0	11LK
16	24	25	3.13	1.04	.93	2.1	.48	-2	T-.30	.17	95.0	95.0	16PK
18	24	25	3.13	1.04	.93	2.1	.48	-2	U-.30	.17	95.0	95.0	18LK
23	24	25	3.13	1.04	.93	2.1	.48	-2	V-.30	.17	95.0	95.0	23LT
50	24	25	3.13	1.04	.93	2.1	.48	-2	W-.30	.17	95.0	95.0	50PQ
53	24	25	3.13	1.04	.93	2.1	.48	-2	X-.30	.17	95.0	95.0	53PQ
62	24	25	3.13	1.04	.93	2.1	.48	-2	Y-.30	.17	95.0	95.0	62PR
65	24	25	3.13	1.04	.93	2.1	.48	-2	Z-.30	.17	95.0	95.0	65LR
69	24	25	3.13	1.04	.93	2.1	.48	-2	aa-.30	.17	95.0	95.0	69PR
71	24	25	3.13	1.04	.93	2.1	.48	-2	ab-.30	.17	95.0	95.0	71PR
35	20	25	1.19	.54	.87	4.1	.82	-4	b-.48	.36	75.0	75.0	35PT
7	23	25	2.36	.76	.85	-1.1	.49	-6	aa-.43	.23	90.0	90.0	07LK
MEAN	24.5	25.0	3.78	1.48	1.00	.31	.97	.21		93.3	93.3		
S.D.	.8	.0	.76	.42	.08	.21	.57	.51		4.1	4.2		

Fig 2. Person Fit Order

The INFIT MNSQ value from each person can be used to examine both fit dan misfit persons. The average value and standard deviation were summed and then compared. The logit value bigger than the summed-up value indicated the misfit person. The number of a person's logit from mean and deviation standard was  $1.00 + 0.08 = 1.08$ . Thus, the criteria can figure out the fit dan misfit persons. The number of a person's logit value from MEAN and S.D. was 1.08 logit. Jika the logit value is bigger than 1,08, the item is indicated inappropriate or not valid.

Based on the logit number of 1.08, there were 6 misfit persons consisting of students with the registered numbers 17, 29, 63, 73, 67 and 38 showing inappropriate answers with their abilities. The students with the entry numbers of 1, 2, 9, 22, 36, 48, 49, and 57 had the same INFIT MNSQ value of +1.05 logit, in which students with the entry numbers 1, 2 and 9 from the same school of Junior High School 8 Singkawang, students with the entry numbers of 22 and 36 from Junior High School Torsina Plus Singkawang, students with the entry numbers of 48 and 49 from Junior High School AL- Fatah, showed that the students with the same INFIT MNSQ possibly performed fraud shown with the correct answers. Meanwhile, students with the entry numbers of 14 and 74 had the same INFIT MNSQ value of +0.99 logit, yet from different schools. The test given was also not in the same time and place. The students with the entry numbers of 5, 11, 16, and 18 were from the same school (Junior High School 20 Singkawang). The students with the entry numbers of 50 and 53 were also from the same school (Junior High School AL-Fatah). In addition, the students with the entry numbers of 62, 65, 69, and 71 were from the same school (Junior High School 8 Singkawang). They had the same INFIT MNSQ value of +0.93 logit. It

showed that those with the same INFIT MNSQ value possibly committed fraud and shown with the correct answers.

**Statistical Summary**

The statistical summary was made to obtain information related to the test results of students' digital literacy with the main menu of output is given by Table 3.

