



Comparison of Student Learning Outcomes in Terms of 'Digital Immigrant-Native' Teachers Learning Methods

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ABSTRAK

Seiring dengan berkembangnya teknologi, kesenjangan antara mereka yang tumbuh dengan teknologi (*digital natives*) dan yang tidak (*digital immigrants*) terus melebar. Oleh karena itu, penelitian ini bertujuan untuk menganalisis perbandingan hasil belajar siswa yang diajar oleh dua kelompok guru yang berbeda dari generasi yang berbeda (*digital native* dan *digital immigrant*). Subjek penelitian ini adalah siswa kelas X Jurusan Teknik Komputer dan Jaringan SMK. Jumlah responden penelitian sebanyak 60 siswa. Penelitian ini menggunakan pendekatan kuantitatif dengan metode komparatif. Data yang dikumpulkan berupa angket dan rangkuman nilai semester terakhir. Hasil uji independent sample t-test diperoleh nilai Sig. (2-tailed) nilai $0,065 > 0,05$, sehingga pengambilan keputusan dalam Independent Sample t-test, disimpulkan bahwa hipotesis nol (H_0) diterima dan hipotesis alternatif (H_a) ditolak. H_0 adalah hipotesis yang menyatakan bahwa tidak ada korelasi atau pengaruh antara variabel dengan variabel lain, sedangkan H_a adalah hipotesis yang menyatakan bahwa ada hubungan atau pengaruh antara variabel dengan variabel lain. Berdasarkan hasil penelitian berarti tidak ada perbedaan hasil belajar antara siswa yang diajar oleh guru digital immigrant dan guru digital native. Penelitian ini membuktikan bahwa guru digital native dan guru digital immigrant memiliki kualifikasi yang sama.

ABSTRACT

As technology continues to evolve, the gap between those who have grown up with technology (*digital natives*) and those who have not (*digital immigrants*) continues to widen. Therefore, this research aims to analyze the comparison of students learning outcomes taught by two different groups of teachers from different generation (*digital native* and *digital immigrant*). The subjects of this research were 10th-grade students in the Department of Computer and Network Engineering at Vocational High School. The total of the research respondents were 60 students. This research was using a quantitative approach with a comparative method. The data collected was the form of a questionnaire and a summary of the scores in the last semester. The results of the independent sample t-test obtained a Sig. (2-tailed) value of $0.065 > 0.05$, so the decision making in the Independent Sample t-test, concluded that the null hypothesis (H_0) was accepted and the alternative hypothesis (H_a) rejected. H_0 is a hypothesis which states that there is no correlation or influence between variables and other variables, while H_a is a hypothesis which states that there is a correlation or influence between variables and other variables. Based on the research result, it means that there is no difference in learning outcomes between students taught by digital immigrant teacher and digital native teacher. This research proves that digital native teachers and digital immigrant teachers are equally qualified.

1. INTRODUCTION

One of the components in education is learning. In learning activities at school, the role of the teacher is relatively high (Ell et al., 2017; Lemmetty & Collin, 2020). The role of the teacher in learning includes making learning designs (Coenders & Terlouw, 2015; Zinn, B., Raisch, K., & Reimann, 2019) improving self to become a teacher with a complete personality, acting as an educating teacher (Hordvik et al., 2020), increasing teacher professionalism (Bernát et al., 2020; Biemans, H. J. A., Mariën, H., Fleur, E., Beliaeva, T., & Harbers, 2020) carrying out learning in accordance with various learning models that are adapted to student conditions (Douglas, 2017; Trust & Pektas, 2018), learning materials (Zhang & Wong, 2018) applied in the competency standards of graduates (Daryono et al., 2020) and learning assessment (Loughland & Alonzo, 2019). Therefore, teachers are the main subject in the achievement of educational goals (Onojah et al., 2021). These adjustments are made to improve the quality of learning in dealing with students (Hall, A. B., & Trespalacios, 2019), the teacher acts as a learning facility (Ferreira et al., 2020; Runhaar et al., 2016), learning guide (González et al., 2016), and providing learning feedback. With these

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roles, the teacher is a lifetime learner. Shorter, (Hariyanto et al., 2020) it can be argued that teachers can create learning programs by utilizing media and learning resources with the aim of increasing learning activities so that the quality of learning outcomes increases (Kiryakova, G., Angelova, N., & Yordanova, 2018; Rupnik, D., & Avsec, 2019). In addition to the media and learning resources, learning methods that are used or applied by teachers are also one of the ways (de Jong et al., 2019; Vangrieken et al., 2015).

