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Utilization of the use of technological devices in delivering communication information in the learning process

Irsyad[1], Anisah[1], Iwan Ramadhan[2], Jitu Halomoan Lumbantoruan[3]
[1]Educational Administration Study Program, Faculty of Education, Universitas Negeri Padang, Padang, Indonesia
[2]Sociology Education Study Program, Universitas Tanjungpura, Pontianak, Indonesia
[3]Department Mathematics Education, Faculty of Teacher Training and Education, Universitas Kristen Indonesia, Jakarta, Indonesia

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ABSTRACT

The development of increasingly sophisticated technology today brings education to participate in using the features available in today's media such as the transition from face-to-face learning communication in schools to face-to-face assisted by technology such as laptops, tablets, cellphones and other multimedia. Technology currently provides innovation in the learning process both from home and from school. However, there are still many teachers and students who have not utilized technology such as laptops, tablets, cellphones and other multimedia in the learning process. The purpose of the study was to analyze the benefits and relationships of the four main variables of communication assessment elements with digital devices. The research method used was quantitative with a sample of 148 teachers randomly selected from schools that use technology in the learning process. Data collection techniques with instruments. The instruments used were four indicator instruments, namely technology from laptops, tablets, cellphones and other multimedia. Data analysis techniques with descriptive statistics using SPSS version 26.0 calculated the mean, standard deviation, and correlation test. The results of the study found that the four indicators had high reliability and the four indicators had significant utilization, were mutually positive and had a high relationship with each other. The conclusion is that the four technological devices are good for use in digital communication during the learning process and laptops and tablets are more recommended in this study.

Corresponding Author:

Irsyad
Educational Administration Study Program, Faculty of Education, Universitas Negeri Padang
Padang, West Sumatra, Indonesia
Email: irsyad@fip.unp.ac.id

1. INTRODUCTION

Technology is developing rapidly and experts continue to develop their knowledge and pour knowledge into technological features to help people communicate with each other so they can communicate verbally, write, watch cartoons, to look at live stories, films, and videos [1], [2]. In the learning process at school, teachers must have a way of presenting information, and teachers start learning by telling stories to attract students' interest. The technique that teachers have used so far by starting with stories will attract students' interest in learning [3]-[5]. The way of communicating today has developed rapidly and can reach any area and even across countries with the help of ICT. This technological development is called communication with digital (CWD) [6]-[8]. In today's education, teachers and students often conduct learning processes with the help of technology called CWD. Thanks to the help of CWD, the learning process

becomes more active and innovative [9], [10]. Teachers in schools must prepare materials and in the material, there are many analogies of questions and questions in the form of stories to make it easy to communicate digitally. With the hope that the material prepared by the teacher can communicate with students and the material prepared by the teacher must be able to be communicated digitally [11]-[13]. The closeness between teachers and students can also be increased with the help of digital communication [14], [15]. Technology developed by experts provides information to teachers and students in schools with easier access to sources and can be communicated directly by students to teachers with the help of digital communication. Communication in digital form has become an obligation for teachers to students and can be done from their respective homes [16]. So far, students and teachers communicate a lot with mobile phones, or what is called cell phones that are used by the wider community. But along with the development of today's technology, scientists have developed many communication devices that are built which are called digital communication. Digital communication can see the faces of students and teachers and is considered more effective in the learning process.