TABLE 3.1 C:\Users\HP\Desktop\dikatomi3.prn ZOU198WS.TXT Apr 20 8:09 2022  
 INPUT: 75 Person 25 Item REPORTED: 75 Person 25 Item 2 CATS WINSTEPS 3.73

SUMMARY OF 30 MEASURED (NON-EXTREME) Person

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	ZSTD	OUTFIT MNSQ	ZSTD
MEAN	23.7	25.0	2.92	.97	1.00	.3	.97	.2
S.D.	.8	.0	.46	.14	.08	.2	.57	.5
MAX.	24.0	25.0	3.13	1.04	1.19	.5	2.10	1.3
MIN.	20.0	25.0	1.19	.54	.85	-.4	.48	-.6

REAL RMSE 1.00 TRUE SD .00 SEPARATION .00 Person RELIABILITY .00  
 MODEL RMSE .98 TRUE SD .00 SEPARATION .00 Person RELIABILITY .00  
 S.E. OF Person MEAN = .09

MAXIMUM EXTREME SCORE: 45 Person

SUMMARY OF 75 MEASURED (EXTREME AND NON-EXTREME) Person

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	ZSTD	OUTFIT MNSQ	ZSTD
MEAN	24.5	25.0	3.78	1.48				
S.D.	.8	.0	.76	.42				
MAX.	25.0	25.0	4.35	1.81				
MIN.	20.0	25.0	1.19	.54	.85	-.4	.48	-.6

REAL RMSE 1.54 TRUE SD .00 SEPARATION .00 Person RELIABILITY .00  
 MODEL RMSE 1.53 TRUE SD .00 SEPARATION .00 Person RELIABILITY .00  
 S.E. OF Person MEAN = .09

Person RAW SCORE-TO-MEASURE CORRELATION = .96  
 CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .28

SUMMARY OF 20 MEASURED (NON-EXTREME) Item

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	ZSTD	OUTFIT MNSQ	ZSTD
MEAN	73.0	75.0	.00	.83	1.00	.2	.97	.2
S.D.	1.2	.0	.63	.20	.09	.2	.38	.5
MAX.	74.0	75.0	.97	1.03	1.11	.4	1.40	.7
MIN.	71.0	75.0	-.58	.55	.80	-.3	.23	-.7

REAL RMSE .87 TRUE SD .00 SEPARATION .00 Item RELIABILITY .00  
 MODEL RMSE .86 TRUE SD .00 SEPARATION .00 Item RELIABILITY .00  
 S.E. OF Item MEAN = .15

MINIMUM EXTREME SCORE: 5 Item  
 UMEAN=.0000 USCALE=1.0000

SUMMARY OF 25 MEASURED (EXTREME AND NON-EXTREME) Item

	TOTAL SCORE	COUNT	MEASURE	MODEL ERROR	INFIT MNSQ	ZSTD	OUTFIT MNSQ	ZSTD
MEAN	73.4	75.0	-.36	1.03				
S.D.	1.3	.0	.91	.43				
MAX.	75.0	75.0	.97	1.81				
MIN.	71.0	75.0	-1.78	.55	.80	-.3	.23	-.7

REAL RMSE 1.12 TRUE SD .00 SEPARATION .00 Item RELIABILITY .00  
 MODEL RMSE 1.12 TRUE SD .00 SEPARATION .00 Item RELIABILITY .00  
 S.E. OF Item MEAN = .19

Item RAW SCORE-TO-MEASURE CORRELATION = -.96  
 600 DATA POINTS. LOG-LIKELIHOOD CHI-SQUARE: 267.35 with 551 d.f. p=1.0000  
 Global Root-Mean-Square Residual (excluding extreme scores): .2420  
 Capped Binomial Deviance = .0380 for 1650.0 dichotomous observations

Fig. 2 Statistical Summary

The statistical summary above gave holistic information related to the instrument quality used and interactions between person and item. The obtained information showed the person measure of = 2.92 logit indicating the average value of all students in completing the question items

provided by the researchers. Based on the obtained average value of 2.92 greater than 0.0 indicated that the students' ability tendency which was greater than the questions' difficulty levels. The value of person reliability and item reliability of each 0.00 showed that the students' answer resistance was poor as well as the question item quality in its instrument reliability aspect. The INFIT MNSQ and OUTFIT MNSQ for the average value of person table were respectively 1.00 and 0.97. For the ideal value of 1.00, it can be concluded that the average value was getting better. The INFIT ZSTD and OUTFIT ZSTD had the average value in the person table of respectively 0.3 and 0.2, in this case, the ideal value was 0.0 (since closing to zero, the value was getting better).