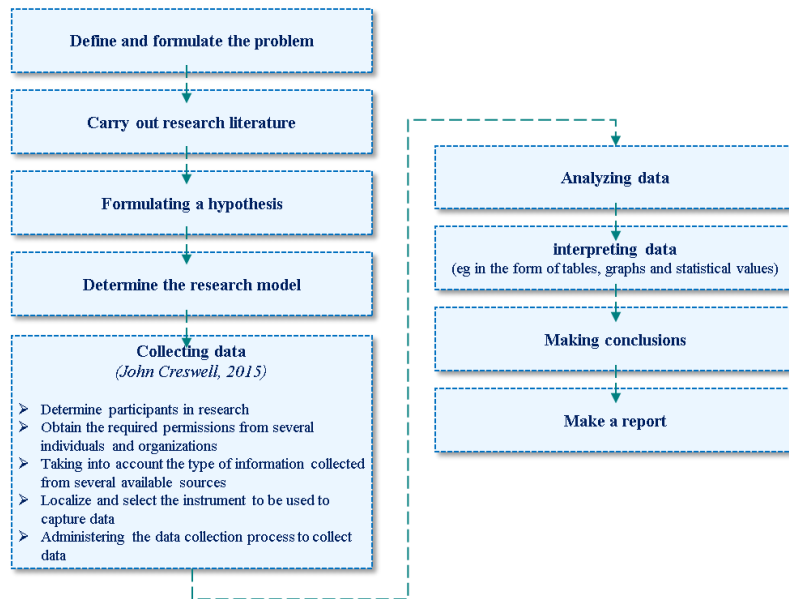
In line with this, an educational consultant named Marc Prensky launched the terms of Digital Natives and Digital Immigrants by 2001 in his article entitled "Digital Natives, Digital Immigrant" (Prensky, 2001). He explained that the Digital Natives generation is a generation that was born where technology was already in its environment starting in 1980, while the Digital Immigrants generation is a generation born before 1980. Furthermore, according to Marc, this difference then creates a gap between students who were born as digital natives in the last decades of the 20th century (Akçayir et al., 2016; Masanet et al., 2019) and teachers who use old methods to teach their students (Georgieva-Tsaneva, 2019; Wilson et al., 2020). This is because technology has changed the way students think and process information, so that when teachers use old teaching methods, it is difficult for students to improve academically (Evans & Robertson, 2020; Wang et al., 2013). Now, years by years after Marc launched the term, of course, many things have changed (Tran et al., 2020). The digital native's generation, who were educated as students, are now working as teachers (Huang et al., 2021; Jarrahi & Eshraghi, 2019). This makes the teachers not only come from the immigrant's digital generation. This phenomenon is also what the author found in Vocational High School 1 Kupang. Some teachers are fresh graduates but already had the opportunity to teach students in 10th grade, 11th grade, and even 12th grade. In addition, the thoughts and methods of teaching digital immigrant teachers are certainly not what they used to be.

