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Validation of the Student Digital Literacy Questionnaire: Analysis using EFA and Rasch Modelling

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Abstract

This study aims to validate a questionnaire designed to assess students' digital literacy. A quantitative survey approach was employed, and the instrument was validated using Exploratory Factor Analysis (EFA) and Rasch modelling. EFA was conducted to identify the underlying factor structure, examine relationships among items, and eliminate items that did not adequately represent the intended constructs. Rasch modelling was subsequently applied to evaluate the instrument's psychometric properties, including item fit, reliability, and measurement invariance. The sample consisted of 101 junior high school and MTs pupils from three schools; the schools were selected using cluster random sampling, followed by the selection of pupils using simple random sampling. The results of the exploratory factor analysis (EFA) showed that the KMO or Overall MSA values for all items were greater than 0.50, and the results of Bartlett's Test revealed a value of X^2 = 1,479.634 at df = 595, with p < 0.001 (i.e. less than 0.05). This indicates that the data are intercorrelated and form four factors. Meanwhile, the results of the Rasch modelling showed a variance of 33.2 per cent, indicating that, overall, the quality of the items developed by KOMINFO falls within the 'adequate' category. Furthermore, the variance contrast eigenvalue of 3.411 exceeds the recommended threshold of 3, suggesting potential multidimensionality and indicating that certain items may require further examination. The eigenvalue in the unexplained variance contrast was 7.0 per cent, whilst the observed unexplained variance contrast was <15 per cent, indicating a good fit with the measurement model. Pupils demonstrate good digital competence in the areas of digital skills, digital safety and digital culture, whilst digital ethics still requires guidance to strengthen pupils' digital ethics, which will have a direct impact on their safety, character and learning environment. If digital ethics continues to be fostered amongst pupils, it is hoped that they will develop an attitude characterised by tabayun, hifzhul lisan, honesty, trustworthiness and responsibility

Keywords*: Digital Competence; Digital Media; Rasch Model.*

Abstrak

Penelitian ini bertujuan untuk memvalidasi kuesioner yang dirancang guna menilai literasi digital siswa. Pendekatan survei kuantitatif digunakan, dan instrumen tersebut divalidasi dengan

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menggunakan Analisis Faktor Eksploratori (EFA) dan pemodelan Rasch. EFA dilakukan untuk mengidentifikasi struktur faktor yang mendasari, memeriksa hubungan antar item, dan mengeliminasi item yang tidak cukup mewakili konstruk yang dimaksud. Pemodelan Rasch kemudian diterapkan untuk mengevaluasi sifat-sifat psikometrik instrumen, termasuk kesesuaian item, reliabilitas, dan invarian pengukuran. Sampel terdiri dari 101 siswa SMP dan MTs dari tiga sekolah; sekolah-sekolah tersebut dipilih menggunakan pengambilan sampel acak berkluster, diikuti dengan pemilihan siswa menggunakan pengambilan sampel acak sederhana. Hasil analisis faktor eksploratori (EFA) menunjukkan bahwa nilai KMO atau Overall MSA untuk semua item lebih besar dari 0,50, dan hasil Uji Bartlett menunjukkan nilai X^2 = 1.479,634 pada df = 595, dengan p < 0,001 (yaitu kurang dari 0,05). Hal ini menunjukkan bahwa data saling berkorelasi dan membentuk empat faktor. Sementara itu, hasil pemodelan Rasch menunjukkan varians sebesar 33,2 persen, yang mengindikasikan bahwa secara keseluruhan, kualitas item yang dikembangkan oleh KOMINFO termasuk dalam kategori 'memadai'. Selain itu, nilai eigen kontras varians sebesar 3,411 melebihi ambang batas yang direkomendasikan sebesar 3, yang mengindikasikan potensi multidimensionalitas dan menunjukkan bahwa item tertentu mungkin memerlukan pemeriksaan lebih lanjut. Nilai eigen dalam kontras varians yang tidak dapat dijelaskan adalah 7,0 persen, sedangkan kontras varians yang tidak dapat dijelaskan yang teramati adalah <15 persen, yang menunjukkan kesesuaian yang baik dengan model pengukuran. Siswa menunjukkan kompetensi digital yang baik dalam bidang keterampilan digital, keamanan digital, dan budaya digital, sementara etika digital masih memerlukan bimbingan untuk memperkuat etika digital siswa, yang akan berdampak langsung pada keselamatan, karakter, dan lingkungan belajar mereka. Jika etika digital terus ditanamkan di kalangan siswa, diharapkan mereka akan mengembangkan sikap yang ditandai dengan tabayun, hifzhul lisan, kejujuran, kepercayaan, dan tanggung jawab

Kata kunci: Kompetensi Digital; Media Digital; Model Rasch.

I. Introduction

Digital technology has become an indispensable part of modern life(Akyas, 2022). Junior high school and MTS pupils categorised as Gen Z are known as a tech-savvy generation; however, it is a great pity if they go too far in their use of technology without being equipped with the knowledge of how best to access digital technology (Havrilova & Topolnik, 2017). Digital technology facilitates connectivity and expands networks, enabling students to access diverse sources of knowledge. Digital technology is also a crucial area for development amongst pupils, particularly within the school environment (Agustina et al., 2022). Digital technology has become a key benchmark for the transformation of educational institutions in the learning process, preparing pupils for the future. (UNICEF, 2021) On the other hand, digital technology undoubtedly has negative impacts (Goodwin, 2016; Timotheou et al., 2023)

The rise in the number of digital platform users has, of course, been accompanied by an increase in various issues relating to these platforms. These include the rise in extremist content, pornography and cyberbullying, as well as an increase in the number of users of online gambling apps, which can exacerbate the negative impact of these digital platforms (Akhonya et al., 2026; J. Eerten et al., 2017; Etumnu et al., 2023). The

popularity of these platforms stems from their appeal to a wide age range and their ease of access, thanks to low costs, affordable connectivity and extensive networks (Putri, 2025). With these various advantages, digital platforms have become highly sought after by many young people, including school pupils. Digital development must, of course, be accompanied by digital literacy amongst pupils. Pupils' digital literacy will enhance their literacy skills in support of their learning (Eerten, Doosje, and De Graaf 2017).

According to Paul Gilster, digital literacy refers to the ability to understand and use information obtained from various digital sources (A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2, 2018; Brown & Martinez, n.d.; Mega, 2020; Rodríguez Illera, 2004). Literacy is the ability to read and understand. Digital literacy is the ability to access digital media platforms; it is not merely the skill of finding information, but also the ability to use it in everyday life (Peng & Yu, 2022).

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO)(UNESCO, 2018) , the Digital Literacy Global Framework (DLGF) defines digital literacy as the ability to access, manage, understand, integrate, communicate, evaluate, and create information safely and appropriately through digital technologies. This framework emphasizes that digital literacy encompasses not only technical proficiency but also the critical and responsible use of digital information across various contexts(Apa Itu Cyberbullying Dan Bagaimana Menghentikannya? - UNICEF Indonesia, n.d.; UNESCO, 2018).

The Ministry of Communication and Information Technology (KOMINFO, 2022, 2023; Survei et al., n.d.). has developed a tool to assess the digital literacy levels of Indonesian citizens. This instrument measures four key aspects, namely: (1) Digital Skills, the ability to use ICT hardware and software as well as digital operating systems in everyday life; (2) Digital Ethics, the ability to develop digital etiquette (netiquette) in everyday life by being able to recognise, exemplify, adapt to, rationalise and consider digital usage; and (3) Digital Safety, the ability to raise awareness of personal data protection and digital security in daily life by recognising, modelling, applying, analysing and weighing up digital usage; and (4) Digital Culture: fostering a sense of national identity and Indonesian values in daily life and the digitalisation of culture through the use of ICT (KOMINFO, 2022, 2023; Survei et al., n.d.)

