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# Application of Computer-Mediated Communication Theory in Online Learning

Mimi Silvia<sup>1</sup>, Dian Rousta Febriyanti<sup>2</sup>, Daniel Gilrandy Tirasbudi<sup>3</sup>, Irwansyah<sup>4</sup>

## Abstrak/Abstract

*Dalam sepuluh tahun terakhir, teori Computer-Mediated Communication (CMC) berkembang pesat pada berbagai penelitian dalam konteks global. Teori ini digunakan dalam berbagai konteks, salah satu yang paling banyak dibahas yaitu online learning. Penelitian ini menggunakan metode Systematic Literature Review untuk melihat bagaimana pengaplikasian teori CMC dalam online learning pada periode 2015-2016. Peneliti menemukan 30 manuskrip yang terindeks Scopus Q1-Q4 dan Sinta 1. Ketiga puluh jurnal ini menggunakan bahasa Inggris dan tersebar di berbagai negara dan benua di dunia. Dari tahun ke tahun, penelitian terkait CMC pada online learning konsisten menanjak sejak 2015. Hasil penelitian kami menunjukkan walaupun CMC dikenal dengan teori multidisiplin, riset pada disiplin ilmu komunikasi masih sangat terbatas. Pembahasan konsep pada disiplin ilmu komunikasi pun masih terkait emoticon. Selain itu, penelitian terkait CMC di negara Asia masih sangat minim. Pembahasan dalam teori CMC juga masih kurang mendalam dan hampir semua membahas konsep struktur sinkronik dan asinkronik. Keterbatasan dalam penelitian ini yaitu walaupun konteks yang paling banyak menggunakan CMC adalah online learning, tetapi masih sedikit penelitian yang membahas CMC dengan metode selain SLR sehingga kurang keberagaman. Untuk itu, peneliti memiliki rekomendasi, untuk riset di masa mendatang dengan konsep dan konteks yang sama, yakni dengan menambah rentang waktu mundur ke belakang.*

In the last ten years, the theory of Computer-Mediated Communication (CMC) has developed rapidly in various studies in a global context. This theory is used in various contexts, one of the most widely discussed is online learning. This study uses the Systematic Literature Review method to see how the application of CMC theory in online learning in the 2015-2016 period. Researchers found 30 manuscripts indexed by Scopus Q1-Q4 and Sinta 1. These thirty journals use English and are spread across various countries and continents in the world. From year to year, research related to CMC in online learning has consistently increased since 2015. Our results show that although CMC is known as a multidisciplinary theory, research in communication science is still very limited. The discussion of concepts in the discipline of communication is still related to emoticons. In addition, research related to CMC in Asian countries is still very minimal. The discussion in CMC theory is also still lacking in depth and almost all of them discuss the concept of synchronous and asynchronous structures. The limitation of this study is that although the context that mostly uses CMC is online learning, there are still few studies that discuss CMC with methods other than SLR so that there is less diversity. For this reason, the researcher has recommendations for future research with the same concept and context, namely by increasing the time span backwards.

## Kata Kunci/Keywords

*Computer-Mediated Communication, CMC, Online Learning, Emoticon, Teori CMC*

Computer-Mediated Communication, CMC, Online Learning, Emoticon, CMC Theory

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## Introduction

Computer-Mediated Communication (CMC) has played an important role globally in the last ten years. For communication scholars, CMC is the impact of the internet on humans that changes communication patterns in the real world to new communication technologies. CMC encompasses all uses of computers, including applications such as statistical analysis programs, remote sensing systems, and financial modelling programs, all of which fall within human communication (Thurlow et al., 2004). This causes research related to multidisciplinary CMC to adapt to the times. Several CMC kinds of research that have attracted the attention of scholars include education (Jung-Ivannikova, 2016),

maintenance of interpersonal relationships (Barraket & Henry-Waring, 2008), and job satisfaction (Bedoya, 2021). One of the most widely written research scholars in the last six years is online learning as an ongoing educational trend. Previously, online learning was a supporter of face-to-face learning (Versteegen et al., 2016). However, since the Covid-19 pandemic changed people's activities with restrictions on gathering in all countries worldwide. The world of education in all contexts is forced to adopt online learning to keep education running (Kim & Gurvitch, 2020). Based on UNESCO's data, school closures are carried out by 39 countries with a range of 421 million students and schools have implemented online learning policies (Kompas, 2020).

CMC research related to online learning refers to the effectiveness of combining synchronous and asynchronous learning. The latest technology has enabled teachers and students to interact in a secure online environment (Khoshnevisan, 2021). Given the cutting-edge technology used in education, online discussion is used in distance education. Online learning has the advantage of offering students the flexibility to work alone. Computer-based technology and the internet are indispensable in distance education. In an online learning environment, learning activities and teacher-student and student-student interaction and communication are achieved through technology usage (Sun & Rogers, 2021).

Online learning changes the pattern of teaching and learning components in the world of education (Kebritchi et al., 2017). Three problems encountered in online learning are online students, instructors, and content development. Learner issues include learner expectations, readiness, identity, and participation in online courses. Instructor issues include changing faculty roles, the transition from face-to-face to online, time management, and teaching styles. Content issues include the part of the instructor in content development, multimedia integration in content, instructional strategy's role in content development, and considerations for content development. In this manuscript, our research aims to answer the question which is How is the development and application of CMC theory in online learning for the 2015-2021 period?

