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The digital literacy of first-year students and its function in an online method of delivery

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Abstract

Purpose – This study aimed to acquire a comprehensive understanding of the digital literacy skills possessed by first-year students and how they impact students' participation in online classes.

Design/methodology/approach – This research was conducted using a quantitative method to investigate first-year students' digital literacy and its effect on their interaction in online learning. Nine hundred and two students from 19 online English writing classes were invited to complete an online survey questionnaire. The sampling approach was conducted by a nonrandom method. Prior to the data collection, the instrument was reviewed by researchers and peers with quantitative and Indonesian language backgrounds. The procedure was conducted to ensure that the instrument covered the objective of the research.

Findings – The results showed that students digital literacy in the first semester, in general, is still in the low category. The average score for each competency area still varies. The average score on information and data literacy competence was low. The average score for communication and collaboration competence was in the medium category. The average score for the digital content creation competence area is low.

Practical implications – The authors suggest that educational institutions should consider organizing primary student digital literacy training or optimizing the lecture process to improve students' digital literacy and further research could usefully explore how information and communication technology (ICT) skills affect student performance.

Social implications – The study reveals the importance of digital literacy of students for online teaching learning. In order to achieve quality teaching in online methods, the digital literacy is a must for students. The study highlights the limitations of the study and indicates the necessity for further research in this area. The findings have immense implications for practice in a distance learning university, where online teaching learning has become a new normal post-Covid-19.

Originality/value – The authors present new findings on the digital literacy of first-year students and their effect on their interaction in online learning. The authors also make connections between digital literacy and student engagement in online classes, which is a significant contribution to the field. This paper also provides a comprehensive review of the literature on digital literacy and e-learning, which adds to the scholarship in the field.

Keywords Digital literacy, English writing, Open and distance learning, Technology

Paper type Case study

1. Introduction

The rapid pace of technological advancement is currently reshaping people's lives, giving rise to a new generation known as digital natives. These individuals are inseparable from digital

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technology, constantly connected to the Internet and possess the ability to process information quickly and effortlessly. They frequently engage in online interactions transcending the barriers of distance and time.

This generation demonstrates a tendency to seek out specific information promptly, without dedicating extensive time to reading, studying, and comprehending detailed information. The needs and lifestyle of digital natives are shaping a social model that demand proficiency in technology utilization and significant contributions across various domains of life. Furthermore, the social communication patterns within communities are undergoing a transformative shift, with the web emerging as a dynamic, open, interconnected and adaptable hub for interaction and communication.

Covid-19 outbreak has boosted the immersion of ICT in the teaching and learning process. Teachers and students of all education levels were required to learn and adopt ICT in the teaching and learning process. ICT literacy became a new skill that was required to possess. Therefore, understanding student ICT literacy, particularly in online higher education level, became paramount.

The rapid pace of technological advancement is currently reshaping people's lives, giving rise to a new generation known as digital natives. These individuals are inseparable from digital technology, constantly connected to the internet, and possess the ability to process information quickly and effortlessly. They frequently engage in online interactions transcending the barriers of distance and time. This generation demonstrates a tendency to seek out specific information promptly, without dedicating extensive time to reading, studying and comprehending detailed information. The needs and lifestyle of digital natives are shaping a social model that demand proficiency in technology utilization and significant contributions across various domains of life. Furthermore, the social communication patterns within communities are undergoing a transformative shift, with the web emerging as a dynamic, open, interconnected and adaptable hub for interaction and communication.

In education, Gilster (1997) recognizes the fundamental but revolutionary uniqueness of the internet and identifies digitally literate students possessing a set of Internet-applied information-seeking and evaluation skills in contexts related to formal school-based learning. This indicates that student engagement with digital media can help students develop knowledge and skills, make high contributions and develop careers. In other words, increasing the digital literacy of the educational community is very important in a digital learning environment.

Universities have a significant role in developing digital literacy for students. Universities need to provide facilities and infrastructure in information and communication technology and adequate resources. Tutors must utilize information and communication technology to support effective and meaningful learning activities.