**Analysis on Students' Ability**

The analysis on the students' ability in completing the test questions of students' digital literacy aimed to identify students who had high competence level, those with different response patterns, and identified working together. The person measure results were presented by Table 4.

INPUT: 75 Person 25 Item REPORTED: 75 Person 25 Item 2 CATS MINISTEP 5.2.2.0  
 Person: REAL SEP.: .00 REL.: .00 ... Item: REAL SEP.: .00 REL.: .00

Person STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	UMLE MEASURE	MODEL S.E.	INFIT [MNSQ ZSTD]	OUTFIT [MNSQ ZSTD]	[PTMEASUR-AL EXACT MATCH CORR. EXP.]	OBSP	EXPS	Person	
3	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	03SK	
4	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	04FK	
6	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	06LK	
8	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	08PK	
10	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	10LK	
12	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	12PK	
13	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	13LK	
15	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	15FK	
19	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	19LT	
21	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	21LT	
24	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	24LT	
25	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	25PT	
26	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	26PT	
27	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	27LT	
28	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	28LT	
30	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	30PT	
31	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	31PT	
32	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	32LT	
33	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	33PT	
34	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	34LT	
37	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	37LT	
39	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	39LK	
40	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	40PK	
41	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	41PK	
42	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	42LQ	
43	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	43PK	
44	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	44PK	
45	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	45PK	
46	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	46PK	
47	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	47PK	
51	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	51LQ	
52	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	52LQ	
54	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	54LQ	
55	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	55PK	
56	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	56LR	
58	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	58PK	
59	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	59LR	
60	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	60LR	
61	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	61LR	
64	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	64PK	
66	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	66PK	
68	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	68LR	
70	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	70PK	
72	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	72LR	
75	25	25	4.35	1.81	MAXIMUM MEASURE		.00	.00	100.0	75PK	
2	24	25	3.13	1.04	1.05	.35 1.02	.39	.12	.17	95.0	02LK
5	24	25	3.13	1.04	.93	.22 1.48	-.20	.30	.17	95.0	05PK
9	24	25	3.13	1.04	1.05	.35 1.02	.39	.12	.17	95.0	09LK
11	24	25	3.13	1.04	.93	.22 1.48	-.20	.30	.17	95.0	11LK
14	24	25	3.13	1.04	.99	.29 1.66	.03	.22	.17	95.0	14LK
16	24	25	3.13	1.04	.93	.22 1.48	-.20	.30	.17	95.0	16PK
17	24	25	3.13	1.04	1.10	.41 2.10	1.12	-.05	.17	95.0	17PK
18	24	25	3.13	1.04	.93	.22 1.48	-.20	.30	.17	95.0	18LK
22	24	25	3.13	1.04	1.05	.35 1.02	.39	.12	.17	95.0	22LT
23	24	25	3.13	1.04	.93	.22 1.48	-.20	.30	.17	95.0	23LT
29	24	25	3.13	1.04	1.10	.41 2.10	1.12	-.05	.17	95.0	29PT
36	24	25	3.13	1.04	1.05	.35 1.02	.39	.12	.17	95.0	36LT
38	24	25	3.13	1.04	1.05	.35 1.02	.39	.12	.17	95.0	38PK
49	24	25	3.13	1.04	1.05	.35 1.02	.39	.12	.17	95.0	49PK
50	24	25	3.13	1.04	.93	.22 1.48	-.20	.30	.17	95.0	50PK
53	24	25	3.13	1.04	.93	.22 1.48	-.20	.30	.17	95.0	53PK
57	24	25	3.13	1.04	1.05	.35 1.02	.39	.12	.17	95.0	57PK