Previous researchs only discuss one of the two variables that the author uses at this time. There are researchs that discuss digital natives, without including digital immigrant variables, and some are the other way around. One of these researchs discusses the teacher's perception of digital native which is studied about the motivation of teachers to use digital learning resources (Dopo & Ismaniati, 2016). However, there has never been a research comparing learning outcomes that can be viewed from the learning methods of digital immigrant teachers and digital native teachers. Previous researchs is more often associated with teachers as digital immigrant generations and students as digital native generations. Meanwhile, this research will explore teachers who come from two generations at once. Starting from this urgency, also the case studies that have been described before and to test existing theories, the research was conducted to determine the comparison of student learning outcomes (digital native) taught by digital immigrant teacher and the teacher from their own generation, the digital native teacher. However, this research will only focus more on 10th-grade students learning outcomes in the Department of Computer and Basic Network. This study took a sample of learning outcomes and processed the data using statistical techniques to find a comparison between the learning outcomes of a group of students who were taught by the digital immigrant and native teachers. With the results of this research, hope that in the future there will be no more discrimination against digital native teachers who are considered not having too much experience and need more motivation for immigrant digital teachers to continually develop themselves.

2. METHODS

This research was using a quantitative approach with comparative methods (Saleh, S., & Jing, 2020). While collecting data in the field, the author also acting as an observer each methods and teaching styles of digital immigrant-digital native teachers. The data collected was the form of a questionnaire and a summary of the scores in the last semester of 10th-grade students at Computer and Network Engineering Vocational High School 1 Kupang. The research flow for data collection carried out by the author are shown in Figure 1.

The data collection methods used in this study was a questionnaire containing a list of written questions addressed to respondents (Sitorus et al., 2019). Respondents' answers are then recapitulated to be processed, then observation to observe teacher methods in learning, and also document study for data collection through written documents (scores summary from the school). First, the respondent's response to each question item is processed by adding up all the scores on the respondent which have been multiplied by the number choice on the Likert scale, then interpreting the percentage of each respondent's frequency in the form of a percentage. Then, each respondent's response is categorized according to the percentage score interval with the calculation in Table 1. This study aims to compare the same variables for different samples, so the analysis used is descriptive comparative analysis. In addition, the samples being compared are two independent samples, that is, these samples are strictly separated from each other where one sample member is not a member of the other sample, so the statistical test of the hypothesis used is the comparative test of two samples (two tails).



Picture 1. The Research Flow

Table 1. Percentage Score Interpretation Criteria

No	Score percentage interval	Criteria
1	75 < % score < 100	Very Positive
2	50 < % score < 75	Positive
3	25 < % score < 50	Negative
4	0 < % score < 25	Very Negative

The basis for decision making on the analysis is if the significance value or Sig (2-tailed) >(5% or 0.05), then Ho is accepted and Ha is rejected. If the value of Significance or Sig. (2-tailed) <(5% or 0.05), then Ho is rejected and Ha is accepted (Alnahdi, 2020; Çetin et al., 2020; Sa-Nguanmanasak, T., & Khampirat, 2019)..

3. RESULT AND DISCUSSION

Results

The data is obtained from a questionnaire on the learning outcomes of two study groups of student in computer and basic network subject during one learning meeting. The number of participants in each class is 30 students then the total sample is 60 students. The research subject is 10th grade of Network Computer Engineering (NCE) 1 taught by digital immigrant teachers and 10th-grade NCE 2 taught by native digital teachers. Table 2 shows the recapitulation of the results of the student learning outcomes questionnaire by the immigrant digital teacher and Table 3 shows the recapitulation of the results of the student learning outcomes that were taught by digital native teachers.

Table 2. Recapitulation of Student Learning Outcomes by Immigrant Digital Teachers

No	Item	SS (4)		S (3)		TS (2)		STS (1)		N	Score	Percentage	Category
		f	%	f	%	f	%	f	%				
1	Item 1	10	33.3	20	66.7	0	0.00	0	0	30	100	83.33	Very positive
2	Item 2	10	33.3	19	63.3	1	3.3	0	0	30	99	82.50	Very positive
3	Item 3	19	63.3	11	36.7	0	0.00	0	0	30	109	90.83	Very positive
4	Item 4	8	26.7	22	73.3	0	0.00	0	0	30	98	81.67	Very positive
5	Item 5	17	56.7	13	43.3	0	0.00	0	0	30	107	89.17	Very positive
6	Item 6	11	36.7	18	60.0	1	3.30	0	0	30	100	83.33	Very positive
7	Item 7	8	26.7	19	63.3	3	10.0	0	0	30	95	79.17	Very positive
8	Item 8	16	53.3	14	46.7	0	0.00	0	0	30	106	88.33	Very positive

