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Student's Readiness for the Industry: An Analytical of Digital Literacy Aspect

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ABSTRACT

The advancement of information technology and increasingly sophisticated internet access has positively impacted society. Unsurprisingly, the world of work now demands human resources capable of optimally utilizing technology and the internet. Today's young generation, known as digital natives, is considered to have high technological skills. However, several studies show that this generation has not fully demonstrated a high curiosity about their surroundings, and has not been fully able to utilize technology effectively. The young generation's interest in digital technology professions must be supported by strengthening critical thinking and information processing skills through increasing digital literacy. Digital literacy is vital to being productively involved in the ever-growing digital economy. This study analyzed digital literacy, which was measured using three main elements—complementary, familiarity, and security—and developed it into six indicators: communication and collaboration, critical thinking, ICT familiarity, data literacy, device security, and personal security. The research was quantitative with a purposive sampling approach, and the respondents were last-year university students. This research is expected to contribute to developing a higher education curriculum by strengthening digital literacy and students' curiosity to be better prepared to face the demands of the digital industry. Educational institutions can utilize the results to design relevant learning programs and by sector in formulating recruitment and HR development strategies. The improvement of these two aspects encourages the active participation of the younger generation in the digital economy. It supports the transformation of industry 5.0, which emphasizes the integration of humans and technology in an intelligent, adaptive, and ethical manner.

Keywords: digital literacy, complementary, familiarity, security, college student

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INTRODUCTION

Digital technology and the internet have become an essential part of today's modern society and are constantly evolving. The growth of technology influences the transformation and development of society; it is critical to identify patterns of technological development and use them to anticipate the transformation of technology and society in the future (Grinin et al., 2020). The development of digital technology and the internet benefits society by allowing it to carry out various activities, including communicating, doing work, getting information, solving problems, and making decisions. Digital

technology and the internet are also important parts of Industry 5.0, and they are a step toward the industrial world becoming more effective and efficient. This then has an impact on the need for human resources to be able to use digital technology well. Digital technology even reduces pollution and waste while increasing production and efficiency, impacting the education system and other activities (Haleem et al., 2022). As a result, the need to obtain qualified workers by utilizing digital technology by various job providers has become natural and recognized by today's young generation.

As a result, the need to obtain qualified workers by utilizing digital technology by various job providers has become the current young generation is known as digital natives because they grew up in an era of rapid digitalization and are accustomed to using digital technology and the internet in their daily lives, both for entertainment, communication, and learning (Untari et al., 2020). However, they cannot fully utilize the internet productively and are still vulnerable to social influences. On the other hand, the world of work now demands digital skills, and the younger generation is aware of technology-based career opportunities, such as data analysts, graphic designers, and copywriters. This is reflected in the increasing number of students choosing majors related to digital business. However, they often forget the importance of digital literacy as the main provision in entering the digital industry. Digital literacy enables the use of safe, comfortable, and productive technology. Unfortunately, research on digital literacy in Indonesia is still limited (Yustika & Iswati, 2020), even though this literacy is important for economic growth (Tomczyk, 2020). This study measures digital literacy and curiosity in college students, primarily from technology-related study programs, focusing on three aspects of digital literacy: complementary, familiarity, and security, as used in the 2022 Bali G20 National Digital Literacy Survey (Damuri et al., 2022).

The development of digital technology and the internet has encouraged increasing attention to digital literacy among researchers. Digital literacy includes the ability to access, produce, create, and communicate information through digital media (Techataweewan & Prasertsin, 2017) and adapt to technological advances. The three main aspects of digital literacy include searching and utilizing content and producing and distributing digital content (Spires & Bartlett, 2013). Easy internet access makes digital literacy an important factor in self-development and career (Yustika & Iswati, 2020; Udeogalanya, 2021). Digital literacy also contributes to economic and social growth in developed and developing countries (Zelenev, 2022; Choudhary & Bansal, 2022). Digitally literate individuals can access, manage, and create information in the digital environment (Wilhelm, 2004) and actively participate in the digital economy, including utilizing social media and e-commerce (Nipo et al., 2020; Zelenev, 2022), for those who do not yet have digital competence, digital literacy training has been shown to improve information and communication skills, as well as support more informed decision-making (Choudhary & Bansal, 2022; Ince, 2022; Tomczyk & Eger, 2020). Digital literacy can open access to jobs and entrepreneurship. Through the G20, Indonesia has established three elements of digital literacy measurement: complementary, familiarity, and security, each consisting of two indicators.

LITERATURE REVIEW

Complementary

Complementary elements in digital literacy measure a person's ability to communicate, collaborate, and verify information sources. This competency is essential in accessing and utilizing technology effectively and driving economic growth (Kurniawan et al., 2021; Indriani et al., 2022). Individuals with good complementary skills can be better prepared to face opportunities in the digital era (Nipo et al., 2020). This element has two leading indicators: communication and collaboration and critical thinking. Communication and collaboration Refer to using digital technology to interact and work together to create shared knowledge. This digital interaction, although challenging, can accelerate economic and social growth (Phelps, 2017) and support remote work and indirect coordination (Collard et al., 2019). Meanwhile, critical thinking is the ability to express and convey the credibility of digital information.

Critical thinking skills are fundamental in assessing information from various sources (Kurniawan et al., 2023; Jones, 2022; Baltezarevic, 2022) and are important for solving problems in the future world of work (Uscanga & Torres-Delgrado, 2022).