A growing body of literature recognizes the importance of having basic information and communication technology (ICT) knowledge in an e-learning environment. Iwu and Umeh (2013) argue that ICT assists students to learn effectively. This view is supported by Pavel *et al.* (2015), who suggest that higher education students must have ICT literacy. Recent evidence suggests that students with inadequate ICT skills might experience frustration (Budiman, 2015). Furthermore, da Silva and Behar (2017) concluded that distance learning should have seven competencies: computer use, Internet, online communication, communication, information management, creation and development of digital content, virtual profile management and online attendance. The importance of ICT in distance education was previously articulated by Rahman (2013), who argues that the characteristics of students and the institution must always be most carefully taken into consideration when selecting the most appropriate and suitable ICT. An interesting finding of research conducted by Byungura *et al.* (2018) has shown that although students were familiar with digital tools, their confidence levels with e-learning systems were low. Thus, understanding student

readiness for online learning is quite obviously a necessity. It could develop a holistic strategy to enhance student readiness for online learning. This paper presents the results of a study investigating the digital literacy of first-year students and its effect on student involvement in online classes. Furthermore, digital literacy is in an essential skill for everyone to adopt and adapt in the digital world (Reddy *et al.*, 2021). As education is moving towards e-learning, digital literacy becomes an important skill and competency that all students must have. However, it is important to bear in mind that to create an effective distance learning, all parties involved are required to have ICT competencies (Prostova *et al.*, 2020). The study's objective was to gain new insight into how first-year students perceive their digital literacy and whether it correlates with their involvement in online classes. The study was conducted in Indonesia, and the participants were students at a distance learning university. To maintain the confidentiality of the data, the university's name remained anonymous.

2. Previous studies on digital literacy

Covid-19 pandemic has changed education in terms of teaching and learning process (Kumar *et al.*, 2021). Implementing online learning policies is an acceptable alternative to maintaining the teaching and learning process. It is almost certain that a sudden shift , which Whelehan (2020) called a seismic shift, from face-to-face learning to online learning has brought major issues and challenges to students, institutions and parents. However, it could be argued that the sudden shift does not have a significant impact on open and distance learning institutions as well as the students as in a distance learning context the teaching and learning arrangements may not always require the students to physically present at a certain room. It has been suggested by Keegan (1996) that the separation between students and teachers is one characteristic of distance learning. Although teachers and students are in separate places, interaction plays an important role (Moore and Kearsley, 2012), and with the help of ICT development, the interaction becomes more interactive. Communication educational technologies have replaced the traditional face-to-face communication among all parties involved and provided opportunities to transform teaching, learning and management practices at any level of educational programs. Online learning, for example, has enabled students to gain more important literacy skills and interact with content (McGuinness and Fulton, 2019).

In a study that set out to investigate the benefits of Skype for undergraduate distance learning students, Budiman (2013) found that synchronous sessions through Skype that enabled the students to interact with the lecturer and other students at the same time helped students promote meaningful interaction with the lecturer and other students, which in turn built their confidence. It could be argued that the interaction occurred due to at least two factors, including students having adequate ICT skills and the network speed being good. These findings agree with the findings obtained by Demir Kaymak and Horzum (2013), which showed that the student interaction was affected by their readiness for online learning. Furthermore, it is interesting to note that they found that readiness for online learning was positively correlated with learning results. However, these findings must be interpreted cautiously because the study respondents were from postgraduate learning programs. It could be argued that they must have possessed more knowledge and meaningful learning experiences.

In recent years, there has been an increasing interest in exploring the use of ICT in distance learning, either from the perspectives of the institutions, including teachers and management, or the students. ICT provides limitless possibilities for a more meaningful teaching and learning process. During Covid-19 outbreak, ICT for education is becoming immensely popular in all levels of education. Remote schooling became the only possible alternative to prevent learning lost during school disruptions. Teachers were challenged to

adapt to the new teaching strategies using ICT. Interestingly, in a study investigating activities in a digital technology-instruction conducted by Pozo *et al.* (2021), it was shown that the teacher-centered approach was still dominant. A possible explanation for this finding may be the inadequate skills to implement ICT in teaching and learning. Thus, they proposed that the teachers were required to develop the necessary competencies, both ICT and pedagogical competencies.