To measure these digital skills, this study utilises an instrument developed based on the four dimensions of digital literacy established by the Ministry of Communication and Information Technology of the Republic of Indonesia.(KOMINFO, 2022; Survei et al., n.d.) The four pillars comprise digital skills, digital ethics, digital safety and digital culture (KOMINFO, 2022, 2023)

Based on these four skills, measurement indicators have been developed to assess the digital literacy of junior high school and Tsanawiyah pupils in recognising, selecting/filtering and avoiding various forms of harmful content, as well as optimising

digital platforms as effective and beneficial learning resources. The research instrument will be based on the following design.

Table 1. Cakap Digital Blueprint

	Digital Skills Items
Digital Skill	I can connect my device to the internet
	I can download files and apps.
	I can upload files.
	I can search for and access data, information and content on digital media.
	I can store data, information, and content on digital media.
	I am used to checking whether the information I find on websites is correct or incorrect.
	I regularly compare information from different sources to assess its accuracy.
	I am able to interact via various digital communication devices.
	I am used to shopping online.
Digital Ethics	I do not post photos with other people's children.
	I do not tag friends when posting content without informing them first.
	I will not make rude comments if someone leaves a negative comment on my post.
	I do not create groups or add people without their permission.
	I will not immediately share information about accidents;
	I will not encourage people to make negative comments;
	I will not share screenshots of conversations on social media.
Digital Safety	On social media accounts, I can control who can view my timeline
	I know how to report misuse on social media.
	I can disable the option to show my location.
	I do not upload personal data on social media.
	I use apps to detect and remove viruses from my device
	I can recognise emails containing spam, viruses or malware.
	I am used to creating secure passwords using a combination of numbers, letters and punctuation marks.
	I back up my data in several locations.
Digital Culture	I adapt the way I communicate so that the other party does not take offence.
	I take into account the feelings of readers from other faiths.
	I credit the author when reposting
	I take into account the feelings of readers from other ethnic groups.
	I share traditional and contemporary Indonesian art and culture online.
	I take into account the feelings of readers with different political views.
	I always take into account and recognise cultural diversity on social media when sharing messages.

The widespread accessibility and popularity of social media platforms have increased adolescents' exposure to diverse forms of digital content, including potentially harmful material. Although social media provides opportunities for communication, learning, and social interaction, exposure to risky online content may also be associated with negative behavioural outcomes. (Goodwin, 2016) Lee and Jun highlight the importance of media literacy in understanding the relationship between exposure to risky online content and cyberaggression among adolescents. These findings underscore the need to examine adolescents' critical abilities to evaluate and respond appropriately to social media content (Lee & Jun, 2024).

Based on this concern, the present study aims to explore digital literacy among school-age adolescents, particularly junior high school and Madrasah Tsanawiyah (MTs) students. Specifically, this study examines how students select social media content and identify potentially harmful or inappropriate material. Accordingly, the study addresses two research questions: (1) How do junior high school and MTs students select social media content? (2) How do these students recognise and interpret potentially harmful social media content?(Etumnu et al., 2023; J.-J. van Eerten et al., 2019)

On the one hand, digital technology facilitates connectivity, expands social networks, and provides young people with greater opportunities to access information, educational resources, and social support. On the other hand, the increasing use of digital platforms, particularly social media, may expose adolescents to various risks, including problematic digital engagement and adverse psychological outcomes. Sala highlights that social media use presents both opportunities and risks for adolescents, with its consequences influenced by individual characteristics, patterns of use, and platform design. These opportunities and challenges have become increasingly complex alongside the rapid proliferation of social media platforms (The State of the World's Children 2017 | UNICEF, n.d.; UNESCO, 2018; UNICEF, 2021)

This study aims to assess students' digital literacy levels using an instrument developed by the Indonesian Ministry of Communication and Informatics (KOMINFO). (KOMINFO, 2022, 2023) To establish the instrument's psychometric properties, two complementary analytical approaches will be employed: Exploratory Factor Analysis (EFA) and the Rasch Measurement Model. EFA will be used to explore the underlying factor structure, examine relationships among observed variables, and identify potentially unsuitable items. (Salzberger, 2006) Subsequently, the Rasch model will be applied to evaluate item fit, reliability, dimensionality, and the relative difficulty of items in relation to respondents' digital literacy abilities. Avinç and Doğan demonstrate the methodological relevance of integrating factor analysis and Rasch modelling to strengthen the validity and reliability of digital literacy assessment instruments . (Davis & Boone, 2021; Jr, 2021; Robert M, 1997) By combining these approaches, the present

study seeks to produce a more rigorous and comprehensive assessment of students' digital literacy levels.

This study aims to address two key issues. First, it examines the validity and reliability of the students' digital competence assessment items and evaluates the correlations among these items. Secondly, in which dimensions do pupils already demonstrate a good level of digital literacy, and in which dimensions do their digital literacy skills need to be improved, so that this information can be utilised in the learning process. It is for this reason that the researcher considers it important to investigate these matters

II. Research Methods

This study employs a quantitative survey methodology(Creswell, 2012; Sari, 2022a), to ascertain the current situation and explain what is happening at present (Nasution, 2014; Sari, 2022b; Singarimbun, 1989). This study utilised an instrument developed by KOMINFO using a Likert scale; the questionnaire was distributed via Google Forms.

This study employed a quantitative survey design to evaluate the validity and reliability of the digital literacy instrument through two complementary psychometric approaches: Exploratory Factor Analysis (EFA) (Salzberger, 2006) and Rasch Measurement Modeling. EFA was conducted using JASP software to explore the underlying factor structure, examine relationships among observed items, and identify items with inadequate factor loadings or limited contributions to the intended constructs Subsequently, Rasch analysis was performed using Winsteps software to evaluate item fit, dimensionality, reliability, item difficulty, and person ability estimates. The Rasch model also enables the examination of local independence and the stability of item and person estimates under appropriate model assumptions.(Boone, 2020; Boone & Staver, 2020a, 2020c, 2020d; Chow & Shiu, 2020; Davis & Boone, 2021; Khine, 2020) Integrating these analytical approaches provides complementary evidence of construct validity and measurement reliability, thereby strengthening the psychometric evaluation of the instrument used to assess students' digital literacy levels.

The Rasch Measurement Model enables the transformation of ordinal raw scores into interval-level measures, provided that the data satisfy the underlying model assumptions. Unlike raw scores, which do not necessarily represent equal measurement intervals, Rasch-derived measures allow for a more meaningful interpretation of students' latent abilities and item difficulties.(Abbitt & Boone, 2021; Boone, 2020; Boone & Staver, 2020a, 2020b) Furthermore, Rasch analysis provides comprehensive psychometric information regarding instrument quality, item fit, person reliability, measurement precision, and the relationship between item difficulty and respondent ability Compared with Classical Test Theory (CTT), Rasch modelling offers a probabilistic framework that allows item and person parameters to be estimated from observed response patterns, including datasets containing missing responses under appropriate

statistical assumptions. (Khine, 2020) These characteristics make the Rasch model particularly valuable for evaluating the psychometric quality of instruments designed to assess students' digital literacy competencies. (Miyazaki et al., 2019; Wyse, 2019, 2021; Wyse & McBride, 2021)

Further analysis using the Rasch Measurement Model was conducted to estimate students' digital literacy abilities based on person measures expressed in logit units. These measures enable the interpretation of individual ability levels in relation to item difficulty, thereby providing a more systematic assessment of students' digital literacy competencies. In addition, Rasch modelling provides evidence of instrument reliability, item functioning, and the distribution of respondents' abilities along a common measurement scale.(Areskoug-Josefsson & ..., 2020; DeMars, 2021)

Data were collected using a digital literacy instrument administered to students from three educational institutions in Bekasi City, Indonesia: SMPN 2 Bekasi, SMPN 16 Bekasi, and MTs Nurul Huda. The study employed cluster random sampling to select participating schools, followed by simple random sampling to select students within the selected institutions. A total of 101 students participated in the study. The collected responses were analysed using the Rasch Measurement Model to estimate students' digital literacy abilities and evaluate the psychometric properties of the research instrument (Creswell, 2012; Vockell, 1983).