Familiarity

A person's familiarity with technology and the internet can affect digital literacy. Familiarity is the level of a person's fluency in using digital technology and managing data on that technology (Damuri et al., 2022). The more familiar a person is with technology, the better their digital literacy skills will be (Emosda & Annisa, 2019; Fox, 2014). Good digital literacy can encourage a person's intention to use digital technology (Nikou et al., 2020). Two indicators can be used to determine a person's level of familiarity: ICT familiarity and data literacy (Damuri et al., 2022). ICT familiarity is a person's comfort level in operating ICT devices in everyday use CSIS Indonesia. Familiarity with ICT devices is shown in digital devices (Reichert et al., 2020). At the business actor level, this is demonstrated through social media and e-commerce as promotional media (Sariwulan et al., 2020). Data literacy is important in a person's digital literacy (Juergens, 2020; Nath & Kirby, 2022). Through data literacy, a person can read, assess, and take important things from the digital economy to make decisions (Krüger, 2022). Understanding information through digital media can impact the economic and business sectors (Juergens, 2020). Data literacy is a person's literacy level in sorting and storing information, data, and digital platform content (Damuri et al., 2022). With the large amount of data available on the internet, a person must have the skills to read, assess, and use the information obtained. Data literacy is an important part of digital literacy because it reminds us of everyday life and work activities (Damuri et al., 2022).

Security

Access to digital devices and the internet poses a threat to its users. To use digital devices and the internet optimally, skills are needed to secure devices and personal data. Security and devices influence a person's digital literacy (Hirschprung et al., 2022; Khdzir & Ahmed, 2019). Although today's young generation is familiar with digital devices and the internet, their insight into device security and personal data theft is still limited (Krasna et al., 2011). Measuring security elements can be done by looking at device and personal security indicators (Damuri et al., 2022). The digitalization of personal information and the importance of digital data management emphasize why someone must understand the digital environment and assess the security of their data (Dupuis, 2019). Device security measures a person's ability to protect digital devices and content and understand the risks in the digital environment. In contrast, personnel security measures people's ability to protect their data and privacy in the digital environment (Damuri et al., 2022). People need to secure their identity and devices to optimally use digital devices (Hirschprung et al., 2022).

METHOD

This study uses quantitative to answer the research questions posed previously. The approach to obtain respondents was purposive sampling, namely with the provision that students are at least 18 years old. The data sources used in this study are primary data obtained from the first source, either from individuals or individuals. The questionnaire contents relate to the respondents' identity, gender, age, general knowledge of industry applications, and readiness to become a professional in the industry from digital literacy. The questionnaire is provided with a 5-point Likert scale that eliminates hesitant, abstaining, average, or similar answers to bring out a more real attitude or perception. This study uses a validity test with the Pearson Product Moment Correlation method, where each item is tested with the total score of the variable.

An item is declared valid if the significance value is <0.05. The Cronbach's Alpha technique is used to test reliability and is suitable for interval or essay data. The instrument is considered reliable if the Cronbach's Alpha value is > 0.60. Data analysis is divided into two methods. First, descriptive analysis is a method for describing the characteristics of the study, including the profile of respondents and the data collected, which are then explained briefly. Second, statistical analysis is a statistical-based method for presenting data descriptions through values such as average (mean), standard deviation, variance, maximum and minimum values, sum, range, and skewness (distribution skewness).

Table 1. Questionary Items

Element	Indicator	Questionary Items
Complementary	Communication and collaboration	• I can communicate through emails • I can use instant messaging or social media for exchanging messages • I can work with others using cloud services • I can make conversation (text, audio, or video calls) over the internet using platforms
	Critical Thinking	• After receiving a message or seeing a post as illustrated in [show fake news], I immediately share it with others • If I get information like [show fake news], I will find out where the information comes from and identify whether the source is credible or not before I share it • I'm used to finding out who the author of information is to determine credibility
Familiarity	ICT Familiarity	• When I talk to someone I meet online, I know how to check If their identity [name and personal information] is real • I know how to connect to a Wi-Fi network, mobile network, or Bluetooth • I know how to download and install apps to my mobile device • I know how to operate a browser [open new tab, navigate pages, or bookmark]
	Data Literacy	• I am aware that I can search information through online searches • I find it easy to decide what are the best keywords to use for online searches • I am able to save/store data, information, and content in digital media • I am able to direct/manage the search for data, information, and content according to my needs in digital media • I am able to upload, download or save files, and open downloaded files
Security	Device security	• 1234abcd is a secure password • [birthdate+name] is a secure password • 21_d61tal is a secure password • I am used to creating and frequently changing secure password with a combination of numbers, letters, and special characters

Element	Indicator	Questionary Items
	Personal security	• I back up my data using a memory card, hard disk, or cloud (ex: Gdrive, OneDrive) • I am aware of the threat (virus, malware) to my devices (handphone, computer) • I use two-factor authentication) two-step verification) for at least one of my accounts • On social media accounts, I am able to control who can see my posts (timeline) • I don't upload personal data as date of birth, address, phone number, ID number, or any information related to an identified or identifiable individual on social media • I can disable the option to show my geographic/GPS position in mobile apps (FB, IG, etc) • I know how to report abuse on social networks if there are posts that contain negative content or are detrimental to me

