



Industrial Revolution Era 4.0: Digital Literacy of Accounting Education Students

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Abstract

This study aims to find out the different profile of digital literacy skills of four batches of Accounting Education students in the 4th industrial revolution era. As almost all human works will be replaced by robots and only those who have particular skills will be able to survive, it is essential to examine students' digital literacy skills. A survey employed quantitative approach was conducted with a sample of 175 of four batches Accounting Education students of Universitas Negeri Yogyakarta. The data gathered with questionnaires technique were analysed using descriptive analysis followed with multivariate analysis. The results show that the four batches Accounting Education students have different profile of digital literacy skills in terms of selecting, addressing, and evaluating information. It is suggested for the students to be aware of the changes in digital technology and its contribution to the field of education and consider it as the weapon for them to improve their digital literacy skills.

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INTRODUCTION

The 4th industrial era is characterized by technological disruption that has caused changes in new cultures such as human machine communication, connections: global villages, internet of things, smart robots, 3D printers, driverless cars, big data, and online/virtual education (Unesco-Unevoc, 2018). Industry 4.0 illustrates the relationship of the manufacturing industry with modern information and communication technology that uses cyber-physical technology systems and the internet of things (IoT) without the separation between the digital, biological, and physical worlds through a blend of technology (Zimmerman, 2018; Wurianto, 2018).

As technology has become an important aspect in various aspects of life let alone the rapid development of technology which results in the adaptation to new life (Ministry of Research, Technology, and Higher Education of the Republic of Indonesia, 2018a; Rosyadi, 2018), people also need to master certain skills. The skills needed in this industrial revolution era include critical and creative thinking skills, digital literacy skills, collaboration, metacognition, flexibility, adaptability, problem solving, leadership, and digital citizenship (Ministry of Research, Technology, and Higher Education of the Republic of Indonesia, 2018b; Mutiara, 2018, Greenstein, 2012; Trilling & Fadel, 2009).

Similarly, The World Economic Forum (2016) released 10 skills that are necessary to master for industrial workers including complex problem solving; critical thinking; creativity; human management; coordination with other people; emotional intelligence; assessment and decision making; service oriented; negotiation; and cognitive flexibility. All these skills are important to master, but in general what needs to be mastered is digital literacy since it is skills that supports all the other skills.

Digital literacy, the ability to use information and communication technology, to find, evaluate, utilize, create, and communicate information (ICT Watch, 2018; Yustika &

Iswati, 2020), is very closely related to information and communication technology. Thus, digital literacy is the key competencies in the fourth industrial revolution era (Prasetyo & Anggraeni, 2020; Tomczyk, 2020). The skills are an essential factor for the development of the society and more specifically labour force (Bejakovic & Mrnjavac, 2020).

The impact of the industrial revolution era 4.0 also penetrated the world of education, such as changing the perspective of education. The changes made were not just ways of teaching but also changes in the way of viewing the concept of education itself which was marked by the increasingly important role of cyber and digital technology in learning (Sukartono, 2018; Priatmoko, 2018). In the world of education, technology plays a very important role and helps students, especially in completing their assignments and completing their undergraduate thesis. Students need to master technology to be able to access various information, process and disseminate information (the results of assignments and theses).

Furthermore, Tomczyk (2020) acknowledged that students' knowledge about technology is associated with their attitude towards digital media they use. However, the need for using technology is greater so that students can meet the requirements in fulfilling the learning assignments. A new term, education 4.0, is used to describe various ways to integrate cyber technology in either physical or unphysical form into learning in the hope of being able to fulfil 21st century skills, such as learning and innovation skills, digital literacy skills and career skills (Trilling & Fadel, 2009; Imaduddin, 2018).

The urgency of digital literacy for students is that digital literacy skills will support their success in the present and the future. The General Director of Learning and Student Affairs, Ministry of Research, Technology, and Higher Education of the Republic of Indonesia, stated that for graduates to be competitive in the industrial revolution 4.0 era, academic curriculum needs to have a new orientation,

not only long enough literacy (reading, writing, & mathematics), but also digital literacy (Ministry of Research, Technology, and Higher Education of the Republic of Indonesia, 2018c).