	62	24	25	3.13	1.04	.93	.22	.48	-.20	.30	.17	95.0	95.0	62PR	
	63	24	25	3.13	1.04	1.10	.41	1.21	1.12	-.05	.17	95.0	95.0	63LR	
	65	24	25	3.13	1.04	.93	.22	.48	-.20	.30	.17	95.0	95.0	65LR	
	69	24	25	3.13	1.04	.93	.22	.48	-.20	.30	.17	95.0	95.0	69PR	
	71	24	25	3.13	1.04	.93	.22	.48	-.20	.30	.17	95.0	95.0	71PR	
	73	24	25	3.13	1.04	1.10	.41	1.21	1.12	-.05	.17	95.0	95.0	73PR	
	74	24	25	3.13	1.04	.99	.29	.66	.03	.22	.17	95.0	95.0	74LR	
	1	23	25	2.36	.76	1.02	.23	1.25	.56	.18	.23	90.0	90.0	01PK	
	7	23	25	2.36	.76	.85	-.09	.49	-.61	.43	.23	90.0	90.0	07LK	
	20	23	25	2.36	.76	1.02	.23	.83	.00	.24	.23	90.0	90.0	20LT	
	67	23	25	2.36	.76	1.19	.51	1.20	1.31	-.07	.23	90.0	90.0	67LR	
	38	22	25	1.87	.64	1.17	.52	1.50	.98	.07	.29	85.0	85.0	38LT	
	35	20	25	1.19	.54	.87	-.41	.82	-.44	.48	.36	75.0	75.0	35PT	
	MEAN	24.5	25.0	3.78	1.48	1.00	.27	.97	.23			93.3	93.3		
	P.SD	.8	.0	.76	.42	.08	.17	.57	.53			4.1	4.2		

Fig. 4. Analysis on students' ability

In person measure table (individual ability level) provided the data of students' competence/ability with logit information from each individual. High logit value showed high problem-solving ability level. This showed the total scores with appropriate columns (number of correct answers). The entry number columns included the students' entry numbers, while the students' codes could be seen in the person section starting from high ability/competence of 8 students from Junior High School 20 Singkawang consisting of 4 male students and 4 female students; 13 students from Junior High School Torsina III Plus consisting of 8 male students and 5 female students; 12 students from Junior High School AL-Fatah consisting of 5 students and 7 female students; and 12 students from Junior High School 8 Singkawang consisting of 6 male students and 6 female students. High logit value shows high problem-solving ability level. There were 45 respondents (students) with the logit value of +4.35 from 4 different schools consisting of 23 male students and 22 female students. This was also shown by 25 students with all correct answers.

The student with poor value had the entry number 35 with the code of 35 PT, a female student from Junior High School Torsina Plus Singkawang. The logit value of + 1.19 means poor logit value that the related student had poor problem-solving level with the number of 20 correct answers when compared to the students with no incorrect answers when solving the problems/questions.

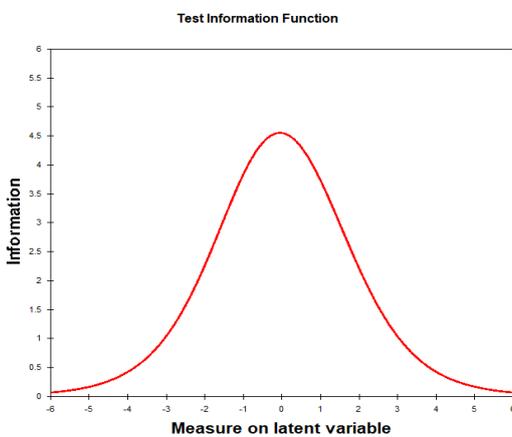


Fig. 5 Information Function

From the Figure 1 of information function curve, it was obtained that 25 question items were given to 75 students. Those question items were greatly appropriate to figure out the students' medium digital literacy ability.