RESULTS

The process of obtaining respondents began by distributing questionnaires online to respondents according to the criteria, using a purposive sampling technique. The questionnaire created using Google Forms was then distributed using a shortened link sent to various social media, namely WhatsApp and Instagram. The results of distributing the questionnaire online got 307 research respondents, who would then be analyzed to obtain answers to the research questions. Based on gender, respondents in this study were dominated by women, 168 people (54.7%), while men numbered 139 people (45.3%). Regarding age, respondents were divided into five groups, but most were in the 19-21 year age range, with 226 respondents (73.6%). This shows that most respondents are in the adult category (young adults), which has the potential to influence attitudes and views in data analysis. In terms of regional origin, respondents came from almost all provinces in Indonesia. The three provinces with the most significant number were Central Java, with 72 respondents (23.5%), followed by the Special Region of Yogyakarta, with 55 respondents (17.9%), and West Java, with 44 respondents (14.3%). Meanwhile, the other 136 respondents (44.3%) came from 27 other provinces. This distribution strengthens the potential for generalizing research results nationally, with the largest concentration coming from Java Island. A total of 142 respondents (46.3%) were recorded as 2nd semester students, indicating that most were new students with less than one year of college experience. Regarding study programs, the two dominant backgrounds were digital business, with 139 respondents (45.3%), and management, with 133 respondents (43.3%), so most respondents came from these two fields. Regarding career experience in the digital sector, 239 respondents (77.9%) had never been involved in activities such as internships, side jobs, or work in the digital industry. This finding shows that most respondents do not have practical experience in the digital field and are not familiar with the digital work world.

Table 2. Validity Test

Item	Sig. (2-tailed)	Item	Sig. (2-tailed)	Item	Sig. (2-tailed)
Com_Col1	0.000	ICT_Fam2	0.000	**Dev_Sec3**	**0.216***
Com_Col2	0.000	ICT_Fam3	0.000	Dev_Sec4	0.001
Com_Col3	0.000	Dta_Lit1	0.000	Dev_Sec5	0.000
Com_Col4	0.000	Dta_Lit2	0.000	Dev_Sec6	0.000

Item	Sig. (2-tailed)	Item	Sig. (2-tailed)	Item	Sig. (2-tailed)
Crt_Thk1	**0.301***	Dta_Lit3	0.000	Dev_Sec7	0.000
Crt_Thk2	0.000	Dta_Lit4	0.000	Psn_Sec1	0.000
Crt_Thk3	0.000	Dta_Lit5	0.000	Psn_Sec2	0.000
Crt_Thk4	0.000	Dev_Sec1	0.049	Psn_Sec3	0.000
ICT_Fam1	0.000	**Dev_Sec2**	**0.078***	Psn_Sec4	0.000

***sig. (2-tailed) > 0.05**

The validity test is done by looking at the sig. (2-tailed) value on each research variable item. Question items are declared valid if they have a sig. (2-tailed) value of less than 0.05. Based on Table 4.1, several question items have a value of more than 0.05: device security in the second and third questions, and critical thinking in the first question. These three question items were then deleted, and the validity of all questionnaire items used was retested. From the results of the retest, after deleting 3 question items, the other 24 items had values below 0.05, making them considered reliable and can be tested for reliability. Table 2. shows a value of 0.932; the question items in this study can be declared reliable.

Table 3. Reliability Test

Cronbach's Alpha	N of Items
.932	24

Descriptive analysis was conducted on complementary dimensions, consisting of communication and collaboration variables and critical thinking. Table 3 shows that most have a range of 4 with a max value of 5 and a min value of 1. The mean results are mostly more than 4. The third and fourth critical thinking question items show values of 3.97 and 3.64, while there is one third communication and collaboration question item with a value of 3.33. The skewness and kurtosis values indicate that the data distribution is in the normality range, with values of more than ±1.0 indicating that the data is not in the normality range. There are three question items (com_col2, com_col4, and crt_thk2) that are indicated as not normal.

Table 4. Descriptive Statistic of Complementary Dimension

Variable	N	Range	Min	Max	Sum	Mean	Std. Deviation	Variance	Skewness	Kurtosis
Com_Col1	307	4.0	1.0	5.0	1262.0	4.11	0.89	.785	-.843	.438
Com_Col2	307	2.0	3.0	5.0	1458.0	4.75	0.47	.221	-1.620	1.659
Com_Col3	307	4.0	1.0	5.0	1022.0	3.33	1.09	1.195	-.335	-.322
Com_Col4	307	2.0	3.0	5.0	1429.0	4.65	0.56	.312	-1.371	.920
Crt_Thk2	307	4.0	1.0	5.0	1276.0	4.16	0.78	.616	-.854	1.034
Crt_Thk3	307	4.0	1.0	5.0	1220.0	3.97	0.82	.679	-.516	-.037
Crt_Thk4	307	4.0	1.0	5.0	1179.0	3.84	0.91	.821	-.555	.217

Based on Table 4, with the variables ICT familiarity and data literacy, it is known that all question items produce data with an average of more than 4. The standard deviation has a value below 1, with the largest deviation value of 0.78 in the third ICT familiarity question item. Data normality is indicated by 4 question items that produce data with a distribution outside the normality range (ict_fam1, ict_fam2, dta_lit3, and dta_lit5).

