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Exploring the Inescapable Suffering Among Postgraduate Researchers: Information Overload Perceptions and Implications for Future Research

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ABSTRACT

This study aims to get a deep understanding of the causes, effects, and remedies of information overload (IO) phenomenon among postgraduate scholars in the era of advanced internet technology. In-depth semi-structured face-to-face interviews and focus group interviews were implemented. Majority of the participants in this study exposed that IO represents real inescapable suffering that severely affects their research performance in different stages of their research. Time-consuming, cost, inferior research work, and poor personal health, isolation, low level of creativity and productivity are some of the major drawbacks resulted from IO. The collected data were thematically analysed using NVivo 12 software; the results were introduced five main themes that described information overload's forms, causes, consequences, and the ways to overcome IO phenomenon. Some practical insights and implications were provided to the decision-makers and professionals in higher education institutions to manage information overload and to reduce its negative effects among postgraduate students.

KEYWORDS

Higher Education, Information Overload, Postgraduate Students, Research Performance

INTRODUCTION

Information today is dramatically produced in our contemporary information society, accelerated and empowered by the high advancement of internet technology. As the former Google executive chairman Eric Schmidt stated that “the amount of information being created every two days is

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equivalent to that created from the dawn of civilization until the year 2003” a. Information Overload is acknowledged explicitly as a problem in many international world-class academic conferences and assemblies. As the leading figure in information science, Maurice Line remarked: “ the scientists would be overwhelmed, that they would be no longer able to control the vast amounts of potentially relevant material that were flowing from the world’s presses, that science itself was under threat”(D Bawden & Robinson, 2020) .

Previous research conducted among postgraduate researchers revealed that information overload shows high possibilities to diminish the learning process. Too much information act as a distraction, therefore students face problem in selecting the exact information due to stress which influences students’ performance and even causes some students to stop or withdraw from university (Mariamdaran & Veloo, 2017). The problem of information overload is receiving more attention, while there are less deeper studies and empirical researches for this problem, especially among university students (binti Suhaimi & binti Hussin, 2017).

This study contributes to the expansion of knowledge in the field of information overload management and higher education development by addressing three important issues. First, this study introduces an illustrative theoretical review about IO causes, effects, and remedies, connected with synthesized information thematically analyzed from collected data. Second, this study provides useful practical and theoretical implications as a guideline for supervisors, doctoral students and researchers in the same field. As well for research institutions’ executive and managers about dealing with IO from a strategic level. Finally, by introducing the “implications and directions for further research”, this study is expected to open the doors for other researchers for more empirical research opportunities in the same filed in different context using different methods and research approaches.

Background of the Study: Existing Knowledge About IO

In very simple words, the term “information overload” convey the concept of receiving too much information (Eppler & Mengis, 2003). Many studies in a different field of knowledge have been addressed the notion of information overload using variety expressions and synonyms, as cognitive overload(Junco, 2012; Mayer & Moreno, 2003), communication overload (Karr-Wisniewski & Lu, 2010), knowledge overload (Al-Shamsi, 2017), or information fatigue syndrome (Kabachinski, 2004). Interestingly, different authors in different field of sciences have introduced the concept of information overload in a different way. For example, research has been conducted about four areas of knowledge, namely accounting, marketing, organizational behavior, and management information systems, on how information overload concept was perceived in the last four decades. It revealed a variety of definitions about the phenomenon of information overload (Eppler & Mengis, 2003). Introducing a variety of definitions are appreciated and assumed to be logically and scientifically accepted, this is because different schools of thought, and it is relying on whether these definitions were based on objectively or subjectively view of point (Zhang, Zhao, Lu, & Yang, 2016). Therefore, the term ‘information overload’ has no single accepted definition agreed upon in the literature (D Bawden & Robinson, 2020; Eppler & Mengis, 2004; Jackson & Farzaneh, 2012).

Despite the fact, some authors define information overload as a mental condition experienced by the individuals and caused by an inability to process the information (Chen, Pedersen, & Murphy, 2012; Jacoby, Speller, & Kohn, 1974). On the other hand, others define it as too much amount of information (Klausegger, Sinkovics, & “Joy” Zou, 2007; Krishen, Raschke, & Kachroo, 2011). In regard to that, in the previous studies, four dimensions of information overload were identified as information processing capacity, information quality, information quantity, and available time. While the processing capacity was reported as the most significant dimension, available time was detected to be relatively less significant than the other three dimensions (Özkan & Tolon, 2015).

