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Systematic Literature Review:
Information Overload of Online Distance Learners

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Abstract
This paper aims to summarize the developments of previous studies done in Information Overload fields in the past five years and gives a prospect to future research in this field using the systematic literature review method. The results show very limitedly and low publication activity has been done in the area of information overload with Online Distance Learners. It is anticipated that this paper will trigger further studies that could focus on the impact of information overload on education fields.

Keywords: Information Overload; Distance Learners; Online Learning; Systematic Literature Review.

1.0 Introduction

The ubiquitous nature and the ease of use of the internet and mobile technology have changed the way humans create and share information throughout the world which could lead to a flood of information. This phenomenon is known as "Information Overload". One of the main aspects of modern society is the creation and sharing of knowledge and information. Systematic information flows to ensure modern society's continuous advancement and development (Melinat, P., Kreuzkam, T., & Stamer, D., 2014). Besides that, as technology has evolved and mobile access to the internet has become mutual, everyone has access to any information available in the network without any limitation to the time and location (Al-Daihani, S. M., 2018; White, M., 2010).

Due to the uncontrollable rate of information sharing over the network, it is essential to review the issue of information overload in the current era. This paper was conducted to get an overview of the recent insight and findings in the field of information overload. Accordingly, the following research questions were defined:

RQ 1: How much activity in the field of information overload is related to online distance learners?
RQ 2: What topics are being investigated in relation to information overload of online distance learners?
RQ 3: What research approaches were used by research on information overload of online distance learners?
RQ 4: What theories or model were used or referred by research on the information overload of online distance learners?
RQ 5: What are the potential research topics for future research on the information overload of online distance learners?

The goal is to see what is currently discussed and identify the potential research topic for future research in the field of information overload. First, the overview of the "*Information Overload*" idea and its related terms is discussed and clarified. Then, in the following section, the method of data collection for the systematic literature review is extensively described. Next, the findings from the literature review were described according to their relation to the research questions. Finally, the conclusion was drawn, to sum up the whole process of the research and to discuss the future implications for the topic of the study.

2.0 Overview of Systematic Literature Review

The term "overload" is commonly used to describe a phenomenon where a burden is too much or exceeds the normal capacity for the carrying subject, which will let to the subject becoming dysfunctional (Cambridge Dictionaries, 2022; Oxford Dictionaries, 2022). Many researchers have been aware of "information Overload" since early 1960 (Peavler, W. S., 1974) and the current technology has significantly increased the amount of accessible and available information to society hence accelerating the cause of information overload (Roetzel, 2019). Information shared over the internet is uncontrollable, where facts and falsehood are often mixed. Good information is accurate, timely, and has "value", which can help improve understanding and/or decrease uncertainty (McKiernan, J. 2004).

According to "Data, Information, Knowledge, Wisdom" (DIKW Pyramid), the data is mixed, unstructured and somehow hardly has meaning as it could be random numbers, letters, or symbols. On the other hand, information is known as organized data which has value and importance to certain people or organizations (Sharma, N. 2008; Frické, M. 2009). In other words, information is commonly understood as "processed data" or "data that has meaning."

The causes of information overload have been discussed in several publications (Bawden, & Robinson, 2020). Information overload occurs when individuals face a level of information that is greater than their information processing capacity (Roetzel, P. G. 2019). The rapidly increasing amount of published information (Information explosion) has been the most common cause of information overload since the late 1960s. The Increase amount of available and accessible information, the shortness of time to manage the information, and individual capacity to manage the information are also often associated with the cause of information overload (Blair, Ann. 2012).

Given the fact that Information Overload is commonly associated with the amount of received information plus the speed rate of the information received exceeding one capability to handle the information, it is mutual to understand that Information Overload is a phenomenon where an individual is being given or receiving too much information that they can handle at one time.

