

21st Century Literacy Skill of Information Technology and Computer Education Students

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Abstract

This study aims to determine student perceptions related to technology and media literacy in the Information Technology and Computer Education (ITC Education) Program and to compare technology and media literacy based on the students' level and gender. The method used in this research is a survey method with data collection tools in the form of questionnaires and analysis using descriptive and comparative analysis. The population of this study were all 696 students of Information Technology and Computer Education and the sample of this study was 236 taken using the Proportionate Stratified Random Sampling technique. The results showed that the technology and media literacy of ITC Education students belong to the quite good category. In this research, it is known that there are significant differences in technology and media literacy based on gender, while based on the level of students there are significant differences in media literacy but there is no difference in technology literacy.

Keywords : Technology Literacy, Media Literacy, Higher Education.

1. Introduction

Indonesia and other countries in the Southeast Asia region have implemented the ASEAN Economic Community (AEC) starting in 2015. The implementation of the AEC aims to increase the competitiveness of countries in the Southeast Asian region. However, the implementation of the AEC means that the Indonesian government is obliged to prepare a workforce that can to compete at the Southeast Asian level. For this reason, workers are currently required to have skills in the field of Information Technology and Computers (ICT) (Chetty et al., 2018; Infante-Moro, Infante-Moro, & Gallardo-Pérez, 2019). With literacy in the field of ICT, workers are expected to be able to create, evaluate, and effectively utilize information, media and technology (Kivunja, 2015; Partnership for 21st Century, 2015). Workers with good ICT literacy will be able to work effectively and efficiently (Lapates, Cunanan, & Abejuela, 2019).

Literacy in the field of ICT also needs to be mastered by teachers, this is because ICT has been penetrated the education sector. The importance of literacy in the field of ICT for teachers had been studied, the results show that literacy in the field of ICT has a positive influence on the teaching and learning process in the classroom (Sahito & Vaisanen, 2017; Sulistiyarini & Sabirin, 2018). Unfortunately, teachers literacy in the ICT sector is still low, especially in the aspects of technological literacy and media literacy (Sulistiyarini & Sabirin, 2018). Even though technology literacy plays an important role in the learning process considering that many ICT products are used for educational activities (Correos, 2014; Digby & Bey, 2014), while media literacy is needed by teachers as a means to disseminate, generate, and demonstrate information (Meehan, Ray, Walker, Wells, & Schwarz, 2015) and teachers with high media literacy can change learning into student-centred learning (Jolls, 2015). Seeing the importance of the role of literacy in the field of ICT and the low level of technological and media literacy of teachers, higher education in the teacher training and education sector, especially the Information Technology and Computer Education Program (ITC Education) needs to equip students with adequate technology and media literacy,

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because ITC Education Program is a program that focuses on the use of ICT and creating ICT products to support teaching and learning in schools.

Students with good technology and media literacy will be useful in lecture activities such as doing assignments and research, as well as in everyday life (Zhang, Li, & Zhang, 2019) and can improve student academic achievement (Nwosu, John, Izang, & Akorede, 2018). Technology and media literacy will have a positive influence on students in acquiring knowledge, using communication media, applying new educational approaches, expanding student cultural life, and helping students in social positioning more quickly (Li, 2015). For teacher education students, technology and media literacy will encourage students to become effective educators and sensitive to technological developments that can be implemented in teaching and learning activities (Ahmad et al., 2016). This, of course, applies to ITC Education students as prospective teachers in the field of ICT, with good technology and media literacy will help these students gain knowledge and form habits in using technology in completing college assignments or daily tasks which will later be useful when being an educator.

Students with high technology and media literacy will have a positive impact such as the use and utilization of technology, the belief in the role of technology in scientific research, and can emphasize the negative impact of media and technology in the form of anxiety due to the use of technology (Heerwegh, De Wit, & Verhoeven, 2016). Technological literacy and media literacy also help students reduce the negative effects of technology such as suppressing excessive dependence on technological devices, filtering fake news or information, reducing excessive use, and avoiding unlawful behaviour (Li, 2015). Based on the research that had been done, it can be interpreted that if teacher education students have good technology and media literacy, it will not only have a positive impact in shaping knowledge and technological skills that will be useful when they become teachers and reduce the negative impact of technology.

