

Researching Summary Writing through Computer-Assisted Language Learning (CALL): A Systematic Review¹

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Abstract

Summary writing is considered one of the paramount assessments to determine students' reading comprehension. The purpose of this study is to examine the kinds of Computer-Assisted Language Learning (CALL) used in summary writing in relation to contexts and the points of recommendation for future research in the English language teaching (ELT) setting. To this end, databases (i.e., *Google Scholar*, *Crossref*, and *Scopus*) were reviewed, and eight articles that were published between 2016 and 2020 were fully analyzed. A systematic content analysis method was used to analyze the articles. The study found that the kinds of CALL used in the summary writing informed the contexts of study, and that CALL can enhance students' engagement and increase autonomous learning. Various suggestions for teachers, practitioners, and future research are pointed out.

Resumen

La redacción de resúmenes se considera una de las evaluaciones más importantes para determinar la comprensión lectora de los estudiantes. El propósito de este estudio es examinar los tipos de aprendizaje asistido por computadora (CALL) utilizados en la redacción de resúmenes en relación con los contextos y los puntos de recomendación para futuras investigaciones en el entorno de la enseñanza del idioma inglés (ELT). Para ello, se revisaron bases de datos (es decir, *Google Scholar*, *Crossref* y *Scopus*) y se analizaron en profundidad ocho artículos publicados entre 2016 y 2020. Se utilizó un método de análisis de contenido sistemático para analizar los artículos. El estudio encontró que los tipos de CALL utilizados en la redacción del resumen informaron los contextos de estudio, y que CALL puede mejorar la participación de los estudiantes y aumentar el aprendizaje autónomo. Se señalan varias sugerencias para profesores, profesionales y futuras investigaciones.

Introduction

Not only early school students appear to have difficulties in comprehending texts of English as a foreign language, but graduate students also do. Reading is learners' receptive activity in decoding the symbols and extracting meaning, while writing is learners' productive activity in expressing the idea. The role of integrated receptive and productive skills in language tasks has been widely investigated (Li, 2014; Motlaq & Egresh, 2016; Plakans, 2009; Shin & Ewert, 2015) as has how the CALL source use for these skills (Barkaoui, 2015; Plakans & Gebril, 2013). At the same time, reports have suggested that the major problem with integration of these skills includes the little time spent on learning to read and write, as well as the ability to integrate reading and writing skills with technology (Genlott & Gronlund, 2013). Most English as a foreign language (EFL) learners learn reading-writing skills spontaneously in their early years' school and when they lag behind in these skills, it hinders their flater education, as the texts they get are longer and more complicated (Genlott & Gronlund, 2013; Myrberg, 2007). Teaching reading and writing in primary school children in grades 1-7 was reported to have a strong autoregressive relation as well as a strong regression on reading-writing performance, but a weak cross-skill regression (Abbott et al., 2010). Given this situation, there are many studies that have reported the significance of teaching reading and writing to solve those problems, and to scaffold the learners easily in the process of transforming and constructing their academic knowledge.

Summary writing is considered an important element of reading and writing. It combines a reading activity and a writing activity, either at the same or at different times. It is used to assess learners' reading comprehension and able to recognize learners' understanding from their writing. It can also accelerate the learners' background knowledge on reading, and it enhances their general writing performance (Asaro-Saddler et al., 2018). This technique is also a tool that supplies learners with practice in finding detailed

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information and then understanding it (Kim, 2001). Kim also said that the ability to write a good summary is an important skill for undergraduate learners' academic performance since they use it for various tasks and frequently need to develop different types of summaries for their classes (Kim, 2001). As a content-based productive activity, summary writing is usually a complicated output assignment for EFL learners due to the integration of both cognitive and psychomotor processes, in which learners must engage in word decoding, main idea identification, and then writing (Yang, 2014). It has been also suggested that learners' reading comprehension can be improved by having the learners write summaries of what they read (Alharbi, 2015).

Over the last two decades, summary writing using Computer-Assisted Language Learning (CALL) tools has increased (Fu & Hwang, 2018; Li, 2018; Rafiq et al., 2021). Li (2018) discussed various aspects of the current body of literature on computer mediated collaborative writing in L2 contexts with English, Spanish, French, or German as a foreign language at both tertiary and secondary levels in an empirical analysis. However, that study did not differentiate the research results as to specific learning contexts, such as EFL or English as a second language (ESL). In another study that focuses on EFL, Fu and Hwang (2018) reviewed the integration of mobile learning for secondary school EFL learners and discussed the challenges. Their results showed that mobile learning encouraged collaborative learning for EFL learners. Unfortunately, that study has many participants at different levels of education and does not focus on several subjects. This means that the participants did not only include higher education students, but also elementary school students who studied several learning subjects like social studies, language and art, engineering, and natural science (Fu & Hwang, 2018).