Unfortunately, there are gaps between education and the skills needed in the era (Tejedor, Cervi, Pérez-Escoda, & Jumbo, 2020) as evidenced by previous studies. For example, the digital literacy ability of students is still not optimal because it only focuses on information seeking (Sholihah, 2016). The study recommends that it would be better if students be able to search for and evaluate information obtained both offline and online, besides, students should improve their ability to search for information digitally. The ability to evaluate information represents students' digital literacy skills. This ability is important to avoid spreading hoaxes and anticipating plagiarism.

Furthermore, research by Kaeophanuek, Na-Songkhla & Nilsook (2018) shows that students understand about copyright issues, but they do not make references by paraphrasing the ideas. This shows that digital literacy is important to be improved in higher education. Students must improve their skills of digital literacy due to the more complex assignments and learning experiences in line with the adoption of digital transformation carried out by universities (Farias-gaytan, Aguaded, & Ramirez-Montoya, 2022). This allows to the different skills of digital literacy of students each batch. Santos, Azevedo, & Pedro (2013) found that there were different digital literacy skills among college students, and it was not randomly distributed. Thus, each student might have different skill.

There is much written about digital literacy. For example, Phuapan, Viriyavejakul & Pimdee (2015) explain that digital literacy is characterized by eight elements including access, manage, integrate, evaluate, make, communicate, analyse, and synthesize. Similarly, UNESCO (2018) states that digital literacy has five characteristics namely information and data literacy, communication and collaboration, digital content creation, safety, and

problem solving (UNESCO, 2018).

Meanwhile, Greenstein (2012) divided the characteristics into nine dimensions including (a) selecting and identifying key information, (b) using keywords and search strategies effectively, (c) managing the flow of information from various sources, (d) comparing, and synthesizing information from various sources, (e) evaluating verifying online information sources, (f) evaluating arguments and statements, (g) using digital media and visual displays, (h) valuing the purposes of messages, (i) considering message effects. In general, the characteristics of digital literacy consist of three dimensions, namely selecting information, evaluating information, and addressing information. From these characteristics, we can measure a person's level of digital literacy.

Tejedor et al. (2020) found that despite communication and teaching, digital competence is considered as the main issue in facilitating the students learning. Digital competence is needed for students and teachers to adapt to the current changes (disruptive era). This era requires a workforce that has skills in digital literacy, technology literacy, and human literacy so that education providers must be able to equip graduates with these three literacies through revitalizing learning systems, education units, students, and educators and education personnel (Yahya, 2018).

Digital literacy is important for all students (including the students of Accounting Education department, Economic faculty of Universitas Negeri Yogyakarta) in order to be able to compete with others in this globalization era. This is in line with the vision of the Accounting Education department that is producing responsive, adaptive, and competitive graduates in the era of the industrial revolution 4.0. Digital literacy needs to be integrated and utilized in the learning process because digital literacy skills in the classroom might help students to develop and expand the use of technology to increase creativity, self-expression, and a more comprehensive understanding of what they do (Kavanagh & O'Rourke, 2016).

Online learning mode provide students with various ways to master important literacy skills (McGuinness & Fulton, 2019). As prospective teachers, they are required to have the ability to teach using information technology. The needs for digital literacy will improve higher education students' ability to access and disseminate information using technology as they need to equip their future students to be able to work with technology (Pianfetti, 2001). To ensure the students work ready with technology dominance, they must also learn and improve themselves their digital literacy skills.

In other words, it is important for the Accounting Education students of Universitas Negeri Yogyakarta who will become vocational teachers to build and improve their digital literacy skills. Thus, as a future teacher, accounting education students also need to be given the opportunity to learn how to teach and apply instructional technology in their studying and future teaching practice (Pianfetti, 2001; Falloon, 2020). Meanwhile as each student might have different learning style and each batch of students might have different learning experiences, this results in that the students might also have different level of digital literacy skills.

The different level of skills was also due to their different learning independence as Anthonysamy, Koo, and Hew (2002) revealed that different self-regulated learning strategies influence different students' digital literacy skills. Therefore, in order to respond the current needs for the students to be equipped with the digital literacy skills, and the possibilities of differences in the skills, the research purpose is to examine the different profile of digital literacy of Accounting Education students in Universitas Negeri Yogyakarta.

