The Impact of the COVID-19 on Digital Technology-based Teaching and Learning in English Language Education: A Systematic Review

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Abstract: In the time of the COVID, with more frequent usage of digital technologies, it is expected that new concepts of digital literacy and new findings and research trends of digital technology-based language teaching and learning will appear during COVID. With such understanding, this paper presents a systematic review of studies where digital literacy and digital technology-based pedagogy are discussed in the field of English language education during the pandemic. Through the qualitative synthesis of 32 studies included in this review, it is found that the classroom roles of digital technology have shifted from complementary to necessary, and factors such as teachers' and students' engagement in online learning mode are newly developed areas of interest after the COVID. However, this review demonstrates that the conceptualisations of digital literacy remain somewhat unchanged, and the focused age group is still largely concentrated in secondary and tertiary settings. It is hoped that future research can focus more on the primary school context, and to discover new perspectives of digital literacy to help our students to make better use of digital technologies to assist their language learning. abstract should summarize the contents of the paper and should contain at least 100 and at most 300 words.

Keywords: COVID-19, Digital literacy, Language Learning, Technology-based Language learning, English language education

1. Introduction

As one of the most challenging crises in this era, COVID-19 pandemic has significantly affected teaching and learning methods in many parts of the world. The pandemic forces many countries to switch from traditional physical classroom lessons to distance and remote learning. While such change of class delivery mode offers opportunities to both teachers and students to sharpen their skills of using digital technologies [1], it also places challenges onto students and teachers. Such challenges include the new requirements for students' and teachers' adaption of their teaching and learning methods to remote virtual learning environment by using collaborative digital tools [2]. To cope with the challenges brought about by the new requirements of digital technology-based pedagogy, students and teachers can benefit from high levels of digital literacy since digital literacy is an inter-related set of skills, competencies, and awareness for successful usage of information and communication technologies [3]. The acquisition of adequate level of digital literacy contributes to students' and teachers' successful adaption to the remote virtual learning.

In fact, before COVID-19, digital literacy has long been discussed in educational research. More specifically, in terms of research on language education, it is believed that digital literacy has a positive influence on English language learners' learning experience [4,5]. Digital literacy also plays an important role in teachers' instructions using digital technologies. Digital technology-based pedagogy has been frequently discussed in the field of language education, because of the inextricable relationships between technologies and students' learning process [4]. The role of digital technology has become increasingly important, which is primarily due to the change of venues in which language learners sought language input and produced language output. Language learners nowadays spend large amount of time reading and interacting with digital texts online [5]. As a result, there is an obligation for language education practitioners to adjust and adapt their pedagogy to one that incorporates digital technologies to ensure that the teaching is relevant to students' lives. Besides the importance of digital technology-based pedagogy to maintain the relevance of instruction to students' lives, the educational digital technologies provide meaningful opportunities for students' language learning experience. Specifically, the multimodality and easy accessibility of digital online texts provide more choices and opportunities for students' language learning experience, and make the language learning process more flexible, attractive, and interactive [6]. However, it has long been recognized that the introduction of new educational technologies has to be accompanied by careful conceptualization of digital literacy, otherwise it will not be so effective to help improve teaching and learning outcomes [7]. Previous studies have noted the huge influence of digital literacy education on students' language learning experience [4,5]. Given the above considerations, digital literacy and digital technology-based pedagogy is valuable in the today's language education, not only within the timeframe of COVID-19 pandemic, but also in the technology-driven world before and after the pandemic.

Considering the importance of digital literacy in the field of language education and new requirements of teachers' and students' digital skills brought about by the digital technology-based pedagogy during the pandemic, this study aims to investigate how the pandemic influences the research in the field of digital literacy-related English language education through a systematic review of relevant literature after COVID-19. Existing systematic reviews mostly focus on summarizing the research trends and findings in this field, but rarely focus on the role of digital technologies and the conceptualization perspectives of digital literacy. To address the research gap, this study aims to provide an overview of the research trends, the classroom roles of digital technologies, and the conceptualizations of digital literacy during the timeframe of COVID-19, to shed light on research directions in the near future after COVID-19. Your paper will be part of the journals therefore we ask that authors follow the guidelines explained in this example, in order to achieve the highest quality possible.