Information overload has been receiving great attention in many disciplines in the previous studies, while there is a scarcity of researches for this phenomenon and its causes, and effects in the context of universities and postgraduate students’ performance. Yet, there are some debates in the

previous literature, some research report reveals that in some past studies there was no confirmation of having declined in the performance of students because of information overload in higher education (Mariamdarani & Veloo, 2017). Contrarily, other studies showed a massive effect of information overload on the performance of university students (Achike & Ogle, 2000; Anderson & Graham, 1980).

In fact, there is a huge growth in academic publication industry accelerated by the internet technology revolution; it has been reflected in the growth of information overload. In consequences, higher educational institutes recently have started realizing overload problems among their students, and large scales studies start to be performed to investigate the prevalence of information overload among higher education researchers (binti Suhaimi & binti Hussin, 2017; Mariamdarani & Veloo, 2017). However, it appears that these studies are inadequate to characterize and comprehensively address this phenomenon. Therefore, this study aims to find answers for core relevant research questions to depict the phenomenon of information overload among postgraduate researchers and to introduce a comprehensive view on IO sources and remedies and how to manage and reduce the negative effect of information overload among postgraduate students.

Research Questions

RQ1: What forms of information overload postgraduate students are facing?

RQ2: What are the causes of information overload among postgraduate students?

RQ3: How Postgraduate students cope with information overload?

RQ4: What are the negative consequences of information on postgraduate students?

RQ5: How information overload influences postgraduate's academic life?

METHODOLOGY

Study Design

This study adopted a qualitative exploratory approach through phenomenology research design. Phenomenology is recognized as an educational qualitative research design (Creswell & Poth, 2017; Marshall & Rossman, 2014). Phenomenology research design is adopted because information overload requires a thoughtful understanding of postgraduate students' experiences on this common phenomenon. Our role in this study is to explore the phenomenon of information overload among postgraduate students and its influence on their research life and performance. Individually in-depth interview, focus group, observation, literature review content analysis was implemented. This implementation of the triangulated methods is to reduce the risk of biases associated due to a specific method and to allow the researcher to acquire a better understanding for the phenomenon and assessment of the generality of the explanations that can be developed (Maxwell, 2008).

Participants Recruitment

Recruiting participants for this study was one of the challenges that have been met. It is due to the task of carefully selecting the individuals who have entirely experienced the phenomenon of IO, those individuals should meet some criteria have been set by the researcher for purposive sampling. To understand the essence of participant's experience, multiple interviews have been conducted with several recruited individuals in two stages as illustrated in research design flowchart in Figure.1 in the Appendix A. In the first stage, an official email invitation has been sent to all active postgraduate researchers to participate in this study. Surprisingly, only a very few postgraduate students have replied the email. Therefore, a decision has been made by the researcher to visit postgraduate students' rooms. After three days of visiting, searching and speaking to postgraduate students on the spot, eleven participants were agreed and hired to be individually interviewed. In the first stage, data collection has been done and initially evaluated. Even though the number of recruited participants was reasonably

enough, a need for more continuous sampling and data collection was required. This is due to the following reasons: (a) satisfactory and holistic view about IO phenomena was not obtained, (b) majority of the participants were recruited from one single school which could be titled for limiting the experience about the phenomenon within only one environment, (c) to meet the aim of this study to introduce as much generalizable understanding of IO phenomenon among postgraduate students, multiple triangulated methods should be implemented. Therefore, it has been decided to conduct the second stage of participants recruitment for data collection. In the second stage, the focus group interview method was conducted and seven participants were recruited from four different schools through snowballing sampling.