Table 5. Descriptive Statistic of Familiarity Dimension

Variable	N	Range	Min	Max	Sum	Mean	Std. Deviation	Variance	Skewness	Kurtosis
ICT_Fam1	307	2.0	3.0	5.0	1438.0	4.68	0.53	.276	-1.395	.999
ICT_Fam2	307	2.0	3.0	5.0	1465.0	4.77	0.46	.209	-1.806	2.393
ICT_Fam3	307	3.0	2.0	5.0	1335.0	4.35	0.78	.607	-.989	.276
Dta_Lit1	307	2.0	3.0	5.0	1401.0	4.56	0.59	.345	-.980	-.032

Variable	N	Range	Min	Max	Sum	Mean	Std. Deviation	Variance	Skewness	Kurtosis
Dta_Lit2	307	3.0	2.0	5.0	1347.0	4.39	0.66	.434	-.752	.111
Dta_Lit3	307	4.0	1.0	5.0	1362.0	4.44	0.73	.534	-1.395	2.586
Dta_Lit4	307	3.0	2.0	5.0	1374.0	4.48	0.62	.387	-.930	.635
Dta_Lit5	307	2.0	3.0	5.0	1415.0	4.61	0.55	.304	-1.029	.046

Table 5 shows the results of descriptive analysis on the security dimension, consisting of device security and personal security. There is 1 data that has different results, namely the device security item of the first question with a mean value of 1.78 and a standard deviation of 1.11. Other question items are relatively similar with a mean value above 4 and a standard deviation below 1. The distribution of data in the normality range is seen from the skewness and kurtosis values, which show that there are 5 question items that produce values outside the normality range, 2 items in the device security variable and 3 items in personal security.

Table 6. Descriptive Statistic of Security Dimension

Variable	N	Range	Min	Max	Sum	Mean	Std. Deviation	Variance	Skewness	Kurtosis
Dev_Sec1	307	4.0	1.0	5.0	546.0	1.78	1.11	1.225	1.277	.676
Dev_Sec4	307	4.0	1.0	5.0	1296.0	4.22	0.81	.663	-1.012	1.280
Dev_Sec5	307	4.0	1.0	5.0	1285.0	4.19	0.87	.753	-.883	.210
Dev_Sec6	307	4.0	1.0	5.0	1290.0	4.20	0.85	.730	-.969	.678
Dev_Sec7	307	4.0	1.0	5.0	1278.0	4.16	0.92	.843	-.941	.391
Psn_Sec1	307	4.0	1.0	5.0	1340.0	4.36	0.81	.651	-1.396	2.296
Psn_Sec2	307	4.0	1.0	5.0	1294.0	4.21	0.90	.810	-1.114	1.040
Psn_Sec3	307	4.0	1.0	5.0	1319.0	4.30	0.80	.634	-.935	.440
Psn_Sec4	307	4.0	1.0	5.0	1337.0	4.36	0.76	.576	-1.012	.744

The correlation between the descriptive variables of age, gender, and respondents' experience and digital literacy can be seen in Table 7. The table shows that most respondents did not significantly influence the digital literacy variable. However, an interesting finding was that experience related to digital technology significantly influenced the device security variable. This variable, along with its correlation with the digital literacy variables, had negative relationship.

This because exposure to digital work can build confidence in overcoming digital challenges, including security issues. Someone with digital experience will show different levels of risk perception, which stems from the perception of comfort with technological devices (Carpenter et al., 2019; Negahban, 2015). Consequently, respondents were relatively lax in securing their digital devices, characterized by a belief in their ability to address potential security issues. A person who grows up with digital technology will have an awareness of digital security which is influenced by self-confidence, which is built through experience (Gkioulos et al., 2017).

Table 7. Correlations

Variable	Comuncation and Collaboration	Critical Thinking	ICT Familiarity	Data Literacy	Device Security	Personal Security
Age	0.062	0.075	-0.014	0.040	0.077	0.120
Gender	0.061	0.048	-0.035	-0.017	0.006	-0.031
Experience	-0.080	-0.085	-0.028	-0.063	**-0.119***	-0.070

*Correlation is significant at the 0.05 level (2-tailed)

Respondent's Responses

Complementary

The complementary dimension has 2 variables, communication and collaboration and critical thinking. Respondents were given questions related to both variables, with 8 question items for communication and collaboration and 4 question items for critical thinking.

Table 8. Questionary Items *Communication and Collaboration* Variabel

Item	Question	Mean
Com_Col1	I can communicate through emails	4.11
Com_Col2	I can use instant messaging or social media for exchanging messages	4.75
Com_Col3	I can work with others using cloud services	3.33
Com_Col4	I can make conversation (text, audio, or video calls) over the internet using platforms	4.65

Communication and collaboration variables identify respondents' ability to communicate and collaborate using digital media. The results can be seen in Table 8. Each item represents how respondents use email, social media, cloud technology, and other online platforms. Respondents tend to agree that they can use email to communicate powerfully. Respondents strongly agree that they can use the chat function to exchange messages with others. Most respondents expressed doubts about using cloud technology to work with others. Respondents also strongly agree with chatting skills using text, audio, or video calls on online platforms.

Table 9. Questionary Items *Critical Thinking* Variable

Item	Question	Mean
Crt_Thk2	If I get information like [show fake news], I will find out where the information comes from and identify whether the source is credible or not before I share it	4.16
Crt_Thk3	I'm used to finding out who the author of information is to determine credibility	3.97
Crt_Thk4	When I talk to someone I meet online, I know how to check If their identity [name and personal information] is real	3.84

The critical thinking variable shows the respondent's attitude statement toward their behavior in receiving information on digital media. The behavior in question is how they identify and discover the source of information and the identity of the person they meet on digital media. From the respondents' statements, it is known in Table 9 that when identifying the source of information, the identity of the author of the information, and the person they are talking to on digital media, respondents tend to agree to do so.