2. Methods and materials

The author has conducted a systematic literature review in selected databases according to established guidelines for using a variety of databases, defining inclusion and exclusion criteria for publications selected for the review process, and being transparent about the procedures [8,9]. Below is a description of the approach to implementing such recommendations.

2.1. Database selections and search terms

This systematic literature review was conducted using three databases: Web of Science, Scopus, and ProQuest Education. For the assessment of international multidisciplinary academic literature, Web of Science and Scopus were selected [10]. This review also included ProQuest Education since

it is a database devoted to educational literature. In this systematic review, the following search terms were used:

"digital literac*" OR "digital competenc*" AND "EFL" OR "second language learning" OR "ESL" OR "English language learning" AND "COVID" OR "pandemic" OR "Coronavirus"

In order to decrease the number of publications to read and to boost the precision of the information search, we narrowed the search to title, abstract, and keywords in the databases [11,12]. The author primarily looked for publications that explicitly defined or discussed the concepts of digital competence and digital literacy; the reasoning was that if the authors had included these concepts there then these concepts should also be central to the publications [13].

2.2. Inclusion and exclusion criteria for selection of publications

Further selection criteria were used by the author to narrow the number of publications. Publications that meet the inclusion criteria should be peer-reviewed articles, reviews or conference papers written in English. In this study, publications like books, reports, policy documents, etc. were excluded since the goal was to systematically capture how digital literacy and digital competence are used and defined in English language education research. To screen studies published during the pandemic, publication restrictions were imposed from February 2020 to September 2021. The searches were carried out in September 2021. The initial screening identified 56 publications that met the inclusion criteria. Nevertheless, 24 papers were excluded during the manual screening of the publications (the reasons being that 11 were not in English and 13 were book reviews), leaving 32 publications to be considered for review. The 32 publications were then prepared for coding.
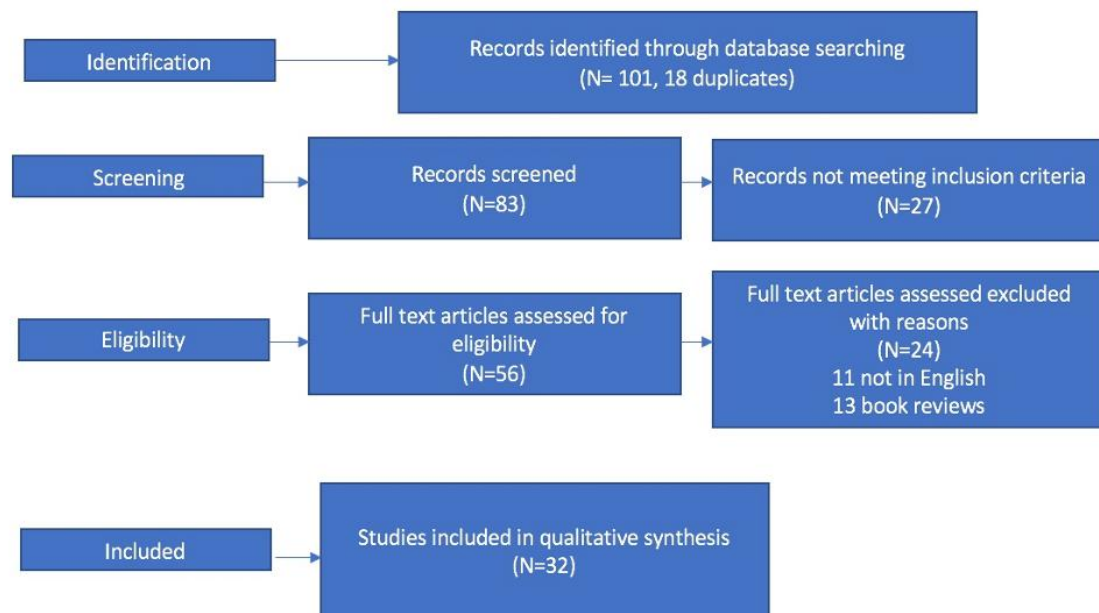

Figure 1:Flowchart of the screening process.