III. Result and Discussion

The results of the validity test, conducted using EFA with the aid of the JASP software, indicate that the instrument developed by KOMINFO meets the criteria for the KMO (Kaiser-Mayer-Olkin) test, Bartlett's Test of Sphericity, and the MSA (Measure of Sampling Adequacy) value.

Table 2. The Result of Validity Test With KMO Criteria

Kaiser-Meyer-Olkin Test

	MSA
Overall MSA	0.764
V4	0.744
V4_2	0.651
V4_3	0.679
V4_4	0.659
V4_5	0.715
V4_6	0.770
V4_7	0.761
V4_8	0.800
V4_9	0.764

Kaiser-Meyer-Olkin Test

	MSA
V4_10	0.724
V4_11	0.653
V4_12	0.770
V4_13	0.782
V4_14	0.719
V4_15	0.799
V4_16	0.755
V4_17	0.812
V4_18	0.762
V4_19	0.823
V4_20	0.788
V4_21	0.733
V4_22	0.664
V4_23	0.774
V4_24	0.726
V4_25	0.874
V4_26	0.786
V4_27	0.736
V4_28	0.795
V4_29	0.705
V4_30	0.822
V4_31	0.888

As can be seen from the table above, the KMO or Overall MSA value is greater than 0.50, which means the data is suitable for further factor analysis.

Table 3. Result of Bartlett's Test

Bartlett's Test

X^2	df	p
1418.253	465.000	< .001

Based on the table of results from Bartlett's Test of Assumptions above, a value of X^2 = 1479.634 was obtained at df = 595, with p < 0.001, which is less than 0.05. This indicates that the data are correlated and meet the criteria for further factor analysis.

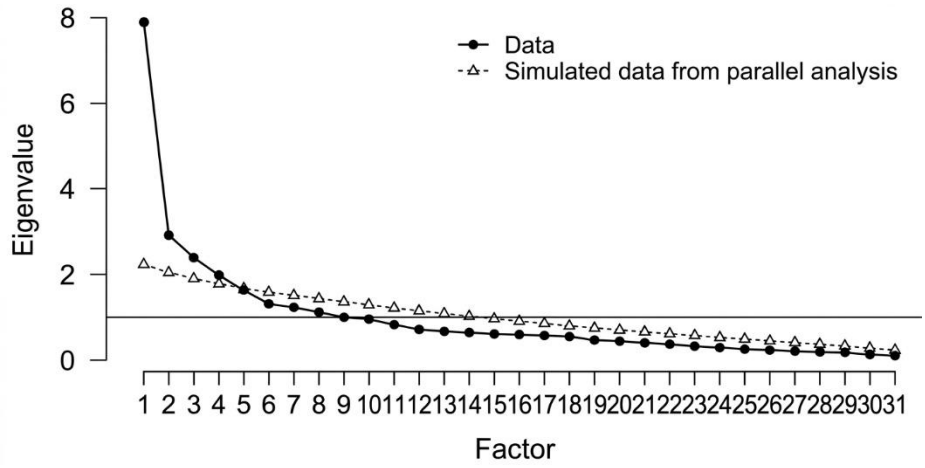


Figure 1. Scree Plot

The scree plots reveal an 'elbow point' at the fourth point. After the fourth point, the curve tends to flatten out, meaning that further factors or points do not contribute any additional information. This is consistent with the table above, which shows that four principal factors have been identified that are worth retaining as they lie above the eigenvalues and the simulated data; they can therefore be interpreted further based on the factor loadings resulting from factor rotation. This aligns with the dimensions proposed by KOMINFO; whilst analyses may differ across different applications, they remain consistent with the four dimensions of digital competence. To provide a clearer picture of the relationships between the items and the factors that have been identified, the results of the factor analysis are further visualised in the form of a path diagram.

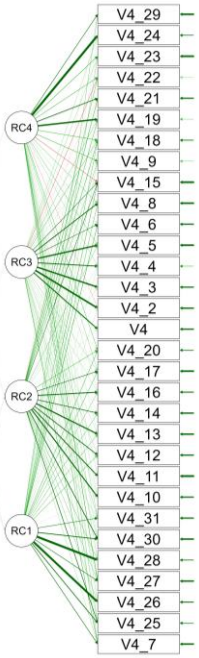


Figure 2. The Path Diagram

As shown in the path diagram, each factor is correlated with each item; however, the degree of correlation varies between items. The thickness of the arrows indicates the degree of correlation: the thicker the line, the higher the correlation; conversely, the thinner the line, the lower the correlation. Consequently, the factors identified on the basis of factor loadings and the path diagram are named as follows:

1) Digital Skills Dimension
2) Digital Ethics Dimension
3) Digital Safety Dimension
4) Digital Culture Dimension

Consequently, the results of the validation using EFA are consistent with those developed by KOMINFO. In Rasch modelling research, the validity of test items can be analysed using Table 23 (Item Dimensionality) and Table 10 (Item FIT Order). These two tables are used to evaluate the extent to which the digital literacy instrument developed by KOMINFO is capable of measuring students' digital literacy skills in accordance with what it is intended to measure. The first stage of validity analysis was carried out using the Item Dimensionality output, which aims to determine whether the entire set of items or the digital literacy instrument measures a single digital literacy construct. The results of the Item Dimensionality analysis are as follows.

```
TABLE 23.0 CAKAP DIGITAL                          ZOU718WS.TXT  Aug 01 2026 10:52
INPUT: 101 Person  31 Item  REPORTED: 101 Person  31 Item  5 CATS WINSTEPS 5.9.0.0
-------------------------------------------------------------------------------

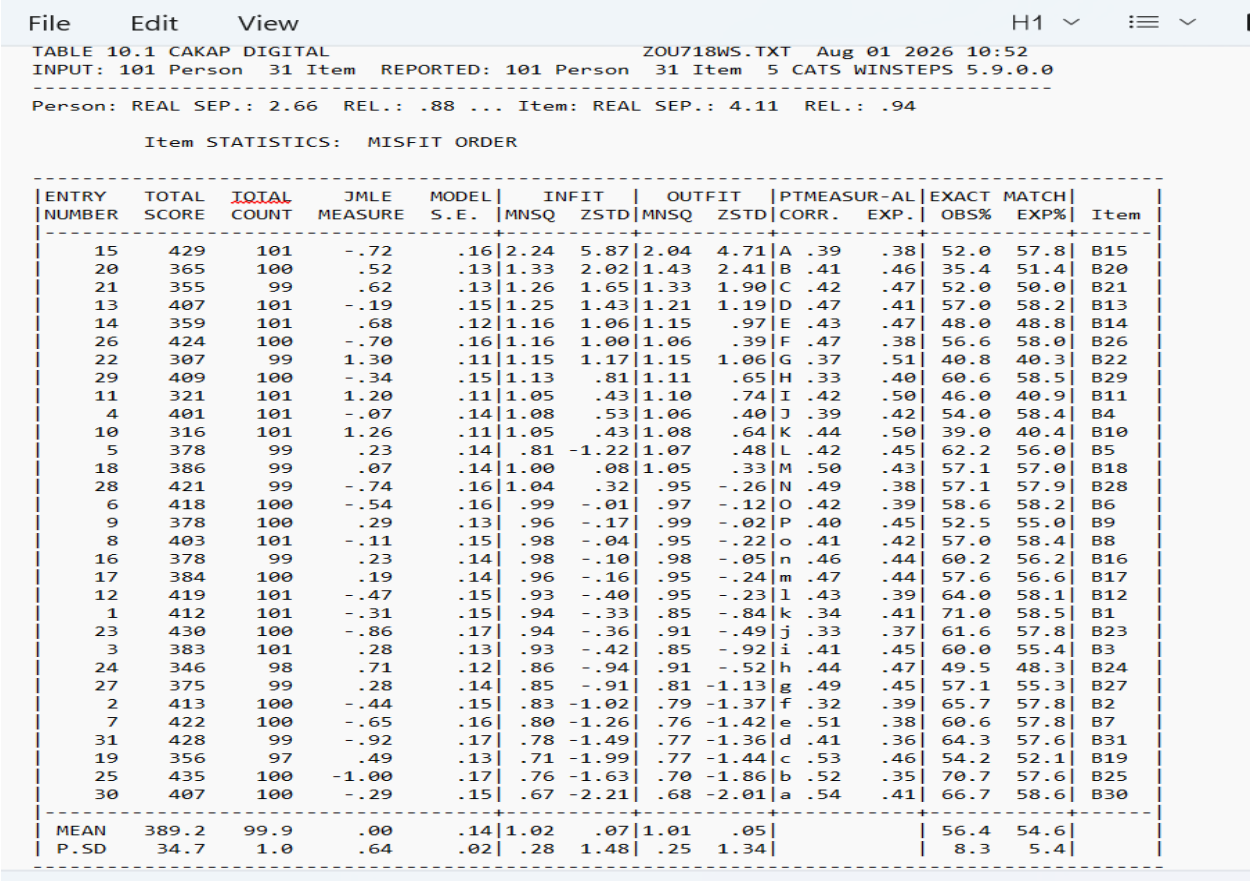
     Table of STANDARDIZED RESIDUAL variance in Eigenvalue units = Item information units
                                       Eigenvalue   Observed   Expected
Total raw variance in observations     =     46.3916 100.0%         100.0%
  Raw variance explained by measures   =     15.3916  33.2%          34.8%
    Raw variance explained by persons  =      8.7632  18.9%          19.8%
    Raw Variance explained by items    =      6.6284  14.3%          15.0%
  Raw unexplained variance (total)     =     31.0000  66.8% 100.0%   65.2%
    Unexplned variance in 1st contrast =      3.4115   7.4%  11.0%
    Unexplned variance in 2nd contrast =      3.3050   7.1%  10.7%
    Unexplned variance in 3rd contrast =      2.6982   5.8%   8.7%
    Unexplned variance in 4th contrast =      1.9546   4.2%   6.3%
    Unexplned variance in 5th contrast =      1.8035   3.9%   5.8%

Essential Unidimensionality (Rasch/Common variance) =  53.9%
```