Mobile assisted language learning (MALL) is now a popular technique among EFL students and teachers, or practitioners in English language teaching (ELT). Rafiq et al. (2021) focused their study on mobile learning for English for special purposes (ESP) with business majors to show which mobile learning applications or tools were available for vocabulary teaching and learning for university undergraduates. (Rafiq et al., 2021). For all the reasons provided, this study seeks to investigate the kinds of CALL used specifically in summary writing. The following research questions were developed: RQ 1: What research contexts and kind of CALL tools have been investigated for teaching summary writing? RQ 2: What kinds of research design, sampling, fields, and framework theories used?; and RQ 3: What aspects need to be taken into consideration for future research on summary writing?

Methods

A systematic review method was used in this study based on the specific research questions above. From this systematic review, the previous research findings can be checked for consistency and generalizability to this field. Compared to a literature review, a systematic review includes various available databases to be reviewed in a precise and well-organized manner (Turan & Akdag-Cimen, 2019), whereas a literature review retrieves the articles from only few databases and does so in a less precise way (Robinson & Lowe, 2015).

Data collection procedure

The chosen databases (Google Scholar, Crossref and Scopus) were selected as they have a large number of education-related studies. The search terms used included 'summary writing,' 'EFL summary writing,' 'summary writing through CALL,' 'summary writing using computer,' and 'online summary writing.' Over 160 articles were generated. Due to the large number of documents, the list was narrowed down by restricting the focus to articles about summary writing then it was limited to summary writing through CALL studies published in reputable journals over the past decade. All the articles were then screened (mainly based on titles and abstracts), and the inclusion criteria were established to narrow down the target articles. It was decided that the articles had to be: (1) focused on summary writing using a computer; (2) were conducted in educational setting; (3) were empirical research studies; and (4) were published between 2016 and 2020. This five-year period was chosen to obtain more accurate data and the recent evolution of technology in teaching and learning (Berrocoso et al., 2020), especially the educational system during the pandemic in 2020. Research studies addressing summary writing without computer support learning or addressing summaries in different field were excluded. The conceptual/synthesis articles, as well as the articles published before 2016 and after 2020, were considered as exclusion criteria.

Data analysis procedure

After the inclusion-exclusion criteria mentioned above were made and the studies to be included in this review were identified, the systematic review process began, allowing or identifying (search), screening (eligibility), evaluating, and analyzing data based on the topic. A diagram of the systematic review process is presented below (Figure 1).

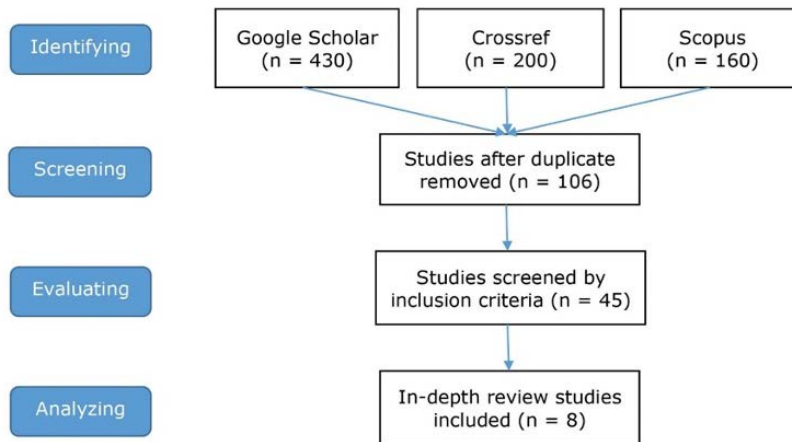


Figure 1: Systematic diagram of the review process

First of all, the raw data was collected from Google Scholar (n = 430), Crossref (n = 200), and Scopus (n = 160), a total of 790 papers. Upon removing the duplicates, there were 106 articles. Then, these were screened to select the articles to be used based on inclusion and exclusion criteria. Articles were included if they were published in a reputable journal, discussed summary writing in an EFL setting, were published between 2016-2020, and if they revealed summary writing through CALL. After careful selection based on the inclusion criteria, 45 articles from three different databases were included in the analysis process. Then, 37 of those 45 articles were excluded since they were published before 2016 and due to the fact they were not related to the aim of this study. After an examination of the titles and abstracts, the remaining eight articles were potentially reviewed for eligibility in this systematic review. (Appendix 1)

Findings

This section focuses on the use of computer supported learning research from 2016 to 2020 to answer the research questions. The studies, including the in-depth review, were classified according to what kinds of CALL, research design, the sample of the study, research field, and underpinned theory.