Seeing the importance of technology and media literacy, this study aims to determine the technology and media literacy of students in ITC Education Program and to find out whether factors such as gender and student-level have an influence on technology and media literacy of student of ITC Education Program.

2. Methods

The research method used is a survey method with the form of research used is comparative research. The research was conducted on all students of the ITC Education Program in Pontianak City, West Kalimantan. The research population amounted to 696 students with a research sample of 236 students. The sample selection was carried out by Proportionate Stratified Random Sampling technique. The sample distribution in this study can be seen in table 1.

Table 1. Research Sample Distribution

Group		Amount
Gender	Male	115
	Female	121
Student-level	First Year	74
	Second Year	78
	Third & Fourth Year	84

To get good research results, it is necessary to carry out procedures in accordance with the principles of quantitative research, especially survey research. The procedures of this study are: (1) formulating problems raised from phenomena supported by research results related to media and technology literacy; (2) formulating a hypothesis which explains the relationship between the variables; (3) making valid data collection tools; (4) classifying data that have characteristics that are the research concern; (5) collecting data related to the variables studied, namely media and technology literacy; (6) perform data analysis using

inferential statistical analysis in the form of independent t-test and one-way ANOVA; and (7) interpreting the results of the data is carried out by taking into account the results of the data analysis used to answer the problem formulation.

Techniques and data collection tools used in the study were indirect communication techniques in the form of questionnaires. The questionnaire was used to collect data related to the perceptions of ITC Education students in Pontianak City on their media and technology literacy. The questionnaire used in this study is a closed questionnaire with four alternative answers based on the Likert scale.

A The media literacy questionnaire uses indicators developed by (Simons, Meeus, & T'Sas, 2017) which have been adapted for this study with indicators consisting of using the media, understanding the media, and contributing to the media. The technology literacy questionnaire uses indicators developed by (Katz, 2007) which have been adapted for this study with indicators consisting of understanding technology, accessing technology, evaluating technology, technology management, technology integration, using technology, creating with technology, and communicating with technology.

Before being used in research, the questionnaire was tested for validity and reliability. The validity test is carried out in content, construction, and prediction. The content and construct validity were carried out by expert judgment and the predictive validity was carried out using the product-moment. Based on the validity test that has been carried out, the statement items for media literacy amounted to 21 and technology literacy amounted to 29. The reliability test used Alpha Cronchbach.

3. Result and Discussion

Result

Media Literacy of Information Technology and Computer Education Students

Based on the results of the questionnaire data analysis, an overview of media literacy can be seen in table 2 and the visual model in Figure 1.

Table 2. Media Literacy Description of ITC Education Students

Var	Mean	Median	Modus	Std. Dev	Min	Max	Range
Media Literacy	54,06	54,00	52	8,870	30	80	50

Based on table 2 it is known that the results of the descriptive analysis of media literacy explained that there were 236 students with the mean was 54.06, the median was 54.00, the most frequent score was 52, the standard deviation was 8.870, the lowest score was 30 and the highest score is 80 with a range of 50.

The media literacy questionnaire has the highest tendency score of 84 and the lowest is 21, the ideal average is 52.5, the ideal standard deviation is 10.5. The media literacy assessment category is divided into five categories, namely: 1) Very Good; 2) Good; 3) Fairly Good; 4) Poor; 5) Very Poor. Based on these categories, it can be seen that the distribution of media literacy among ITC Education students in Pontianak City in Figure 1.

Based on Figure 1, there are 8 students have a perception that media literacy is in the very good category; 58 students have a perception that media literacy is in the good category; 125 students have a perception that media literacy is in the fairly good category; 43 students have a perception that media literacy is in the poor category; 2 students have a perception that media literacy is in the very poor category. This shows that the majority of ITC Education students in Pontianak City have the perception of media literacy is still in the fairly good category.