3.0 Procedure of Systematic Literature Review

The goal of this paper is to review studies in the field of information overload that is related to online distance learners. To achieve the objective of this research, the systematic literature review approach was chosen. The advantage of this method is that the approach is completely straightforward and repeatable because every approach made by the researcher is documented. In addition, the systematic literature review will provide a "bigger picture" of the result because the results will be based on various scientific findings and hence will provide a summary of current findings on the research subject. Thus, for a systematic literature review, the researcher must fulfil the document search more inclusively. Additionally, this approach matches the purpose of this paper, which is to get an overview of the field of information overload related to online learning.

The review process consists of 5 steps. The first step in this research is to formulate the research question and problems, which has already been done in the previous section. The following steps are the identification process of research papers. The research papers were searched using two (2) major scientific databases and Google Scholar. The articles were first "marked" and downloaded for research paper selection in the third step. To keep the number of research papers manageable, the research paper will go through the screening and filtering process adopted from Butler, R.'s work (2021) so that only the relevant articles will be reviewed for the literature. The details of this step will be described further in this section. When the final group of research papers is identified, the data for the literature review is collected. Then the collected research papers were analyzed, and the result was described according to the research questions in the previous section. The final steps in this research are the interpretation of the results in the conclusion of this paper.

The literature search was conducted in June 2022, using two major scientific databases and Google Scholar. The following two main sources are included:

- Scopus
- Web of Science (WOS)

Because the objective of this literature is to review the published articles in recent years, the search period stretched from January 2018 to the date of the search (June 2022). Besides that, the researcher also includes several older articles that were found to be relatable to the research objective in the analysis.

For the search strategy, the authors use the search terms as describe the following steps. In the first step, the author search for the derivation of information overload (search string) from the research questions. Next, the identification of alternative spellings and synonyms in the search string is applied. The primary search strings are Information Overload, followed by the substitute search string such as online learning and/or distance learning. Then, the author executes searching using the operator Boolean "OR" and Boolean "AND" to integrate primary keywords and/or substitutes of each keyword to search comprehensive research articles on information overload. The search string was executed into the Scopus and WOS search engine. In addition, a few research articles were searched and selected from Google Scholar. Due to the equivocal search result from Google Scholar, the author has to be very selective and does not make Google Scholar the main priority for the search process.
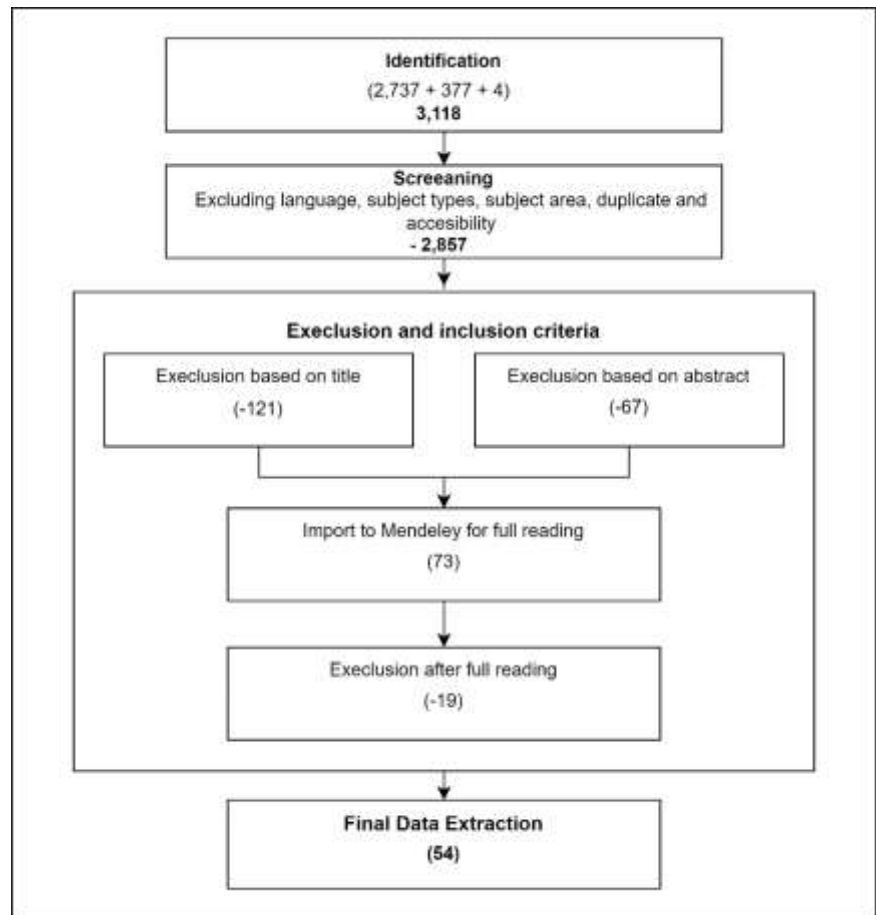
Fig. 1: Screening and refinement flow