To answer RQ1 (What research contexts and kind of CALL tools have been investigated for teaching summary writing?), the subcategories examined by the researcher included the distribution of the studies by year, the research contexts, and the kinds of CALL used in the study. The studies were conducted in the following ELT contexts: 154 sixth grade of elementary school in China, 24 graduate students studying in Taiwan, 50 university students, 60 L students in Iran, 30 fourth semester students in Malaysia, 20 students in China, and two were conducted Malaysia (Chew et al., 2019; Chew et al., 2020).

As shown in Table 1, all the articles published from 2016 – 2020 used technology or computer to support summary writing; examples included Latent Semantic Analysis (LSA), online summary writing, Computer Supported Collaborative Learning (CSCL), Online summary writing, Computer-based testing, Virtual text and graphic on Interactive Multimedia, Computer Assisted Summary Writing (SW-PAL), Marginal Glosses (GM), Network Tree Advance Organizer (NTAO), and Summary writing through online systems. All findings indicated that using those kinds of CALL yielded some improvement in students' summary writing ability. The most frequently used tools in assisting summary writing were online summary writing and computer assisted summary writing (SW-PAL). While the remaining tools had similar results that could help overcome the students' difficulty in writing the summary.

Articles	Kinds of CALL	Research Aim
Sung et al., 2016	<ul style="list-style-type: none"> ➤ Latent Semantics Analysis (LSA) ➤ Online summary 	<ul style="list-style-type: none"> • To compare the effectiveness of relevance feedback on enhancing EFL students' summary writing performance • To investigate the effect of providing relevance information and concept maps on the writing of summary
Yang, 2016	<ul style="list-style-type: none"> ➤ Computer supported collaborative learning (CSCL) ➤ Online summary writing 	<ul style="list-style-type: none"> • To investigate how EFL students transform and construct their academic knowledge through peer feedback when involved in summary writing
Lu et al, 2018	<ul style="list-style-type: none"> ➤ Computer-based testing 	<ul style="list-style-type: none"> • To reduce EFL students' anxiety during the process of oral production • To reevaluate the positive effects of embedded summary writing
Ayob & Adnan, 2019	<ul style="list-style-type: none"> ➤ Virtual text and graphic on Interactive Multimedia 	<ul style="list-style-type: none"> • To assess students' summary writing before and after the treatment • To identify significant difference between pre-test and post-test
Chew et al., 2019	<ul style="list-style-type: none"> ➤ Computer Assisted Summary Writing (SW-PAL) 	<ul style="list-style-type: none"> • To enhance ESL students' summary writing • To assess the extent of SW-PAL effected ESL students' cognitive load • To evaluate ESL students' perception of using concept mapping, worked example, and feedback
Nevisi et al., 2019	<ul style="list-style-type: none"> ➤ Marginal Glosses (MG) ➤ Network Tree Advance Organizer (NTAO) 	<ul style="list-style-type: none"> • To investigate the relative impact of NTAO and MG on EFL summary writing ability'
Chew et al., 2020	<ul style="list-style-type: none"> ➤ Summary Writing online tool (SW-PAL) 	<ul style="list-style-type: none"> • To design and develop a theory based on summary writing online tool to assist ESL students in improving their summary writing • To evaluate the effectiveness of SW-PAL in enhancing students' summary writing • To examine the students' perception about it
Yeh et al., 2020	<ul style="list-style-type: none"> ➤ Summary Writing through online system 	<ul style="list-style-type: none"> • To explore the integrated reading and summary writing process while using online summary writing system

Table 1: In-depth studies in CALL used

All the findings emphasized that the use of those CALL tools could promote students' summary writing ability. The findings indicated that CALL tools can enhance the students' summary writing performance, but the findings did not indicate whether the use of these tools over a longer period or a wider aspect would yield different results. The use of those CALL tools in this study were limited to the period of treatment over nine meetings and, therefore, the possible aspects beyond the research findings that plausible arose in a longer time could not be found or estimated.