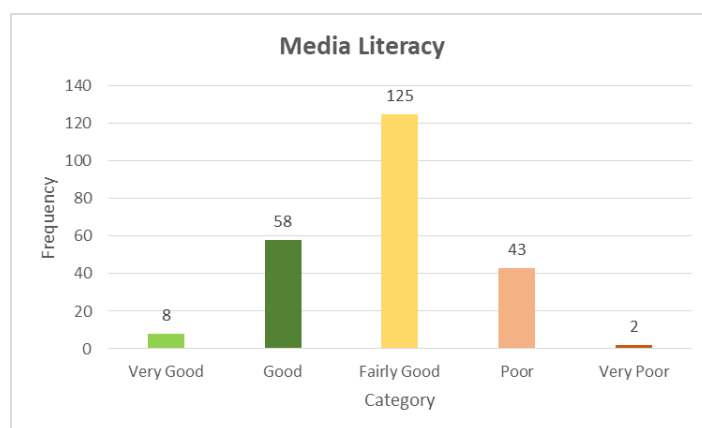


Figure 1. Media Literacy Tendency Graph of ITC Education Students

To determine differences in media literacy based on gender and student-levels, further testing was carried out using an independent t-test to measure differences based on gender and analysis of variance to measure differences based on student-levels. The results of the test can be seen in table 4.

Table 4. Differences in Media Literacy of ITC Education Students

Factor	Sig.	Conclusion
Gender	0,010	Ha Accepted
Student-level	0,000	Ha Accepted

Based on table 4, it is known that differences in media literacy based on gender have a significance value of 0.010 or less than the significance level of 0.05 ($0.010 < 0.05$) so that the alternative hypothesis (H_a) is accepted, which means there is a significant difference in media literacy between male and female. Meanwhile, the difference in media literacy based on student-level is known to have a significance value of 0.000 or less than the significance level of 0.05 ($0.000 < 0.05$) so that the alternative hypothesis (H_a) is accepted, which means that there is a significant difference in media literacy based on student-level. Because there are differences based on both gender and student level, further testing is carried out to see the magnitude of the difference between each group.

Table 5. Average Media Literacy of ITC Education Students Based on Gender

Group	Sample	Mean	Mean Difference
Male	115	55,58	2,979
Female	121	52,60	

Based on table 5, media literacy in the male group is 55.58 and media literacy in the female group is 52.60 so that there is a difference of 2.979 between the male and female groups, or the average media literacy in the male group is higher 2.979 from the average media literacy of female groups.

Table 6. Post Hoc Media Literacy Test for ITC Education Students Based on Student-Level

	First Year	Second Year	Third & Forth Year
First Year	Sig	0,693	0,000*
	Mean Diff	-1,699	-5,743

Second Year	Sig	0,693	0,008*
	Mean Diff	1,699	-4,074
Third & Fourth	Sig	0,000	0,008
Year	Mean Diff	5,743	4,074

Based on Table 6, it is known that the groups that have significant differences are the third and fourth year students with the first and second year students.

Technology Literacy of Information Technology and Computer Education Students

Based on the results of the questionnaire data analysis, an overview of technology literacy can be seen in table 7 and the visual model in Figure 2.

Table 7. Media Literacy Description of ITC Education Students

Var	Mean	Median	Modus	Std. Dev	Min	Max	Range
Technology Literacy	79,26	79,00	83	14,631	44	109	65

Based on table 7 it is known that the results of the descriptive analysis of technology literacy explained that there were 236 students with the mean was 79.26, the median was 79.00, the most frequent score was 83, the standard deviation was 14.631, the lowest score was 44 and the highest score is 109 with a range of 65.

The technology literacy questionnaire has the highest tendency score of 116 and the lowest is 29, the ideal average is 72.5, the ideal standard deviation is 10.5. The media literacy assessment category is divided into five categories, namely: 1) Very Good; 2) Good; 3) Fairly Good; 4) Poor; 5) Very Poor. Based on these categories, it can be seen that the distribution of media literacy among ITC Education students in Pontianak City in Figure 2.