Figure 3. Output Item Dimensions

Based on the variance explained by the measured values in the observed column, a percentage of 33.2 per cent was obtained. This figure indicates that, overall, the quality of the items developed by KOMINFO falls within the 'adequate' category. Furthermore, the observed variance contrast value of 3.411 indicates that, according to the evaluation criteria for eigenvalues in the variance contrast >3, there are potentially problematic items that require further analysis. An eigenvalue in the variance contrast of 7.4 per cent; a variance contrast of <15 per cent indicates that the items meet the requirements of the

measurement model. Consequently, a further analysis was carried out using the Item Fit Order output to identify items that did not fit the model. As shown in the following output Figure;



File Edit View H1

TABLE 10.1 CAKAP DIGITAL ZOU718WS.TXT Aug 01 2026 10:52
INPUT: 101 Person 31 Item REPORTED: 101 Person 31 Item 5 CATS WINSTEPS 5.9.0.0

Person: REAL SEP.: 2.66 REL.: .88 ... Item: REAL SEP.: 4.11 REL.: .94

Item STATISTICS: MISFIT ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	JMLE MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEASUR-AL CORR.	PTMEASUR-AL EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Item
15	429	101	-.72	.16	2.24	5.87	2.04	4.71	A .39	.38	52.0	57.8	B15
20	365	100	.52	.13	1.33	2.02	1.43	2.41	B .41	.46	35.4	51.4	B20
21	355	99	.62	.13	1.26	1.65	1.33	1.90	C .42	.47	52.0	50.0	B21
13	407	101	-.19	.15	1.25	1.43	1.21	1.19	D .47	.41	57.0	58.2	B13
14	359	101	.68	.12	1.16	1.06	1.15	.97	E .43	.47	48.0	48.8	B14
26	424	100	-.70	.16	1.16	1.00	1.06	.39	F .47	.38	56.6	58.0	B26
22	307	99	1.30	.11	1.15	1.17	1.15	1.06	G .37	.51	40.8	40.3	B22
29	409	100	-.34	.15	1.13	.81	1.11	.65	H .33	.40	60.6	58.5	B29
11	321	101	1.20	.11	1.05	.43	1.10	.74	I .42	.50	46.0	40.9	B11
4	401	101	-.07	.14	1.08	.53	1.06	.40	J .39	.42	54.0	58.4	B4
10	316	101	1.26	.11	1.05	.43	1.08	.64	K .44	.50	39.0	40.4	B10
5	378	99	.23	.14	.81	-1.22	1.07	.48	L .42	.45	62.2	56.0	B5
18	386	99	.07	.14	1.00	.08	1.05	.33	M .50	.43	57.1	57.0	B18
28	421	99	-.74	.16	1.04	.32	.95	-.26	N .49	.38	57.1	57.9	B28
6	418	100	-.54	.16	.99	-.01	.97	-.12	O .42	.39	58.6	58.2	B6
9	378	100	.29	.13	.96	-.17	.99	-.02	P .40	.45	52.5	55.0	B9
8	403	101	-.11	.15	.98	-.04	.95	-.22	o .41	.42	57.0	58.4	B8
16	378	99	.23	.14	.98	-.10	.98	-.05	n .46	.44	60.2	56.2	B16
17	384	100	.19	.14	.96	-.16	.95	-.24	m .47	.44	57.6	56.6	B17
12	419	101	-.47	.15	.93	-.40	.95	-.23	l .43	.39	64.0	58.1	B12
1	412	101	-.31	.15	.94	-.33	.85	-.84	k .34	.41	71.0	58.5	B1
23	430	100	-.86	.17	.94	-.36	.91	-.49	j .33	.37	61.6	57.8	B23
3	383	101	.28	.13	.93	-.42	.85	-.92	i .41	.45	60.0	55.4	B3
24	346	98	.71	.12	.86	-.94	.91	-.52	h .44	.47	49.5	48.3	B24
27	375	99	.28	.14	.85	-.91	.81	-1.13	g .49	.45	57.1	55.3	B27
2	413	100	-.44	.15	.83	-1.02	.79	-1.37	f .32	.39	65.7	57.8	B2
7	422	100	-.65	.16	.80	-1.26	.76	-1.42	e .51	.38	60.6	57.8	B7
31	428	99	-.92	.17	.78	-1.49	.77	-1.36	d .41	.36	64.3	57.6	B31
19	356	97	.49	.13	.71	-1.99	.77	-1.44	c .53	.46	54.2	52.1	B19
25	435	100	-1.00	.17	.76	-1.63	.70	-1.86	b .52	.35	70.7	57.6	B25
30	407	100	-.29	.15	.67	-2.21	.68	-2.01	a .54	.41	66.7	58.6	B30
MEAN	389.2	99.9	.00	.14	1.02	.07	1.01	.05			56.4	54.6	
P.SD	34.7	1.0	.64	.02	.28	1.48	.25	1.34			8.3	5.4	

Figure 4. Item Statistics: Misfit order

Item-fit sequence analysis relies on several criteria to determine whether a test item falls within a fit category. An item is considered to meet the fit criteria when it satisfies the following three main indicators:

1) The OUTFIT Mean Square (MNSQ) value falls within the range 0.5–1.5.
2) The OUTFIT Z-Standard (ZSTD) value falls within the range −2.0–2.0.
3) The Point-Scale Correlation value (Measurement Section) falls within the range 0.40–0.85