### **Computer-Mediated Communication**

In simple terms, CMC can be defined as a form of human-to-human communication that is carried out with the help of or through computer technology (Thurlow et al., 2004). Gerry Santoro in Thurlow et al. (2004) also said that CMC covers almost all computer uses, including applications such as statistical analysis programs, remote sensing systems, and financial modelling programs, all things that fall into the concept of human communication. Another definition is given by John December (1997) which says that CMC is a human communication process carried

out through computers, involves people in certain contexts, and forms media with various purposes. Another opinion was expressed by Susan Herring (1996) that CMC is communication between humans through computer devices. Computer-mediated communication is the transmission of meaning between two or more humans through digital technology and emphasizes the mediating effect of human communication through certain technological processes (Carr, 2020).

The core concepts in CMC according to Thurlow (2004) are first, communication is a dynamic, transactional, and multimodal process. Second, mediated is the process or means by which something is transmitted, whether it is a message, feeling, or sound. In CMC, there is another layer of mediation, namely technology. The third is computers, related to computer equipment, and the definition is focused on computing technology that facilitates human communication. CMC focuses on how humans conduct conversations, build community and identity through new technologies in communication, namely the internet with the web as part in it, where communication activities occur such as bulletin board chats, email, and so on.

There are 2 computer-mediated communication structures, synchronous and asynchronous (James Simpson, 2021). Asynchronous communication occurs in a delayed time and the context of online learning and does not require the participation of students and teachers simultaneously (Branon & Essex, 2001). Students carry out the learning process independently, and learning occurs asynchronously in space and time. Forms of asynchronous communication can be text-based such as e-mail, online discussions through websites, and voice and video-based, such as students learning through recordings. Asynchronous forms of instruction via voice and video have proven useful in several instructional contexts (McIntosh et al., 2003). In a survey of educators, the asynchronous online discussion was reported to be more useful for encouraging more in-depth and thoughtful discussion, allowing for communication with diverse students, providing space and archives for ongoing discussion, and enabling all students to respond to a topic (Branon & Essex, 2001). While the limitations of the asynchronous structure are the lack of feedback that occurs in real-time, students are not careful in checking assignments, the length of time it takes to reach an agreement in discussions, and students feeling isolated (Branon & Essex, 2001). Dede and Kremer concluded that asynchronous discussions provide a richer and more inclusive message exchange but require more time and less social interaction (Dede & Kremer, 1999).

Synchronous communication occurs in real-time and requires the simultaneous participation of students and teachers (Romiszowski & Mason, 2004). Some synchronous communication channels include text chat by live/real-time and

audio/video conferencing. In online learning context, a survey reported that synchronous communication is useful for holding virtual meetings during working hours, effective in team decision making, conducive to brainstorming and community building, and dealing with technical problems (Branon & Essex, 2001). Whereas the limitations in synchronous discussions related to online learning are when students are online simultaneously, educators find it difficult to moderate conversations, lack of reflection time for students, and there is the possibility of misunderstandings due to text typing errors (Branon & Essex, 2001). Nevertheless, the synchronous discussion can provide a greater sense of presence and generate spontaneity (Hines & Pearl, 2004).

The channels available to CMC are constantly evolving. To discuss CMC we cannot rely on currently developing devices, but depart from communication theories associated with the CMC concept. Initially, some theories and research said that CMC was inappropriate if used for message exchange because the interpersonal exchange of messages was needed in the communication process due to that the media provided little social information (Dubrovsky et al., 1991).

Walther (1996) proposed a reconceptualization to explain CMC and its interpersonal effects in two directions. First, efforts are needed to integrate theory and research on impersonal and interpersonal interactions in CMC. Second, combining media attributes, social phenomena, and psychological processes has made CMC a hyperpersonal concept beyond face-to-face interpersonal communication. This combination affects the process of interaction personally and in a professional context.

Social Information Processing Theory (SIPT) is the first theory to explain the mechanisms and process that enable CMC to facilitate exchange and interpersonal relationships. The assumption of the theory put forward by Walther (1992) is that communicators in CMC, just a like communicators in other mediated communication, are encouraged to develop social relationships. To do this, users who previously did not know each other then get acquainted with other people by forming simple impressions through textual information conveyed.

SIPT predicts the development of interpersonal relationships in CMC although it is slow, so this theory has been widely used to predict and explain how individuals can form rich interpersonal relationships with socio-emotional aspects through CMC (Walther, 1996). SIPT was formed under the premise that media users are motivated to form rich and deep impressions of one another. This theoretical framework has recognized a lack of social information in messages in CMC due to the absence of non-verbal cues. SIPT elements include time and face-to-face gesture adaptation (language, emoticons, and beyond text).

SIPT predicts that with sufficient time, us-

ers adapt the limited cues available through the CMC and use them to form rich interpersonal relationships. The main mechanism of SIPT is time, with sufficient time, users can adapt online verbal communication to accommodate missing nonverbal cues to facilitate proximity electronically. Time here means not only the minutes that pass but also the interactive exchange of messages that occur in a sequence.

The next important component is the amount of information exchanged. SIPT requires participants to exchange multiple messages and reply to each other. It takes more time to communicate online than face-to-face because reading and typing are three times slower than plain speaking and listening (Tidwell & Walther, 2002).