There is a large volume of published studies describing the role of students' ICT competencies in an online learning environment. A quantitative study by Firat and Bozkurt (2020) involving higher education students concluded that gender, age and employment status were correlated with online learning readiness. In addition, it was found that learning readiness was also in correlation with the number of Internet users per day. Another interesting finding is that online learning readiness was correlated with preferred technological devices. It could suggest that technology literacy is a factor that affects online learning readiness. More representative research was conducted by Park and Weng (2020). The study aimed to investigate the relationship between ICT and student achievement and the moderating effects of country-level economic factors on these relationships. The findings suggest that student' use of ICT for studying and entertainment had a negative correlation with academic achievement. Meanwhile, students with better ICT skills showed better performance. In addition, the research showed that the students with higher interest in ICT were more engaged in the learning and had better achievement. Another important point was articulated by Sari and Oktaviani (2021), who discovered that online learning enabled students to collaborate with their classmate. This finding suggests that online learning is similar to traditional learning in terms of giving opportunities for students to apply collaborative learning strategies. In addition, the finding further mentions that successful online learning was affected by students' learning background and experience.

3. Objectives

The objectives of this research are

(1) To gain new insight into how first-year students perceive their digital literacy and

(2) To investigate first-year students' digital literacy and its effect on students' interaction in online learning.

4. Method

A quantitative method was used in this study to investigate first-year students' digital literacy and its effect on their interaction in online learning. Nine hundred and two students from 19 online tutorial classes were invited to complete an online survey questionnaire about their experience of participating in the online classes as well as their general perceptions of digital literacy. The sampling approach was conducted by a nonrandom method (Kumar, 2018).

4.1 Participants

This study involved students who enrolled in a compulsory online Basic English Writing course during the second semester of 2020 at a distance learning university in Indonesia. A survey questionnaire was completed and returned by a total of 319 students. The participants who voluntarily responded represented 35% of the overall sample. Table 1 provides an overview of the key characteristics of the participants.

Table 1 shows that many participants were females (72%) and were studying full-time (67%). Meanwhile, the dominant age of the participants was less than 23 years (69%). The data also showed that most participants were high school graduates (91%). A significant

Gender	
Male	28%
Female	72%
Age	
Under 23 years	69%
Above 23 years	31%
Employment status	
Employed	33%
Not employed	67%
Latest education	
High school	91%
Diploma three	3%
Bachelor's degree	4%
Master's degree	2%
Previous studies in a distance learning mode	
Yes	9%
Never	91%
Attending new student orientation program	
Yes	73%
No	27%
Understanding the distance learning system	
Yes	76%
Not Sure	21%
No	3%
Number of hours of accessing the online sessions	
Less than 3 h	11%
3–5 h	44%
More than 5 h	45%
Online sessions access time	
During weekdays	64%
At the weekends	36%

Source(s): Table by authors

Table 1. Demographic profile of the participants

majority of the participants had no prior studies in distance learning institutions. This means that for many participants, learning in a distance learning mode was a new experience. Surprisingly, most of the participants (76%) have a clear understanding of the distance learning system. A probable explanation is that most of the participants (73%) attended a new student orientation program in which the students were introduced to a distance learning system, including developing independent learning skills, accessing various online learning materials, handling the registrations and preparing for the examination.

Interestingly, only 11% of the participants accessed the online sessions for less than 3 h per week. There are two possible explanations for this result. First, more students are now connected to the internet. Second, Internet accessibility for Indonesian has been become more evenly distributed across the country.