To answer RQ2 (What kinds of research design, sampling, fields, and framework theories used?), the following subcategories were defined and examined by the researcher based on the study of research design, research sampling, research field, and underpinned theory. The subcategories of the study are presented briefly in Table 2.

Article	Publication Year	Design	Sampling	Research Field	Underpinning Theory
1st	2016	Experimental	154 sixth grade of an elementary school in Taiwan	Reading, writing, feedback	<ul style="list-style-type: none"> • Behaviorism • Cognitive load theory
2nd	2016	Quasi-experimental	24 graduate students in Taiwan	Reading, writing, peer feedback	<ul style="list-style-type: none"> • Collaborative learning
3rd	2018	Quasi-experimental	50 2 nd year university students	Speaking, writing,	<ul style="list-style-type: none"> • Vygotsky's sociocultural theory • Interactionist theory
4th	2019	Quasi-experimental	30 fourth semester Malay students of secondary high	Reading, writing	<ul style="list-style-type: none"> • Cognitivism • Constructivism
5th	2019	Quasi-experimental	58 undergraduate students of computer science of Malay that take an English course	Reading, writing	<ul style="list-style-type: none"> • Rosenblatt's Transactional theory • Ausubel's Meaningful learning theory • Sweller's Cognitive load theory
6th	2019	Quasi-experimental	60 undergraduate students of Iran	Reading, writing	<ul style="list-style-type: none"> • Ausubel's cognitive learning theory • Sweller's Cognitive load theory
7th	2020	Mixed method empirical study	53 undergraduate students of computer science of Malay that take an English course	Reading, writing	<ul style="list-style-type: none"> • Rosenblatt's Transactional theory • Ausubel's Meaningful learning • Sweller's Cognitive load theory • Vygotsky's ZPD theory
8th	2020	Mixed method	20 undergraduate students in Taiwan	Reading, writing, vocabulary	<ul style="list-style-type: none"> • Cognitive load theory

Table 2: In-depth studies by design, sample, research field, and theory used

Research design used in the reviewed articles

As shown in Table 2, the most commonly used research design was the quasi-experimental (75%), and it was closely followed by the mixed method (25%). It indicated that most of the examined research from 2016 – 2020 concerned with integrating reading-writing, intended to measure the effectiveness of computer supported learning on summary writing, while qualitative data in two studies were provided to complete the quantitative results on the effectiveness of summary writing by giving the students' perspective on it.

Participant samples in the articles

Table 2 reveals that the majority of articles (62.5%) selected undergraduate students as the sample, followed by K-12 students (25%), and the remaining groups were graduate students (12.5%).

Research field chosen in the reviewed articles

All of the studies investigated reading and writing as the main concern; however, there were three articles (37.5%) that investigated feedback, speaking, and vocabulary as their additional research field besides reading and writing. These data are shown in Table 2 above.

Theory underpinned the reviewed articles

As presented in Table 2, the theories used in all of the studies were under the umbrella of cognitivism and constructivism learning theory. Moreover, they break it down into several theories, like cognitive load theory, transactional theory, meaningful learning theory, sociocultural theory, interactionist theory, cognitive learning, collaborative learning, and ZPD theory. However, the first article used the behaviorism learning theory since the sample involved elementary school students.

Discussion

In this study, eight articles collected from the Google Scholar, Crossref, and Scopus databases were analyzed in terms of the CALL used in summary writing and the contexts of study (RQ1), the research design identification, research sampling, research field, and theory for CALL (RQ2), as well as the points of recommendation for future research (RQ3).

This study reveals the current body of literature on summary writing through CALL in EFL contexts. The use of the CALL tools for summarizing describe the objects of research and the school systems/facilities in the study., meaning that CALL as a tool for learning only can be used to enhance the students' achievement if both students and school facilities support and ready to use it. For example, Ayob and Adnan (2019) drew on the use of interactive multimedia by using virtual text and graphic integration to enhance quality summary writing in one secondary school in Malaysia. The integration of text multimedia and virtual graphic suit for the national high school, which had sufficient computer and internet access for the students (Ayob & Adnan, 2019). In accordance with the instructional or printed materials, multimedia text, and internet access, the ESL students can construct a summary writing correctly and accurately, and the teacher can mark the criteria of success. Similarly, Nevisi et al. (2019) observed the use of instructional techniques like marginal gloss (MG) and network tree advance organizers (NTAO) in summary writing for university students in Iran. To apply the two instructional techniques, the students had to specify their language proficiency by administering the quick Oxford placement test (OPT), and they were categorized at an intermediate level of language proficiency (Nevisi et al., 2019). Thus, by the result of it, the researchers equipped students with MA or NTAO, and they were able to know the effects of the MA and NTAO on summary writing.