No	Item	SS (4)		S (3)		TS (2)		STS (1)		N	Score	Percentage	Category
		f	%	f	%	f	%	f	%				
9	Item 9	6	20.0	23	76.7	1	3.30	0	0	30	95	79.17	Very positive
10	Item 10	18	60.0	9	30.0	3	10.0	0	0	30	105	87.50	Very positive
11	Item 11	9	30.0	19	63.3	2	6.70	0	0	30	97	80.83	Very positive
12	Item 12	3	10.0	20	66.7	7	23.3	0	0	30	86	71.67	Positive
13	Item 13	14	46.7	13	43.3	3	10.0	0	0	30	101	84.17	Very positive
14	Item 14	7	23.3	19	63.3	4	13.3	0	0	30	93	77.50	Very positive
15	Item 15	5	16.7	18	60.0	6	20.0	1	3.3	30	87	72.50	Positive
Score of learning result variables											1478		
Average score of learning outcomes											99	82.11	Very positive

As described in Table 2, the responses of students who were taught by digital immigrant teachers related to learning outcomes in computer and basic networks subject comprised in the very positive category with an average total score of 99 with a percentage of 82,11%. Based on the calculation results, the student's response to the variable learning outcomes is the highest in item number 3 (109), which is after attending the lessons that day, students get useful information that has never been obtained before and the student's response to learning outcomes with immigrant digital teachers is in an item number (12), which is the practice that has been performed, students can do it as easily as the theory given by the teacher.

Table 3. Recapitulation of Student Learning Outcomes by Digital Native Teachers

No	Item	SS (4)		S (3)		TS (2)		STS (1)		N	Score	Percentage	Category
		f	%	f	%	f	%	f	%				
1	Item 1	4	13.3	25	83.3	1	3.3	0	0	30	93	77.50	Very positive
2	Item 2	14	46.7	16	53.3	0	0	0	0	30	104	86.67	Very positive
3	Item 3	13	43.3	15	50.0	2	6.7	0	0	30	101	84.17	Very positive
4	Item 4	2	6.70	20	66.7	8	27	0	0	30	84	70.00	Positive
5	Item 5	12	40.0	16	53.3	2	7	0	0	30	100	83.33	Very positive
6	Item 6	12	40.0	14	46.7	4	13	0	0	30	98	81.67	Very positive
7	Item 7	12	40.0	18	60.0	0	0	0	0	30	102	85.00	Very positive
8	Item 8	14	46.7	16	53.3	0	0	0	0	30	104	86.67	Very positive
9	Item 9	4	13.3	22	73.3	3	10	1	3.3	30	89	74.17	Positive
10	Item 10	8	26.7	19	63.3	3	10	0	0	30	95	79.17	Very positive
11	Item 11	7	23.3	19	63.3	4	13	0	0	30	93	77.50	Very positive
12	Item 12	4	13.3	11	36.7	14	47	1	3.3	30	78	65.00	Positive
13	Item 13	11	36.7	10	33.3	8	27	1	3.3	30	91	75.83	Very positive
14	Item 14	6	20.0	15	50.0	9	30	0	0	30	87	72.50	Positive
15	Item 15	0	0.0	14	46.7	15	50	1	3.3	30	73	60.83	Positive
Score of learning result variables											1392		
Average score of learning outcomes											93	77.33	Very positive

In Table 3, it is explained that the responses of students who were taught by digital native teachers to variable items of student learning outcomes are as follows: in general, the variable learning outcomes of students who are taught by digital native teachers are comprised in the positive category with an average total score of 93 with a percentage 77.33%. Based on the calculation results, the student's response to the variable learning outcomes is the highest in item number 8 (104), which is students are interested in constantly attending this lesson and the lowest student's response is in an item number (15), which is the student successfully completes a practicum task right on the time. Up to this point, it can be seen that the difference in the learning outcomes of students taught by digital immigrant teachers is higher than that of students taught by digital native teachers. However, further tests using SPSS are still needed for more valid results. So, the test results with using the Independent Sample t-test SPSS. The value of N is the number of respondents involved, i.e. 30 subjects. While the total score for each item is calculated using the Likert scale formula, i.e. the number of times the respondent's answer is

multiplied by the score for each scale. Then based on Table 2 and Table 3, the comparison of student learning outcomes from the two classes is made in the form of graphs (shown in Figure 1).