Information communication and technology today have been widely developed and applied in the field of education. Teachers are given the freedom to develop their materials with the help of computers at home and laptops and mobile phones that can be carried anywhere for communicating. Materials developed by teachers with the help of technology can be accessed by students and can directly communicate digitally [17], [18]. Teachers and students welcomed the digital communication assistance developed by experts [19]. Experts in the field of technology have developed more sophisticated learning tools that can be easily accessed by teachers and students in the learning process [20]. In today's era, where all people use technology such as mobile phones, tablets, laptops and other communication devices, it forces its production to be increased by developed countries such as products from China and Japan. This country continues to develop communication devices and many are traded to Indonesia [21], [22]. Teachers in schools use laptops more often in the learning process, while students prefer tablets and mobile phones as digital communication tools compared to laptops. This is because not all students have parents who can afford to buy them laptops. In addition, laptops have advantages compared to mobile phones. The laptop screen is larger than tablets and mobile phones, the screen size is larger and easy to operate or use by teachers in explaining the material that has been prepared and students are more free to understand the material given by the teacher compared to digital communication via mobile phones. While the advantages of mobile phones and tablets are lighter, easier to carry, cheaper than laptops. Each device used in digital communication has its own advantages and disadvantages, but what is more important is the smooth process of delivering material and student understanding through digital tools used by teachers [23], [24]. Teachers have the hope that students can use laptops and tablets in learning interactions compared to mobile phones when asked by teachers to explain story-based questions, students have difficulty providing illustrations in the form of models or images. In fact, by using information, communication and technology developed in the laptop component, it is complete [25]. It is hoped that by using laptops and tablets to communicate digitally during the learning process, teachers and students can easily add and save data that can be accessed easily whenever needed [26], [27]. In the learning process using communication media with the help of digital technology, teachers are more relaxed in telling stories about previously prepared material [28]-[30]. With digital communication is more effective and more innovative than when learning is done in front of the blackboard. The use of technology such as laptops and tablets and freely searching for references and information that can support the material given by teachers to students [31], [32].

In discussing the material that has been designed by the teacher, a digital-based communication device is needed between the teacher and the students, devices such as laptops and tablets are needed that can help them in two-way communication. The CWD concept that has been developed can provide innovation and effectiveness in the learning process [33]. This shows that narrative aids such as digital communication can clarify material and inspire students in the learning process [34]. With the help of tools directed by teachers in learning with digital communication, students are more relaxed and more enthusiastic in achieving learning outcomes [35]. In the process of distance learning and digital communication, teacher skills are also required in operating the media used, such as understanding the components of laptops and tablets used by teachers and students [36]. Tools developed in digital communication such as Email, Microsoft, Power Point, Google Meet, Zoom, Google Drive and other features available in Google must be installed on the laptop and must be mastered and understood by teachers before delivering the material and implementing it to students [37]. In the learning process, it is better to avoid digital communication aids such as mobile devices. Because aids such as mobile phones are not designed for learning but only for short communication [38]. This study needs to evaluate the CWD used by teachers in the learning process. In this study, it is very urgent to conduct research, because there is hope that by using CWD assisted by laptops, tablets, mobile phones and other communication devices can improve understanding and improve student learning outcomes. So the purpose of this study is to analyze how tools such as laptops, tablets and mobile

phones can improve the effectiveness of the learning process and communication between teachers and students.

2. RESEARCH METHOD

The method used in this research is a quantitative method with a survey [39], [40]. The sample of this study was 148 people, consisting of teachers and students who use technology during the learning process at school and from home. The sample was selected randomly and did not pay attention to the order. Anyone found in the field of students and teachers who use digital communication (DC) in learning was used as a sample in this study [32], [41].

The data collection technique in this study was by providing an instrument. This instrument consists of two parts, namely an instrument in the form of a statement and an instrument in the form of a test. Digital communication aids used by students and teachers were first taught by researchers about the components and how to use them. For teachers, this study first introduced the components and how to use the features available in laptops, tablets and headphones in designing learning and how to implement them. In this study, what was measured was the ability and effectiveness of using laptops, tablets and mobile phones by students and teachers in the learning process. Data will be obtained from the results of each respondent's assessment of the statements given and data is also obtained from the results of the test. In this study, there were 40 items of statements and questions that had to be assessed by respondents. The instrument was given to respondents using a google from link, to avoid biased answers [42], [43]. All items are assessed using a Likert scale, namely from point 1 to point 5, namely from very unnecessary to very necessary [44], [45]. The indicators measured in this study can be seen in Table 1, which consists of 40 items and all measure dimensions in facilitating and evaluating the use of multimedia such as laptops, tablets and mobile phones and communicating digitally.