The affordance of CALL and the contexts can be fully used in teaching and learning to enhance EFL/ESL summary writing. This study is in line with Rafiq et al. (2021) which reported that the sources of mobile technology, including various types of CALL can encourage students' engagement in learning when the technology adopted, and materials used are suitable for a particular context. The various kinds of CALL applied in this study remain successful due to the suitable contexts. This notion allowed educators to identify the future researcher in order to develop the effective strategies in the term of adoption of the CALL in the EFL/ESL contexts. Furthermore, there was no detailed information related to CALL, whether it could create joyful learning and can alleviate students' anxiety or not, except that of Lu et al. (2018), which indicated that CALL can alleviate students' anxiety and motivate them in summarization. Therefore, the information on the benefit of learning tools is needed for the future research of CALL that can reduce students' anxiety, so that the learning objectives are achieved.

The use of CALL tools in summary writing had been limited on the period of treatment, which approximately ranged from seven to nine meetings. This limited time of treatment impeded the plausible learning cases that happen in long period of learning, and it could not be clarified only in the short period of writing. Therefore, Sung et al., (2016) and Chew et al., (2020) suggested that the future research observe the research with longer practice phase, so that the plausible arose beyond the research findings can be found and estimated.

Next, the review also looks at research design, research sampling, research field, and framework theory in implementing CALL in summary writing. In terms of methodological issues, the review was challenged by the similar variables, the dependent and independent variables with the single site and single study research. The findings of this study correspond to Fu & Hwang (2018) and Pimmer et al. (2016) regarding the necessity to consider not only the quantitative method but also the qualitative method and mixed methods in emerging the phenomenon of CALL for summary writing. Moreover, by investigating the potential and reciprocal influence of CALL and the contexts, future researchers can conduct a longitudinal study and holistic approach.

In the reviewed studies, the most common participants consisted of undergraduate students with a few studies undertaken with pre-school students, students of K-12, graduate students, and other participants. Parallel to this finding, Lo and Hew (2017) observed lack of using technology research with K-12 students not only in ELT but also in other fields. The examined studies in the literature also indicate that in the research of languages skill using technology, the participants are generally chosen from university-level students (Kucuk et al., 2013). The reason for this might be the fact that undergraduate students are more adept at using technology and are expected to show greater abilities in summary writing and both lead to better performance.

In terms of research field, the findings of the review observed the reading and writing skills in ELT setting. It is reported that teaching and learning language can be more effective if teachers use technology instead of a conventional method. Today's technology, both synchronous and asynchronous, naturally allows for extra time for teachers in choosing or searching an appropriate application to facilitate students' learning in the classroom based on the students' needs and condition. Therefore, the use of technology will help teachers determine the result of students' achievement in these skills. Thus, in the systematically reviewed articles in this current study, the most commonly investigated language skills included reading and writing. For creating a gap, future researchers may provide valuable insight into the effective use of the summary writing through CALL strategy by reporting on integrating language skills or language components in ELT setting.

The extensive presence of summary writing online tools within scholarly discourse underscore their significance in the domain of CALL. The summary writing online tool, summary writing through online system, or computer assisted summary writing (SW-PAL) is the kind of CALL tools with greatest presence in the analyzed articles. By harnessing technology to enhance summarization skill, those tools contribute to the development of learners' linguistic competence and their critical thinking prowess. Those tools applied in Chew et al. (2019), Chew et al. (2020), and Yeh et al. (2020). The components in those tools can activate students' prior knowledge, give summarizing strategies instruction, provide scaffolding, and recognize students' metacognitive, as well as students' motivational process by using select-organize-integrate (SOI) model. The SOI model proposed students to go through the poses of selecting the most important information and keywords from a text, organizing these keywords and important messages to generate the main idea of each paragraph, and then integrating the main idea by constructing a summary. With respect to administering those tools in CALL, the objectives of the study and the students' perception are fully achieved.