Familiarity

A person's fluency in navigating digital media is built from 2 variables, namely ICT familiarity and data literacy. Identification of attitude statements in respondents with 8 question items for the ICT familiarity variable and 5 question items for the data literacy variable.

Table 10. Questionary Items *ICT Familiarity* Variable

Item	Question	Mean
ICT_Fam1	I know how to connect to a Wi-Fi network, mobile network, or Bluetooth	4.68
ICT_Fam2	I know how to download and install apps to my mobile device	4.77
ICT_Fam3	I know how to operate a browser [open new tab, navigate pages, or bookmark]	4.35

ICT Familiarity provides an overview of the respondents' comfort level in operating various information and communication technologies, both hardware and software. In Table 10, it can be

identified that most respondents strongly agreed with the eight questions. These questions represent the familiarity with operating hardware, installing software on smartphones, using browsers and search engines, searching and downloading data, and opening data downloaded on their devices.

Table 11. Questionary Items *Data Literacy* Variable

Item	Question	Mean
Dta_Lit1	I am aware that I can search information through online searches	4.56
Dta_Lit2	I find it easy to decide what are the best keywords to use for online searches	4.39
Dta_Lit3	I am able to save/store data, information, and content in digital media	4.44
Dta_Lit4	I am able to direct/manage the search for data, information, and content according to my needs in digital media	4.48
Dta_Lit5	I am able to upload, download or save files, and open downloaded files	4.61

Data literacy communicates a person's ability to assess data and make decisions from the data. In Table 11, it is known that in this variable, respondents stated whether they could easily obtain data from online searches, determine relevant keywords, store data, manage what was received in digital media, and make decisions based on the data. The results of the respondents' answers are in Table 10. most respondents strongly agree with the five questions raised by the 5 question items. Data literacy is important because it impacts daily life and work activities.

Security

Table 12. Questionary Items *Device Security* Variable

Item	Question	Mean
Dev_Sec1	1234abcd is a secure password	1.78
Dev_Sec4	I am used to creating and frequently changing secure password with a combination of numbers, letters, and special characters	4.22
Dev_Sec5	I back up my data using a memory card, hard disk, or cloud (ex: Gdrive, OneDrive)	4.19
Dev_Sec6	I am aware of the threat (virus, malware) to my devices (handphone, computer)	4.20
Dev_Sec7	I use two-factor authentication) two-step verification) for at least one of my accounts	4.16

Device security is part of a person's digital literacy. Based on Table 12, statements of respondents' attitudes towards digital device password security, data storage security and access, device visibility control, and reporting on disclosures on social media were obtained. Most respondents strongly disagreed with the level of password security 1234abcd in determining the password. Most respondents then stated that they strongly agreed with the need to replace passwords with a combination of numbers, letters, and special characters, secure devices from malware and backup data regularly, use double verification, and control who can access the digital devices they own. Respondents are aware of the importance of preserving the digital devices they own.

Table 13. Questionary Items *Personal Security* Variabel

Item	Question	Mean
Psn_Sec1	On social media accounts, I am able to control who can see my posts (timeline)	4.36
Psn_Sec2	I don't upload personal data as date of birth, address, phone number, ID number, or any information related to an identified or identifiable individual on social media	4.21

Item	Question	Mean
Psn_Sec3	I can disable the option to show my geographic/GPS position in mobile apps (FB, IG, etc)	4.30
Psn_Sec4	I know how to report abuse on social networks if there are posts that contain negative content or are detrimental to me	4.36

In addition to device security, personal security is a benchmark that can be seen in Table 13. The question items represent how respondents control access to information on social media, GPS devices, and the ability to report harassment on social media. The results of the respondents' statements show that most respondents strongly agree with their ability to control who can see posts on social media, ensure that important personal information is not displayed on social media, control the GPS system on social media, and be able to report harassment experienced on social media.

Discussion

This study has a formulation of the problem to be answered: 1) whether the digital literacy measurement produced through the G20 Bali 2022 can be used in student objects and 2) how is student digital literacy based on the G20 Bali 2022 digital literacy measurement standards. Based on the study's results, out of 40 digital literacy measurement items, 36 question items passed the validation and reliability tests tested by SP using SS 22. Another finding was that most of the student's digital literacy measurements showed good results based on three dimensions, namely complementarity, familiarity, and security.

Validity and reliability testing of the G20 Bali 2022 digital literacy measurement items was carried out with a total of 40 measurement items, with 36 measurement items declared valid and reliable. This measurement was carried out with students as research objects, most of whom were in semester 2, indicating that they had not been studying at university for long and had no experience in a career in the digital world. The complementary dimension has 12 measurement items, with eight items in the communication and collaboration variables and four measurement items in the critical thinking variable. The validity test requires each variable to delete one measurement item, wherein the communication and collaboration variables, the item "When I see a post, I immediately share it with others," was deleted. In the critical thinking variable, the item "After receiving a message or seeing a certain post, I immediately share it with others" was deleted. The second measurement item reflects an important attitude because it reflects the behavior of sharing messages or posts received on digital media.