Most of the databases used only allow to browse results through their content. It shall be stated that the quality of the findings is hardly seen as adequate for this research. One of the issues during the identification process was that the search results were too generic as the search result included all fields. Besides, not all of the listed articles were accessible due to "paywall" limitations. Therefore, the article identification process was moderately successful as the researcher believed several relevant papers could not be identified or accessed during the process.

To counterweight the disadvantages during the search process, the researcher used advanced search to filter all articles published regarding "Information Overload" in all fields and later refined the search result. Therefore, the search results in a total of 3,118 papers which 2,737 articles from Web of Science (WOS), 377 articles from Scopus, and four from Google Scholar.

To keep the number of papers manageable, the researcher has adopted the screening methods proposed by Butler (2021), as shown in *Figure 1*. The central restriction was to find scholarly literature that suits the topic for the research that is accessible without charge.

After the step of identification, the screening process takes place. The excluding criteria during the screening phase are language berries, subject types, subject area, duplicate (article redundancy), accessibility (paywall), and publication date (between 2018 and 2022). A total of 2,857 results were removed based on the criteria. Later, the result was filtered through exclusion and inclusion criteria based on the title and abstract of the paper. Besides that, literature review articles were also excluded from this study, which removed a total of 188 papers. The reminders of 73 selected articles were later imported to Mendeley for full reading, and a total of 54 articles were accepted to be used in this study after full readings. The visualization of this process can be referred to in fig 1.

4.0 Findings
In the beginning, five research questions were phrased. In the following section, there are 54 identified papers. The research papers were reviewed and analyzed to fulfil the research objective.

RQ 1: How much activity in the field of information overload is related to online distance learners?

Based on the selected articles, six (6) main topics in the field of information overload are identified from the selected articles: Social Networking (social media), Business, Health and Medical, Education, General/Public, and Government. Most of the articles focus on social networking (26) and General/Public (9), and due to the recent pandemic outbreak, the researcher is also concerned regarding information

overload in Medical and Health (8). Unexpectedly, the researcher has been moderately focused on issues of information overload from a business perspective (6) in the last 5 years, and only 4 articles are discussing topics on information overload related to education. Last but not least, only one selected article on information overload discusses government-related topics.
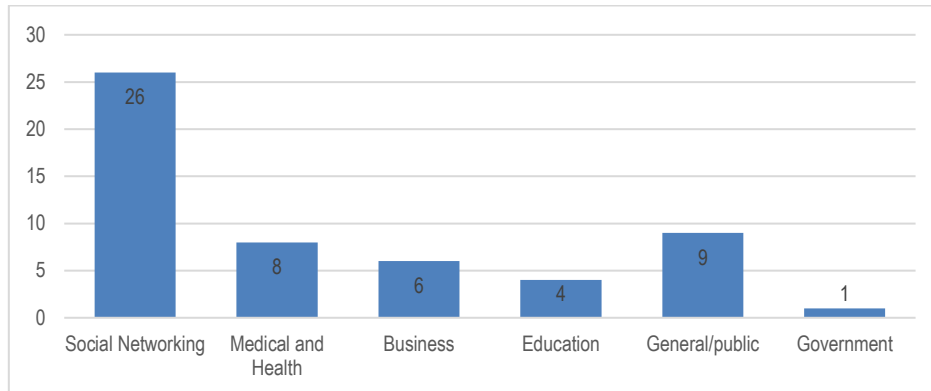

Fig. 2: Publication of Information Overload based on topic

Out of 54 articles selected for this research, there are only four (4) articles on information overload that is related to education, and only one (1) out of four is related to online learning and/or distance learning; (Al-Kumaim, N. H., 2021; Shi, C., Yu, L., Wang, N., Cheng, B., & Cao, X., 2020; Fuertes, M. C. M., et al., 2019; Chen-levi, T., 2019).