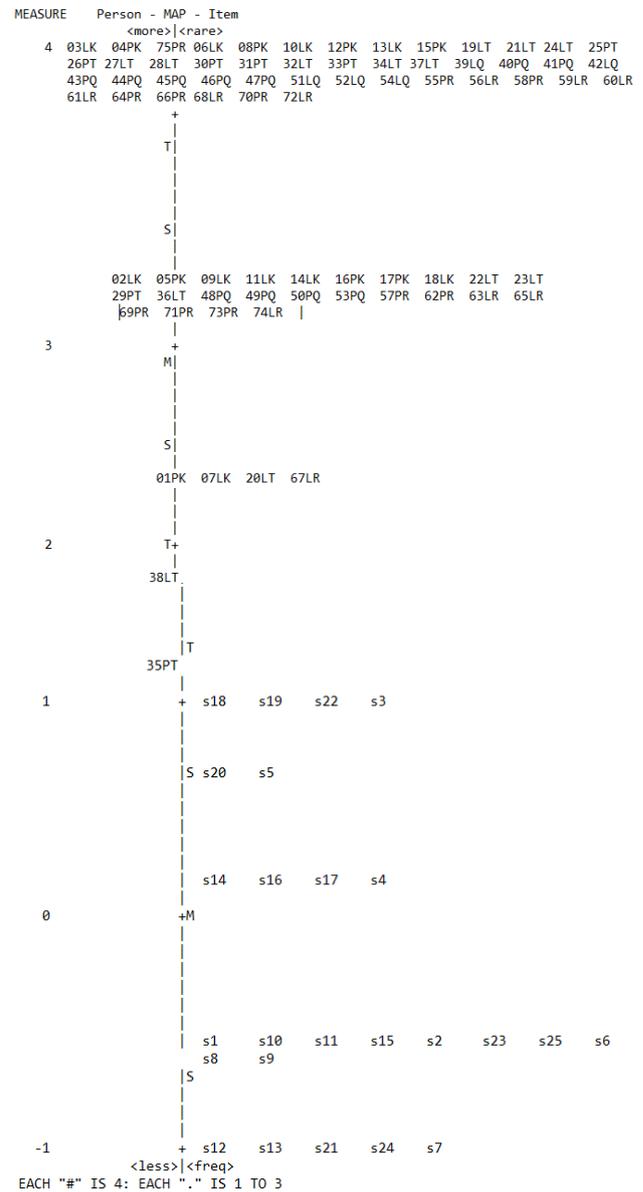


Figure 6. Wright map

The Wright map on Figure 2 depicted the students' digital literacy competence in which there were 45 students with high ability covering students with entry numbers of 03LK 04PK 05PK 06LK 08PK 10LK 12PK 13LK 15PK 19LT 21LT 24LT 25PT 26PT 27LT 28LT 30PT 31PT 32LT 33PT 34LT 37LT 39LQ 40PQ 41PQ 42LQ 43PQ 44PQ 45PQ 46PQ 47PQ 49PQ 50PQ 51LQ 52LQ 54LQ 55PR 56LR 58PR 59LR 60LR 61LR 64PR 66PR 68LR 70PR 72LR. The logit value was +4. Meanwhile, student with the poorest ability was that with the entry number of 35 PT and logit

value of above + 1 which means still classified into the medium category. For questions with medium difficulty level included s18 s19 s22 s3 with the logit value of +1 above the average of item's logit (0.0). in addition, the questions with low difficulty level included s7 s12 s13 s21 s24 with the logit value of -1 below the average of logit value.

### **Discussion**

Based on the research results using 5 M activities to provide the digital literacy competence reinforcement to the Junior High School Students in Singkawang through digital literacy test questions in the multiple-choice forms seen from their validity and reliability, the students' digital literacy competence was measured based on its variables consisting of Internet searching, hypertextual navigation, Content Evaluation, and Knowledge Assembly. The indicator from the digital literacy competence variable when 5M activities were implemented showed a very high ability. The statistical results also showed that the logit value was  $2.92 > 0.00$  which means that the digital literacy competence of students in Singkawang when 5M activities were implemented was better after the reinforcement was given.