The familiarity dimension becomes with measurement items that meet the overall validity and reliability tests, with no measurement items that need to be deleted because they do not meet the validity test. This dimension has 13 measurement items: eight in the ICT familiarity dimension and five in the literacy data. Security has two items that need to be deleted, both of which come from the device security variable. This dimension has 15 measurement items, with 11 items in the device security variable and four in personal security. The second measurement item that was deleted was "a combination of name and date of birth is a safe password" and "21_d61tal is a safe password". Both words represent passwords that someone can create, with the first password being a combination of two personal data, namely name, and date of birth, and the second password being a variant of letters, numbers, and special characters as a password. Password variants can still be used in the measurement; a combination of numbers and letters arranged sequentially.

Students' digital literacy levels can be assessed from the distribution of their responses to the three main dimensions of digital literacy. Figure 1. shows the distribution of answers to communication collaboration and critical thinking variables parts of complementary dimension. Communication and collaboration are important dimensions of digital literacy, influencing how they use digital tools effectively (Rakhimov, 2023; Yi & Siqian, 2025; Zorko, 2024). Collaborative approaches and critical thinking are important in digital literacy (Rakhimov, 2023). Communication and collaboration enable students to solve problems collectively and have the ability to solve problems in a digital environment

(Ashley et al., 2012). Students as respondents expressed their confidence in their ability to communicate effectively using digital media, both in text, video, and images. Someone who can communicate and access information digitally easily will encourage them to become more active in today's society (Pinheiro & Simões, 2020). This communication ability is their strongest aspect in complementary variables. However, students expressed doubts about collaboration, namely their ability to work together using digital media such as the cloud. This needs to be considered, considering that activities that require dialogue and group activities can be significant indicators of digital skills in the use of technology (de Lima & Schnitman, 2024). Collaborative learning encourages people to work together on projects requiring digital technology to improve their digital competence (Zorko, 2024). When critical thinking is applied when receiving information, students check the credibility of the information and the disseminator of the information. Looking at the distribution of answers, they began to be unsure if they had to search for information up to the content's profile or information creator's. This is understandable because the effort to explore the profile of the content creator is greater than ensuring whether the content or information is credible. This process requires students' ability to listen to information and think critically about the information they obtain in digital media. The competencies that must be built into the student learning process need to interact with digital literacy, which also has an impact on improving the learning experience and preparing them for work challenges (Zorko, 2024).