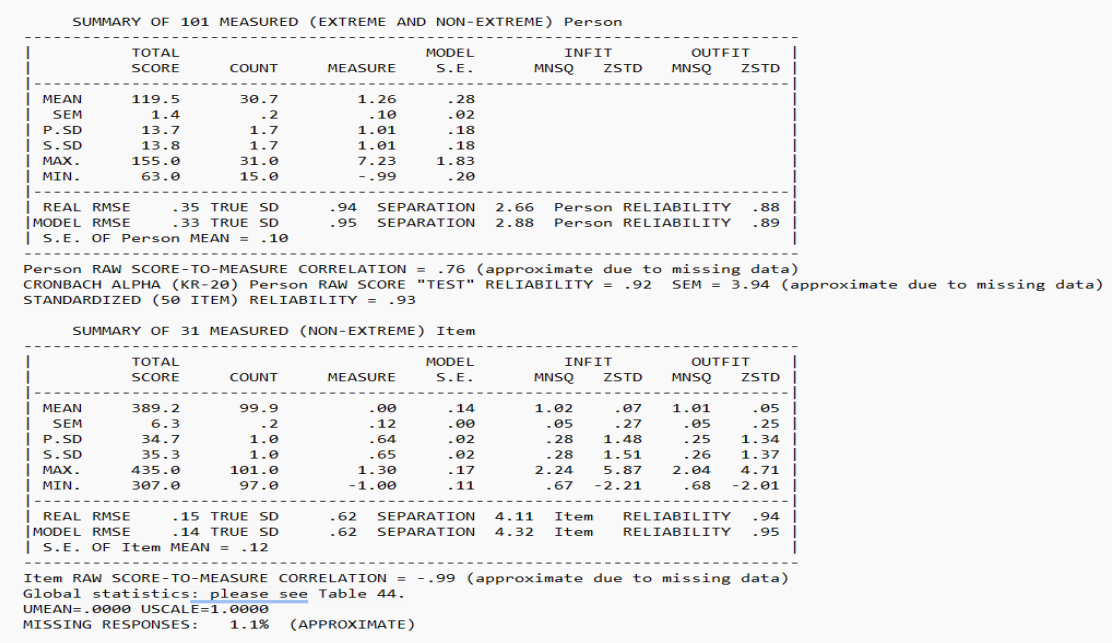
An analysis of the validity of each item, tested using the Item Fit Order output, indicates that two items are MISFIT, as summarised below:

Table 4. Analysis of Item Validity

	Item Number (MISFIT)	
The OUTFIT Mean Square (MNSQ) values fall within the range 0.5–1.5.	1,2,3,4,5,6,7,8,9,10, 11,12,13,14,16,17,18,19,	15, 20.

The OUTFIT Z-Standard (ZSTD) values fall within the range −2.0–2.0. The Point Measure (Pt. Measure) correlation values fall within the range 0.40–0.85.	21,22,23,24,25, 26,27,28,29,30,31	
Total	29	2
Percentage	93.54%	6.45%

The table above shows that there are two items where there is a mismatch or a misunderstanding between the items developed by the researchers and how they are interpreted differently by the respondents; it is these items, where misconceptions have arisen, that require further investigation. This indicates a misconception regarding the items; in other words, the items developed by KOMINFO are understood differently by the pupils, and a more in-depth investigation is required to interpret these misconceptions. Furthermore, in the Rasch model, This table presents important information regarding the quality of the instrument, including item reliability and test-taker reliability, as well as the level of interaction between students and items, as indicated by Cronbach's alpha.



SUMMARY OF 101 MEASURED (EXTREME AND NON-EXTREME) Person

	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	119.5	30.7	1.26	.28				
SEM	1.4	.2	.10	.02				
P.SD	13.7	1.7	1.01	.18				
S.SD	13.8	1.7	1.01	.18				
MAX.	155.0	31.0	7.23	1.83				
MIN.	63.0	15.0	-.99	.20				

REAL RMSE	.35	TRUE SD	.94	SEPARATION 2.66	Person RELIABILITY	.88
MODEL RMSE	.33	TRUE SD	.95	SEPARATION 2.88	Person RELIABILITY	.89

S.E. OF Person MEAN = .10

Person RAW SCORE-TO-MEASURE CORRELATION = .76 (approximate due to missing data)
CRONBACH ALPHA (KR-20) Person RAW SCORE "TEST" RELIABILITY = .92 SEM = 3.94 (approximate due to missing data)
STANDARDIZED (50 ITEM) RELIABILITY = .93

SUMMARY OF 31 MEASURED (NON-EXTREME) Item

	TOTAL SCORE	COUNT	MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD
MEAN	389.2	99.9	.00	.14	1.02	.07	1.01	.05
SEM	6.3	.2	.12	.00	.05	.27	.05	.25
P.SD	34.7	1.0	.64	.02	.28	1.48	.25	1.34
S.SD	35.3	1.0	.65	.02	.28	1.51	.26	1.37
MAX.	435.0	101.0	1.30	.17	2.24	5.87	2.04	4.71
MIN.	307.0	97.0	-1.00	.11	.67	-2.21	.68	-2.01

REAL RMSE	.15	TRUE SD	.62	SEPARATION 4.11	Item RELIABILITY	.94
MODEL RMSE	.14	TRUE SD	.62	SEPARATION 4.32	Item RELIABILITY	.95

S.E. OF Item MEAN = .12

Item RAW SCORE-TO-MEASURE CORRELATION = -.99 (approximate due to missing data)
Global statistics: please see Table 44.
UMEAN=.0000 USCALE=1.0000
MISSING RESPONSES: 1.1% (APPROXIMATE)

Figure 5. Summary Statistics Table

Based on the output of the Summary Statistics table, researchers can obtain comprehensive information about items and respondents. A person reliability coefficient of 0.88 indicates that the quality of the respondents—or the quality of the pupils who completed the digital competence instrument—is categorised as good, whilst an item reliability coefficient of 0.94 is categorised as very good, indicating that the digital

competence instrument is capable of measuring what it is intended to measure. Furthermore, pupils' levels of digital competence are categorised according to the Rasch model, as shown in figure 6. below:

TABLE 17.1 CAKAP DIGITAL ZOU718WS.TXT Aug 01 2026 10:52
INPUT: 101 Person 31 Item REPORTED: 101 Person 31 Item 5 CATS WINSTEPS 5.9.0.0