2.3. Review and coding process

NVivo software was employed to manually code the selected 32 publications using both deductive and inductive coding methods. Deductive coding was used to explore whether the pandemic has reshaped people's definition of digital literacy and how the pandemic influenced the roles of digital

technologies, so codes such as "definition of digital literacy", "the roles of digital technologies", "COVID relatedness", and "major conclusions" are predefined. Inductive coding method was also used, since new codes were created based on the qualitative data. Moreover, this review uses a hierarchical coding frame to help organizing codes based on how they relate to one another. For example, the code definition of digital literacy was divided into three sub-codes, namely digital literacy as ICT competences, digital literacy as cyber safety, and digital literacy as social practice.

The coding scheme consisted of the following nine categories:

1) Definition of digital literacy (digital literacy as ICT skills; digital literacy as cyber safety; digital literacy as social practice)
2) The roles of digital technologies (supportive; necessary)
3) Age level (Primary; Secondary; Tertiary; Adult)
4) Context (categorised by country)
5) Aim (to discuss the concept of digital literacy; to test levels of digital literacy; to conclude the effects of digital literacy on language skills)
6) variable of interest (students' language skills, students' cognitive skills, students' affective factors, students' digital literacy, teachers' digital literacy)
7) COVID relatedness (research conducted before the COVID; research conducted while the COVID)
8) Research paradigm (empirical research, conceptual research, literature review)
9) Data collection methods in empirical research (interview, survey, observation, experiment, video recording, not reported)
10) Major conclusion

3.   Results

There are a total of 32 studies selected to be included in this systematic literature review. They have been categorized into three groups based on the time when the research was conducted: 1) explicitly time-stamped during COVID-19; 2) during COVID-19 but not explicitly time-stamped; 3) before covid-19. There are seven studies that have specified their COVID-related background, twenty during the COVID and five conducted before COVID.

After comparing those three groups, it is found that the focused age group has not been influenced much by COVID. These 32 studies were further analyzed in terms of the age group of their participants. They are primarily concerned with students in tertiary-level education, and the age group of the target participants remains relatively stable before and after the covid-19. Amongst the 7 COVID-related studies, there are 6 focused on the tertiary level and 1 focused on the secondary level. As for the during-COVID group, 15 are focused on the tertiary level, 4 are focused on the secondary level, and 1 is a systematic review that did not specify its focused age group. Regarding the 5 studies before COVID, all five are focused on the tertiary level. Therefore, it can be observed that digital technology-based English pedagogy is mostly studied in higher education, with the field of secondary education being undervalued, and the primary level being fully ignored.

Amongst all the studies included in this systematic literature review, there are seven studies that have been specifically clarified by the authors as COVID-related. Despite the different research focal points of these studies, all these studies agreed on the idea that the role of digital technologies in language classrooms has been reshaped by the pandemic. Terms such as "technology/media-based pedagogies" and "Computer-assisted language learning" which were commonly used in studies before COVID have been replaced by terms such as "distance learning" and "remote learning". This shows that the role of technologies shifts from supportive and complementary to necessary. Before the pandemic, technologies are often used in language classrooms to support traditional teaching, either in order to improve students' language learning experience or in order to

improve students' digital or media literacy etc., while during the pandemic, when teachers and students are physically separated, digital technologies are then used to replace traditional face-to-face teaching. Some new concepts are also mentioned in studies post COVID. For example, in Akbana, Rathert, and Agcam 's study [14], the learning experience during COVID has been termed as emergency remote learning, which is characterized as the only option available to address the challenge of the pandemic. In addition, in Bozavli's study [15], the language learning and teaching experience during COVID has been discussed together with the idea of de-schooling, to see if traditional face-to-face language instruction can be fully replaced by instructions conducted on digital devices.