In face-to-face communication, we know how to use gestures to tell our friends that we are happy by smiling, for example. But how do we communicate happiness without facial expressions in online communication? At the beginning of the development of the internet, this is what the CFO paradigm predicted that CMC could not facilitate interpersonal communication. SIPT then shows that with sufficient time, internet users will find or develop new ways to send, receive, and understand new verbal cues that replace nonverbal cues (Caleb T. Carr, 2021). One way we can communicate happiness is by subtly changing our language with our choice of words.

Another way to add expression is to use text characters to create images to replace the missing nonverbal cues in CMC called emoticons. Sometimes, we may just type in nonverbal gestures or expressions, such as when we type "LOL" or "::grin::" into an email to show humour that we are laughing out loud. Another option is to use the generally accepted alphanumeric characters as nonverbal expressions, commonly called emoticons. Walther and D'Addario (2001) studied the relationship between verbal messages and online emoticons. The words used to communicate in an interaction affect how messages are interpreted more than the emoticons that follow them. Not all emoticons have the same communicative weight. For example, the smiley emoticon ☺ on the one hand can mean happiness but if the right choice of words does not follow it then it can be considered an expression of sarcasm by the recipient of the message.

The second theory of CMC, namely the hyperpersonal communication model (Walther, 1996), was put forward to explain how individuals can use limited signal channels to develop relationships that may go beyond face-to-face relationships. The hyperpersonal model, in particular, helps to understand how humans communicate and relate when interactions occur entirely online. The hyperpersonal model argues that individuals can form enhanced impressions when computers mediate communication. This model explains how CMC can facilitate interpersonal images that exceed the desire and intimacy in offline interactions (Walther, 2011).

The hyperpersonal model contradicts the social presence theory. Social Presence Theory (Short, 1976) predicts that the fewer channels or codes available in a medium, the fewer attention users pay to the presence of other participants in an interaction. Sproull and Kiesler (1986) claim that CMC reduces the presence of “social cues” or environmental and nonverbal cues, and the absence of these two aspects can hinder interpersonal impressions. Without nonverbal tools, the sender cannot easily change the message’s mood and communicate feelings. The hyperpersonal model predicts that individuals gain an increased impression of others when interacting through communication media due to four factors: the sender’s selective self-presentation, the receiver’s idealization, the strain of mediated channels, and a feedback loop reinforcing idealization (Caleb T. Carr, 2021).

**Research Methods**

The method used in this study is a Systematic Literature Review (SLR) which discusses the use of Computer-Mediated Communication theory in various contexts. A systematic Literature Review is an essential element in any research. A literature review usually provides an overview, synthesis, and critical assessment of previous research, challenging or disputing existing knowledge. It also identifies or constructs new research problems and promising research questions (Stone, 2012).

The Systematic Literature Review is described by Machi and Mcevoy (2009) in (Boell & Cecez-Kecmanovic, 2015) as a written document presenting logical argumentation cases based on a comprehensive understanding of the current state of knowledge about the topic of study. The six steps in the literature review process are selecting a topic (determining and framing), literature search (exploration and cataloguing), developing arguments (organizing and shaping), literature survey (documents and findings), and critiquing literary works (supporting and defining) and writing a review.

Managing a Systematic Literature Review from various sources and topics is challenging for researchers (Khorasani & Cross, 2015). In concrete terms, summarizing the findings and presenting the precise results of the research that has been carried out on diverse materials is not possible unless proper systematic methods are used to sort the materials. In this case, secondary literature should be considered, which is defined as academic writing on a topic that is not the subject of primary research. The main idea of secondary sources includes review, synthesis, conclusion, criticism, and analysis.

**Systematic Literature Review Process**

As a review method, this study adopted the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and chose

Google Scholar and Scopus as the databases to search. The PRISMA Guidelines are used to conduct systematic reviews in the social sciences. PRISMA is well-known for its three main advantages, namely: a) clarification of research questions, b) precise filtering matrices (inclusion and exclusion criteria), and c) search of appropriate databases with limited time (Sierra-Correa & Kintz, 2015). Thus PRISMA allows a rigorous search for scientific research and code information relevant to the application and development of CMC theory. The following chart describes the literature retrieval process used:

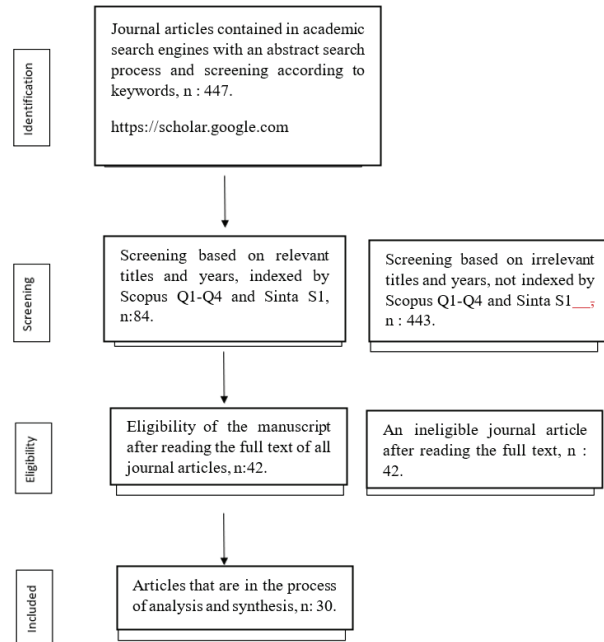


Figure 1. Chart of Synthesis of Systematic Literature Review, adapted from (Moher et al., 2009)

**Identification**

Researchers use a single source manuscript search engine to find manuscripts that support the research results. Google Scholar is the manuscript search engine used by researchers because this technology helps researchers get manuscripts with the greatest reach compared to other search engine sources. Google Scholar helps researchers find manuscripts indexed by Scopus and Sinta. Beginning with a search using one keyword, namely “computer-mediated communication” on December 9, 2021 without a timeframe, the researchers found 6,870 study articles.