Table 1. Items as measuring tools for digital communication

No	Items
1	Different components.
2	Suitability to the material.
3	The right combination.
4	Good design.
5	More than one display.
6	Attracts students and teachers.
7	Relevance of material to media
8	Media according to material
9	Component system
10	Fiction and real-world system
11	Utilization of components
12	Communication similarity
13	Error control
14	Old data deletion component
15	Smooth system
16	Practical and effective
17	Good development
18	Component control
19	Writing Aids
20	Smooth communication
21	Finding previous references.
22	Material is communicated smoothly
23	Teachers are active in communicating
24	Two-way interaction between students and teachers.
25	Communication attracts students' interest in learning.
26	Communication concepts are imitated.
27	The media used are imitated.
28	Presentation methods attract students' interest.
29	The arrangement runs smoothly.
30	The concept is conveyed well.
31	The material runs smoothly until the end.
32	Two-way interaction.
33	Utilization as it is according to ability.
34	Smooth communication with the media used
35	Attracts interest
36	Digital communication used is directed
37	Measurable material concept by media
38	Ideas are easy to find in media
39	Students are interested in features
40	Complete evaluation concept

The data analysis technique used is descriptive statistics with the help of SPSS version 26.0 to determine the most suitable technological devices for teachers and students in the learning process and learning management at school and from home [46], [47]. Based on the data obtained, it is analyzed by measuring the mean, variance, standard deviation and percentage. The technological devices used as aids such as laptops, tablets and mobile phones are measured for their benefits, speed of use, efficiency, effectiveness, learning process, understanding, sophistication and understanding of components. Before the instrument was distributed to respondents, the instrument had been tested for validity and reliability. All items used, totaling 40 items consisting of digital communication such as laptops, tablets and mobile phones, were valid and the research instrument had a high mean alpha of 0.880 in the reliability analysis. This coefficient is less than 0.80 and the level of reliability is clearly very high. The cronbach alpha coefficient is used to determine the reliability of the research instrument. A reliable instrument must have a cronbach alpha coefficient of at least 0.07. An alpha line between 0.60 and 0.75 can be drawn, but a line below 0.60 is not accurate [48], [49].

3. RESULTS AND DISCUSSION

The results of this study found that aids in delivering learning materials and communicating digitally with the help of laptops, tablets, and mobile phones in other multimedia can arouse enthusiasm and curiosity in the material. This can happen because the media used and the aids used help them communicate smoothly and produce good understanding. Respondents assessed that the multimedia used can make it easier for them to learn from a distance and make it easier for them to communicate with each other and easily get the references they need. Respondents, namely teachers and students, agreed that multimedia really helped them. But it was found in the study that students were more proficient in the multimedia components used than teachers as facilitators. Projects given by teachers can be easily completed by students. From Figure 1, it can be seen that there are 70.94% of student respondents and all of them master the use of features in the aids used in communicating digitally to teachers. Data also found that 16.89% of teachers in this respondent said it was easier to use laptops than tablets and mobile phones. However, this is in contrast to the students' assessment, that they have no problems with multimedia and its use in communicating digitally. This finding is in line with previous findings which stated that students do not have problems communicating digitally during the learning process [20], [50]. Before conducting an assessment of multimedia and devices used by teachers and students. This study provides direction to teachers in using the devices used in designing learning and implementing it to students. The same goes for teachers. In the instrument given instructions to students in the use of devices used by each student in communicating with digital, such as laptops, tablets or mobile phones. Figure 1 shows the distribution of teacher and student respondents and the gender of the respondents. The total number of respondents was 148 students and the number of men and women was proportionally divided evenly with 50% to 50%. This proportion is in accordance with the findings of previous studies which said that the comparison in research using multimedia and its devices must be the same [51], [52]. The results of the study were used to measure communication made by participants using narrative tools based on laptops, tablets and mobile phones. Figure 1 shows the status of respondents who participated in this study. This study used a random sample by collecting 148 respondents. There are a number of students and teachers of various genders. The number of male and female students is 70.94%, male and female teachers are 16.89% and teachers who have other duties are 12.17%.

Based on the results of data analysis in Table 2, there was an increase in the number of connections between various devices such as laptops, tablets, mobile phones, and multimedia devices, with a total of 148 respondents. Both laptops and tablets have very strong connections during the learning process and can be used as aids by teachers and students during the learning process. The correlation coefficient of 0.487 indicates a positive and significant relationship between the two variables. Thus, the use of tablets by teachers and students is also increasingly interested in the use of laptops. This finding is in line with previous research which states that both laptops and tablets are interconnected [53], [54]. The statistical significance (p-value) for this relationship is 0.001, indicating that the results are highly significant. This means that those who use laptops more often also use tablets, perhaps because both devices offer valuable functionality in educational activities. In contrast, laptops or mobile phones showed a kurtosis of 0.398. This value is much lower than the laptop and tablet connection, but still indicates a positive and meaningful connection. The P-value of 0.001 indicates that there is a tendency for laptop users to also use mobile phones, even when there is no strong connection with the tablet. This may be a result of the fact that smartphones are often used for quick access to information and communication, which may be greater than laptop use. This finding is in line with previous findings that laptop users tend to use mobile phones as well. Meanwhile, the results of the analysis between laptops and other multimedia devices, the correlation coefficient is 0.737, which is the lowest value among all the connections analyzed. This shows that there is a strong relationship between