METHODS

As this study is to make inference about the population interest which is the profile of digital literacy of accounting education students in Universitas Negeri Yogyakarta at one

point in time, a snapshot study using cross-sectional survey design was employed (Allen, 2017). The approach chosen for this research is a quantitative approach with the aim to facilitate the analysis of aspects of digital literacy that have not been optimal. The population in the study is accounting education students in Universitas Negeri Yogyakarta consisting of four batches, 2015 to 2018, totalling 310 students. Using the formulation of Yamane (1967) the sample size is 175 the rate of responses of 100%. As there are four batches, proportionate random sampling was used to define the sample of the study. A survey was done online using google forms.

The instrument used to gather the data was a questionnaire with a four-point scale (always, often, seldom, never). The instrument was developed by researchers within four stages including defining research question and population of the study, identifying indicators of the variables measured, constructing grid of the instrument, formulating items of the instrument (Williams, 2003; Hidayat, 2021). The instrument was then validated using expert judgement for face validity, while for the construct validity, it was done through exploratory factor analysis.

The indicators using in this study was derived from Greenstein (2012) who categorised the characteristics of digital literacy into nine aspects. Those aspects were then extracted into three dimensions covering the selecting, evaluating, and addressing information. Selecting information was indicated by selecting and identifying key information, using keywords, and managing information from various sources. Evaluating was indicated by comparing and synthesizing information, evaluating, and verifying online sources, and evaluating arguments and statements.

Lastly, addressing information consists of valuing the use of digital media and visual displays, valuing the purposes of messages, and message effect consideration. To examine if there are differences of digital literacy skills for each batch of students, a multivariate analysis of variance using Wilks' lambda. The

formulated of alternative hypothesis was there is difference level of digital literacy skills of each batch of Accounting Education students of Universitas Negeri Yogyakarta.

RESULT AND DISCUSSION

The research result in three aspects of digital literacy skills. They are selecting, evaluating, and addressing information. The three aspects can be seen in Figure 1.

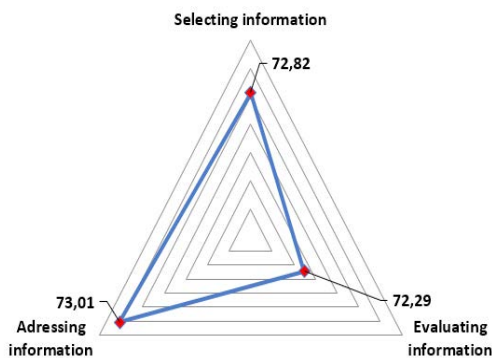


Figure 1. The Level of Digital Literacy
Source: Primary Processed Data (2021)

The results of the analysis of the level of digital literacy skills of the whole Accounting Education students reviewed per aspect can be seen that the aspect of addressing information is the highest aspect compared to other aspects. The value of the aspect of selecting information is 72.82 out of 100, the aspect of addressing information is 73.01, and the aspect of evaluating information is 72.29. This means that 72.82% of the students are good in selecting information, 73.01% of the students are good in evaluating information, and 72.29% of them are good in addressing information.

Aspects of addressing information get the highest results because students more often use digital media and visual displays. This makes students be more respectful to goals and understand the persuasion of the messages and makes them able to consider the effects of messages. In details, the result will be

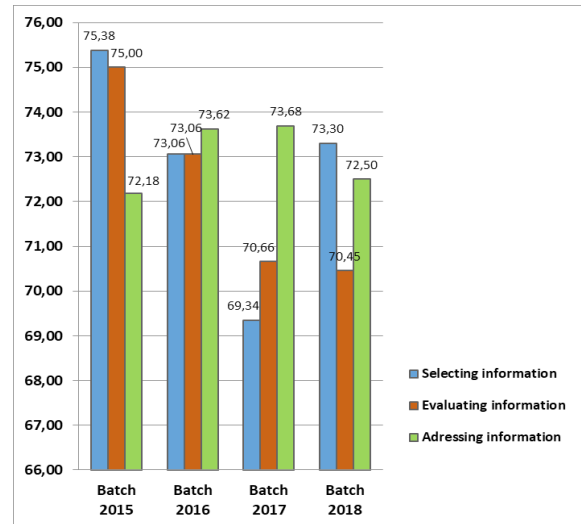


Figure 2. Digital Literacy Level for Each Batch

Source: Primary Processed Data (2021)

presented in each category for each batch of students ranging between 2015 and 2017. The result can be seen in the following Figure 2.