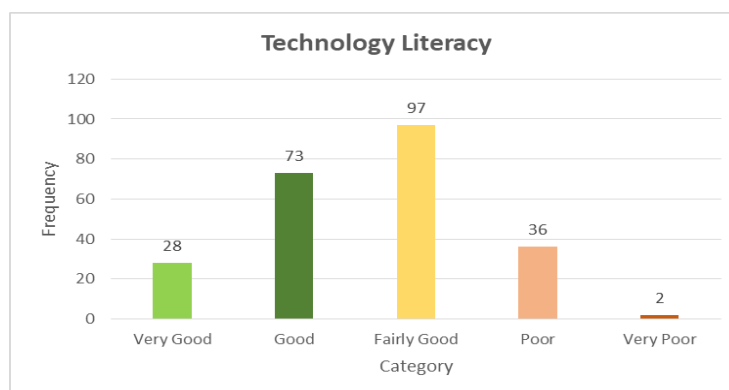


Figure 2. Technology Literacy Tendency Graph of ITC Education Students

Based on Figure 2, there are 28 students have a perception that technology literacy is in the very good category; 73 students have a perception that technology literacy is in the good category; 97 students have a perception that technology literacy is in the fairly good category; 36 students have a perception that technology literacy is in the poor category; 2 students have a perception that technology literacy is in the very poor category. This shows that the majority of ITC Education students in Pontianak City have the perception of technology literacy is still in the fairly good category, even though there are quite a number of students who have a good perception of technology literacy.

To determine differences in technology literacy based on gender and student-levels, further testing was carried out using an independent t-test to measure differences based on

gender and analysis of variance to measure differences based on student-levels. The results of the test can be seen in table 8.

Table 8. Differences in Media Literacy of ITC Education Students

Factor	Sig.	Conclusion
Gender	0,008	Ha Accepted
Student-level	0,473	H0 Accepted

Based on table 8, it is known that differences in technological literacy based on gender are known to have a significance value of 0.008 or less than the significance level of 0.05 ($0.008 < 0.05$) so that the alternative hypothesis (H_a) is accepted, which means that there is a significant difference in technological literacy between male and female groups. Meanwhile, differences in technological literacy based on student levels are known to have a significance value of 0.473 or greater than the significance level of 0.05 ($0.473 > 0.05$) so that the null hypothesis is accepted, which means that there is no significant difference in media literacy based on student levels. Because there are differences based on gender, further testing is carried out to see the magnitude of the differences between each group, while for groups based on levels there will be no further testing because there are no differences in each level.

Tabel 10. Average Technology Literacy of ITC Education Students Based on Gender

Group	Sample	Mean	Mean Difference
Male	115	81,84	5,304
Female	121	76,81	

Based on table 10, technological literacy in the male group is 81.84 and technology literacy in the female group is 76.81 so that there is a difference of 5.304 between the male and female groups, or the average technological literacy in the male group is higher 5.304 from the average technology literacy of female groups.

Discussion

Media Literacy of Information Technology and Computer Education Students

Based on the research conducted, it is known that the media literacy of ITC Education students in Pontianak City is fairly good. The results of this study are slightly different from previous research studies which show that students' media literacy is in a good category (Ahmad et al., 2016; Busabong, 2018; Hoi, Teo, & Zhou, 2015), although several other research shows that media literacy students are generally in the fairly good category (Fitryarini, 2017; Kurniawati & Baroroh, 2016; Schmidt, 2012; Shin & Zanuddin, 2019).

Seeing the inadequate media literacy of ITC Education students, it is necessary to respond to efforts to improve students' media literacy. To improve media literacy for students, it can be done by training students in making learning media (Sukasih, Sismulyasih, & Harmanto, 2015), through media making activities students will understand the basic concepts of media literacy such as knowledge and skills in making media, the use of media in helping lecture activities and work, and confidence in sharing the resulting media (Schmidt, 2015). In addition, to improve media literacy skills can be done with an innovative approach so as to create critical and complex thinking skills (Schilder & Redmond, 2019). To improve student media literacy, ITC Education can be done by giving assignments that encourage students to produce products that integrate the use of media in them, such as tasks for making videos, animations, games, or augmented reality.