Subsequent searches using time restrictions in the last six years (2015-2021) found 3,060 study articles. From the second search, the researcher found that the discussion of mediated education was the topic that dominated the study articles using the theory of Computer-Mediated Communication. Based on these findings, the researcher added one keyword, “online learning”, to further understand computer-mediated communication theory. By adding one keyword, researchers got 447 study articles from the last six years.

The trend of CMC publications related to on-

line learning can be seen in the following table:

Table I. Trends in CMC Publication and Online learning for the 2015-2021 Period

Year	Number of Publications
2015	59
2016	75
2017	57
2018	65
2019	74
2020	59
2021	103

Referring to Google Scholar, since 2015, the application of Computer-Mediated Communication in online learning has become a consistent discussion used by researchers to date. Research related to CMC in online learning has increased in the last 3 years as the Covid-19 pandemic hit the world so that all schools and campuses are online-based. In addition, students are interested in learning foreign languages through distance communication. This can be seen in the 2019-2021 period, which has increased dramatically compared to the previous year. Based on the table, around 74 studies were conducted in 2019, then decreased slightly by 59 years. The culmination of more than 100 studies conducted in 2021 proves the CMC theory is popular in this pandemic.

**Screening (Inclusion and Exclusion Criteria)**

The second stage of the systematic literature review process involves scientific screening articles according to inclusion and exclusion criteria. The criteria we determine include the timeline or period of journal articles, namely for the last 6 years until 2021, type of literature, language, journal index, and object of research/research. These criteria can be seen in the following table:

Table II. Inclusion and Exclusion Criteria

Criteria	Including	Not Including
Timeline	2015-2021	< 2015
Literature type	Journals (research articles)	Books, Masters thesis / Undergraduate thesis, proceedings, website articles, other than research articles.

Language	English	other than English
Journal Index	Scopus Q1 – Q4 Sinta 1-2	Journals that are not indexed by Scopus Q1-Q4 and Sinta 1-2
Research Object	CMC and online learning	CMC-related topics other than online learning

**Eligibility**

Eligibility is when authors manually enter or exclude literature based on certain criteria according to the research questions and objectives. In this process, the author reads the entire text of the article to see if it meets the criteria, especially discussing the concept of CMC in online learning. Data extraction was carried out in three steps: reading the title, the abstract, and the whole article. Of the 84 articles that were screened, 42 articles met the eligibility requirements to be used as a reference source. Of the 42 articles, the authors get 30 journal articles that meet the criteria to be included in the analysis.

**Selected Journal Article Identity**

Table III. Selected Journal Article Identity

No	Article Title	Journal Name	Year	Writer's name
1	Student Perceptions of Asynchronous Computer-Mediated Communication in Face-to-Face Courses	Journal of Computer-Mediated Communication	2021	Yun-Jo An, Theodore Frick
2	Emoticon, Emoji, and Sticker Use in Computer-Mediated Communication: A Review of Theories and Research Findings	International Journal of Communication (IJOC)	2019	Yin Tang Khe Foon Hew

3	Improving Communicative Competence through Synchronous Communication in Computer-Supported Collaborative Learning Environments: A Systematic Review	Education Science (MDPI)	2018	Xi Huang	7	Coronavirus Diseases -19: an overview in education, agriculture, and communication perspectives	Journal of Regional Finance and Development Perspectives	2021	Ikawati Karim; Indah Nur'Aini; M. Fikri Akbar
4	Synthesizing the Practice of SC-MC-Based Telecollaboration: A Scoping Review	Institute of Education Science (ERIC)	2018	Yuka Akiyama and D. Joseph Cunningham	8	Generative models of <i>online</i> discussion threads: state-of-the-art and research challenges	Journal of Internet Services and Applications	2017	Pablo Aragón, Vicenç Gómez, David García, and Andreas Kaltenbrunner
5	E-learning in the present-day context: from the experience of the foreign languages department, PSACEA	Journal of physics conference series	2018	A V Tokarieva, N P Volkova, Y V Degtyarova and O I Bobyr	9	Issues and Challenges for Teaching Successful <i>Online</i> Courses in Higher Education: A Literature Review	Journal of Educational Technology Systems	2017	Mansureh Kebritchi, Angie Lipschuetz, Lilia Santiago
6	Democratizing digital learning: theorizing the fully <i>online learning</i> community model	International Journal of Educational Technology in Higher Education	2017	Todd J. B. Blayone, Roland vanOostveen, Wendy Barber, Maurice DiGiuseppe and Elizabeth Childsc	10	The effect of synchronous and asynchronous Computer-Mediated Communication (CMC) on EFL learners' pragmatic competence	Computer in Human Behaviour	2018	Zahra Fakher Ajabshir