The way how digital technologies-related skills, awareness, and competencies are conceptualized in different studies will be explored in this paragraph. As digital technology-based language pedagogies are studied for different purpose in different studies, the way they conceptualize related skills, awareness, or competencies also differs. This review groups those conceptualizations into six categories, namely, critical media literacy, digital literacy, information literacy, media literacy, multimodality, and digital skills. Amongst the 32 studies included in this review, fifteen focused on/termed digital technologies-related skills, awareness, and competencies as digital literacy, five on/as digital skills, four on information literacy, three provided conceptualization of media literacy, two provided conceptualization of multimodality, and one provided conceptualization of critical media literacy. Interestingly, the ways how critical media literacy, digital literacy, information literacy, and media literacy were conceptualized have some commonalities. They are all conceptualized as a framework to access, analyze, evaluate, and create messages on digital technology enhanced platforms.

Amongst a total of 32 studies, six discuss digital technology-based English pedagogy from the perspective of teachers, and nineteen from that of students. On the one hand, studies focusing on the teachers' perspective were mostly concerned with teachers' attitudes toward digital technology, their practical use of it, obstacles faced by them, their beliefs about digital literacy, and their engagement. On the other hand, more diversified topics were found in studies focusing on the perspective of students. Within all these topics, the most frequently mentioned two are the improvements of students' digital literacy and language performance, with a total of six each. The remaining studies include one that focused on the development of students' 21st century skills, two on digital competencies, one on intercultural competencies, two on media literacy, and one on engagement. Interestingly, those two studies focusing on engagement from the perspectives of teachers and students respectively were all conducted after COVID-19 had taken place. This finding signals that during the time of COVID, when teaching completely shifts to an online environment, and the role of digital technology transfers from complementary to obligatory, the engagement of both groups then becomes a crucial prerequisite of successful implementation of digital technology-based English pedagogies.

This paragraph specifically analyses the aims of studies included in this systematic review. Amongst a total of 32 studies included in this review, only two of them aimed to deliver a theoretical discussion. These two studies that tried providing a theoretical discussion tend to conceptualize digital literacies from a sociocultural perspective, and to propose a theory-driven situated problem-based learning approach to EFL classroom practices – the 3D model of literacy. The remaining 29 are all empirical studies, amongst them, 14 aimed to trace its effects of digital technology-based pedagogy, including five examining its effect on students' language proficiency, three on perceived challenges or obstacles, one on students' motivation, one on teaching practice, two on students' digital literacy or competencies, and one on teachers' engagement. Another ten studies aimed to examine the relationships between digital literacy levels and other factors, which includes one between digital literacy and students' language proficiency, one students' self-efficacy,

two teachers' practice, three teachers' and/or students' attitudes, two students' digital literacy practice, and one students' conceptions of it. The other five studies that specified its COVID-related background all examined the potential of digital teaching mode to replace traditional teaching by comparing students' learning experience, required teachers' skills, students' motivation, students' digital literacy development and student's English language proficiency development. By contrasting the aims of these empirical studies before the COVID and during COVID, the result seems to echo my finding in the focus section that role of digital technologies in classroom setting has shifted from a complementary role to a substitutional role.

4. Discussion

By comparing studies before and after the COVID, the differences were found in the role of digital technology while the similarities were found in the perspectives of digital technology-related literacies and competences.