It is mutual understanding for every researcher to agree that it is impossible to include all data for the study due to the limited sources, searching methods, and access during the article identification process. However, based on the selected data, a few studies have been done on "Information Overload" concerning "Online Distance Learning" in the past five years. Hence, this has opened a gap in the knowledge of "Information Overload" about "Online Learning" and/or "Distance Learning".

Although there are very limited studies have been done related to Information Overload and Online Distance Learning in the last 5 years, it can be stated that the research activity in this field (Information Overload) overall is moderately active and only a small number of researchers are active in this field (Melinat et al., 2014). However, the researcher believed that the range of this field is extendable as different aspects could be discussed or linked to this field.

RQ 2: What topics are being investigated in relation to the information overload of online distance learners?
The field of information overload is extendable as different aspects could be discussed in the field. One form of criteria in the classification is to determine whether the articles aimed to identify or interconnect a new problem resulting from information overload or the articles aimed to offer the solutions for the existing problems. As several aspects should be considered in the classification of the articles, the researcher considered the classification of the articles into 5 categories. To illustrate the whole coverage of the selected papers, each article can be assigned to two or more of these categories.

Table 1. Research topics

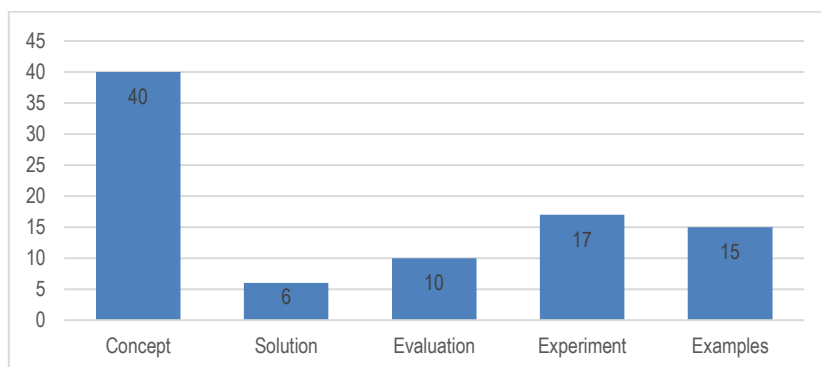| Topic	Description
Concept	Presenting a general idea of information overload.
Solution	Aim to implement a general concept or a framework to overcome the issue of information overload.
Evaluation	Evaluate a solution and try to verify or falsify the solution.
Experiment	Experimenting with the concept and trying to verify or falsify the concept.
Examples	Illustrate an approach and applies the approach to the participant of the research.

Fig. 3: Research topics

According to the data, most articles focus on the concept of information overload, which presents a general idea of information overload. While most articles focus on the concept (40), however, these articles are also linked with experiments (17) and evaluations (10) of existing concepts or/and solutions (Melinat et al., 2018). Besides, Examples (15) are often linked with experiments and Solutions (Chen, 2018; Mundluru, S. N., Werbaneth, K., Therkelsen, K. E., Larson, A. R., & Santini, V. E., 2019; Mahdi, M. N., Ahmad, A. R., Ismail, R., Natiq, H., & Mohammed, M. A., 2020).

