Teaching as Part of Blended Learning Lead to the Trend of Indonesian Future Cyber Education

Ratna Hidayah [*1] **, Muhammad Nur Wangid** [2] **, Wuri Wuryandani** [3]

Abstract*:* Millions of children and teachers have been adversely affected by the COVID-19 issue and the subsequent school closures. National government standards have also been put in place in order for schools to reopen, since there is increasing demand from parents, teachers, and students. The purpose of this research is to get a sense of how educators and other members of the education community feel about the current state of affairs and what they want to see when schools reopen. Teachers, administrators, and representatives from teacher professional associations in Indonesia participated in a survey and focus group discussions, as well as interviews with members of the local education office. A total of 100 people took part in the focus groups and interviews, which were conducted in five different regions. According to the findings, 76% of teachers were concerned about the health dangers of reopening schools, and 95% of teachers favoured mixed learning or continuing to use complete distance learning. Even if schools reopen, teachers have expressed the need for better health protection for teachers and students, improved coordination and collaboration with local stakeholders, and increased capacity to ensure that the learning process is secure, comfortable, and effective. Teachers' concerns have been heard. Teachers who work with students with special needs and those from underprivileged backgrounds are examined in greater detail. COVID-19 has had a significant impact on our global society, particularly in the sector of education, since its inception. Education has moved out of the classroom and into people's homes and spare rooms all over the world, serving a variety of social tasks in addition to rote memorization and basic reading and numeracy training. For educators, this new virtual world presented a new set of physical and psychological challenges, which this study examined. Researchers used a combination of narrative inquiry and survey data in this study to better understand the impact of COVID-19 and the ways in which educators processed and dealt with the shift to online learning environments. The findings provide light on how people coped with the pandemic's pain and stress. It's possible that future research may concentrate on repeating this study in multiple locations.

Keywords: instructional design, cyber education, digital media, teaching

1. Introduction

The Ministry of Education and Culture (MOEC) in Indonesia has been quick to respond to the first recorded cases of corona virus disease 2019 (COVID-19) in March 2020 by halting schools and advising children to learn at home [1], [2]. More than 500,000 schools have been forced to close as a result of the MOEC policy, affecting over 68 million students and nearly 4 million educators [3]. As a result, the quality of education for students and teachers has been disrupted because learning from home necessitates the acquisition of new skills, particularly in education for children with special needs and in disadvantaged areas or also known as the frontiers, outermost and least developed areas, or 3T (terluar, tertinggal) as outlined by Yarrow et al in their paper [4]. Areas designated as 3T by the Presidential Regulation Number 63, Year 2020, have a low economic level in the community, a lack of infrastructure, a lack of financial capabilities and a characteristic of the area categorised as 3T. More than half of all parents and education advocates are concerned about the long-term impact of this disruption in access to quality education for their kids on their children's psychosocial, mental and emotional state, and that the prolonged school closure may exacerbate existing risk factors associated with child care [5]. Continued learning from home practise further increases the divide between the rich and the poor, as people who are unable to afford internet access, gadgets, and additional hurdles for families where both parents are working face many obstacles (ibid). As a result of this, parents and children across Indonesia want schools to reopen, with an overwhelming 80 percent of Indonesians supporting this idea in a study conducted in July 2020 [6].

Indonesia continues to see a rise in the daily rate of new positive COVID-19 cases, with an estimated 3,000 to 4,200 cases being reported in September 2020. (WHO, 2020). Furthermore, a small number of studies have showed how the total number of COVID-19 cases could

¹ *Universitas Negeri Yogyakarta, Sleman – 55281 INDONESIA*
ORCID ID : 0000-0001-9943-0390
² *Universitas Negeri Yogyakarta, Sleman – 55281 INDONESIA*
ORCID ID : 0000-0003-0348-9238
³ *Universitas Negeri Yogyakarta, Sleman – 55281 INDONESIA*
ORCID ID : 0000-0003-2483-0394
* *Corresponding Author Email: ratnahidayah.2019@student.uny.ac.id*

reach over 500,000 by year's end, with Indonesia having a substantially higher mortality rate than other countries [7].