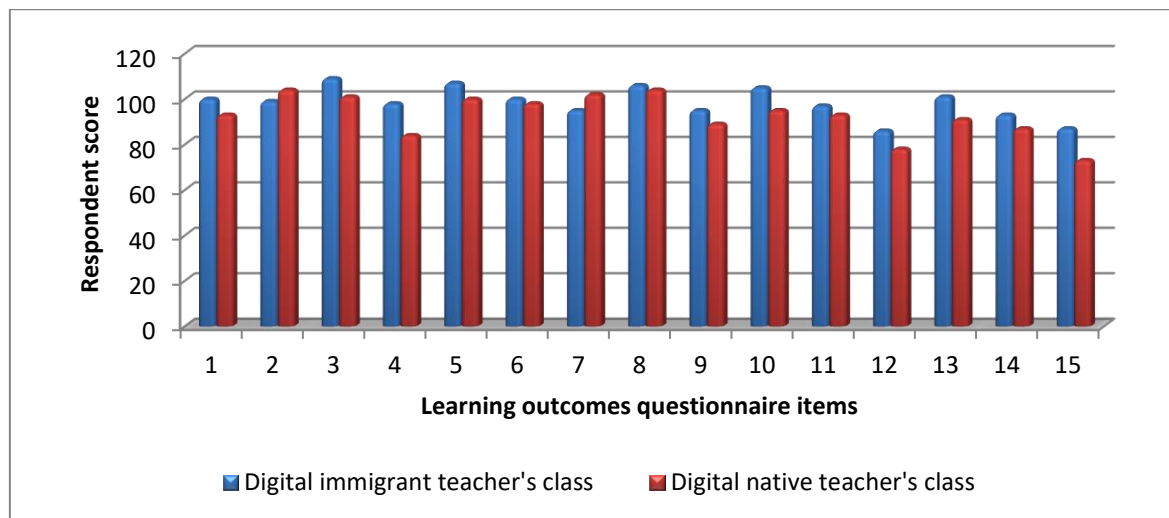


Figure 1. Comparison of Student Learning Outcomes

In Figure 1 showed that the responses of students from the two classes to the digital immigrant and digital native teacher learning methods are not much different. Other than that, the questionnaire data were accordingly analysed using the SPSS (independent sample t-test) shown in Table 4.

Table 4. Independent Samples T-test

Statistic		F	Sig.	t	df	Sig. (2-tailed)	95% Confidence Interval of the Difference	
							Lower	Upper
Learning result	Equal variances assumed	1.453	0.283	1.924	28	0.065	-0.369	1.183
	Equal variances not assumed			1.924	25.461	0.066	-0.397	1.186