4.2 Data collection procedure

For the aims of this study, data were collected through an online survey. The questionnaire consisted of two main parts. The first part related to student demographic information and

the second student perception of their ITC literacy level concerning their involvement in the online sessions. The questionnaire was written in Indonesian and utilized a five-point Likert scale to measure the students' agreement with the statements. After gaining permission from the tutors, the questionnaire was uploaded in each virtual class and circulated online using Microsoft Forms. It was clearly stated that completing the questionnaire was elective to ensure ethical practices.

4.2.1 Statistical analysis. IBM Statistic SPSS for Windows version 25 was used to perform the descriptive and correlation analysis. The data were presented in numerical values—the descriptive analysis aimed to describe the participants' demographic features and their views on the questionnaire variables. Meanwhile, crosstab chi-square and correlation with Spearman rank were used to study the relationship between students' digital literacy and online learning interaction.

5. Findings and discussion

Table 2 demonstrates the students' responses to each questionnaire item regarding learning readiness.

As shown in Table 2, most of the students are ICT literates. This was indicated by the low task value of technological backwardness (M = 2.1) and low self-esteem when working with computers (M = 2.0). The results demonstrate two useful pieces of information. First, the students have acquired ICT skills. Second, the students were confident about using the ICT for learning. These are two important aspects because they must engage with an online education platform. Further analysis showed that the participants were fond of using the internet (M = 4.4), able to use a web browser to search information (M = 4.4), able to use

Description	Items	M	STD
Current ICT literacy	1. Technological backwardness	2.1	0.8
	2. Low self-esteem when working with computers	2.0	0.8
	3. Fond of using the internet	4.4	0.6
	4. Able to use the web browser to search information	4.4	0.6
	5. Able to use software tools, such as Word and Excel	4.1	0.6
	6. Able to use a word processor to copy, edit, format, and print	4.0	0.7
	7. Able to use webmail (sending and receiving emails, including emails with attachments)	4.4	0.5
Activities in the online tutorials	8. A fondness of participating in the online tutorial	4.3	0.6
	9. The online class meets my expectations	4.0	0.7
	10. The features in the online class are easy to operate	4.1	0.6
	11. I know how to download the materials provided by the tutor	4.4	0.6
	12. I know how to open the tutor's Open Educational Resources (OER) link	4.1	0.7
	13. I actively give my responses in the discussion forum	3.6	0.9
	14. I tend to wait for other students' responses in the discussion forum	2.5	1.0
	15. I know how to download and upload assignments	4.4	0.6
	16. I understand the instructions for each assignment	4.2	0.6
	17. I use the spelling and grammar check when doing the assignments	4.1	0.8
	18. I look for other online learning resources to help me do the assignments	3.6	1.0
	19. I use other software to check my assignments	3.0	1.0

Source(s): Table by authors

Table 2. Mean score for the student digital literacy survey

software tools such as Word and Excel (M = 4.4), able to use a word processor to copy, edit, format and print (M = 4.0) and able to use webmail (sending and receiving emails, including emails with attachments) (M = 4.4). The high task values might indicate that the students were ready for online learning.

Further analysis indicates that the students did not encounter certain fundamental difficulties. This could be seen from the high task values of the activities of the eighth variable in the online tutorial. It is apparent from the table that the majority of the students fond of participating in the online tutorial (M = 4.3), they can use the features in the online class easily (M = 4.1), they know how to download the materials provided by the tutor (M = 4.4), they know how to open the Open Educational Resources (OER) provided by the tutor (M = 4.1), they know how to download and upload the assignments (M = 4.4), they understand the instructions for each assignment (M = 4.2), they use the spelling and grammar check to when doing the assignments (M = 4.1) and they use other software to check my assignments (3.0). Other interesting findings show that the online class meets their expectation (M = 4.0), the students are actively engaged in the online discussion forum (M = 3.6), and the students look for other online learning resources to help them do the assignments (M = 3.6). It could be argued that the latest finding provides at least two useful pieces of information. First, the students have developed and implemented self-regulated learning strategies in help-seeking initiatives. Second, the students have developed and implemented self-efficacy, which was implemented by seeking further information to ensure that the task was completed accordingly.