1.1. Covid 19

COVID-19 has caused "billions of lives to be disrupted and the global economy to be put at risk" because of its severity. Teachers in the United States have to adapt to teaching their kids from home as a result of this unique incident, which has forced thousands of individuals to work from other locations. Additionally, teachers were responsible for creating and disseminating curricula for pupils of varied skill levels. Children with special needs, gifted pupils, English language learners, and on-level students were all included in this new curriculum. Greg Abbott, the governor of Texas, shut down colleges, public K-12 schools, and charter schools in the middle of March 2020, until the conclusion of the school year [8]. Many teachers, from kindergarteners to university professors, used Zoom or other online video teleconferencing services to instruct their students. Teaching pupils and caring for one's own children at the same time has blurred or even destroyed the distinguishing line between the two. A look at the lives of teachers, parents, and researchers during these turbulent times is provided in the following accounts.

1.2. Synchronous and Asynchronous Online Teaching

Teachers were left scrambling to give their classes online in the first quarter of 2020 after COVID-19 ravaged the United States and schools were forced to close overnight, resulting in the devastation of entire communities. As the pandemic spread, the researchers in this study explored how teachers, parents, and researchers' identities intertwined. At the end of the school day, teachers do not "tuck neatly into the desk" [9]. To better understand how teachers deal with this "relational phenomena," researchers have turned to teacher identity [10]–[12]as a major focus of their work [10], [13]. He said in 1994 that "listening to a tale needs us to involve ourselves in the universe of time, embodiment, relational meaning and care" of another. Philips (p. 10). The goal of this study is to discover, using narrative inquiry [14] , how educators and parents deal with the stress and anxiety brought on by the COVID-19 pandemic. Online instruction that is both real-time and asynchronous It is characterised by real-time instruction via distance that tries to replicate the classroom experience as organically as possible. Synchronous online teaching [15], [16]. Effective synchronous teaching necessitated the availability of virtual platforms for teachers and students to engage with one another. Students had to log on to their devices at the start of each scheduled school day and move in and out of virtual classrooms as they went about their daily agendas, according to this teaching technique. Online disruption can be caused by a wide range of factors, many of which are present at the same time, making preparation for synchronous online teaching more time consuming than

it would be in a traditional classroom [17]. Synchronous teaching in K-12 was judged to be the safest and most ideal method of education, but it was hindered by a lack of control over kids' diversions, one-to-one gadgets for students, and stable internet service [18]. To help pupils understand how to use the new online platforms or even just remind them to sit down, pay attention, and stay on task, parents were needed in the lower grades.

Teachers and children alike were affected by the lack of proper mobility breaks and hands-on activities. Many districts were unable to use synchronous online teaching because of these obstacles. As a result of the perceived novelty of the circumstance, synchronous online teaching was initially exciting for districts that attempted online learning. It is still debatable whether online synchronous teaching is effective and developmentally appropriate for K-12 students as time has gone on due to the influence of instructor attitudes and emotions [19]. As the term suggests, asynchronous online learning allows students to log on and work even if no one else is [16]. In the midst of the epidemic, several districts turned to asynchronous online learning as a more practical way to make use of the limited number of devices that were available because it offered more flexibility for students, teachers, and parents. "A higher degree of self-management on the part of the pupils" necessitates "parent oversight and teacher communication to individual students" [16]. When students learn in an asynchronous manner, they miss out on the opportunity to communicate with their peers, which is essential for the development of social skills and problem solving. When educating older kids, this strategy was a more practical option for allocating resources; yet, it did not provide pupils with quick feedback and control, which is essential for effective education of younger children. Asynchronous and synchronous online teaching methods are well-established in universities around the country, thanks to the use of both online-only and online-plus-in-person courses, as well as hybrid programmes that combine online and in-person meetings [20]. For online discussion boards, quizzes, tests, literature and media, universities used Blackboard and Moodle learning management systems [20]. During COVID-19, institutions were able to move to totally online classes with minor concerns from university professors because of these online platforms. K-12 public schools, on the other hand, did not have a generally organised platform and "rely on a number of outside learning providers, and in most cases, K-12 school administrators opted to contract with various online learning providers to suit a range of specialised instructional needs" [21]. A unifying point for students' online learning was difficult to find because teachers were compelled to offer several new technologies, such as Google Classroom, Zoom, and Seesaw, to students remotely [21]. As a result of the lack of a widespread