According to Cote, T. J., & Milliner, B. (2017), learning using digital literacy has become one important step in developing literacy in the 21st century. Based on the results of analysis on the Person Fit Order table, it showed that the items could cover all students' competences starting from those with high to low competences although there were still six misfit items which were further improved for the development of this research and the scales were then extended. According to Taskiran, C., & Salur, M. (2021), Digital Literacy can provide contributions for the students to develop themselves through technology. Baterna, H. B., Mina, T. D. G., & Rogayan Jr, D. V. (2020) also explained that digital literacy can better facilitate the student's learning activities. Moreover, digital technology can help develop the learning materials and create fun learning environment (Liza & Andriyanti, 2020).

Person reliability and item reliability showed that the students' answers still had low consistence, yet the average value was still at ideal category of 1.00. According to Mursidi, A & Murdani, E (2018), the students' literacy levels had a vertical relationship with the quality of the nation. The students' high reading interest influenced their insight, mentality, and behavior. The analysis on students' ability answered the student's high digital literacy questions in which 45 students had answered all questions correctly for the whole 25 items. However, one student could correctly answer only 20 of 25 questions. The high digital literacy competence belonged to 20 students of Junior High School 20 Singkawang; 12 students of Junior High School 8 Singkawang; 13 students of Junior High School Torsina Plus; and 12 students of Junior High School AL-Fatah Singkawang. Each student had the total score of 25 items with the logit value of 4.35. Based on the logit value, the students' digital literacy for learning showed that they had good skills. According to Chan, B. S., Churchill, D., & Chiu,

T. K. (2017), the Digital Literacy skills should be developed, so that the students could communicate and express their ideas effectively using digital media. Alexander, B., Becker, S. A., Cummins, M., & Giesinger, C. H. (2017) explained that the ability to discern credible from inaccurate resources is foundational to digital literacy. Rumahlatu et al. (2021) mentioned that digital literacy could also empower the students' creative thinking. Digital Literacy helped the students succeeded in various fields, such as in learning (Sivrikaya, M. H., 2020). This research was probably the first conducting the assessment of students' digital literacy competence using Rasch modelling. According to Sumintono and Widhiarso (2015), the main objective of Rasch modelling is creating measurement scales with the same intervals.

The question items of students' digital literacy competence with the indicator of internet searching included question item numbers 7 and 12 with the parameter of searching operation execution, question item number 13 with the indicator of hypertextual navigation and the parameter of internet exploring, question item number 21 with the indicator of Content Evaluation and the parameter of evaluating information source, question item number 24 with the indicator of Knowledge Assembly and the parameter of making appropriate decision to reach the goals. Of those five question items, the students making their mistakes had the codes of 01PK 07LK 20LT 67LR 38LT and 35 PT, consisting of 4 male students and 2 female students. The question items related to digital literacy competence can be used as a reference to improve the quality of education, especially in Singkawang. Jessica, Harmianto & Mareza (2020) explained that literacy activities are encouraged to improve the quality of education in Indonesia and quality of human resources to possibly use the technology. Sumiati & Wijonarko (2020) mentioned that digital literacy has recently become a necessity to realize the educational operation. Dewi et al (2021) further explained that it is important to utilize digital literacy in forming the students' characters, especially those at primary school levels.

### **IV. CONCLUSIONS**

From the research results, it can be concluded that "The students' digital literacy test questions" were valid and reliable measuring instruments. These questions can be used to measure the students' digital literacy competence. The students' digital literacy levels will reveal to what extend good digital literacy has been implemented through activities during the learning processes. Six misfit questions will show the possible improvements required in the following greater research. The digital literacy competence with the high logit value of +3.78 shows the competence level to solve the higher-level questions. The digital literacy competence level of students based on activities was in high ability. The performed activities were 5 M: mencari dan memilih [researching and selecting] (M1), mengolah [managing]

(M2), [analyzing] (M3), menggunakan [utilizing] (M4), and membagikan [sharing] information (M5).

The implication of 5M activities is that students must be selective in receiving and sharing information both for learning and non-learning to avoid false news and discrimination issues throughout the world. These 5M activities can be implemented by the teachers to reinforce the students' digital literacy. The digital literacy competence should be well possessed by the people to create their growth-mindset preventing from the information flow susceptible to social conflicts.

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