laptop users and other multimedia devices. The highly significant P value (0.000) indicates that this relationship is highly significant. This may indicate that laptop users often use other multimedia devices, such as televisions or streaming devices, to access digital content. On the other hand, tablets have a correlation value of 0.234 when compared to mobile phones. Although this number is lower, the p-value of 0.000 shows that this relationship is also significant. This shows that tablet users are increasingly using mobile phones, although there is no strong relationship between laptops and tablets. This may be due to the common belief that tablets and mobile phones are mainly used for specific purposes, such as accessing applications and browsing the internet. The correlation coefficient between tablets and other multimedia devices is 0.258, which is also significant with a p-value of 0.003. This shows that tablet users also frequently use other multimedia devices, although there is no strong relationship between tablets and other multimedia devices. The correlation coefficient analysis between smartphones and other multimedia shows a value of 0.217, with a p-value of 0.001. This indicates that there is a significant positive relationship, although they are less strong than the other relationships. This shows that although there is no strong relationship between laptops and other multimedia devices, smartphone users also frequently use other multimedia devices. Comprehensively, this analysis provides a clear illustration of how multimedia devices work. Tablets and laptops show the strongest relationship, built by other multimedia devices and laptops. This illustrates that when using digital devices, there is a tendency to use several devices in a coordinated manner, which undermines the ever-growing use of technology in everyday life.

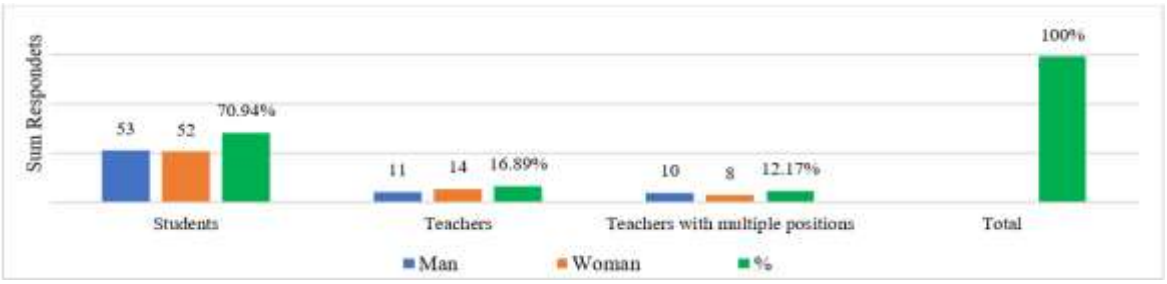

Figure 1. Percentage of teacher and student respondents

Table 2. Relationship between digital communication devices

What is measured		Laptop	Tablet	Handphone	Other multimedia
Laptop	Correlation	1	0.487**	0.298**	0.737**
	Signature (1- tail)		0.001	0.001	0.000
	N	147	147	147	147
Tablet	Correlation	0.456**	1	0.234**	1
	Signature (1- tail)	0.000	0.000	0.000	0.000
	N	147	147	147	147
Handphone	Correlation	0.372**	0.389**	0.267**	0.322**
	Signature (1- tail)	0.001	0.001	0.001	0.001
	N	147	147	147	147
Other multimedia	Correlation	0.237**	0.258**	1	0.217**
	Signature (1- tail)	0.002	0.003	0.001	0.001
	N	147	147	147	147