learning management system in many school districts, teachers, schools, and districts were forced to scramble to fill the gaps with a variety of software and online accounts, resulting in confusion for students and parents alike.

1.3. Cyber Education

Identify three didactical roles of digital media in teaching and learning processes: media can be utilised as knowledge tools for 1) Information and specific contents. Difficult-to-understand data can be presented in a more comprehensible manner through the use of diverse representations, hence facilitating comprehension and memory retention. The second role of media is to facilitate communication and cooperation by facilitating both synchronous and asynchronous communication between individuals and groups. Media are also appropriate for 3) regulating or controlling the learning process [22], [23]. Provides an expansion of these three purposes by examining five additional uses of media used in education [24].

These tasks can also be extended to informal learning environments that utilise media. Media can be used as a 1) informational and presentational tool to provide learning content in an intelligible manner and to provide clear examples, to explain connections, and to build ties to other content. Digital media can also be used to deliver information in many codecs and formats, such as text, image, audio, video, or a mix of these. Media can give numerous avenues for 2) A range of instructional media alternatives can be utilised to create learning tasks. Learning assignments can be linked to a variety of multimedia materials, and hence the actual world. Through word processing and presentation tools or mind mapping software, media as a 3) tool and method of work can help learners enhance their productive and creative capabilities. Through chats, forums, and audio and video conferencing, media for 4) learning guidance and communication can facilitate interactions between students and instructors. 5) Test-and-assess media extend the potential for formative and summative evaluation. Standardized tests can be administered more efficiently in digital format, graded automatically, and reported on [25].

In 2019, Kampschulte and colleagues surveyed 120 informal learning spaces regarding their use of all forms of media for research. In addition, the functions of the employed media were analysed and categorised according to [24]into the five functions shown in the upper portion. In 81 informal learning environments evaluated, media are largely employed as "information and presentation tools," followed by "learning task design tools" and "tools and work equipment." In informal learning settings, media for "learning guidance and communication" are employed infrequently, while "examination and evaluation" play a negligible role.

2. Methodology

Using a cross-sectional research approach, we were able to determine the important elements responsible for the infrastructure of cyber education in Indonesia. In addition, this design was selected based on the number of variables and data gathering methods, which included accessibility to digital technology, software use frequency, and self-rated proficiency. This study focuses on primary school teachers in Sleman regency, Yogyakarta province, Indonesia. To obtain valid data, a purposeful sample was chosen. The sample included 100 primary school teachers from 17 districts in the Sleman regency. The determination of sample methodologies and regions in Indonesia is based on the respondents' cyber education knowledge and comprehension. Observation, documentation, interviews, and validated questionnaires are used to collect data. Expert discretion is used to validate the observation, documentation, and interview instruments. Meanwhile, questionnaire uses expert judgement and product moment correlational test statistics. There were two formats for the questionnaire: open and closed. Open questionnaires are excellent for eliciting respondents' natural opinions, whereas closed questions are useful for identifying and generalising key themes that emerge. The Likert scale surveys are used to obtain solutions to certain challenges in the development of vocational education in Indonesia. Observations were conducted to assess and record the implementation of vocational education. Interviews were performed with school principals, the director of the education department, teachers, and students in order to collect sufficient data. However, the research variable is extremely intricate; hence, restriction is required. Historically, data were also gathered through in-depth interviews, observations, and recordkeeping. In the meantime, the development, opportunity, and challenge variables utilise all available instruments. The data were analysed using deductive, inductive, and meta-analytic techniques. Various policies and actual practises were examined using these methodologies; hence, the implications can be established.