Based on the results of the analysis, it is known that there are three dimensions as the characteristics in the digital literacy of Accounting Education students, namely selecting information, evaluating information, addressing information. The difference in the value of aspects of digital literacy levels in each batch of Accounting Education students is caused by several factors that influence. This is in line with the opinion of Greenstein (2012) which states that differences in the characteristics of digital literacy are influenced by the process of selecting information and identifying problems, managing information flow, evaluating, comparing, and synthesizing information from various sources.

Digital Literacy Per Batch

The four batches of Accounting Education students share differences in the profile of digital literacy skills. Multivariate analyses were used to test if the differences are significant. Table 1 and Table 2 illustrated the result of the analysis.

Table 1. Multivariate Test Results

Effect	Wilks' lambda	F	Sig.
Batch	0.896	2.045	0.033

Source: Primary Processed Data (2021)

The result of the multivariate analysis shows that there are significant differences in the level of digital literacy skills between generation. It means that the four batch have different level of digital literacy skills. To find out which ability provide significant differences, a further test, post hoc test, was carried out. The results were presented in Table 2.

The results of the post hoc test show that the aspects that provide significant differences are selecting information and evaluating information, while addressing information does not contribute significant differences. However, there is no significant differences in the aspect of selecting information between these batches, 2015, 2016, and 2018. Only batch 2017 has significant differences in the level of digital literacy skills, in the aspect of selecting information. The highest level of skills

Table 2. Post Hoc Tests

Dependent Variable	(I) Batch	(J) Batch	Mean Difference (I-J)	Sig.
Selecting Information	2015	2016	.0929	.183
		2017	.2417*	.001
		2018	.0836	.242
	2016	2015	-.0929	.183
		2017	.1488*	.035
		2018	-.0094	.889
	2017	2015	-.2417*	.001
		2016	-.1488*	.035
		2018	-.1581*	.029
	2018	2015	-.0836	.242
		2016	.0094	.889
		2017	.1581*	.029

Dependent Variable	(I) Batch	(J) Batch	Mean Difference (I-J)	Sig.
Evaluating Information	2015	2016	.0776	.304
		2017	.1737*	.031
		2018	.1818*	.019
	2016	2015	-.0776	.304
		2017	.0961	.206
		2018	.1043	.154
	2017	2015	-.1737*	.031
		2016	-.0961	.206
		2018	.0081	.917
	2018	2015	-.1818*	.019
		2016	-.1043	.154
		2017	-.0081	.917
Addressing Information	2015	2016	-.0577	.427
		2017	-.0602	.435
		2018	-.0128	.863
	2016	2015	.0577	.427
		2017	-.0025	.973
		2018	.0449	.523
2017	2015	.0602	.435	
	2016	.0025	.973	
	2018	.0474	.527	
2018	2015	.0128	.863	
	2016	-.0449	.523	
	2017	-.0474	.527	

Source: Primary Processed Data (2021)

belongs to students' batch 2015, followed by batch 2018, and 2016. The lowest score of digital literacy skills belongs to students' batch 2017.

The batches also share differences in the aspect of evaluating information. For example, there are significant differences between the 2015 and 2017 or between the 2015 and 2018 batch. However, there are no significant

differences between batch 2015 and 2016. The highest score belongs to batch 2015 and the lowest is owned by batch 2018. Meanwhile, there are no significant differences between the four batches in the aspect of addressing information. Thus, in this aspect, all generations share the similar level of skills.

Selecting Information

Based on Figure 2, the aspect of selecting information in digital literacy of Accounting Education students is highest in the class of 2015. The class of 2017 is the class with the lowest digital literacy, especially in aspects of selecting information. In the aspect of information selection, there are items that get low marks, namely accessing information that is interesting even if it is not relevant to what is sought and items that summarize information coming from one source on the internet or social media.

This is in contrast with Bawden's (2001) opinion which states that in the selection of information must consider a reliable source of information and pay attention to the validity and completeness of the source so that the information received becomes more complete. In addition, in selecting information required an identification process that can encourage someone to be more selective in choosing information in the industrial era 4.0 (Iswan & Herwina, 2018).