Based on the results of this study, it was also known that male students' media literacy was better than female students' media literacy. The results of this study differ from several studies which state that there is no significant difference in media literacy between

male and female (Ashrafi-Rizi, Khorasgani, Zarmehr, & Kazempour, 2014; Hoi et al., 2015; Ode, 2017), however, the results of this study are in line with other studies which state that women in developing countries need to get strengthening in media literacy (Sharda, 2014; Suwana & Lily, 2017). This situation certainly needs to be a concern for the ITC Education Program to increase media literacy in female groups so that they are not left behind with male groups. Efforts that can be made are to form learning in groups by combining male students and female students and increasing the involvement of female students in the given assignments. It is intended that there is a transfer of knowledge from male students to female students. Furthermore, from this study, it appears that new students still have media literacy which is below student literacy. For this reason, debriefing for new students can help first-year students understand the use, analyze, evaluate, or create media. In addition, the role of the lecturer can be enhanced by integrating an understanding of the media in the teaching and learning process.

Media Literacy of Information Technology and Computer Education Students

Based on the research that has been conducted, it is known that students' technological literacy is in the fairly good category, the results of this study are in accordance with several previous studies that have been conducted (Amelia & Ulumu, 2019; Handayani, 2018; Ivanković, Špiranec, & Miljko, 2013), although several studies have shown that technology literacy at the student level is good (Heerwegh et al., 2016; Nwosu et al., 2018). To improve students' technology literacy, the way that can be done is by integrating technology in teaching and learning activities (McGuinness & Fulton, 2019; Saleh, 2015; Supratman & Wahyudin, 2017). The form of technology integration in teaching and learning activities in the ITC Education Program can be the use of online learning, digital libraries, or tasks that require technological devices, both software and hardware via the internet network. With the integration of technology in teaching and learning activities, ITC Education students are expected to form student confidence in using technological devices. Furthermore, the use of technology such as the internet can facilitate students to convey arguments without fear of being criticized or ridiculed, so that in the end students are more critical when using the internet, and think repeatedly before posting or commenting on content on the internet (Supratman & Wahyudin, 2017).

Based on the research that has been done, it is known that there are differences in technology literacy between male students and female students. These results are consistent with previous research which shows that male students' technology literacy is better than female (Imhof, Vollmeyer, & Beierlein, 2007; Kuhlemeier & Hemker, 2007; Maxwell & Maxwell, 2014; Patrick & Ngozi, 2014). For this reason, the ITC Education Program needs to provide reinforcement for female students so that they are not left behind by male students by increasing the quantity and quality of technology use. Furthermore, from this study it is known that there is no significant difference between student-level, this result is in accordance with previous research which states that there is no difference in technology literacy at the levels of senior high school to higher education (Saleh, 2015). This situation can be seen from the use of technology such as computers, smartphones, social media, and the internet which have been widely used by students, but further use such as the use of advanced applications such as video/photo editing, animation, and programming, as well as troubleshooting capabilities. As prospective graduates who will be engaged in technology, an understanding of advanced applications and troubleshooting needs to be instilled in students as well, so that female students are also able to use advanced applications or solve problems with hardware that will be needed both in everyday life and in the world of work.

4. Conclusions and Recommendations

Based on the results of the research and the results of data analysis from this study, it can be concluded that the average media literacy and technological literacy of ITC Education students in the city of Pontianak are fairly good. Based on gender, it is known that there are differences in media and technology literacy among male students and female students,

where male students have better media and technology literacy than female students. Meanwhile, based on student level, the media literacy of third and fourth-year students was better than the media literacy of first and second-year students, but there was no difference in technology literacy.

With the rapid development of information technology and computers, strengthening media literacy and technology iterations need to be a concern to increase student competence related to student readiness to become teacher candidates, especially for prospective educators who will later teach in the field of information and communication technology. Efforts that can be made to improve technology and media literacy are by integrating teaching and learning activities with technology tools, group learning, and projects that prioritize the use of media and technology. With the increase in technology and media literacy, students not only understand and use technology and media, but are able to analyze, evaluate, and even create a media or technology product.

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