3. Result

Table 1 shows the variations in access to digital technology between 1st to 3rd grade teachers and 4th to 6th grade teachers as respondents in relation to several digital instruments. For example, 1st to 3rd grade teachers have higher access to tablets (mean = 2.64) than 4th to 6th grade teachers (mean = 1.86); nevertheless, neither 1st to 3rd grade teachers and 4th to 6th grade teachers as respondents have a high level of access to these digital gadgets. Furthermore, while the 1st to 3rd grade teachers group had significantly greater access to personal computers, the 4th to 6th grade teachers group had greater access to laptop PCs. In terms of other digital tools and technologies, we

discovered no notable differences between 1st to 3rd and 4th to 6th grade teachers.

Table 1. Teachers' access to digital technology

Digital tools	1st to 3rd grade teachers respondents (S.D.)	4th to 6th grade teachers respondents (S.D.)	Mean difference
Mobile (smart) phones	3.863 (0.103)	3.841 (0.264)	0.011
Tablets	1.523 (1.510)	1.747 (1.130)	0.665***
Personal Computers	3.051 (1.356)	1.704 (1.506)	1.146***
Laptop	2.185 (1.460)	3.168 (1.043)	—0.872***
Game	1.553 (1.030)	1.584 (0.844)	—0.021
Wearable devices (e.g., smartwatch, Fitbit)	1.600 (1.365)	1.563 (1.399)	0.026

Note: *p < .05. **p < .01. ***p < .001.

Table 2. Teachers' self-rated proficiency

Digital tools	1st to 3rd grade teachers respondents (S.D.)	4th to 6th grade teachers respondents (S.D.)	Mean difference
Mobile device organizers (e.g., address book, calendar)	3.863 (0.103)	3.841 (0.264)	0.011
Website management tools (e.g., WordPress, Squarespace)	1.523 (1.510)	1.858 (1.241)	0.776***
Email services (e.g., Outlook, Gmail)	3.131 (1.135)	3.578 (0.455)	-
		3.626 (0.551)	-
Social media sites (e.g., Instagram, Facebook)	3.123 (1.307)		

Note: *p < .05. **p < .01. ***p < .001.

Table 3. Teachers' software use frequency

Digital tools	1st to 3rd grade teachers respondents (S.D.)	4th to 6th grade teachers respondents	Mean difference
Mobile device organizers (e.g., address book, calendar)	3.863 (0.103)	3.841 (0.264)	0.011
Website management tools (e.g., WordPress, Squarespace)	1.523 (1.510)	1.747 (1.130)	0.665***
Email services (e.g., Outlook, Gmail)	37.132 (1.135)	3.578 (0.455)	-
		3.626 (0.551)	-
Social media sites (e.g., Instagram, Facebook)	3.123 (1.30)		

Note: *p < .05. **p < .01. ***p < .001.

As indicated in table 2, there were some disparities in the frequency with which 1st to 3rd and 4th to 6th grade teachers as respondents used software such as spreadsheets. The 1st to 3rd grade teachers groups (mean = 3.90) utilise these programmes substantially more than the 4th to 6th grade teachers groups (mean = 2.84). As a result, it is possible to conclude that the frequency of software use varies between 1st to 3rd and 4th to 6th grade teachers' respondents. As demonstrated in table 3, we discovered some disparities in self-reported proficiency among 1st to 3rd and 4th to 6th grade teachers' respondents in Technology and digital tools. The observable difference was in their ability with technologies such as the Microsoft Word processor and file sharing programmes, with 4th to 6th grade teachers' respondents indicating greater proficiency than 1st to 3rd grade teachers' respondents. As a result, it is possible to claim that their self-reported proficiency in digital tools and technologies differs.