11	A Qualitative Study of the Perceptions of Iranian EFL Learners' Attitudes towards CMC Tools Usefulness	Theory and Practice in Language Study	2017	Sanam Mehri and Siros Izadpanah	16	Online Language Teacher Education: Practices and Possibilities	RELC Journal	2017	Dong-shin Shin dan Hyun-Sook Kang
12	Synchronous CMC text chat versus synchronous CMC voice chat: impacts on EFL learners' oral proficiency and anxiety	Journal of Research on Technology in Education	2021	Ehsan Namaziandost, Mohammad Hasan Razmi, Ronald M. Hernández, Yolvi Ocaña-Fernández & Masoud Khabir	17	Synchronous and asynchronous teacher electronic feedback and learner uptake in ESL composition	Journal of Second Language Writing	2018	Estela Ene, Thomas A, Upton
13	Digitally mediated remote learning of pragmatics	Foreign Language Annals	2020	Naoko Taguchi	18	The Relationship Between Self-Regulations and Online learning in an ESL Blended Learning Context	English Language Teaching	2019	Hind Al Fadda
14	The effect of synchronous and asynchronous Computer-Mediated Communication (CMC) on learners' pronunciation achievement	Cogent Psychology	2021	Majid Zeinali Nejad, Mohammad Golshan & Amin Naeimi	19	Language learning going global: linking teachers and learners via commercial Skype-based CMC	Computer-Assisted Language Learning	2015	N.M. Terhune
15	A New Model for Cultural-Based Emoticon in Distributed Collective Interaction via CMC	Journal of Telecommunication, Electronic and Computer Engineering	2017	Mohd Zhafri Bin Mohd Zukhi, Azham Hussain and Husniza Husni	20	Learning Through a CMC-Based Tandem Project with Native Speakers: A Descriptive Study of Beginning CFL Learners	Journal of Technology and Chinese Language Teaching	2016	Shenglan Zhang



21	Communication challenges learners face online: Why addressing CMC and language proficiency will not solve learners' problems	British Journal of Educational Technology	2016	Liubov Jung-Ivan-nikova	26	Systematic Review of Two Decades (1995 to 2014) of Research on Synchronous <i>Online</i> learning	American Journal of Distance Education	2017	Florence Martin
22	The Influence of Computer-Mediated Communication on Students' Writing Ability	International Journal of Multimedia and Ubiquitous Engineering	2017	Hadriana Hadriana	27	The Use of Interactive Environments to Promote Self-Regulation in <i>Online</i> Learning: A Literature Review	Institute of Education Science (ERIC)	2016	Erhan Delen, Jeffrey Liew
23	Interculturality in <i>Online</i> learning: Instructor and Student Accommodations	<i>Online learning</i> journal	2019	Gulnara Sadykova dan Carla Meskill	28	A scientometric review of research trends in computer-assisted language learning (1977 – 2020)	Computer-Assisted Language Learning	2021	Mei Hui Lim & Vahid Aryadoust
24	Positioning identity in computer-mediated discourse among esol learners	Language Learning & Technology	2016	Carlton J. Fong, Sheng-jie Lin, Randi A. Engle	29	A Systematic Review of Emoji: Current Research and Future Perspectives	Frontiers in Psychology Human-Media Interaction	2019	Qiyu Bai, Qi Dan, Zhe Mu, and Maokun Yang
25	What Sunshine Is to Flowers: A Literature Review on the Use of <i>Emoticons</i> to Support	ScienceDirect	2016	Joanna C. Dunlap, Devshikha Boseb, Patrick R. Lowenthal, Cindy S. York, Michael Atkinson, Jim Murtagh	30	E-Mentoring in Higher Education: A Structured Literature Review and Implications for Future Research	MDPI	2020	Harold Tino-co-Giraldo, Eva María Torrecilla Sánchez, and Francisco José García-Peñalvo

## Analysis Results

### Category Index 30 Selected Manuscripts

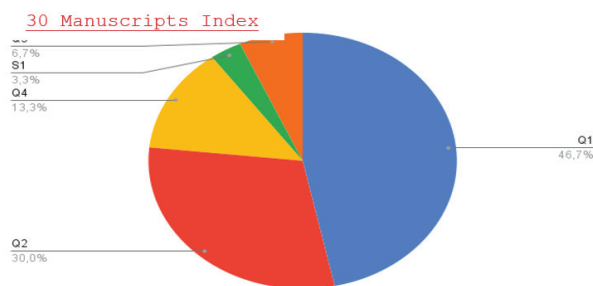


Figure II. Index of 30 Manuscripts

Researchers used the criteria for international journals indexed by Scopus and national journals using the Science and Technology Index (SINTA). Researchers do this to obtain sources from journals with excellent credibility and reputation. Scopus provides quality and coverage of reliable data, analytics, and modern technology in one solution for the best-informed decision. Scopus classifies the Q1 journal index as the highest index value up to Q4 with the lowest. Like Scopus, SINTA also provides analytical benchmarks and identification of research strengths at institutions to analyze research trends created by the Indonesian government. SINTA groups more index scores than Scopus, the highest index value is grouped with S1, and the lowest is S6. In the grouping of the SINTA index, there is a special requirement for S1 that the journal must be written in English. From the final dataset, most journals obtained are from Q1-Q2, with details 46.7% from Q1 and 30% from Q2. Meanwhile, journals with a Q3 rating of 6.7% and a Q4 rating of 13.3%. In addition to using Scopus indexed journals, the researcher uses a journal with a Sinta 1 index of 3.3% as one of the sources in this manuscript. The researchers used English manuscripts from the index assessment of the selected manuscript journals. Researchers believe in getting accurate results in manuscript sources that get good index scores.