**Correlation is significant at the 0.01 level (2- tailed)

In Table 3 presents in-depth statistical data on digital communication devices, laptops, tablets, mobile phones, and other multimedia with a focus on the minimum value and standard deviation of the various metrics measured. Found in laptops, there is a minimum value recorded of 5.24 with a standard deviation of 1.280, this informs that the lowest performance of this laptop is quite varied. In contrast, the highest value recorded for laptops is 6.35 with a lower standard deviation of 0.596 indicating better consistency in performance. Data for tablets shows the lowest and highest values, namely 5.39 with a standard deviation of 1.165, and the highest value of 6.20 with a standard deviation of 0.813, indicating that tablets have more stable performance compared to laptops. Mobile phones, on the other hand, show varying values, with a minimum value of 5.88 and a standard deviation of 0.872, and a highest value of 6.02 with a standard deviation of 0.874. This finding is in line with research opinions which say that laptops and tablets are better than mobile phones and other multimedia devices, although not significantly [55], [54]. From Table 3, it can be seen from this comparison that tablets tend to have better performance compared to laptops and mobile phones, with higher minimum values and standard deviations showing good consistency. Data found

that digital communication multimedia devices have varying performance, but there are some trends that can be identified with lower standard deviations indicating more consistent performance. For example, a laptop with a value of 6.35 and a standard deviation of 0.596 indicates that this device can be relied on by teachers and students in the learning process. The highest value recorded for a laptop is 6.35, while tablets and mobile phones show values close to that number, but not exceeding it, indicating that laptops are still a strong choice in the multimedia device category. Some values show higher standard deviations, such as 1.491 for laptops with a value of 5.32, indicating that there is significant variation in the performance of these devices. This can be an important consideration for teachers and students looking for devices with more stable performance. With a thorough analysis, how each tool works in a broader context and makes the work of teachers and students more accurate based on available facts. Each device, such as laptops, tablets, and mobile phones, has its own set of advantages and disadvantages. Therefore, having a reliable device can help meet the unique needs of users. By setting clear guidelines and consistent standard deviations, users can more easily choose which approach best suits their needs, both in terms of performance and consistency.

Table 3. Standard deviation and minimum value of each CWD

Laptop		Tablet		Handphone		Multimedia		Digital communication	
Minimal	Standard deviation	Minimal	Standard deviation	Minimal	Standard deviation	Minimal	Standard deviation	Minimal	Standard deviation
6.23	0.897	5.91	0.823	5.92	0.857	5.79	0.823	5.99	0.869
6.37	0.673	6.22	0.881	6.22	0.881	6.22	0.881	6.15	0.792
5.76	1.138	6.35	0.596	6.35	0.596	6.35	0.596	6.02	0.908
5.65	0.844	5.88	0.872	5.88	0.872	5.88	0.872	6.00	0.806
5.32	1.491	5.24	1.280	5.24	1.280	5.24	1.280	6.89	0.737
5.39	1.322	5.85	0.963	5.85	0.963	5.85	0.963	6.22	0.852
5.34	1.165	6.20	0.813	6.20	0.813	6.20	0.813	6.22	0.789
5.63	1.220	6.51	0.874	6.51	0.874	6.51	0.874	5.76	0.972
5.63	1.199	6.15	0.792	6.15	0.792	6.15	0.792	6.24	0.888
6.17	1.022	6.22	0.881	6.22	0.881	6.22	0.881	5.90	0.800
5.76	0.946	6.35	0.596	6.35	0.596	6.35	0.596	6.17	0.892
6.15	0.882	5.88	0.872	5.88	0.872	5.88	0.872	6.12	1.053
5.65	1.123	5.24	1.280	5.24	1.280	5.24	1.280	6.02	0.724
6.37	0.673	5.85	0.963	5.85	0.963	5.85	0.963	5.95	0.792
5.76	1.138	6.20	0.813	6.20	0.813	6.20	0.813	6.15	0.881
5.65	0.844	6.51	0.874	6.51	0.874	6.51	0.874	6.02	0.596
5.32	1.491	6.15	0.792	6.15	0.792	6.15	0.792	6.00	0.872
5.39	1.322	6.22	0.881	6.22	0.881	6.22	0.881	6.89	1.280
5.34	1.165	6.35	0.596	6.35	0.596	6.35	0.596	6.22	0.963
5.63	1.220	5.88	0.872	5.88	0.872	5.88	0.872	6.22	0.813
5.63	1.199	5.24	1.280	5.24	1.280	5.24	1.280	5.76	0.874
6.17	1.022	5.85	0.963	5.85	0.963	5.85	0.963	6.24	0.792
5.76	0.946	6.20	0.813	6.20	0.813	6.20	0.813	5.90	0.881
6.15	1.123	6.51	0.874	6.51	0.874	6.51	0.874	6.17	0.596
5.65	0.673	6.15	0.792	6.15	0.792	6.15	0.792	6.12	0.872
6.37	1.138	6.22	0.881	6.22	0.881	6.22	0.881	6.02	1.280
5.76	0.844	6.35	0.596	6.35	0.596	6.35	0.596	5.95	0.963
5.65	1.491	5.88	0.872	5.88	0.872	5.88	0.872	6.15	0.813
5.32	1.322	5.24	1.280	5.24	1.280	5.24	1.280	6.02	0.874
5.39	1.165	5.85	0.963	5.85	0.963	5.85	0.963	6.00	0.792
5.34	1.220	6.20	0.813	6.20	0.813	6.20	0.813	6.89	0.881
5.63	1.199	6.51	0.874	6.51	0.874	6.51	0.874	6.22	0.596
5.63	1.022	6.15	0.792	6.15	0.792	6.15	0.792	6.22	0.872
6.17	0.946	6.22	0.881	6.22	0.881	6.22	0.881	5.76	1.280
5.76	1.123	6.35	0.596	6.35	0.596	6.35	0.596	6.24	0.963
6.15	0.673	5.88	0.872	5.88	0.872	5.88	0.872	5.90	0.813
5.65	1.138	5.24	1.280	5.24	1.280	5.24	1.280	6.17	0.874
6.37	0.844	5.85	0.963	5.85	0.963	5.85	0.963	6.12	0.792
5.76	1.491	6.20	0.813	6.20	0.813	6.20	0.813	6.02	0.881
5.65	1.322	6.15	0.874	6.15	0.874	6.15	0.874	5.95	0.907
5.78	0.823	5.98	0.876	5.83	0.890	5.95	0.842	5.67	0.821