Sampling Strategy

Two qualitative sampling strategies were employed in this study. First sampling is purposive sampling which was implemented during the first stage of data collection based on reflections by research questions and criteria have been set to serve research aims. There were some purposive criteria applied on participants as follow: (1) participants must be an active postgraduate researcher the school (2) not yet submitted his/her final thesis (3) speaks English in an understandable manner. In the first stage eleven participants has been confirmed, and their profile information is shown in Table 1 in Appendix A. As commonly suggested in the previous researches about the phenomenon to be explored, in terms of a concept or idea, or an educational issue such as this research problem “information overload” it could be carried out with a heterogeneous group that may vary in size from 3 to 4 individuals to 10 to 15 (Creswell & Poth, 2017; Moustakas, 1994; Van Manen, 2016). However, in purposive sampling, interpreted findings are usually limited to the population under study. Therefore, to produce more wide range of useful data collection and to form the basis for more consistent information, the researcher decided to carry out second round data collection for confirmation in a different population, still using a non-probability method (Bernard, 2017; Tongco, 2007). Second stage data collection employed snowballing sampling technique whereby requesting from informants or with whom contact has already been made to use their social network to suggest other people who could potentially contribute to the study. From the second stage of data collection through snowball sampling, seven participants have been confirmed and their profile information is shown in Table 2 in Appendix A.

Data Collection and Management

The data for this study was collected by the researcher using two stages interviews, in the first stage, semi-structured in-depth interviews with eleven participants from one school were conducted (Creswell, 2007). In this stage, the researcher planned for a scheduled interview and met with participants one by one for a 40-45 minute for each interview where the researcher wrote notes for any observations or remarkable thoughts, and interviews were electronically recorded using mobile phone and lab top recorders for accuracy and transcription. In the second stage, the data was collected through focus group interview that comprises seven participants from four different schools. The same semi-structured open-end questions in the first stage were used. This focus group interview was moderated by the researcher and it took one hour and ten minutes. All the recorded, written and observed data was collected in these interviews was written as textual transcript using Microsoft Word then saved as a raw database to NVivo.12 software to be analyzed. The instruments and materials were used to facilitate data collection include interview questions and an interview protocol for recording participants’ responses and any other comments the researcher may consider noteworthy (Creswell, 2007). During the interview, the researcher introduced the primary terms of this study and their general definitions. The interview questions and the terms and definitions can be found in Appendix A.

Data Analysis

The process of data analysis in this research adopted the general concept of qualitative content analysis which was defined as “ a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns” (Hsieh & Shannon, 2005). With a combined procedure were inspired to the researcher by (Creswell, 2017) who reintroduced Moustakas (1994) phenomenological analysis. In this study, we attempted to produce both phenomenology analysis enhanced by thematic analysis by including: (a) organizing the data, (b) re-reading through of the database, (c) developing a list of significant statements from the interviews and relevant data sources (d) facilitated by NVIVO.12 software we reduced the data into themes through a process of coding which encompasses merging the transcript data into small categories of information, then looking for evidence for the code from various databases being used in a study, and then assigning a label to the code (e) and abridging the codes, and finally representing the analysed data in figures, tables, or a discussion and forming an interpretation of them. Regardless the size of the database in this research we have followed the recommended typical way of thematic data analysis by Creswell to not exceed development of 25–30 categories of information about the IO phenomena then we reduce and combine them into few themes that used to write research narrative and synthesized findings.

Ethical Issues

First during participants recruitment, when the participants agree to share their experience, a letter of consent were provided to them to be reviewed, as shown in Appendix B, this letter clarified the details of the participants willingly participation, their right to withdraw from the study at any time and guarantee of their anonymity and confidentiality. Once the researcher has the participant's acceptance either in written forms or orally, then data collection could begin. Second, an ethical consideration during data collection, while conducting the interview the participants were reminded and re-informed about the interview common protocol procedures such applying audio records, requesting some personal demographic information and things to avoid such mentioning academic names or popular figures in their institution. Third, an ethical consideration during data analysis is to confirm the mutual trust and credibility between the researcher and participants by sending back to every participant his/her own interview transcript file to be read and even add any comments to confirm there was no any deviation or misunderstanding of interpretation committed by the researcher.