Person: REAL SEP.: 2.66 REL.: .88 ... Item: REAL SEP.: 4.11 REL.: .94

Person STATISTICS: MEASURE ORDER

ENTRY NUMBER	TOTAL SCORE	TOTAL COUNT	JMLE MEASURE	MODEL S.E.	INFIT MNSQ	INFIT ZSTD	OUTFIT MNSQ	OUTFIT ZSTD	PTMEASUR-AL CORR.	PTMEASUR-AL EXP.	EXACT MATCH OBS%	EXACT MATCH EXP%	Person
87	155	31	7.23	1.83	MAXIMUM MEASURE				.00	.00	100.0	100.0	087P
92	149	30	5.98	1.02	1.02	.34	.97	.37	.06	.12	96.7	96.7	092P
60	139	31	2.58	.32	.98	-.01	.91	-.29	.68	.34	64.5	60.2	060P
83	139	31	2.58	.32	.99	.06	1.04	.25	-.07	.34	38.7	60.2	083P
31	137	31	2.38	.31	.65	-1.42	.68	-1.35	.60	.35	77.4	58.9	031P
39	135	31	2.19	.30	1.14	.58	1.14	.59	.26	.36	51.6	57.6	039P
47	135	31	2.19	.30	.71	-1.06	.73	-1.08	.38	.36	64.5	57.6	047P
85	135	31	2.19	.30	1.39	1.35	1.30	1.14	.51	.36	61.3	57.6	085P
26	134	31	2.10	.30	1.10	.42	1.09	.42	.27	.37	54.8	57.1	026L
29	134	31	2.10	.30	1.38	1.31	1.38	1.39	.57	.37	45.2	57.1	029P
32	134	31	2.10	.30	2.15	3.22	1.98	3.03	.56	.37	32.3	57.1	032P
96	134	31	2.10	.30	.77	-.78	.82	-.66	.24	.37	61.3	57.1	096P
90	125	29	2.04	.31	2.14	3.08	1.83	2.57	.74	.38	55.2	56.9	090P
16	133	31	2.01	.29	.72	-1.01	.75	-.94	.44	.37	54.8	57.0	016P
54	132	31	1.92	.29	.91	-.23	.99	.05	.46	.37	58.1	56.9	054P
61	132	31	1.92	.29	2.00	2.82	1.77	2.45	.72	.37	35.5	56.9	061P
95	132	31	1.92	.29	1.36	1.24	1.26	.99	.59	.37	51.6	56.9	095P
94	131	31	1.84	.29	.53	-1.90	.57	-1.82	.15	.38	71.0	56.5	094L
35	63	15	1.80	.41	.78	-.45	.85	-.29	.53	.38	53.3	55.3	035L
4	130	31	1.76	.28	.88	-.35	.91	-.24	.54	.38	54.8	56.7	004P
62	130	31	1.76	.28	.87	-.35	.91	-.24	.53	.38	51.6	56.7	062P
63	130	31	1.76	.28	1.10	.42	1.14	.59	.58	.38	38.7	56.7	063P
84	130	31	1.76	.28	1.19	.70	1.06	.30	.81	.38	54.8	56.7	084P
50	129	31	1.68	.28	3.80	5.85	3.56	5.80	.33	.39	16.1	56.8	050P
65	129	31	1.68	.28	.79	-.67	.86	-.46	.53	.39	58.1	56.8	065P
21	128	31	1.60	.27	1.38	1.24	1.30	1.07	.46	.39	48.4	55.5	021L
75	128	31	1.60	.27	.71	-1.00	.68	-1.18	.43	.39	74.2	55.5	075P
86	128	31	1.60	.27	1.00	.10	1.03	.20	.38	.39	58.1	55.5	086P
28	127	31	1.53	.27	.96	-.04	.97	-.03	.57	.40	48.4	55.1	028L
13	126	31	1.46	.27	.28	-3.44	.29	-3.47	.15	.40	83.9	55.7	013L
19	126	31	1.46	.27	1.03	.21	1.02	.17	.57	.40	48.4	55.7	019L
58	126	31	1.46	.27	1.92	2.56	1.78	2.33	.60	.40	19.4	55.7	058P
79	126	31	1.46	.27	.38	-2.71	.38	-2.85	.38	.40	83.9	55.7	079P
5	125	31	1.39	.26	.51	-1.94	.54	-1.84	.73	.41	61.3	56.2	005P
41	116	30	1.05	.25	.46	-2.24	.49	-2.05	.63	.44	66.7	56.0	041P
11	119	31	1.00	.24	.19	-4.36	.16	-4.69	.59	.44	87.1	55.4	011L
40	119	31	1.00	.24	1.51	1.65	1.71	2.13	.56	.44	48.4	55.4	040P
42	119	31	1.00	.24	.68	-1.17	.63	-1.41	.08	.44	71.0	55.4	042L
89	119	31	1.00	.24	.59	-1.61	.48	-2.19	.45	.44	74.2	55.4	089P
6	118	31	.94	.24	.91	-.23	.91	-.21	.55	.44	54.8	54.6	006P
23	118	31	.94	.24	.34	-3.08	.36	-2.88	.56	.44	74.2	54.6	023P
14	117	31	.89	.24	1.61	1.93	1.74	2.22	.36	.45	54.8	54.5	014P
44	117	31	.89	.24	2.09	3.06	2.00	2.80	.44	.45	35.5	54.5	044P
2	113	30	.87	.24	1.73	2.20	1.78	2.27	.13	.45	46.7	54.4	002P
56	113	30	.85	.24	2.87	4.53	2.80	4.30	.09	.45	26.7	54.5	056P
12	116	31	.83	.24	.27	-3.69	.29	-3.43	.61	.45	80.6	52.9	012P
18	116	31	.83	.24	.91	-.25	.82	-.57	.21	.45	61.3	52.9	018P
71	116	31	.83	.24	.43	-2.57	.37	-2.88	.45	.45	67.7	52.9	071P
46	115	31	.77	.23	.41	-2.73	.38	-2.79	.54	.46	64.5	52.8	046L
78	115	31	.77	.23	.64	-1.40	.65	-1.30	.50	.46	54.8	52.8	078P
82	115	31	.77	.23	1.04	.25	1.03	.21	.13	.46	58.1	52.8	082L
66	114	31	.72	.23	.66	-1.33	.68	-1.20	.56	.46	64.5	52.6	066L
7	113	31	.67	.23	1.26	.98	1.24	.88	.21	.46	45.2	52.4	007L
22	113	31	.67	.23	.61	-1.58	.64	-1.37	.05	.46	64.5	52.4	022P
36	113	31	.67	.23	.74	-.96	.74	-.94	.44	.46	54.8	52.4	036L
45	113	31	.67	.23	.39	-2.90	.37	-2.88	.42	.46	71.0	52.4	045P
3	109	30	.63	.23	.76	-.87	.74	-.91	.05	.47	53.3	52.1	003P
69	99	27	.63	.25	.77	-.77	.89	-.27	.22	.44	74.1	53.2	069P
10	112	31	.62	.23	.85	-.51	.80	-.68	.52	.47	61.3	49.9	010P
43	112	31	.62	.23	.51	-2.15	.46	-2.33	.66	.47	58.1	49.9	043P
88	111	31	.57	.22	.78	-.79	.66	-1.32	.59	.47	58.1	48.4	088P
101	111	31	.57	.22	.70	-1.17	.67	-1.26	.76	.47	58.1	48.4	101L
34	109	31	.47	.22	.71	-1.14	.75	-.92	.48	.48	58.1	47.9	034P
53	104	30	.39	.22	.29	-3.77	.30	-3.54	.71	.49	76.7	47.8	053L
74	107	31	.37	.22	.52	-2.23	.58	-1.76	.51	.49	51.6	47.3	074L
52	106	31	.33	.21	.93	-.19	.94	-.15	.43	.49	51.6	47.2	052L
51	105	31	.28	.21	.54	-2.15	.54	-2.04	.31	.49	54.8	47.0	051P
77	105	31	.28	.21	1.69	2.36	1.62	2.08	.41	.49	32.3	47.0	077P
100	102	31	.15	.21	1.90	3.01	2.04	3.22	.21	.50	41.9	44.4	100P
80	100	31	.07	.21	1.14	.65	1.13	.58	.35	.51	41.9	44.0	080P
99	100	31	.07	.21	.84	-.64	.90	-.32	.42	.51	51.6	44.0	099P
37	86	31	-.49	.20	2.84	5.70	2.76	5.40	.47	.52	12.9	36.3	037P
81	74	31	-.95	.20	1.28	1.25	1.25	1.09	.52	.50	32.3	38.0	081P
57	73	31	-.99	.20	1.03	.21	1.13	.64	-.03	.50	45.2	39.2	057P
MEAN	119.5	30.7	1.26	.28	1.03	-.23	1.01	-.26			56.4	54.6	
P.SD	13.7	1.7	1.01	.18	.66	2.14	.64	2.15			17.3	6.1	

Figure 6. Pearson Statistics Cakap Digital

The values in the table are intended to determine the grouping of respondents. The higher the measure, the better the students' level of digital literacy. In the person-measure table, the separation value is 2.66. The grouping of persons can be determined from the separation. The higher the separation, the better the overall quality of the instrument for respondents, as it enables the identification of respondent groups.

The following are the categories of social strata:

$$\mathrm{H}\ \ \mathrm{H} = \frac{[(4xSEPARATION)+1]}{3}\ .$$

With an item separation value of 6.48, H. = [(4 × 2.66) + 1] / 3 = 3.88. This means there are 4 groups of pupils. They are categorised as follows.