4.1. The role of digital technology: from complementary to necessary

Firstly, by reviewing studies included in this review, a change in the role of digital technology is found, as evident by the different terms used to characterize digital-technology-enhanced pedagogies before and after COVID-19. It is found that terms such as "technology/media-based pedagogies" and "Computer-assisted language learning" which were commonly used in studies before COVID have been replaced by terms such as "distance learning" and "remote learning". For example, Akabana et al.'s study termed such pedagogy as remote education [14], Bilosterkovets et al.'s and Bozavli's studies termed it as distance learning. Such changes of terms imply changes of roles of digital technologies in language classrooms [15,16]. Before COVID, the role of technology was to 'assist' language teaching, which is complementary. After COVID, when the teaching mode has shifted to 'distant learning' and 'remote learning', the role of technology has shifted to necessary. Before the pandemic, technologies are often used in language classrooms to support traditional teaching, either in order to improve students' language learning experience or in order to improve students' digital or media literacy. For example, according to the systematic review by Evseeva and Solozhenko [17], studies concerning the use of digital technology in classroom were once largely focused on blended learning. In this way of using digital technologies, they serve as supportive tools to help educators achieve their innovative language teaching. However, after COVID took place, due to the physical constraints, there was no room for such blended learning, which was then replaced by distance learning. In this approach, learners are physically separated from the institution that sponsors the instruction [18]. In a general sense, distance learning mainly serves learners who cannot attend face-to-face courses or programs. Learners stay at home or office and follow the course, do the assignments, and interact with each other and the teacher via Internet [19]. During the pandemic, in order to control the spread of the disease, many countries were forced to give up face-to-face teaching and to move towards distant learning, which contributes to the necessary and prominent role of digital technologies in classrooms. However, it is also worth mentioning that, in the world after COVID, when the class delivery mode returns to traditional face-to-face delivery mode, the role of digital technology might change accordingly which requires further research. This is because teachers' and students' technology skills improved during the pandemic; in the meantime, they also benefited from the use of digital technologies. In this case, it is worth exploring whether they will be more willing to use digital technology in English language teaching and learning after COVID, whether they become more capable of effective usage of digital technologies, and how to incorporate digital technology into classroom teaching to make better use of its potentials.

4.2. Conceptualisation of digital literacy

Three different perspectives of the conceptualisation of digital literacy have been identified according to the result of this systematic review, namely 'digital literacy as information and communication technology (ICT) skills', 'digital literacy as cyber safety', and 'digital literacy as social practice'. By comparing the studies before and after COVID, it is found that the conceptualisations of digital literacy do not alter much after COVID, and focal points of studies are still within these three perspectives, similar to the focal points of studies before COVID, as Weinger summarised in his review [20]. In this case, the categories of digital literacy in this review will be based on the three perspectives summarised by Weinger [20]. These perspectives are presented separately below, but they should not be considered as entirely different. In fact, they represent different emphases of digital literacy, which in turn have different implications for English language teaching and learning.

4.2.1. Digital literacy as 'tech competence'

This particular understanding conceives of digital literacy as an array of skills, competencies and to some extent attitudes relating to the use and role of technology in society. Importantly, the word literacy here is mainly used as a helpful analogy: just like the ability to read and write is indispensable today in most contexts, so is the ability to use digital software and hardware with ease and efficiency. Digital literacy thus gains legitimacy and authority through its association with traditional literacy [21,22]. The analogy goes further: just as cognitivist conceptions of reading and writing view literacy as comprised of discrete skills (e.g., word recognition, decoding, comprehension, spelling, phonics), digital literacy in this perspective can be seen as a bundle of ICT skills such as coding, computational thinking, or facility with social media. In fact, as Pangrazio and colleagues note [23], the term 'digitals skills' is increasingly being used in some contexts for precisely such functional ability with digital technological tools. This perspective which puts a heavy emphasis on ICT skills is also evident in studies after COVID. For example, in Alsmari's study [24], L2 digital literacy is conceptualised as a set of prerequisite ICT skills for successful exploitation of language-specific web-based resources and efficient communication in computer-mediated environments to optimize second language acquisition. In Darwanto, Rini, and Herusatoto's study [25], digital literacy is conceptualised as necessary navigating skills of using ICTs. Likewise, in Dashtestani and Hojatpanah's study digital literacy is defined as the ability to use ICTs to find, evaluate, create, and communicate information [26].