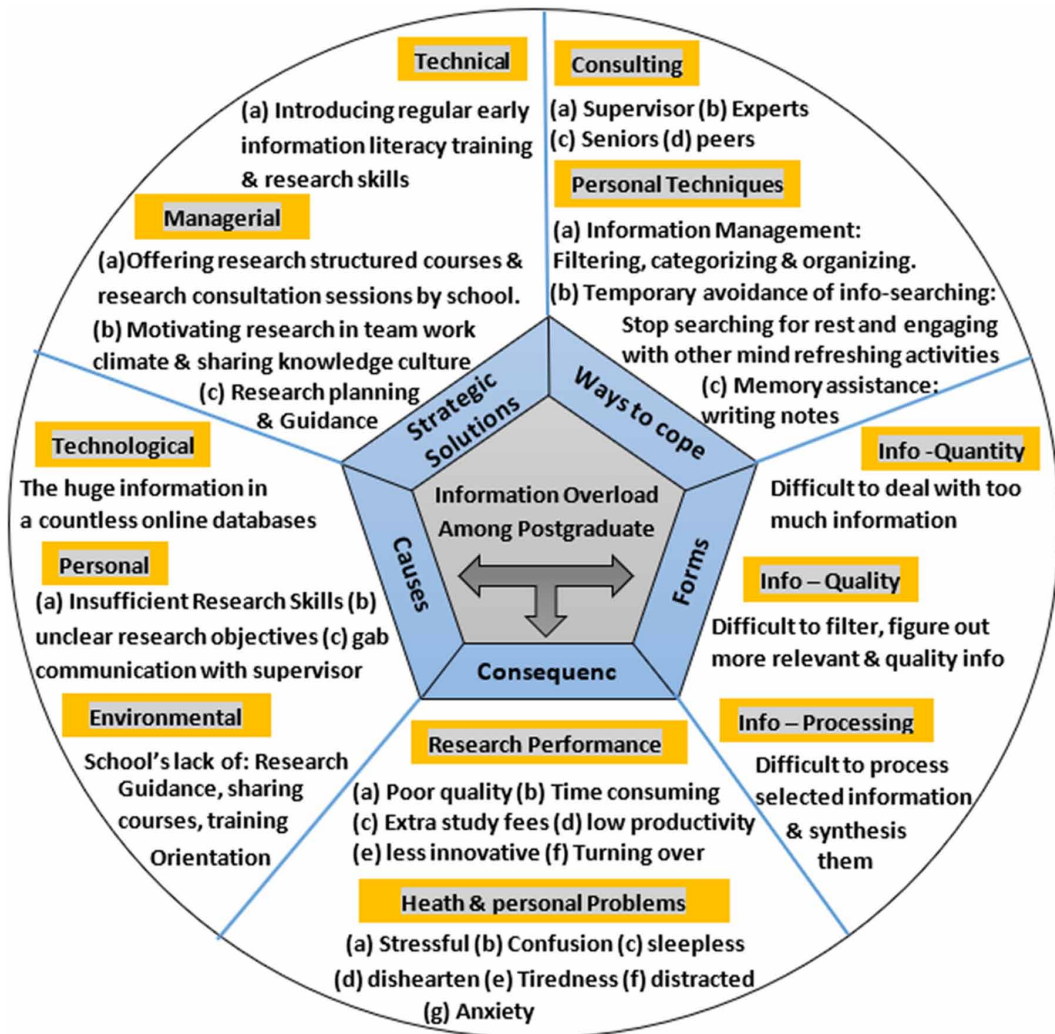
Findings and Results Discussion

The content of the transcription includes eleven individually interviews and one focus group interview, which comprises seven participants. Therefore, the total participants are eighteen, all participants' demographic information is shown in Table 1 and 2 in the appendix A. In the interviews, the participants were asked nine open-end questions to describe their experience towards the phenomenon of information overload. All the interviews were recorded, the verbal data was cautiously transcribed, and analyzed using content analysis facilitated by NVIVO.12 software. Five main themes and subthemes about the IO phenomenon were developed and identified as illustrated and summarized in Figure 1 below. The frequencies and percentages were calculated for each concept to be used to write research narrative and synthesized findings as described in the following sections. The reflection of findings with supporting pieces of evidence extracted from collected data and emerged in relevant literature can be seen in the following identified themes:

Theme I: IO Forms and Dimensions

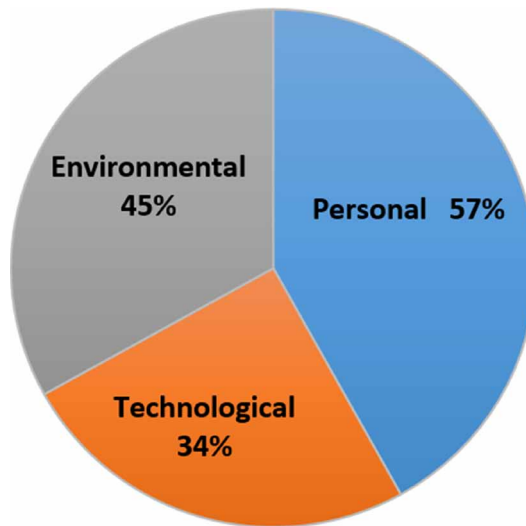
The participants' descriptions showed that they faced three main forms of information overload while performing their research activities. These three forms were varied from some participants to others and they include these forms as (a) an excessive quantity of online information resources (b) the

Figure 1. Visualized summary of the five main results and research themes



difficulty of identifying the most relevant quality information related to their research (c) inability of processing the information as shown in Figure 2. Among these three forms of IO, the too much quantity of information appeared more frequently in the narrations. Ten of the participants (56%) who informed that the too much quantity of information to deal with during research represents one of the major forms of information overload. As described by the Participant (P6): “Huge databases such google scholar and so on bring to you huge number of information which is not easy thing to know which one is good and which one is not good” and as stated by participant (P15): “the most overwhelming is likely to be the quantity of information because that is the first thing you get before you go and select, I always cut off when it comes to a quantity”. While another seven participants (40%) who stated the difficulty of identifying the most relevant quality information related to their research. As described by the participant (P16): “sometimes it is quite difficult to distinguish or to find which information is best, I mean to value and evaluate the quality for that’s why it is difficult to choose this one is good or bad in term of quality it is quite confusing”. And as testified by (P5): “For me, I don’t have the ability to recognize the most relevant quality information related to my thesis”.

Figure 2. Information overload forms



On the other hand, twelve participants (67%) indicated that the difficulty of processing obtained information is the major form of IO.

As described by (P8): “after typing keywords to search you will get too much article and too many research papers so when you start reading then reading you get confused. So, I think it is all about the process, the more you search the more you get confused”. And as clarified by (P9): “It is the matter of understanding the appropriate research keywords, also we need to know databases, we need to know which database is more appropriate to my study. So, this is how I minimize my overload you see how I minimize information overload if I know the process! So sometimes It depends on academicians how he handles the information.”. Interestingly, findings and results were found in this part of our research is in consistency with what has been found in previous studies, that indicated the information processing capacity represents the most important major form of all the information overload dimensions (Mansourian & Ford, 2007; Naveed, 2016; Savolainen, 2015). The results here show that information overload is perceived as a common and inescapable complain among postgraduate researchers which can be originated in three forms as information quantity, quality and information processing. Although, this results found in consistency with some previous literature (Özkan & Tolon, 2015), that the one’s capacity of processing of information represented the main major form of IO than the excessive amount of information or its low quality. Still, there is a need for empirical studies to investigate these forms in the context of university’s postgraduate researchers or any other relevant context concern with information overload phenomenon.