Discussion

From an educational point of view, the teacher's perception of the digital native is examined in relation to the teacher's motivation to use digital learning resources. The digital immigrant theory is more often associated with the figure of a teacher and digital native for students. However, there has never been a comparison of the learning methods of digital immigrant teachers and digital native teachers. This study aims to determine the success of the teaching methods of teachers who come from two generations and how the influence of digital immigrant and digital native teachers' teaching on student learning outcomes. Previous studies explain that the digital native generation consists of people born after 1980 (Alnahdi, 2020; Çetin et al., 2020; Sa-Nguanmanasak, T., & Khampirat, 2019). The digital native generation grows and develops in an environment where they are immersed in digital technology from a young age, therefore this generation certainly has a high ability to learn and adapt to new technologies. The digital native generation is experiencing a change in their way of thinking, accustomed to quickly receiving and transmitting information, liking multi-tasking, instant gratification, and continuous rewards (as in video games), and preferring graphics before the text rejected. Previous studies found that digital natives are aware of the impact of technology, not only on their lives but also on their learning (Alnahdi, 2020; Çetin et al., 2020; Sa-Nguanmanasak, T., & Khampirat, 2019). In fact, digital natives have made technology an important part of their daily communication efforts. Digital natives bring their experiences of technology with them according to their backgrounds, interests, and preferences. Digital natives are not like digital immigrants who perceive technology as different rejected (Alnahdi, 2020; Çetin et al., 2020; Sa-Nguanmanasak, T., & Khampirat, 2019), which makes them unique and bound to technology. Digital native population When this theory was put forward, the digital native population is people from infancy to the age of college students. Now, a few years later, residents of this generation have graduated and not a few are working as teachers.

Digital immigrant describes a generation of humans who are immersed in their old lifestyle and did not grow up with technology. The digital immigrant generation consists of people born after 1980 (Alnahdi, 2020; Çetin et al., 2020; Sa-Nguanmanasak, T., & Khampirat, 2019). In line with this, digital immigrants as a generation that is bound to old media, unable to catch up. Because digital immigrants don't grow up with the everyday use of technology like digital natives have, they have to learn to use technology often but slower than digital natives. They often “talk” with their own “accent” and refer to actions that limit the use of technology and are accustomed to direct access to information such as printing documents for editing rather than editing documents virtually. Some digital immigrants use technology only when absolutely necessary and others follow modern technological advances (Alnahdi, 2020; Çetin et al., 2020; Sa-Nguanmanasak, T., & Khampirat, 2019). Therefore, one of the biggest problems facing education today is that teachers who are digital immigrants who “speak an outdated language” struggle to teach a population that speaks an entirely new language (Alnahdi, 2020; Çetin et al., 2020; Sa-Nguanmanasak, T., & Khampirat, 2019). Based on the results of the analysis of the results of learning tests conducted by digital immigrant teachers and digital native teachers consisting of 15 questions, there are 2 items that get the lowest results from the others. Item number 12 on the learning of immigrant teachers obtained a percentage of 71.67% and native teachers of 65.00%. This proves that the practicum that has been done by students in learning can be done as easily as the theory given by the teacher is still low when compared to other statement items. Furthermore, in item number 15 on learning immigrant teachers get a percentage of 72.50% and native teachers of 60.83%. This proves that the achievement of students in completing practical assignments on time has been successful. Overall, in 15 statement items, it was obtained that immigrant teachers' learning obtained a percentage of 82.11% and native teachers obtained a percentage of 77.33%. The two teacher learning methods are in the very positive category to be implemented in the learning process. However, it would be better to implement immigrant teachers with advanced and modern learning methods compared to native teachers.

Based on the recapitulation of student learning outcomes by Digital Immigrant teachers (Table 2), the largest percentage achievement is in item number 3 of 90.83% which states that after participating in each lesson, students get useful information that has never been obtained before. Furthermore, number 5 is 89.17% which states that students can understand the media used by teachers to help understand the subject matter. Therefore, number 8 is 88.33% which states that students are interested in always following lessons implemented by immigrant teachers. Based on the recapitulation of student learning outcomes by native teachers (Table 3), the largest percentage of achievement is in item number 2 of 86.67% which states that the way native teachers teach has been able to convey the material well. Furthermore, number 8 is 86.67% which states that students are interested in always following the lessons carried out by native teachers. Therefore, the number 7 is 85.00% which means that native teachers are able to create a pleasant classroom atmosphere for students.