4.2.2. Digital literacy as cyber safety

This second take on digital literacy highlights the need for media users to be able to critically assess and evaluate digital media messages, with a special emphasis on online falsehoods, also known as 'fake news'. The spread of misinformation concerning COVID-19 during the global pandemic of 2020 again highlighted the need for citizens to be discerning of what they view, read and hear online. English teachers here have much to offer, given that critical reading and viewing is a skill that is a regular part of English language curricula, not just in L1 contexts but also increasingly in contexts where English is taught as a second or foreign language. At the heart of critical reading is the idea that all texts are representations; constructed by authors within particular cultural and political-economic contexts, for specific purposes and using different genres and conventions of communication [27]. Reading therefore should not merely entail extracting information from texts but rather understanding this process of construction. For Renee Hobbs [28], reading a text critically entails the following:

- Understanding conventions of textual, visual or multimodal communication work
- Identifying the author, genre, purpose and point of view of a text
- Comparing and contrasting sources
- Evaluating the quality and credibility of sources and arguments
- Understanding one's own biases

As English teachers, we cannot ignore these facts but rather need to incorporate into our teaching multimodal digital texts our students encounter daily, as well as teach students how to read such texts critically. Before COVID, there has been a growing body of empirical, classroom-based research that has documented how this can be done in the EFL context. For example, studies like Bigelow, Vanek, King & Abdi [29], Chen [30], and Chun all documented how this cyber safty perspective of digital literacy could be implemented into EFL classrooms [31]. This perspective of digital literacy has also been a focal point of studies after COVID, for example Vorobel, Voorhees and Gokcora's study focuses on this perspective using a qualitative method to investigate students' critical digital-text reading practices and students' challenge in this process [32], and Aristizabal-Jimenez's study measures students' levels of digital literacy using a quantitative method based on their critical analysis of YouTubers' content. Similarly, Biloserkovets and colleagues also conceptualise digital literacy as skills that protect students from misinformation and helps them to take control over what they receive from the internet [16]. It is found in these studies that digital literacy is about students' critical analysis of online information to protect themselves from potential risks of internet usage.

4.2.3. Digital literacy as social practice

The defining feature of this third take on digital literacy rests on an understanding of literacy as "socially recognized ways of generating, communicating and negotiating meaningful content" [33] (p. 64) in multiple modes and media, and as members of social groups. Literacy is not simply the ability to read and write but "the sharing of meaning through symbols" [28], learned and used within communities whose values and beliefs shape their literacy practices. Digital literacy thus entails mastery of these literacy skills, but also encompasses technical expertise, critical analyis as well as awareness of and adherence to community ethics concerning participation and communication online [27,34,35]. In this articulation, digital literacy includes both so-called receptive and productive skills: the ability to access, analyze and evaluate information and texts online but also the ability to produce texts in accordance with literacy practices of particular communities [36].

Given the above characteristics of this 'third take', fostering digital literacy as social practice falls very much within the purview of English language teachers. But it is also clear that there are some challenges. This is evident in studies before COVID, according to [20], there have been a large body of studies documented language teachers' challenges in integrating digital literacy as a social practice into language classrooms. Similarly, such challenges are also evident in studies after COVID, for example, in Pratolo and Solikhati's study conceptualises digital literacy as a social practice and points to some challenges in implementing digital literacy such as lack of time and limited budgets in Indonesian context [37]. Some other examples of while-pandemic studies that have conceptualised digital literacy as socially constructed and consider it helpful for students' successful engagement in the 21st century are Jamalai &Krish's study which focused on Malaysian context [38], Machwate et al.'s study hat focused on German and Moroccan contexts, and Rifai et al.'s study [39,40] that focused on Indonesian and Japanese contexts. Although there exists difference in contexts, the conceptualisations of digital literacy are quite similar within each study.