RQ 3: What research approaches were used on information overload of online distance learners?
For the comprehensiveness of the analysis, it is essential to review the findings in the researcher's articles and see the approach that the researcher adopted and adapted to get their results. During this project, three main groups for research approaches were identified:
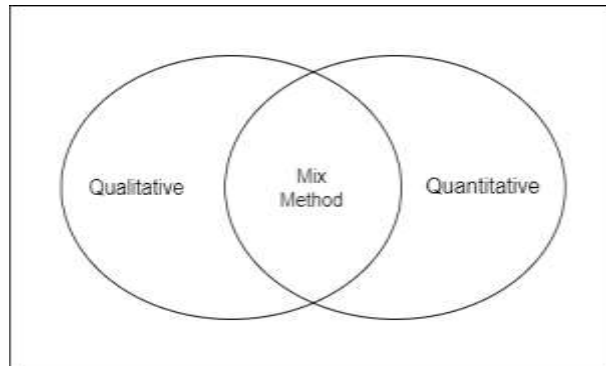

Fig. 4: Illustration of research approach

In the scientific study, there are three (3) main research approaches used by every researcher, namely, Qualitative, Quantitative, and Mix Methods (Creswell & Zhang, 2009). Quantitative Methods are known as systematic empirical research, which describes observable phenomena through statistical and mathematical approaches (Blummer & Kenton, 2014). Besides that, the Qualitative Methods, are also known as interpretivism or constructivists. The Mix Method is the combination of both Qualitative and Quantitative methods.
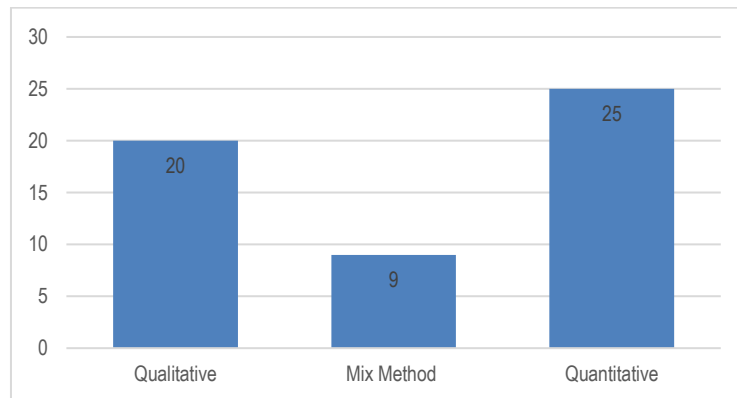

Fig 5: Research approach

Although the qualitative approach (20) is more desirable in this domain, the data shows that a majority of researchers use the form of quantitative approach (25) for their research. This finding is similar to findings from previous work (Melinat et al., 2014). Mix Method (9), on the other hand, is the least dominant approach in the information overload field. However, considering the small number of articles being reviewed in this research, this does not conclude the final trend, as a result, can be differs depending on the data and focus of the study.

RQ 4: What theories or models were used or referred to by research on the information overload of online distance learners?
One of the most important aspects to be reviewed in research is the theory used in the studies. Empirical work (Quantitative) studies require the researcher to develop a research framework and hypothesis which will be tested in the study. However, the qualitative and mixed-method do not necessarily require the researcher to develop a research framework depending on the objective of the studies (Creswell & Zhang, 2009).
There are fourteen (14) theories or research models that are adopted in the studies;
Dual-Process Theory (D-PT), Stimulus Organism Response Theory (SOR), Stressor Strain Outcome Model (SSO), Multiple Mediation Model (MMM), Heuristic-Systematic Model (HSM), Transaction-Based Model of Stress (TBMS), Reassure, Redirect, Refer (3 Rs), Theory Of Information Worlds (TIW), Agent-Based Model (ABM), Information Avoidance Theory (IAT), Experiential Learning Theory (ELT),