Table 5. Criteria for Determining Pupils' Levels of Digital Competence

Logit Value Range	Criteria	Number of Pupils	Percentage
(-0.49—(-0.99)	Low	3	2.97%
(0.07—0.99)	Fair	32	31.68%
(1.00—1.92)	Good	52	51.48%
(2.01—7.23)	Very Good	14	13.86%

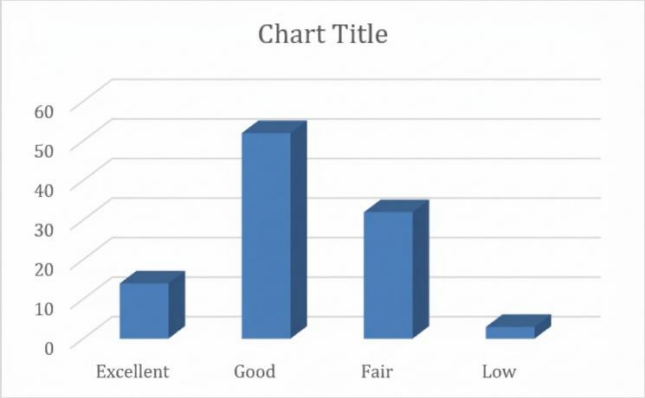


Figure 7. Chart Showing Categories of Digital Competence Levels

The diagram above shows that the level of understanding amongst 101 junior high school and MTS pupils from three schools was categorised as 'Low' (2.97 per cent), 'Fair' (31.68 per cent), 'Good' (51.48 per cent) and 'Very Good' (13.86 per cent). Based on these results, it can be said that 65.34 per cent of junior high school and MTS pupils possess good digital competence. Two validity tests were conducted using Exploratory Factor Analysis (EFA), assisted by the JAMOVI application, and Rasch modelling using the Winstep application. It can be concluded that the CAKAP Digital instrument developed by KOMINFO is of a very high standard, fits the model well, and is capable of measuring what it is intended to measure. The following descriptive analysis is used to identify the items on which pupils scored low in the digital literacy assessment.

Table 6. Percentage of Sources of Digital Competence

Number	Digital Competence Items	Score (out of 505)	Percentage
1	I can connect my device to the internet.	412	82%
2	I can download files and apps.	413	82%
3	I can upload files.	383	76%
4	I can search for and access data, information and content on digital media.	401	79%
5	I am able to store data, information and content on digital media.	378	75%
6	I am used to checking whether the information I find on websites is correct or incorrect.	418	83%
7	I am used to comparing various sources of information to determine whether the information is correct.	422	84%
8	I can communicate using a variety of digital devices.	403	80%
9	I am used to shopping on online marketplaces.	378	75%
10	I do not post photos with other people's children.	316	63%
11	I do not tag friends when posting content without telling them first.	321	64%
12	I will not make rude comments if someone posts a negative comment on one of my posts.	419	83%
13	I do not create groups or add people without their permission.	407	81%
14	I will not share information about accidents straight away.	359	71%
15	I will not encourage people to make negative comments.	429	85%
16	I will not share screenshots of conversations on social media.	378	75%
17	On my social media accounts, I can control who can see my timeline.	384	76%
18	I know how to report harassment on social media.	386	76%
19	I can disable the option to show my geographical location.	356	70%
20	I do not post personal data on social media.	365	72%
21	I use apps to detect and remove viruses from my device.	355	70%
22	I can recognise emails containing spam, viruses or malware.	307	61%
23	I am in the habit of creating secure passwords using a combination of numbers, letters and punctuation marks.	430	85%

24	I back up my data in several locations.	346	69%
25	I adapt my communication style so as not to offend others.	435	86%
26	I take into account the feelings of readers from other religions.	424	84%
27	I include the author's name when reposting.	375	74%
28	I take into account the feelings of readers from other ethnic groups.	421	83%
29	I share traditional and contemporary Indonesian art and culture online.	409	81%
30	I take into account the feelings of readers with different political views.	407	81%
31	I always take into account and acknowledge cultural diversity on social media when sharing messages.	428	85%
	Total	**12065**	

Based on the above findings, it is evident that pupils still have weaknesses in the area of digital ethics, as they continue to regard uploading photographs of others without permission as commonplace, and tagging friends when uploading content without permission is also considered normal. This indicates that pupils still require guidance in using digital media, platforms and social media. Furthermore, pupils tend to perform well in the areas of digital culture and digital safety, as evidenced by their consideration of cultural norms when posting content and their understanding of how to communicate in a way that does not cause offence to others. These results highlight the need for us all to continue providing guidance and support to pupils in the wise use of social media and other platforms, particularly with regard to digital ethics.

Through this analysis of pupils' digital literacy levels, both teachers and parents will be able to identify their children's strengths and weaknesses in navigating digital developments and using social media wisely. Pupils are required to apply the principles of the Qur'an and Sunnah when using social media and other platforms. The attitudes that pupils must possess in accordance with the requirements of the Qur'an and Sunnah include tabayyun, hifzul lisan, honesty, trustworthiness and responsibility.

Pupils who practise tabayyun will first verify the accuracy of information before believing or even sharing it. Pupils are able to avoid hate speech, abusive comments, the dissemination of manipulative content and so on. Pupils are also expected to realise that they will be held accountable before Allah SWT for all their uploads, posts and search histories.

IV. **Conclusion**

This study demonstrates that the 'Cakap Digital' instrument developed by KOMINFO is capable of measuring what it is intended to measure. Based on the analysis conducted, which utilised two validation methods, Exploratory Factor Analysis (EFA) and Rasch

Modelling, two items were found to exhibit a 'missfit', indicating that pupils had misconceptions regarding those items. One limitation of this study is its relatively small sample size, which could be addressed in future research by including a larger and more representative sample. Future research could also continue to validate the instrument using CFA to determine whether it is based on a robust theoretical framework.

The digital literacy of junior high school and MTS pupils is categorised as 'good' because they are already accustomed to digital activities, including the use of gadgets and other devices. Of the four dimensions of digital skills developed by KOMINFO, digital ethics is still considered to be very limited. Pupils still struggle to distinguish between what is permitted and what is not; activities they consider commonplace may in fact breach digital ethics, such as uploading photographs of others without permission, adding others to groups, reporting incidents, and sharing negative information or information they do not fully understand. Therefore, guidance from teachers is essential, and programmes on the responsible use of digital platforms and social media must continue to be strengthened. If pupils' digital competence improves significantly, this will have a positive impact on the use of digital media in learning.

V. **Bibliography**

A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2. (2018). http://www.uis.unesco.org

Abbitt, J. T., & Boone, W. J. (2021). Gaining insight from survey data: an analysis of the community of inquiry survey using Rasch measurement techniques. Journal of Computing in Higher Education. https://doi.org/10.1007/s12528-020-09268-6

Agustina, A., Saputra, A. S., Indranika, D. B., Suryoto, S. S., Kusumaningsih, O., Mamuri, J., & Pazqara, E. W. (2022). Increasing digital literacy in realizing golden Indonesia. East Asian Journal of Multidisciplinary Research, 1(10), 2091. https://doi.org/10.55927/eajmr.v1i10.1920

Akhonya, C. A., Walekhwa, M., & Kasyuma, A. M. (2026). Technology and Gambling: A Comprehensive Analysis of Social, Ethical, Religious and Moral Decadence Caused by Cyber Activities. Journal of Science, Innovation and Creativity, 5(1), 85–96. https://doi.org/https://doi.org/10.58721/jsic.v5i1.1488

Akyas, M. (2022). Upaya Peningkatan Literasi Digital bagi Siswa dan Guru Melalui Program Madrasah Ibtidaiyah Gunungkidul Cakap Digital (MI Geka Kapital) Tahun 2022 (Vol. 05). https://conference.uin-suka.ac.id/index.php/ACoMT

Areskoug-Josefsson, K., & ... (2020). Value of performing a Rasch analysis on a reliable and valid instrument—Case study of the SA-SH. Journal of Nursing …. https://connect.springerpub.com/content/sgrjnm/early/2020/05/22/jnm-d-18-00106.abstract