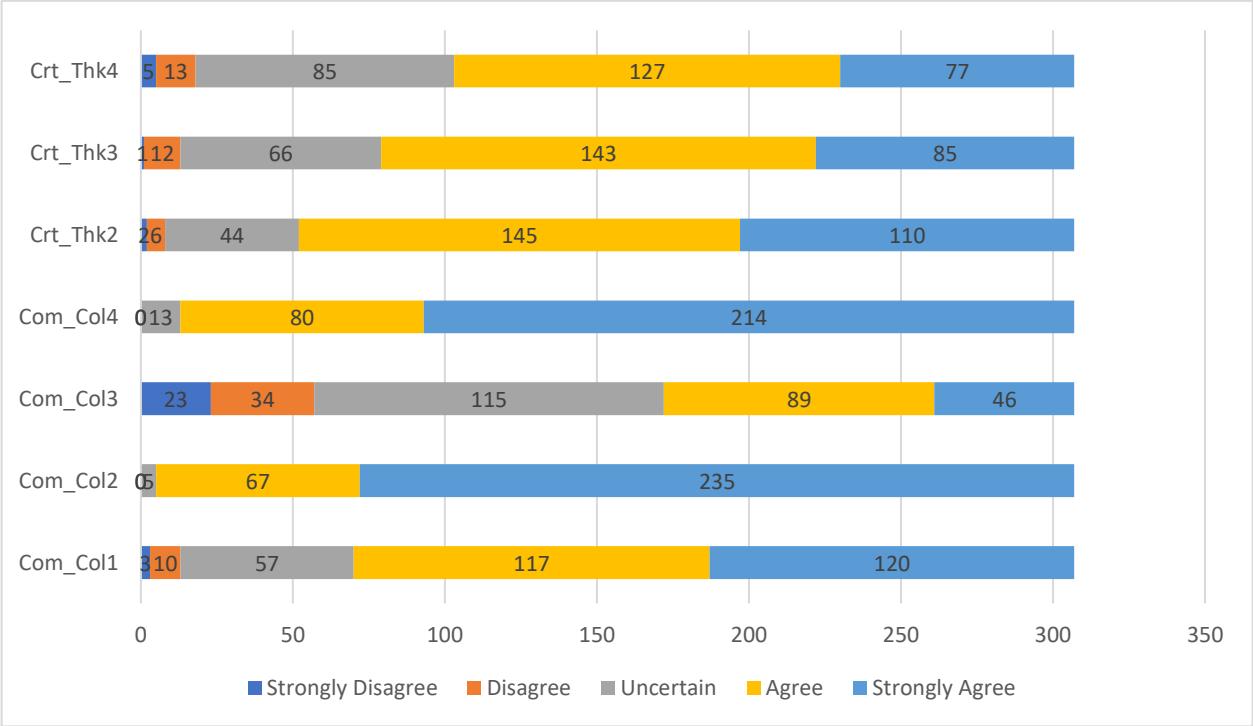

Figure 1. Distribution of Respondents' Answers on Complementary Dimensions

Meanwhile, students' digital literacy skills in the familiarity dimension can be seen in Figure 2. This section shows how they are accustomed to operating digital devices in hardware and digital data. Familiarity with ICT increases a person's digital literacy so that they can utilize technology to complete various tasks (Kasemsap, 2018; Reddy et al., 2020). The results of this study indicate that students are familiar with ICT, especially in the awareness that they can operate technological devices to obtain information and download and install applications that are relevant to their needs. Through a person's habit of using technological devices, the person can access more diverse resources and be better connected to the community (Cheung et al., 2024; Toven-Lindsey, 2017). The level of students' familiarity with ICT will enable them to develop digital literacy independently (Kasemsap, 2018). Students' ability to operate digital devices will impact their future careers. Through habits built through direct practice in ICT, a person becomes more prepared for jobs that require technological devices (Toven-Lindsey, 2017).

The level of ICT familiarity that a person has will affect how he or she overcomes problems that make it challenging to achieve digital inclusion (Pinheiro & Simões, 2020). Problems that arise related to barriers to increasing ICT familiarity arise from limited access to technology (Hussain & Phulpoto, 2024).

Data literacy refers to an individual's ability to acquire, manage, and store information as needed, which is the key to success in the data-based era (Taş, 2024). The study results showed that students can access and manage digital information from the media they use every day. Routine interaction with digital devices exposes them to various data, which plays an important role in decision-making. Data literacy contributes significantly to students' readiness to face the world of work (Taş, 2024; Zhong & Liu, 2024). Data literacy helps students produce information to express ideas effectively in everyday life (Krzton, 2018). However, students' ability to manage digital data is still relatively low compared to ICT familiarity. This shows that mastery of technology is now limited to technical aspects and the ability to sort relevant information (Pertiwi et al., 2024). In the era of big data, students need to manage large and complex data, making data literacy an important part of digital literacy (Giese et al., 2020; Zhong & Liu, 2024). Universities strategically strengthen students' data literacy to deepen their understanding of digital literacy (Tas. 2023; Pertiwi. 2024). Students with good data literacy can interpret and convey data effectively, supporting their future careers (Murray-Rust et al., 2019; Zhang et al., 2022).

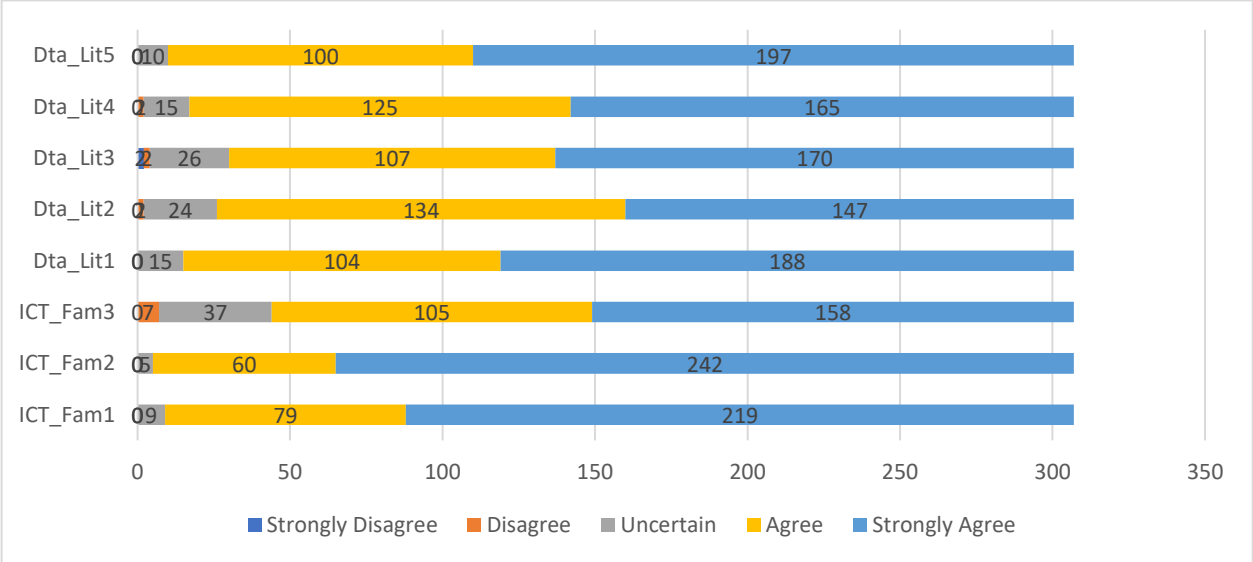

Figure 2. Distribution of Respondents' Answers on Familiarity Dimensions

The security dimension is the third aspect in measuring digital literacy, including an individual's ability to protect their devices and personal data. Based on the research results shown in Figure 3, students showed good awareness and ability to maintain security when using digital media. This awareness is important to reduce cybersecurity risk problems (Koller, 2022; Pankajakshan & Bangur, 2024). Security constraints experienced by students can hinder the development of their digital literacy. Using complex passwords—involving letters, numbers, and special characters—indicates security awareness (Parker et al., 2015). Knowledge of risks such as data breaches and identity theft also shapes students' understanding of the importance of data protection (Repi & Nasution, 2024; Siahaan & Tampubolon, 2024; Siregar et al., 2024). However, this awareness must still be transformed into real action because security practices are often troublesome (Krishna, 2024). Therefore, regular training and the formation of a paradigm that emphasizes the importance of digital security need to be carried out (Koller, 2022; Krishna, 2024). In the world of work, the ability to recognize and overcome digital threats is a crucial skill (Swain, 2014).