The other interesting finding is that the students tend to wait for other students to comment in the discussion forum, which is indicated by a moderate task value (M = 2.5). This might indicate that the students were insufficiently confident to express their ideas on their initiative. This is a fundamental challenge for distance learning students as they are not accustomed to having discussions with peers compared to conventional university students. It would be worth trying to examine the students' comments on the discussion forum and the tutors.

Turning now to the correlation analysis, statistical hypothesis testing was conducted to assess the plausibility of the hypotheses based on the following criteria:

(1) If the value of asym. Sig (2 sided) is less than 0.05. Thus, the H0 is rejected, and Ha is accepted.

(2) Otherwise, if the value of asym. Sig (2 sided) is greater than 0.05; the study accepts H0 and rejects Ha.

The analysis shows that most of the correlations were statistically not significant. For instance, gender was not correlated with technological backwardness, lack of self-confidence, fondness of using the Internet, web browser, software tools, word processor and email. In contrast, previous studies, including the study conducted by Firat and Bozkurt (2020), identified that gender was correlated with learning readiness. Several correlations showed significance, but they were weak and negative. The following is a brief description of the analysis that showed a significant correlation.

5.1 The correlation between technological backwardness and the fondness of participating in the tutorial

The correlation between technological backwardness and the fondness of participating in the tutorial has the p value = 0.004 > 0.05. Thus, the H0 is rejected. There is a correlation between technological backwardness and the fondness of participating in the online tutorials. The r = −0.191 indicates that the correlation of both variables is weak, significant and unaligned. This result indicates that the less the technological backwardness is, the more the fondness of

participating in the online tutorial is. It seems possible that students with technological backwardness were more likely to be enthusiastic about online learning.

Technological backwardness with the online tutorial meeting the expectation has the p-value = 0.001 > 0.05. It denotes that the H0 is rejected. It means there is a correlation between the two variables that existed (r = −0.149), but the correlation was weak, significant and unaligned. In other words, it could be concluded that the less the technological backwardness is, the more the online tutorial meeting the expectation will be. This result, however, must be interpreted with caution. On the one side, it is almost certain that students with technological backwardness were satisfied with the online tutorial. On the other hand, their feedback may not be insightful due to technological backwardness.

Correspondingly, the analysis shows that technological backwardness with the features in the online tutorial easily understood has the p-value = 0.002 > 0.05. Thus, the H0 is rejected, meaning there is a correlation between technological backwardness and easily understood online tutorial features. The r = −0.223 indicates that the correlation between both variables is weak, significant and unaligned. It is somewhat surprising that the correlation was negative, which indicates that the less the technological backwardness is, the more features in the online tutorial will be easily understood.

5.2 Students' low self-esteem when working with computers and the fondness of participating tutorials

Correlation analysis between low self-esteem when working with computers and the fondness of participating in tutorials resulted in a p-value = 0.000 > 0.05. Thus, the H0 is rejected. There is a correlation between the low self-esteem when working with computers with the fondness of participating in the online tutorial (r = −0.267). The correlation was a medium, significant and unaligned correlation between both variables. A negative correlation indicates that the less self-confidence when working with computers, the more fondness of participating in the online tutorial.

Low self-esteem when working with computers with the online tutorial meeting the expectation p-value = 0.011 > 0.05. Thus, H0 is rejected. There is a correlation between the low self-esteem when working with computers with the online tutorial meeting the expectation (r = −0.208), but as indicated, the strength is a weak, significant and unaligned correlation between both variables. The less the low self-esteem is, the more the tutorial meeting the expectation will be.

Low self-esteem with the features in the online tutorial easily understood has the p-value = 0.000 > 0.05. Thus, H0 is rejected, meaning there is a correlation between the low self-esteem and easily understood online tutorial features. r = −0.308, meaning a mediocre, significant and unaligned correlation between both variables. This means that the lower the low self-esteem is, the more the features in the online tutorial will be easily understood.