4.3. Limitation

The first perceived limitation of this review is that it only focuses on studies published during a short period. In this case, studies included in this review might not be sufficient to conclude the changes in the conceptualizations of digital literacy during the COVID-19 pandemic. The second perceived limitation is regarding the quality of the studies include in this. This is because most of these included studies are newly published studies, so that the review time of these studies are relatively short, which may lead to concerns about the quality. The third perceived limitation is the author's limited access to databases. All the databases used in this review were accessed through the library of the author's school, which can lead to limited access.

5. Conclusion

This systematic review synthesizes the trend in the field of digital technology-based language education during the COVID pandemic. The results of this review show that the classroom role of digital technologies has shifted from complementary to necessary during the pandemic, and new focal points such as teachers' and students' engagement during distance learning emerges after the COVID. However, the focused age group and the conceptualizations of digital literacy have not changed as much. The studies are still mostly focused on secondary and tertiary education, leaving the primary school context underexplored. And the conceptualizations of digital literacy can still be categorized into the three categories, namely digital literacy as ICT skills, digital literacy as cyber safety, and digital literacy as social practice. Despite the limitations such as short timeframe, short review time, and limited access, this review has its implication to future studies. For example, areas of further research are identified for future studies: 1) Primary school context; 2) Long-period research focused on the integration of digital technology into the language classroom. More research is called for investigating a broader context and exploring how to integrate digital technology into language classroom to promote better development of students' competencies.

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[38]*Jamali, M., & Krish, P. (2021). Fostering 21st century skills using an online discussion forum in an English for specific purposes. *Malaysian Journal of Learning and Instruction, 18(1),* 219-240.

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[40]*Rifai, I., Setiadi, C. J., Renaldo, J., & Andreani, W. (2021). Toward society 5.0: Indonesia and Japan on the 21stcentury literacy skills. *Paper presented at the IOP Conference Series: Earth and Environmental Science.*

Appendix

List of articles included in the systematic review

1) *Akbana, Y. E., Rathert, S., & Ağçam, R., (2021). Emergency remote education in foreign and second language teaching. *Turkish Journal of Education, 10(2),* 97-124. DOI: 10.19128/turje.865344

2) *Alm, A., & Watanabe, Y. (2021). Functional caption literacy development through intra-formal L2 viewing. *Aula Abierta, 50(2),* 635-642. doi:10.17811/RIFIE.50.2.2021.635-642

3) *Almusharraf, N. M., & Engemann, J. F. (2020). Postsecondary Instructors' Perspectives on Teaching English as a Foreign Language by Means of a Multimodal Digital Literacy Approach. *International Journal of Emerging Technologies in Learning, 15(18),* 86-107. doi:10.3991/ijet.v15i18.15451

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11) *Irawan, N., Retnaningdyah, P., & Mustofa, A. (2021). Distance learning of ELT for Chinese students in ICUTK: digital literacy practices. *Journal Of Physics: Conference Series, 1842(1),* 012017. doi: 10.1088/1742-6596/1842/1/012017

12) *Jamali, M., & Krish, P. (2021). Fostering 21st century skills using an online discussion forum in an English for specific purposes. *Malaysian Journal of Learning and Instruction, 18(1),* 219-240.

13) *Kovalev, M. N. (2021) Prospects for Teaching English at Higher Education Institutions in a Digitalized Educational Process. In: Vol. 314. Studies in Systems, Decision and Control (pp. 1201-1209).

14) *Kurbakova, S. N., Volkova, Z. N., & Kurbakov, A. V. (2021). Developing Students' Cognitive Abilities in E-Learning Environment. *Paper presented at the ACM International Conference Proceeding Series.*

15) *Machwate, S., Bendaoud, R., Henze, J., Berrada, K., & Burgos, D. (2021). Virtual Exchange to Develop Cultural, Language, and Digital Competencies. *Sustainability, 13(11),* 5926. doi: 10.3390/su13115926

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22) *Pratolo, B., & Solikhati, H. (2020). Investigating teachers' attitude toward digital literacy in EFL classroom. Journal Of Education And Learning (Edulearn), 15(1), 97-103. doi: 10.11591/edulearn.v15i1.15747*

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