Teachers' Asynchronous Teaching through ICT Integration Perception

It was found that in this study, the teachers were given 10 statements to respond to in relation to their teaching materials and media, teaching method, teaching content, knowledge and ability, as well as evaluation and students' motivation in integrated social science lesson evaluation and teaching ability (item number 9 and 10).

Table 4. Teachers' Asynchronous Teaching through ICT Integration Perception

No	Statements	Responses (%)			
		SD	D	A	SA
1	I teach students about social science on the topic of economic activities using e-books and e-modules.	5	25	60	10
2	I would prefer teach about economic activities on their own than as part of a larger subject like social science using e-books and e-modules.	10	60	32	8
3	I have ever used e-books and e-modules to teach my pupils about production, distribution, and consumption as components of social activity.	2	6	62	30
4	I never use e-books and e-modules to teach my pupils about production, distribution, and consumption as part of social activities.	26	62	2	10
5	When teaching about production, distribution, and consumption, I solely utilize printed pictures, books, and discourse.	13	74	10	3
6	My understanding of ICT and mastery of asynchronous class as a medium for instructional activities remain inadequate.	3	12	70	15
7	I may effectively incorporate the social science topics of production, distribution, and consumption into my teaching subjects using e-resources.	2	23	70	5
8	I use e-resources to teach pupils about production, distribution, and consumption.	2	8	75	15
9	After using e-resources for asynchronous class, I assess the students' grasp of the concept of production, distribution, and consumption.	2	3	75	20
10	After using e-resources, my pupils are more motivated to learn about production, distribution, and consumption.	2	8	75	15

Source: Field survey, 2021

Based on the data in Table 4, it was established that 75 percent of teachers used e-books or e-modules as part of e-resources in asynchronous class and 92 percent used instructional media for the lesson on the topic of production, distribution, and consumption. The teachers used e-books or e-modules provided by the schools through the Educational Department at the regency level.

E-books or e-modules were the most often used teaching materials by teachers (item 1), and they were substantially connected with the usage of instructional media (item number 8). Table 5 describes the association between e-resources (e-books and e-modules) and teaching media utilization as follows:

Table 5. Cross table of e-resources and teaching media

E-resources -Media cross table

The use of teaching media

	Interactive multi media	Digital video and animat	Pod-cast	Game based lear	Total

The use of e-resources		ion			n-ing	
Strongly disagree	Frequency	2	1	0	1	4
Disagree	Frequency	10	15	2	10	37
Agree	Frequency	70	45	14	30	159
Strongly agree	Frequency	10	8	4	10	67
Total		92	69	20	51	232

Teachers could choose numerous teaching medium in the questionnaire; according to Table 5, 92 teachers chose interactive multimedia as their preferred teaching tool, followed by digital video and animation (69), podcast (20), and game-based learning (51). In comparison to those who utilized e-resources with digital video and animation, e-resources with podcast, and e-resources with game based learning, the frequency of teacher respondents who strongly agreed and agreed to use interactive multimedia was the greatest (92).

As previously stated, some lecturers took an integrated approach to the social science issue, focusing on production, distribution, and consumption. According to the teachers' responses, 70 agreed with statement number 7: "I may effectively incorporate the social science topics of production, distribution, and consumption into my teaching subjects using e-resources," while they disagreed with statement number 2: "I would prefer to teach about economic activities on their own rather than as part of a larger subject like social science using e-books and e-modules." Table 6 explained the usage of e-resources in the integrated teaching practice.

Table 6. The usage of e-resources in the integrated teaching

Textbook-Media cross table

Integrated teaching practice

The use of e-resources		Interactive multimedia	Digital video and animation	Podcast	Game based learning	Total

The use of e-resources						
Strongly disagree	Frequency					
Disagree	Frequency	10	15	2	10	37
Agree	Frequency	80	45	16	30	171
Strongly agree	Frequency	7	8	4	10	29
Total		97	68	22	50	237

Table 6 shows that 171 teachers agree to choose an integrated teaching style using e-resources. The findings in Table 7 supported this conclusion by explaining the utilization of e-resources in solo instruction.