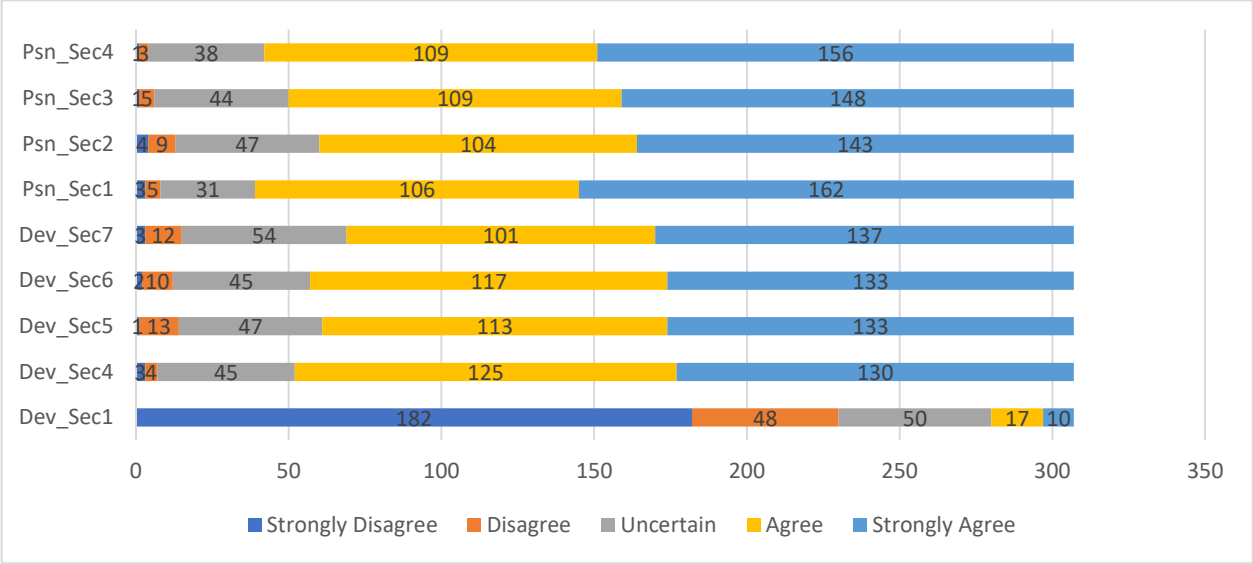

Figure 3. Distribution of Respondents' Answers on Security Dimensions

CONCLUSION

This research aims to test digital literacy measurement tools in target students as a generation that is familiar with technological developments. The digital literacy measurement tool used is an adjustment of the results of the Bali 2022 which contains three main elements: complementary, familiarity, and security (Damuri et al., 2022). The study also intends to use a measuring tool that has been adjusted to determine the level of digital literacy of the research object. The results of the study show that there are several measurement items that meet the classical assumption test, by producing answers that students, especially in the early period of college, have good digital literacy. Based on the results of this study, the state of digital literacy in Indonesia, particularly among university students, still shows a decline in several important aspects. Students demonstrate fairly good digital communication skills in the complementarity dimension, such as using email, social media, and other online communication platforms. However, digital collaboration through technologies like cloud services remains challenging, reflecting students' hesitation in working collaboratively with colleagues. Critical thinking also needs strengthening; although students can verify digital information sources, they tend not to investigate the identity of the content creator or sender. This indicates that students' critical thinking skills in the digital realm have not yet fully developed.

There are several things that are underlined that they feel doubtful about their ability to collaborate working using cloud media, which affects their performance in their careers after graduation. With the research results obtained, there are several limitations that need to be noted for further research. First, although the reach of respondents is quite wide geographically, the limited number will affect the generalization of the research results. Second, testing the relationship between variables has the potential to produce more interesting insights for the development of the younger generation in the world of careers. In the familiarity dimension, Indonesian students are familiar with using ICT devices. Their ability to access networks, operate applications, and search for information online is in the good category. This reflects that ICT familiarity has become part of students' digital habits. However, the data literacy subdimension found that although students can access and store digital information, their ability to sort, manage, and make decisions based on digital data is not yet fully developed. Reliance on basic technical skills without the ability to sort out relevant information is essential for strengthening this aspect. The security dimension demonstrates students' awareness of the importance of protecting their devices and personal data in the digital world. Students understand basic security practices such as using complex passwords, backing up data, and controlling personal information on social media. However, this knowledge has not been consistently implemented in their

daily digital behavior. While awareness of cybersecurity risks exists, implementing preventive and protective measures to safeguard devices and personal data requires further training so that students not only understand the risks but also actively manage them.

Overall, Indonesian students' digital literacy is developing, with strengths in digital communication and the operation of ICT devices, but weaknesses in online collaboration, critical thinking about digital information, data management, and strengthening digital security behaviors. The results of this study suggest that enhancing digital literacy in Indonesia needs to focus on developing collaborative and critical thinking skills, enhancing more applicable data literacy, and transforming security awareness into concrete actions. These findings provide an essential foundation for higher education institutions to design curricula that emphasize the use of technology and a critical and secure understanding in the digital era.

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