The process of selecting the right information will help someone in solving a problem according to their needs. For example, in the world of education in the 21st century, students use digital technology to facilitate the learning process (Trilling & Fadel, 2009). Students need to utilize digital technology to get a lot of information so that from the various information obtained and combined, they can draw conclusions. In a nutshell, improving student digital literacy skills on the aspect of selecting information consists of starting to select and identifying key information, using keywords, and managing information from various sources by students.

Evaluating Information

In addition to choosing the right information, aspects of evaluating information are also important in digital literacy. This competence illustrates a person's ability to think critically and provides an assessment of what is found online accompanied by the ability to identify the truth and completeness of information referenced by hypertext links (Gilster, 1997). Figure 2 shows that the aspect of evaluating information in the class of 2015 is the highest, while the class of 2018 is the lowest.

The results of this study indicate that Accounting Education Students lack the awareness to do a cross check to prove the truth of the information gathered so that it causes a mismatch in drawing conclusions from information. For this reason, evaluating information requires several skills such as cognitive skills, namely the power of thought in assessing content, confidence, and responsibility, creative, and critical in responding to content (Iswan & Herwina, 2018).

If these skills are possessed, students will better understand the right strategy in interpreting the values contained in digital information. The aspect of evaluating information in the digital literacy skills can be improved by comparing and synthesizing information from various sources, evaluating and verifying online sources, and evaluating arguments and statements.

Addressing Information

In terms of addressing information, this aspect value for batch 2017 students is the highest while the batch 2015 students are the lowest generation in addressing information. This aspect also has the highest value among other aspects, this is because students often use digital media in finding information. Digital media helps students in creating more effective and efficient learning (Ministry of Education and Culture of the Republic of Indonesia, 2017).

Looking for learning references can be done anywhere and anytime if there is an

internet connection. In addition, this study shows that students often consider the effects of messages conveyed by the media on their own behaviour, values, views of the environment, and viewpoints of others. Therefore, students become wiser in responding to the information they get. By addressing information wisely, students can contribute to developing higher quality science and education (Iswan & Herwina, 2018). The aspect of addressing information needs to be based on considering the factors of using digital media and visual displays, respecting the purpose and persuasion of media messages, and considering the effect of messages that will be conveyed from that information.

Based on the findings of this research in the digital literacy level of Accounting Education students, three aspects of digital literacy have a pretty good value but there is still a need to increase literacy, especially on aspects of selecting information and evaluating information. This is consistent with the result of Tomczyk (2020) stating that teachers with regular use of IT in facilitating the students will gain higher results. Digital literacy in the field of education, especially in Student Accounting Education YSU FE is very important. The importance of this is to produce responsive, adaptive, and competitive graduates in the era of the industrial revolution 4.0, which therefore requires integrated cooperation, both from the students themselves, universities, society, and government as the main parties in the delivery of education in Indonesia.

CONCLUSION

The digital literacy level of Accounting Education Students in general covers three main aspects, namely selecting information, addressing information, and evaluating information. The four batches share different level of those skills, evidenced by the result of the multivariate analysis and post hoc test, showing Wilk's lambda at the value of 0.896, the F at the value of 2.045 with the significant level of 0.033.

Digital literacy skills are essential for accounting education students to master. As students, they need the skills to broaden their knowledge and fulfil the assignments while studying, and as a teacher to be, they are required to facilitates their future students to be able to have the skills as well. It means that the accounting education students need to improve the skills so that they will be able to satisfy their students.

Being aware of the changes in digital technology and its contribution to the field of education can be a weapon for students to improve the skills. Considering the importance of digital literacy in the era of the industrial revolution 4.0, especially in the world of education where the concept of digital literacy is closely related to the skills that can be used as a basis in addressing the development of the digital world. It is necessary to increase digital literacy in aspects of selecting information, evaluating information, and addressing information.

As the researchers use questionnaire in gathering the data, there is no guarantee that all respondents expressed their opinion honestly and fairly. If they do not understand the question, still they choose an answer even though this answer does not represent the real situation. In addition, to optimize the skills of the accounting education students regarding digital literacy, it is recommended for the future researcher to employ different design and more techniques in collecting data. Also, it is recommended to develop a learning model which can equip the students with these skills.

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