Low self-esteem with the spelling and grammar checks with tools available in MS Word online the p-value = 0.000 > 0.05. Thus, H0 is rejected, meaning there is a correlation between the low self-esteem with the spelling and grammar checks with tools available in MS Word. r = −0.187, meaning a weak, significant and unaligned correlation between both variables. This means that the lower the self-esteem is, the more the spelling and grammar checks with the tools available in MS Word will be.

Low self-esteem with utilizing other software to check the p-value = 0.001 > 0.05. Thus, H0 is rejected, meaning there is a correlation between the low self-esteem and the utilization of other software for answer checking r = −0.070, meaning a weak, significant and unaligned correlation between both variables. This means that the lower the low self-esteem is, the more utilization of other software for answer checking will be.

5.3 First-year students' digital literacy and its effect on students' interaction in online learning

Overall, the digital literacy level of first-year students aligns with the anticipated proficiency. The findings from a representative sample indicate that first-year students, specifically those in their first semester, express a generally positive satisfaction with the online learning platform employed by the university. The data show that in terms of information literacy competence, the lowest competence is the competence in finding and filtering digital information, with a very high category score low, followed by the competence to store information in various formats with a low category score, and finally, the competence to evaluate digital information and data with an average score of the medium category. Students often search for material information by entering keywords that are considered relevant without specifying the information either from the form of the file, the source of the website, or blocking information that does not want to be displayed. Pavel *et al.* (2015) also stated that most students could not find information quickly and precisely because they did not use the right keywords in the search engine. They are not used to using effective ways to find the information they need.

OER is one of the information facilities available on the internet, which students widely access. The frequency of storing information in the form of videos tends to be higher than the frequency of storing information in text or articles, so the skills in storing information or data in the form of videos tend to be better. The more an activity is carried out, the better the skills or competencies will be. Competence in evaluating digital information and data is measured by evaluating the information obtained. This competency has the highest score in information literacy and digital data competence. The student admitted that after the spread of hoaxes in various fields, students were more careful in receiving information. Students tend to confirm the information by looking for information related to different sources so that if there is an error, it can be confirmed with more valid information. These results reflect those of (McGuinness and Fulton, 2019), who also mentioned that online learning has enabled students to gain more important literacy skills.

6. Conclusion

The primary objective of this study was to comprehend the digital literacy levels of first-year students and examine how it impacts their engagement in online English writing classes. Additionally, the study aimed to explore the relationship between students' digital literacy and their interaction in online learning environments. The findings from this research could provide valuable insights to university administrators for enhancing and fostering students' digital literacy skills. Moreover, it may open avenues for collaborative efforts with other stakeholders in this regard.

The digital literacy of students in the first semester, in general, is still in the low category. The average score for each competency area still varies. The average score on information and data literacy competence is low. The average score for communication and collaboration competence is in the medium category. The average score for the digital content creation competence area is low. Contrary to expectations, this study was unable to discover statistically significant findings. Hence, further research could usefully explore how ICT skills affect student performance.

The condition of student digital literacy in the first semester is inseparable from student habits in using digital technology, which is more often used for online communication and entertainment. The frequency of using digital technology for entertainment is higher than for academic purposes.

The findings of this study suggest that students exhibit hesitancy to actively participate in online class discussions. During these discussions, students tend to adopt a passive

approach, waiting for others to comment before contributing themselves. It could be argued that cultural barriers might contribute to this situation. Consequently, it is crucial for tutors to possess the skills to stimulate discussions and motivate students to actively engage in them. On a positive note, the results also indicate that despite generally having low digital literacy levels, both male and female students display interest and enthusiasm towards learning English writing through online platforms. Enhancing digital literacy and providing information and guidance to facilitate student engagement in online learning pose significant challenges that need to be addressed seriously.

Based on the research results on digital literacy for students in the first semester, which is still low, stakeholders in relevant educational institutions should consider organizing primary student digital literacy training or optimizing the lecture process to improve students' digital literacy. The aspiration is for students to possess proficient digital literacy skills that contribute to their academic achievements.