The differences between the digital native and digital immigrant generations then have profound implications for education: if young people today have different preferences that do not match current educational practices, then-current pedagogies need to change. In fact, many schools and teachers have not responded to the alleged new ways in which students communicate and access information. One example is seen in the United States, namely the gap or 'digital disconnect' between students and teachers (Alnahdi, 2020; Çetin et al., 2020; Sa-Nguanmanasak, T., & Khampirat, 2019). Based on the results above, it's obtained a Sig. (2-tailed) value of 0.065 >0.05, so according to the basis for decision making in the Independent Sample t-test, it was concluded that H_0 was accepted and H_a was rejected (Alnahdi, 2020; Çetin et al., 2020; Sa-Nguanmanasak, T., & Khampirat, 2019), which means that there is no difference in learning outcomes between students taught by digital immigrant teacher and digital native teacher. This means that the hypothesis is not answered, because the results of data analysis state that the facts on the ground show evidence that is different from the initial hypothesis and does not support the digital immigrant-digital native theory proposed by Marc Prensky (in this case, based on previous evidence field at SMK N 1 Kupang). The results of this study are in accordance with previous research conducted with the aim of research to verify the perceptions of digital immigrants to digital natives on learning interest and motivation in learning in the field of Business Informatics with the results of the research stating that the perception of digital native and immigrant methods plays an active role in improving student competence for the learning process (Howlett & Waemusa, 2018). Furthermore, research aimed to examine how the interaction of media use in digital native and digital immigrant methods to be implemented in the learning process by obtaining research results showed that digital native teachers respond more consistently positively to the benefits of using media has been used for the learning process (Jarrahi & Eshraghi, 2019). Further research with the aim of providing a multidimensional perspective between opinion perspectives on digital natives and digital immigrants methods that are applied and comprehended to work (Suša, 2014).

About the learning methods used by each teacher, it is not much different. This is in line with the results of research which shows that despite consistent differences between digital native and digital immigrant teachers, both subgroups had a commonality of experience and ability to use technology (Howlett & Waemusa, 2018). The digital immigrant teacher opened the lesson by greeting and checking student attendance, then continued with the lecture method with a question and answer to explain in outline about the material to be studied at the meeting at that time and to open horizons of knowledge regarding related material. At the core of learning, one of the groups

of students who had been assigned (at the previous meeting) made a presentation related to practicum procedures, followed by practicum learning methods by all class members together. Previous research confirms that because digital immigrants did not grow up using technology to teach and learn in the classroom, they are able to offer digital natives insight into learning to use, troubleshooting, and operating without technology (Riegel & Mete, 2018).

While the digital native teacher also uses the lecture method to start the lesson by providing a brief explanation of the material to be studied and slightly repeating the material at the previous meeting. This is what distinguishes digital native teachers from digital immigrant teachers. Digital native students are used to receiving information fast and naturally find traditional modes of education boring, unappealing, and irrelevant, so the way their teachers teach them ought to be different as well (Lewis, 2018). At the core of the lesson, a demonstration method is used regarding the steps for sharing files/folders, followed by a practicum learning method carried out by all class members in turns. In this regard, the results of the study suggest that the school can improve student learning outcomes in other ways. On the other hand, because both digital immigrant teachers and digital native teachers both prove the quality of their performance, the school also needs to help students grow a good perception of new teachers (in this case digital native teachers) so that their teaching abilities are not underestimated and long-standing teachers (digital immigrant teachers) so that their ability to use IT is also not underestimated so that student learning outcomes can be maintained and even improved. For researchers to be able to carry out further development by examining a wider sample, using different data collection instruments, and making hypotheses that are clearer in direction (positive or negative) so that they can be processed using the one-tailed testing principle in determining the rejection criteria. to hypothesis testing.

4. CONCLUSION

Based on the results of the research and discussion in this study, it can be concluded that although there are differences in the average total score of the questionnaire and the scores in the two classes, it turns out that there is no difference in the effect of the learning methods of digital immigrant teachers and digital native teachers on student learning outcomes in the eyes of basic computer and network lessons. This means that the research hypothesis is not answered, because the results of data analysis state that the facts on the ground show different evidence from the initial hypothesis and do not support the digital immigrant-digital native theory. On the other hand, this study proves that digital native teachers and digital immigrant teachers are equally qualified.

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