### Researcher Geographic Location Category

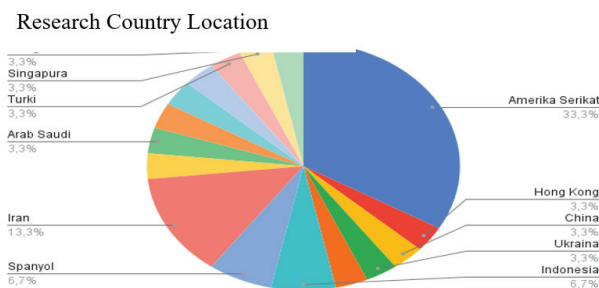


Figure III. Research Country Location

In addition to the continents, we also identify the countries where the study is located. Based on the pie chart above, it can be seen that the United States is the location of the most research countries, with a total of 10 manuscripts or 33.3% of all selected manuscripts. The two largest contributors of manuscripts came from Iran, with 4 manuscripts or 14% of the total manuscripts used. Meanwhile, Indonesia, China, and Spain became the third largest in supporting 2 manuscripts with a percentage of 7%. Meanwhile, the locations of other research countries were identified based on the manuscripts, namely Malaysia, Saudi Arabia, Japan, Russia, Singapore, Turkey, and England. Each of these countries has 1 manuscript in this study. This finding illustrates that the CMC theory has received less attention from researchers in various countries in Asia. CMC theory is generally used by developed and modern countries such as the United States. This is caused of mediated communication must be supported by qualified state infrastructure so that people familiar with it will find it easier to obtain analytical information from the effects of mediated communication.

### Category Trends of the Year

In the 2015-2021 time period, it can be seen that the 30 selected manuscripts contributed the most in 2017 with a total of 8 manuscripts. At least in 2015 only one manuscript was found. In addition, since 2017 researchers have consistently researched CMC in online learning. Analysis of year trends using the keyword "Computer-Mediated Communication" coupled with the keyword "online learning" has a constant growth from 2017 to 2021. Even though, there were only 2 manuscripts down in 2020, the number of manuscripts will increase again in 2021 with the number 5 manuscripts.

### Categories of Disciplines

Although CMC is known as a multidisciplinary theory, currently, there is minimal research related to CMC theory in the communication discipline. Not many studies discuss the application of CMC theory in communication studies. It can be seen that the percentage of communication is only around 13.3% and ranks third compared to other disciplines. Although the concept of CMC is known to be multidisciplinary, CMC is a theory that comes from communication science.

In the last six years, almost half of the research related to CMC has addressed the linguistic context. Linguistics is a discipline that dominates compared to other disciplines. Students use technology or computer media to learn foreign languages, especially English, from natives. One of the journals also examined the use of an application in learning a foreign language (Zhang, 2016). In addition, CMC theory is also popular in education with a percentage of 33.3%, the majority of which discuss the comparison of

online schools with face-to-face. In the literature and culture and Information Technology (IT) only a few studies discuss CMC, the percentage of both disciplines is the same which is around 3.3 percent.

**Category Research Methods**

Currently, CMC is dominated by the Systematic Literature Review (SLR) method with 43.3 percent. The SLR method examines the comparison of CMC studies related to online learning carried out in various developed and developing countries. SLR, which discusses using CMC theory in online learning, has become popular since Covid-19 hit the world in 2019. Many research findings from SLR discuss the use of CMC in students, teachers, and also content in learning.

Quantitative is the second most popular method, with research using this method ranging from 40 percent. Experiments are quantitative methods that are widely used in research. After that, the survey is also a quantitative method used in discussing the application of CMC theory in online learning. None of the studies used content analysis methods in discussing CMC in online learning.

The mixed method is ranked third in CMC research related to online learning. The technique used by the researcher is a combination of surveys and interviews with respondents. The majority of researchers discuss the effectiveness of communication using computers. In addition, the qualitative method is the least popular in discussing CMC. The method used is in-depth interviews.

**Category Use of Computer-Mediated Communication Concepts**

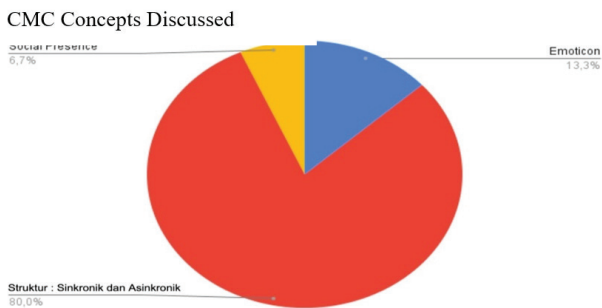


Figure IV. CMC Concepts Discussed

Based on the graph above, there are 3 concepts discussed by CMC researchers in online learning, including synchronous and asynchronous structures, social presence, and emoticons. Most of the CMC concepts discussed in selected journal articles are related to the CMC structure, namely synchronous and asynchronous. Such as the journal article entitled “Synchronous and Asynchronous Teacher Electronic Feedback and Learner Uptake in ESL Composition” compiled by Estela

Ene, Thomas A, and Upton in 2018. This article discusses the responses of students and teachers of foreign language schools to the combination of 2 online learning methods, synchronic and asynchronous, the results of which were responded positively. The number of studies related to the concept of the CMC structure is also consistently carried out during the 2016-2021 period.