References

Budiman, R. (2013), "Utilizing Skype for providing learning support for Indonesian distance learning students: a lesson learned", *Procedia-Social and Behavioral Sciences*, Vol. 83, pp. 5-10.

Budiman, R. (2015), *A Longitudinal Study of Student Achievement and Dropout in a Distance Learning English Writing Course*, University of Dundee.

Byungura, Hansson, Muparasi and Ruhinda (2018), "Familiarity with technology among first-year students in Rwandan tertiary education", *Electronic Journal of E-Learning*, Vol. 16 No. 1, pp. 30-45.

da Silva, K.K.A. and Behar, P.A. (2017), *Digital Competence Model of Distance Learning Students*, International Association for Development of the Information Society.

Demir Kaymak, Z. and Horzum, M.B. (2013), "Relationship between online learning readiness and structure and interaction of online learning students", *Educational Sciences: Theory and Practice*, Vol. 13 No. 3, pp. 1792-1797.

Firat, M. and Bozkurt, A. (2020), "Variables affecting online learning readiness in an open and distance learning university", *Educational Media International*, Vol. 57 No. 2, pp. 112-127.

Gilster, P. (1997), *Digital Literacy*, Wiley Computer Publications, New York.

Iwu, A.O. and Umeh, J.O. (2013), "ICT in education: implications for distance learning", *Mediterranean Journal of Social Sciences*, Vol. 4 No. 7, p. 59.

Keegan, D. (1996), *Foundations of Distance Education*, 3rd ed., Routledge, London.

Kumar, R. (2018), *Research Methodology: A Step-by-step Guide for Beginners*, Sage.

Kumar, A., Sarkar, M., Davis, E., Morphet, J., Maloney, S., Ilic, D. and Palermo, C. (2021), "Impact of the COVID-19 pandemic on teaching and learning in health professional education: a mixed methods study protocol", *BMC Medical Education*, Vol. 21 No. 1, pp. 1-7.

McGuinness, C. and Fulton, C. (2019), "Digital literacy in higher education: a case study of student engagement with e-tutorials using blended learning", *Journal of Information Technology Education: Innovations in Practice*, Vol. 18, pp. 001-028.

Moore, M.G. and Kearsley, G. (2012), *Distance Education: A Systems View of Online Learning*, 3rd ed., Cengage Learning, Wadsworth.

Park, S. and Weng, W. (2020), "The relationship between ICT-related factors and student academic achievement and the moderating effect of country economic index across 39 countries", *Educational Technology and Society*, Vol. 23 No. 3, pp. 1-15.

Pavel, A.P., Fruth, A. and Neacsu, M.N. (2015), "ICT and e-learning–catalysts for innovation and quality in higher education", *Procedia Economics and Finance*, Vol. 23, pp. 704-711.

Pozo, J.I., Pérez Echeverría, M.P., Cabellos, B. and Sánchez, D.L. (2021), "Teaching and learning in times of COVID-19: uses of digital technologies during school lockdowns", *Frontiers in Psychology*, Vol. 12, p. 1511.

Prostova, D.M., Sosnina, N.G. and Tikhonova, A.D. (2020), "Online course as a way to organize distance learning", *International Scientific Conference 'Digitalization of Education: History, Trends and Prospects' (DETP 2020)*, Atlantis Press, pp. 703-710.

Rahman, H. (2013), "The role of ICT in open and distance education", *Turkis Online Journal of Distance Education-TOJDE*, October 2014 ISSN: 1302-6488, Vol. 15 No. 4, 9.

Reddy, P., Sharma, B. and Chaudhary, K. (2021), "Digital literacy: a review in the South Pacific", *Journal of Computing in Higher Education*, pp. 1-26.

Sari, F.M. and Oktaviani, L. (2021), "Undergraduate students' views on the use of online learning platform during COVID-19 pandemic", *Teknosastik*, Vol. 19 No. 1, pp. 41-47.

Whelehan, D.F. (2020), "Students as Partners: a model to promote student engagement in post-COVID-19 teaching and learning", *All Ireland Journal of Higher Education*, Vol. 12 No. 3.

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