4. CONCLUSION

The conclusion of this study is that the four indicators in the variables that are the benchmarks for digital communication, namely with laptops, tablets, mobile phones and other multimedia, are in the good category and can be used as sources or learning tools by teachers and students. However, this study found that laptops and tablets are more effective than mobile phones and other multimedia. The high mean value and standard deviation are almost close to one, and the level of trust of the respondents is quite high in all the

devices in this study. All devices in this study have a very significant and positive relationship between the four variables in assessing CWD in the learning process. The higher the CWD, the higher the trust and assessment of teachers and students towards laptops, tablets, mobile phones and other multimedia in the learning process. By using communication components by encouraging the learning process from the usual to more interactive long-distance multimedia. However, this study has limitations in terms of methodology and small samples, so this study recommends further research with regression analysis and samples taken on a larger scale and can represent all students in Indonesia.

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BIOGRAPHIES OF AUTHORS

Irsyad is a lecturer at Padang State University. Masters at IKIP Bandung Education Administration Study Program in 1995, 2020 Doctoral Program from the Education Science Study Program, Padang State University. Research focuses on learning, educational management development, educational public analysis, learning models, and learning evaluation. He can be contacted via email: irsyad@fip.unp.ac.id.

Anisah is a lecturer at Padang State University. Masters at IKIP Bandung Educational Administration Study Program in 1995, 2021 Doctoral Program from the Educational Science Study Program, Padang State University. Research focuses on educational management, development, public analysis, learning models, and learning evaluation. She can be contacted via email: anisah@fip.unp.ac.id.

Iwan Ramadhan is a lecturer at Universitas Tanjungpura, Pontianak, Indonesia. Masters at Tanjungpura University, Pontianak, Indonesia, graduated in 2018. Research focuses on learning, Social and Cultural Anthropology, Local Wisdom, Multiculturalism and Studies in Border Areas. He can be contacted via email: iwan.ramadhan@untan.ac.id.

Jitu Halomoan Lumbantoruan is a lecturer at the Universitas Kristen Indonesia, a mathematics education study program. Master's degree in mathematics education from Jakarta State University, graduated in 2017. Research that focuses on learning mathematics, development, analysis, learning models, and learning evaluation. He can be contacted at email: Jituhalomoan.lumbantoruan@gmail.com.