In the term of theoretical framework, the engagement of cognitivism and constructivism learning theories were used in these reviewed studies more frequently than other theories. The underpinned theory is chosen mainly based on the students' psychological learning process, students' need, and students' sociocultural condition. Moreover, the reviewed articles in this study confirmed that the CALL tools on summary writing classrooms elaborates the various aspects of the courses. The main findings of these studies indicate that this strategy helps improvement in students' writing achievement and reading-writing performance. In addition, the utilization of the CALL tools promotes greater collaboration among students. Thus, the use of cognitive load theory, transactional theory, meaningful learning theory, computer-based testing, cognitive

learning, collaborative learning, and ZPD theory has a significant role in these studies. Therefore, positive outcomes of the findings of these studies on summary writing through CALL came as no surprise.

Adding to the body of knowledge, it is also suggested for future researchers to find alternative analytic eclecticism in the teaching and learning language skills. It means that researchers, teachers or practitioners may provide an alternative way of thinking the relationship among learning assumptions, concepts, theories, the organization of research, and real-world classroom problems, which are based on the students' needs, challenges they face in ELT process, and their condition taken from the preliminary study. Therefore, there is no exact theory that fits the real condition of students and the learning process.

Conclusion

This systematic review has analyzed previous studies related to summary writing through CALL in EFL/ ESL learning setting. The gaps of this study of revealing the kinds and the concepts of CALL used in the summary writing (in relation to RQ1), as well as the subcategory aspects of methodology, participant, and pedagogical framework (in relation to RQ2), have been filled in the following texts, the authors discuss the results interchangeably based on the analysis of eight articles reviewed.

In addition, the findings of this study show that there are generally two particular points that need to be taken into consideration in future research on summary writing ability. They are categorized as a conceptual gap and a theoretical gap. Firstly, the conceptual gap deals with the connection of language skills or language components, the design of the study, and the participants of the study. It reveals that the strategy of summary writing through CALL should be connected to other language skills or language components. Moreover, there is still an insufficiency of library samples to boost the reliability of findings.

Secondly, the theoretical gap reflects that several learning theories were used in the reviewed articles. To add to the body of knowledge, further research should use the analytic eclecticism learning theory suitable for the learning condition. It means that language teachers or practitioners can create a learning environment that takes into account the diverse needs and preference of their students, as well as the school condition. This approach will allow flexibility, adaptability, and ultimately enhancing the teaching and learning experience, so it is like the incorporation of evidence-based practices (Sil & Katzenstein, 2010). Therefore, the study enhances the production of knowledge that may help teachers, researchers, and practitioners in teaching and conducting research under the same topic or beyond.

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Appendix 1

Articles Reviewed

No.	Author	Title	Journal	Year
1	Y.T. Sung, C.N. Liao, T.H. Chang, C.L. Chen, and K.E. Chang	The effect of online summary assessment and feedback system on the summary writing on 6th graders: The LSA-based technique	<i>Computers and Education</i>	2016
2	Y.F. Yang	Transforming and constructing academic knowledge through online peer feedback in summary writing	<i>Computer Assisted Language Learning</i>	2016
3	Z. Lu, C. Zheng, and Z. Li	Effect of embedded summary writing on EFL learners' anxiety and oral production in a computer-based testing environment	<i>Journal of Computer in Education</i>	2018
4	A. Ayob and N. S. Adnan	The effects of virtual text and graphic integration based on interactive multimedia towards students' achievement in summary writing	<i>International Journal of Innovation, Creativity & Change</i>	2019
5	C.S. Chew, N. Idris, E.F. Loh, W.C.V. Wu, Y.P. Chua, and A.T. Bimba	The effects of a theory-based summary writing tool on students' summary writing	<i>Journal of Computer Assisted Learning</i>	2019
6	R.B. Nevisi, R.M. Hosseinpour, and R. Kolahkaj	The impact of marginal glosses and network tree advance organizers on EFL learners' summary writing ability	<i>Journal of Asia TEFL</i>	2019
7	C.S. Chew, W.C.F. Wu, N. Idris, E.F. Loh, and Y.P. Chua	Enhancing Summary Writing of ESL Learners via a Theory-Based Online Tool: System Development and Evaluation	<i>Journal of Educational Computing Research</i>	2020
8	H.C. Yeh, S.H. Yang, and G.L. Chen	Exploring Students' Integrated Reading and Summary Writing Processes Through an Online System	<i>English Teaching & Learning</i>	2020