Table 7. Cross table of the usage of e-resources in the separated teaching

E-resources -Media cross table

The use of teaching media

The use of e-resources		Interactive multimedia	Digital video and animation	Podcast	Game based learning	Total
Strongly disagree	Frequency	2	1	0	1	4
Disagree	Frequency	18	15	2	10	52
Agree	Frequency	70	45	14	30	159
Strongly agree	Frequency	10	8	4	10	35
Total		100	69	20	51	240

According to the numbers in Table 7, 159 teachers polled chose an separated teaching approach to use e-resources.

Table 5 shows how frequently teachers employ integrated and independent teaching styles.

Table 8. Cross table of integrated and independent teaching methods

Independent Teaching-Integrated Teaching cross table

The use of integrated teaching practice media

		Interactive multimedia	Digital video and animation	Podcast	Game based learning	Total
Independent teaching practice	Strongly disagree Frequency	2	1	0	1	4
	Disagree Frequency	18	15	2	10	52
	Agree Frequency	70	45	14	30	159
	Strongly agree Frequency	0	8	4	10	35
Total		90	69	20	51	240

159 teachers consistently agreed using integrated teaching practice media in the independent teaching. While 4 of them stated to be strongly disagree for the media integration in teaching practice independently. Overall, it can be driven a statement that the final usage of media integration for independent teaching is acceptable for the teachers seen from the total frequency in amount of 240 shown on table 8 above.

Then, 94 percent of teachers have already taught their students about the social activities of the production, distribution, and consumption of goods, with an additional 86 percent covering production and distribution. 87 percent of the teachers also agreed that their knowledge of economic activities was subpar compared to their professional teaching capacity. More than 90% of teachers employed behavioral, attitude and writing assessments to evaluate their pupils' understanding of the material they had studied.

95 percent of teachers said that the students were eager to participate in economic activities. 33 teachers said that their pupils were highly motivated to learn; 83 teachers said that their students were highly motivated; 15 teachers said that their students were moderately motivated; and just 1 teacher said that his or her pupils were unmotivated.

4. Discussion

4.1. Access to digital technology

A number of studies have demonstrated that the utilitation of ICT is an effective method for giving students access to an experience that cannot be carried out inside the confines of a traditional classroom setting. This advantage of information and communication technology is a result of the inherent risk that is present in the activity (for example, engaging with contagious diseases like those found in Virtual Singapura is not recommended in educational settings), the richness of the visual experience that cannot be accessed through two-dimensional communication, the quantity of information that is readily available, the ability to avoid the messiness of the real world, the capacity to foster scientific methods, and interactions with an unfamiliar environment [26]. Using information and communication technology (ICT) for inquiry learning can result in enhanced student attitudes toward learning science, which is a form of learning that is difficult to instruct effectively without support [27], [28]. According to Dede and Johnson, Levine, Smith, Smythe, and Stone, MUVE technology and virtual worlds are emerging as promising technologies to keep an eye on because of the motivational and engaging qualities that they possess [29], [30]. Siorenta and Jimoyiannis (2008), Webb and Cox (2004), and Zacharia (2003) all found that educators and educational institutions were not taking full advantage of the potentials offered by information and communication technologies (ICT) in educational settings [28], [31], [32]. Nevertheless, the use of ICT in classroom settings was found to have a myriad of benefits.