Discussions related to synchronous and asynchronous structures in online learning are about the perceptions and preferences of students and educators, the success and effectiveness of communication, the factors that affect the communication process, the tools/technology used, and the application of this structure in any field. Most research on the structure of the CMC was conducted on students and educators of English as a foreign language Education Institutions in countries in Asia (ESL).

While the concept of emoticons is 13.3% or discussed by 4 out of 30 selected journal articles, the discussion of the concept of emoticons is related to the influence of culture in the use of emoticons when participants communicate through computer media. Another concept, as much as 6.7% or 2 out of 30 selected journal articles, discusses social presence related to the effect of using CMC in the distance teaching process.

**DISCUSSION**

Of the 30 selected journal articles analyzed by researchers, as much as 70% confirmed that the research results support the hypothesis or answer the research question. On the other hand, as much as 30% of the research results show that CMC does not support the effectiveness of communication in the distance learning process. As in the article entitled “Student Perceptions of Asynchronous Computer-Mediated Communication in Face-to-Face Courses” compiled by Yun-Jo An and Theodore Frick in 2021 who examines the perceptions of boarding school students in the United States of CMC for the distance education process. far. The results of his research stated that boarding school students preferred face-to-face discussions rather than computers. Some students find face-to-face discussions faster, easier, and more convenient than online learning. This is influenced by the involvement and activeness of teachers in the teaching and learning process. Students feel that they will be more enthusiastic about CMC if interaction and communication with teachers can be done more quickly and comfortably.

This is related to the lack of interpersonal interaction formed in CMC and online learning, which is explained by social presence theory. Social Presence Theory (Short, 1976) predicts that the fewer channels or codes available in a medium, the fewer attention users pay to the presence of other participants in an interaction. Sproull and Kiesler (1986) claim that CMC reduces the presence of “social cues” or environmental and

nonverbal cues, and the absence of these two aspects can hinder interpersonal impression.

This theoretical assumption is not proven in a journal article entitled “A Qualitative Study of the Perceptions of Iranian EFL Learners’ Attitudes towards CMC Tools Usefulness” by Sa-

nam Mehri and Siros Izadpanah in 2017. Their research results use the theory of social presence in assessing perceptions Class students learning foreign languages in Iran prove that there is no difference before applying CMC and after being given treatment using computer media as a learning tool. Students can still feel the presence

Table IV. Summary of Findings

Topics/Concepts in CMC	Finding	Sample Studies
Social Presence	<ol style="list-style-type: none"> <li>1. The presence of teachers and teaching (teacher and teaching presence) is the most important factor in supporting the success of the online learning process through CMC.</li> <li>2. The presence of teachers in every online learning activity, proficiency in using technology, and positive responses to online learning methods raises student motivation to give positive perceptions of CMC and online learning.</li> </ol>	Todd et al. (2017); Sanam et al. (2017)
Emoticon	<ol style="list-style-type: none"> <li>3. The effective use of emoticons can improve a person’s ability to use CMC accurately and appropriately.</li> <li>4. There are differences in user behaviour towards emoticons based on individual conditions, cultural backgrounds, and platforms used.</li> <li>5. Developers can use the culture-based emoticon model in designing and developing emoticons that can express cultural elements.</li> <li>6. Emoticons are used in many fields such as communication, computing, behavioural science, marketing, and education.</li> </ol>	Joanna et al. (2016); Ying (2019); Mohd Zhafri et al. (2017); Qiyu (2019)
Synchronous and Asynchronous	<ol style="list-style-type: none"> <li>7. CMC structure, synchronous and asynchronous, supports the success of the online learning process.</li> <li>8. Several factors of synchronous communication in online learning include sociocultural factors, individual characteristics, individual collaboration with groups, self-efficacy, verbal ability, and the length of time using computer media in the learning process.</li> <li>9. Students and teachers who are not used to using CMC, the results of the learning process are not yet optimal.</li> <li>10. For students of foreign language learning programs (ESL) in several countries in Asia, CMC, with its structure, has proven to be more effective in improving their oral skills and abilities.</li> <li>11. Online learning in synchronous and asynchronous form received a positive response from students and teachers in several educational institutions.</li> <li>12. The most common independent variable of synchronous online learning is the tool itself (application and device).</li> <li>13. Synchronic technology is widely used in English, foreign language teaching, education, and engineering.</li> </ol>	Xi Huang (2018); Yuka et al. (2018); A V Tokarieva (2018); Ikawati et al. (2021); Pablo et al. (2017); Mansureh et al. (2017); Zahra (2018); Ehsan et al. (2021); Naoko (2020); Majid et al. (2021); Dong-shin et al. (2017); Estela et al. (2018); Hind (2019); N.M. Terhune (2015); Shenglan (2016); Liubov (2016); Hadriana (2017); Gulnara (2019); J. Fong et al. (2016); Yun-Jo et al. (2021); Florence (2017); Erhan et al. (2016); Mei et al. (2021); Harold et al. (2020)

of the teacher in the CMC interaction. Another research result from Liobov Jung-Ivannikova in 2016 entitled "Communication challenges learners face online: Why addressing CMC and language proficiency will not solve learners' problems" revealed that students view the presence of tutors as making it difficult for them to contribute to online communication. In addition, in this study, we did not see any advantage in asynchronous communication as is often claimed in the theoretical literature because it creates distance between participants and makes online communication more formal. This study proves scepticism about CMC on relationship quality and communication effectiveness.