Theories of Transactional Stress and Psychological Resilience (TSPR), Push-Pull Mooring (PPM), and Bourdieu's Sociological Theory of Habitus (BSTH).
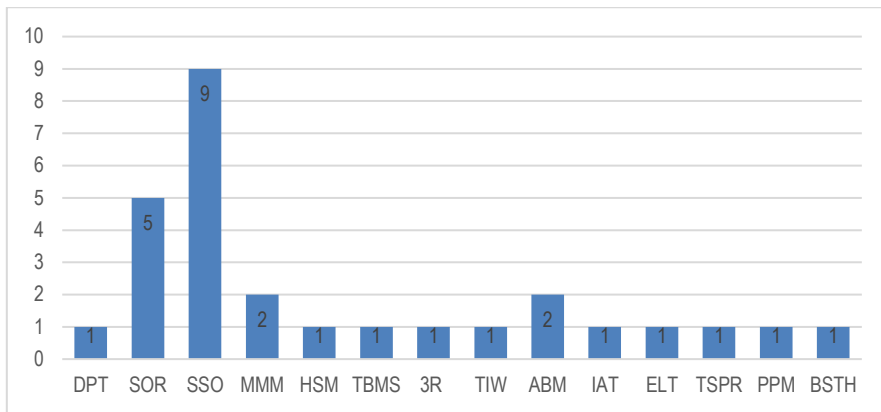

Fig 6: List of theories used

Out of fourteen (14) recorded theory, only four (4) are the most frequent theory/model used in this field, which is Stressor Strain Outcome Model (SSO) (9), Stimulus Organism Response Theory (SOR) (5), Agent-Based Model (ABM) (2) and Multiple Mediation Model (MMM) (2). Therefore, it is safe to mention that SSO is the most dominant theory used in the information overload field, followed by SOR. ABM is usually used in mixed-method or controlled experiments to test a solution to information overload.

Another common scale used in information overload is Cancer Information Overload Scale (CIO). Although Scale is not considered a theory, model, or framework, thus the scale has been adapted to almost every framework in information overload studies. Based on the selected articles, all articles dealing with medical and health adopt CIO as their instrument to measure information overload.

RQ 5: What are the potential research topics for future research on the information overload of online distance learners?
Most studies on Information Overload are related to social network. This is because a vast amount of information is shared using social networking, which is well known to lead to Information Overload. All shared information is not filtered, where the fact and falsehood are often mixed. Thus, it is understood why most researchers focus on investigating the phenomenon from a social networking perspective. It is also believed that the next step of research in Information Overload can be focusing on finding solutions for information overload in social networking.

Besides that, since most of the teaching and learning is done online due to recent pandemic outbreaks, many sectors and services were converted to online methods, including education. However, not much is done to investigate the impact of Information Overload associated with online or distance learners. Thus, this led to the future research topic in this field.

Apart from that, the world has been shocked by the flooding news of the economic crisis, which affects many stockholders and businesses worldwide. Based on the data collected, not many studies have investigated the impact of information overload on stockholders and businesses in recent years. Thus, this led to another potential research topic in this field.

5.0 Conclusion
This literature review started with a brief introduction to the topic and definition of the terms information, overload, and information overload. Next, the procedure of this literature review was described and illustrated. After the screening and refinement, 54 research articles were considered relevant to the topic. These selected articles were used to answer the 5 research questions.

Based on the data collected, it was found that there is a sizable research community in the field of information overload. The researched topics were mostly concepts, experiments, or examples. Based on publications recorded since 2018, the research community publishes, on average, about 10 papers per year. Since the recent pandemic outbreak, most research papers are related to information overload regarding health and social network. This bias is inevitable as the demand regarding the topic is increasing radically by the funding organization and/or governmental institutions. In addition, hardly any research has been done in the past 5 years to investigate the relation of information overload on online and/or distance learners. Based on the collected data, it is clear that Stressor Strain Outcome Model (SSO) and Stimulus Organism Response Theory (SOR) are among the dominant theory used in Information Overload studies. Besides that, Social Network is the most prevalent research topic, and this topic commonly involves a general topic: social media related to health and business.

This literature review does not cover all aspects of this field. In addition, not all relevant articles were able to be acquired or accessed during the screening and refinement process. Despite the issue in online learning during the pandemic lockdown, still, there is no demand to investigate the impact of information overload on distance learners in the field. Besides that, there is no extensive discussion about the meaning and definition of information overload in the selected articles.

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