4.2. Software use frequency

As a general rule, tailored feedback in the digital learning environment or future task trials is designed to help students improve their overall performance in the digital learning environment. Authors in around one-third of cases referred to feedback goals involving engagement/motivation or self-regulation. As an illustration, Sun et al. used real-time analysis of learning activities to encourage students who were on-task readers to keep going with their work and to alert students who were off-task readers to concentrate on the topic [33]. Using tailored feedback messages, Rajendran et al. encouraged disappointed students to keep working on the tasks [34]. Students' learning behaviour in a series of geography problems was used by Jones and Castellano to

integrate domain feedback with feedback to increase task scores and self-regulated learning [35]. The learning environment, for example, tracked how long students spent working on a task and whether or not they chose a task of appropriate complexity. In a series of studies, students in online courses received weekly and multiple-weekly personalised feedback emails that offered learning skill recommendations or reminded them of deadlines and educated them about their resources [36][37] [38].

AI-based machine learning techniques were also found to be lacking in this review. The vast majority of the examined feedback systems use rule-based algorithms to personalise feedback messages. Since instructors can build various assignment rules for each course, rule-based adaptive learning systems have several advantages [39]. Additionally, deployment is quicker because rule-based feedback assignment does not require historical data analysis. To avoid conceptual drift, AI-based adaptive learning systems are only useful for lengthy courses that span a significant time period. However, future study in this area should take into account the advantages of AI-based feedback creation methods. Machine learning approaches, for example, can uncover previously unknown patterns of student behaviour in historical data. Trainer models can be used by adaptive learning system creators to provide students with individualised feedback. Several of the papers in this study already show how machine learning techniques can be put to use. As an example, recent developments in predictive learning analytics [40] allow for the prediction of student success in the early stages of online learning. When the risk of a student dropping out or failing a course exceeds a predetermined level, the predictive model sends individualised feedback messages. In other fields and feedback systems, we believe similar method should be applied.

4.3. Self-rated proficiency

As students have different levels of prior knowledge, social media experience, and collaborative effort, the impact of online ways for their learning outcomes may vary from one student to another [41]. Individual variations, such as gender, age, Internet use experience, and prior knowledge, may influence the outcomes of blended learning. According to Papastergiou and Solomonidou and Wu Cheng, male students are more likely to be distracted by online entertainment than female students [42][43]. As a result, the motivation to adopt a mixed learning system differs between men and women. However, for female students, attitudes toward blended learning were found to be a mediating factor in the relationship between perceived ease of use and intention to use a mixed learning environment. According to a study by Gonzalez-Gómez et al. and Lu and Chiou, males are more satisfied and value blended learning more than females [44], [45]. Blended

learning outcomes have traditionally been considered to be influenced by factors such as Internet use experience, age, and prior knowledge [46]. However, time spent on social media or the number of times per day that students visited social media was found to be negatively associated with blended learning performance [47][48], [49]. Some research demonstrate that age is not an obstacle to using technology in learning [50], but other studies have shown that age is an explanatory factor in the blended learning performance [46]. According to López-Pérez et al., and Wu, people with more prior knowledge in blended learning courses likely to get better grades at the end of the course [46], [51].

5. Conclusion

According to studies, the design of digital media tools, such as interactive multimedia, digital video and animation, podcast, and game based learning as e-resources, has gotten increasingly sophisticated in recent years. Digital media tools have primarily been used in portable form throughout the last three years. With continued technological advancements in the smartphone industry, it remains to be seen if this trend will continue or whether traditional digital media (tabletops) will be employed in the future. In the studies analysed, the roles of digital media tools were discovered to primarily supply information and tasks. Almost none of the identified digital media tools make full use of their capabilities. The investigations did not find a special support function, such as adapting the work to the learner's level of expertise. However, adaptability is one of the virtues of digital media tools. Functions that expressly facilitate group cooperation were likewise found to be extremely rare in the research. Because informal learning environments were primarily visited in groups during the experiments, this is a function that may be given additional emphasis. Cognitive strain was not taken into account in the outcomes measured in the trials analysed. This is relevant insofar as measuring cognitive load has become a standard procedure in most studies focusing on digital media for learning purposes, and it is relevant for learning processes because different design features of digital learning media can have both positive and negative effects on the cognitive processing of information for Indonesian cyber education in the future.

6. Acknowledgments

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