Another concept from the analysis is about emoticons. In the Cues-Filtered Out (CFO) perspective of Culnan and Markus (1987), CMC is considered less socially oriented and less personal than face-to-face communication because CMC always limits the number of cues. CMC is considered unable to accommodate socioemotional expressions, such as when humans interact face-to-face. However, several studies on emoticons as a feature in CMC denied this. An example is an article entitled "What Sunshine Is to Flowers: A Literature Review on the Use of Emoticons to Support Online Learning" by Joanna C. Dunlap, Devshikha Bose, Patrick R. Lowenthal, Cindy S. Yorkc, Michael Atkinson, and Jim Murtagh in 2016, the results of his research stated that the effective use of emoticons has the potential to improve a person's ability to use CMC accurately and precisely. Emoticons usage can help students meet the interaction needs of the social world, which is replaced by computers rather than face-to-face. As a recommendation, the researcher advises educators to reach a universal agreement on the perception of emoticons to foster a constructive online learning climate.

Walther and D'Addario (2001) studied the relationship between verbal messages and online emoticons. The words used to communicate in an interaction affect how messages are interpreted more than the emoticons that follow them. Not all emoticons have the same communicative weight. This is in line with the results of a systematic literature review entitled "A Systematic Review of Emoji: Current Research and Future Perspectives" conducted by Qiyu Bai, Qi Dan, Zhe Mu, and Maokun Yang in 2019. The findings of this study state that there is a possibility of ambiguity and misunderstandings in using emoticons by CMC participants in different situations and cultural backgrounds.

The general conclusions about the research results from 30 selected journal articles after analysis can be seen in the following table:

## **Conclusion**

In this Systematic Literature Review, researchers found that using Computer-Mediated Communication theory in online learning

uses sources from Google Scholar. From the 447 journals we identified, we found and selected 30 manuscripts indexed by Scopus Q1-Q4 and only 1 manuscript indexed to Sinta 1. These thirty journals use English and are spread in various countries and continents in the world.

Although Asia dominates the research location category with a percentage of 43.3%, the research conducted is in various countries, such as Saudi Arabia, Malaysia, Japan, and Singapore, each contributing 1 manuscript. Meanwhile, Indonesia and China each contributed 2 manuscripts discussing CMC in online learning. This proves the lack of CMC research related to online learning in various countries, especially in Asia. Meanwhile, developed countries such as the United States contributed the most manuscripts because mediated communication must be supported by qualified state infrastructure.

From year to year, research related to CMC in online learning has consistently increased since 2015. This research associated with CMC significantly increased in 2017, with 8 manuscripts. However, the number of studies fell again in 2020, with only 2 manuscripts. The number of studies will increase again in 2021, with 5 manuscripts from 30 selected manuscripts.

Although CMC is known as a multidisciplinary theory, research in the discipline of communication is still minimal. The discussion of concepts in the discipline of communication is still related to emoticons. Meanwhile, the disciplines that mostly discuss CMC in online learning are linguistics with a percentage of 46.7% and education with a range of 33.3%. These two disciplines discuss synchronic and asynchronous structures which are one of the concepts in CMC.

Meanwhile, the research methods widely discussed are SLR with a percentage of 43.3% and quantitative with a percentage of 40%. Qualitative-related research only contributed 6.7%. This is because the research limitations during the Covid-19 pandemic made qualitative research difficult for researchers. SLR and quantitative methods become the mainstay of researchers when they cannot meet face-to-face with participants/resource person of the research.

The most widely discussed concepts in CMC theory are synchronous and asynchronous structures. However, research focuses more on the effect of synchronous and asynchronous structures on the success and effectiveness of online learning. Several synchronic communication factors in online learning include sociocultural factors, individual characteristics, individual collaboration with groups, self-efficacy, verbal ability, and the length of time using computer media in the learning process. Online learning in synchronous and asynchronous received a positive response from students and teachers in several educational institutions. For students of foreign language learning programs (ESL) in several countries in Asia, CMC with its structure has proven to be

more effective in improving their oral skills and abilities.

Synchronous and asynchronous structures represent the development of CMC applications in general and their influence on the effectiveness of communication in the context of online learning. Many studies related to this have been conducted, considering that the CMC theory is still developing. It can be concluded that scholars are currently trying to measure the influence and effectiveness of the computer-mediated communication process and compare it with face-to-face interactions. This is not without reason, considering that some theories related to impersonal communication are still sceptical of whether CMC can provide quality interpersonal interactions such as face-to-face learning processes.

The CMC concept discussed which is related to the presence of teachers and teaching (teacher and teaching presence) is the most important factor in supporting the success of the online learning process through CMC. The teacher's presence in every online learning activity raises student motivation to perceive CMC and online learning positively.

Meanwhile, another CMC concept discussed was the use of emoticons by students. This study

sees differences in user behaviour towards emoticons based on individual conditions, cultural backgrounds, and the tools or platforms used. The culture-based emoticon model can be used by developers in designing and developing emoticons that are able to express cultural elements.

### Research Limitations and Recommendations

The limitation of this study is that although the context that uses CMC the most is online learning, few studies still discuss CMC with methods other than SLR, so it lacks diversity. For this reason, the researcher recommends future research with the same concept and context by increasing the period backwards. Thus, the next researcher will get alternative manuscripts that use methods other than a systematic literature review. It can also be used to see the track record of the development of CMC theory and its application in everyday life and professional.

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