Boone, W. J. (2020). Rasch basics for the novice. Rasch Measurement. https://doi.org/10.1007/978-981-15-1800-3_2

Boone, W. J., & Staver, J. R. (2020a). Advances in Rasch analyses in the human sciences. Springer. https://doi.org/10.1007/978-3-030-43420-5

Boone, W. J., & Staver, J. R. (2020b). Correction to: Advances in Rasch Analyses in the Human Sciences. Advances in Rasch Analyses in the Human …. https://doi.org/10.1007/978-3-030-43420-5_21

Boone, W. J., & Staver, J. R. (2020c). Rasch and Forms of Validity Evidence. Advances in Rasch Analyses in the Human …. https://doi.org/10.1007/978-3-030-43420-5_17

Boone, W. J., & Staver, J. R. (2020d). Using Rasch theory to Develop a Test and a Survey. Advances in Rasch Analyses in the Human …. https://doi.org/10.1007/978-3-030-43420-5_18

Brown, A., & Martinez, P. (n.d.). Digital Culture, Digital Literacy, Digital Competence as the Modern Educational Definitions. XJournals Education Review, 15(3), 45–58. Retrieved https://xjournals.com/collections/articles/Article?qt=Ci%2FymIV3I3k9OqCArZ%2Fkz%2F29BIQWSWaKIF3ODSotBss%3D

Chow, J., & Shiu, A. (2020). the Rasch Model. Rasch Measurement: Applications in …. https://books.google.com/books?hl=en&lr=&id=8JPHDwAAQBAJ&oi=fnd&pg=PA125&dq=rasch&ots=DxOlCkK7tK&sig=Kr0fL10xGp_GfpA9W2ah6Jhy10o

Creswell, J. W. (2012). Educational research: Planning, conducting, and evaluating quantitative and qualitative research. In Educational Research (Vol. 4). https://doi.org/10.1017/CBO9781107415324.004

Davis, D. R., & Boone, W. (2021). Using Rasch analysis to evaluate the psychometric functioning of the other-directed, lighthearted, intellectual, and whimsical (OLIW) adult playfulness scale. International Journal of Educational Research Open. https://www.sciencedirect.com/science/article/pii/S2666374021000248

DeMars, C. E. (2021). Violation of Conditional Independence in the Many-Facets Rasch Model. Applied Measurement in Education. https://doi.org/10.1080/08957347.2021.1890743

Eerten, J., Doosje, B., & De Graaf, B. (2017). Developing a social media response to radicalization: The role of counter-narratives in prevention of radicalization and de-radicalization. https://www.researchgate.net/publication/327667910

Etumnu, E. W., Williams-Etumnu, O. I., & Williams, E. E. (2023). Radicalisation and Extremism on Social Media: What Steps can be taken? https://digitalcommons.unl.edu/libphilprac

Goodwin, N. M. I. (2016). INDONESIAN YOUTH IN THE 21 ST CENTURY DisClaimer.

Havrilova, L. H., & Topolnik, Y. V. (2017). Digital culture, digital literacy, digital competence as the modern educational phenomena. Information Technologies and Learning Tools, 61(5), 1–14.

Jr, W. P. F. (2021). Separation Theorems in Econometrics and Psychometrics: Rasch, Frisch, Two Fishers and Implications for Measurement. Journal of Interdisciplinary Economics. https://doi.org/10.1177/02601079211033475

Khine, M. S. (2020). Rasch measurement. Springer. https://doi.org/10.1007/978-981-15-1800-3

KOMINFO. (2022). Survei Status Literasi Digital di Indonesia.

KOMINFO, K. I. C. (2023). STATUS LITERASI DIGITAL DI INDONESIA.

Lee, H.-S., & Jun, J. K. (2024). Role of moral disengagement and media literacy in the

relationships between risky online content exposure and cyberaggression among Korean adolescents. Scientific Reports, 14(1), 30877. https://doi.org/https://doi.org/10.1038/s41598-024-81858-1

Mega, I. R. (2020). Students' perception of digital literacy competence as learning sources. Majesty Journal, 2(1), 47–53. https://doi.org/https://doi.org/10.33487/majesty.v2i1.199

Miyazaki, Y., Chungbaek, Y., Shropshire, K. O., & Hedeker, D. (2019). Consequences of ignoring nested data structure on item parameters in Rasch/1P-IRT model. Behaviormetrika. https://doi.org/10.1007/s41237-019-00090-8

Nasution, S. (2014). Metode research. Bumi Aksara.

Peng, D., & Yu, Z. (2022). A literature review of digital literacy over two decades. Education Research International, 2022(1), 2533413. https://doi.org/https://doi.org/10.1155/2022/2533413

Putri, P. (2025). Peran Media Sosial Facebook Pada Peningkatan Pendapatan Ekonomi Rumah Tangga (Studi Pada Momprenuer Desa Anggasan Kabupaten Toil-Toli). Universitas Islam Negeri Datokarama Palu.

Robert M, T. (1997). Measurement and Evaluation in Psychology and Education. Prentice-Hall, Inc.

Rodríguez Illera, J. L. (2004). Digital Literacies (Number 9). http://www.ub.es/multimedia/iem

Salzberger, T. (2006). Reconsidering the problem of data equivalence in international marketing research: Contrasting approaches based on CFA and the Rasch model for measurement. International Marketing Review, 23(4), 390–417. https://doi.org/10.1108/02651330610678976

Sari, E. (2022a). METODOLOGI PENELITIAN ILMU SOSIAL (RESEARCH DESIGN QUANTITATIVE AND QUALITATIVE) (1st ed., Vol. 1). Pena Persada.

Sari, E. (2022b). Metodologi Penelitian Ilmu Sosial (Research Design Quantitative And Qualitative) (1st Ed., Vol. 1). Pena Persada.

Singarimbun, M. (1989). Metode Penelitian Survei. LP3ES.

Survei, H., 34, D., & Kominfo, P. (n.d.). Status Literasi Digital Indonesia 2020.

The State of the World's Children 2017 | UNICEF. (n.d.). Retrieved October 29, 2026, from https://www.unicef.org/reports/state-worlds-children-2017

Timotheou, S., Miliou, O., Dimitriadis, Y., Sobrino, S. V., Giannoutsou, N., Cachia, R., Monés, A. M., & Ioannou, A. (2023). Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review. Education and Information Technologies, 28(6), 6695–6726. https://doi.org/10.1007/s10639-022-11431-8

UNESCO. (2018). A Global Framework of Reference on Digital Literacy Skills for Indicator 4.4.2. http://www.uis.unesco.org

UNICEF. (2021). Final Report SITUATIONAL ANALYSIS ON DIGITAL LEARNING LANDSCAPE IN INDONESIA.

UNICEF Indonesia. (n.d.). Apa itu cyberbullying dan bagaimana menghentikannya? - . Retrieved January 9, 2025, from https://www.unicef.org/indonesia/id/child-protection/apa-itu-cyberbullying

van Eerten, J.-J., Doosje, B., Konijn, E., de Graaf, B., & de Goede, M. (2019). Counter-messaging: an effective means to prevent or counter radicalization. Challenging Extremist Views on Social Media, (March 2020).

Vockell, E. L. (1983). Educational Research. Mac Millan Publishing Co., Inc.

Wyse, A. E. (2019). Analyzing job analysis data using mixture Rasch models. International Journal of Testing. https://doi.org/10.1080/15305058.2018.1481853

Wyse, A. E. (2021). Rasch Joint Maximum Likelihood Estimation Algorithms and Missing Data. Psychological Test and Assessment Modeling. https://www.psychologie-aktuell.com/fileadmin/Redaktion/Journale/ptam-2021-4/PTAM__4-2021_3_kor.pdf

Wyse, A. E., & McBride, J. R. (2021). A Framework for Measuring the Amount of Adaptation of Rasch-based Computerized Adaptive Tests. Journal of Educational Measurement. https://doi.org/10.1111/jedm.12267.