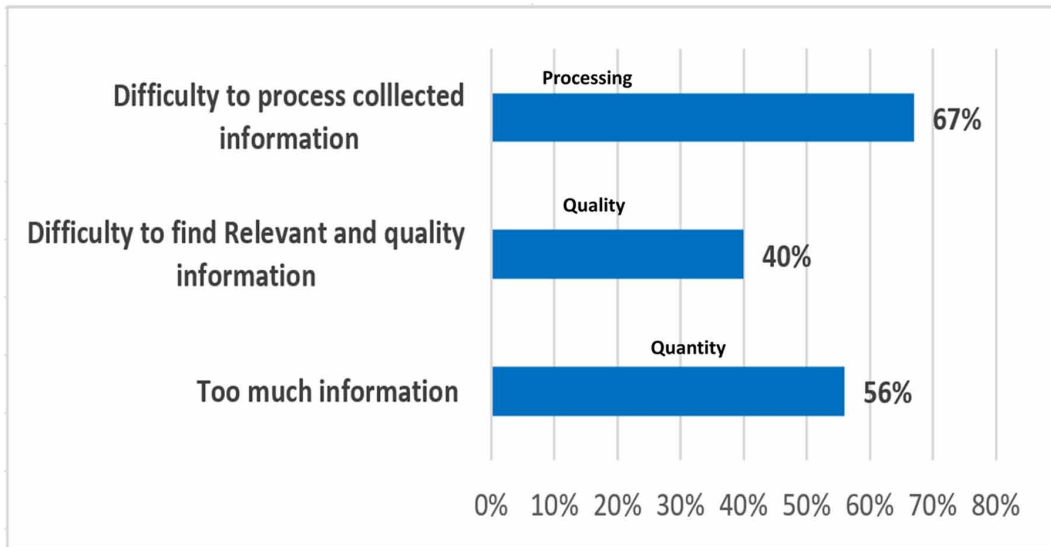
Theme II: Causes of IO

In this part of the research, the causes of IO among postgraduate students were investigated. The data collected from participants uncovered several causes of information overload, these causes have been summarized into three categories personal, environmental and technological causes as shown by responses ratios in Figure 3 and explained in detail in the following subsections.

Personal Causes

First, the personal factor which causes the IO to be accrued among postgraduate researchers. According to the participants’ narrations, there were three personal characteristics have been identified as a cause of IO. These personal characteristics in this study are referring to the lack of some necessary

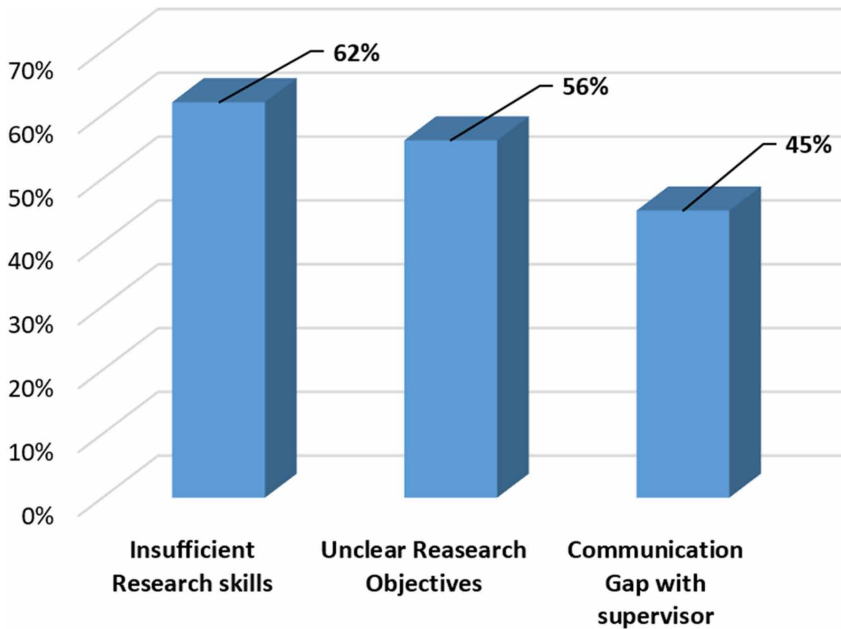
Figure 3.



personal, research, cognitive and communication skills postgraduate researchers must have to manage and reduce IO, and they were surmised as (a) lack of research skills, (b) unclear research objectives and (c) communication gap between supervisor and researchers as shown in Figure 4. The lack of research skills was described by participants to be among the important causes of IO. The lack of research skills in this research refers to postgraduate student's insufficient skills of using the right research keywords, terms and tools to manage and filter information and make good use of them. The participants' narrations showed that eleven participants (62%) stated that a lack of research skills is among the major causes of IO. As described by (P9): "I think one of the main causes is the lack of knowledge, how to handle databases I think this is main causes but if you know how to handle for me if millions of databases, I mean the information you can actually extract your relevant ideas". More evidence on how important is the research skills was expressed by (P18): "So I think there is lack of orientation in searching information, we just do a blind searching, unfortunately, if you do a blind searching or wide searching just like that, many things come but I think if you limit using some key terms maybe it reduces the amount of information you will get". Another evidence from the participants' demographic collected data it revealed that majority of those who suffer IO (70%) used a traditional way of searching in which they didn't use Boolean operators for information searching. Only a minority of participants (30%) were utilizing features that are essential for effective information searching, such as the use of OR, AND as part of search skills that could minimize or manage IO. The results in previous literature were found in agreement with this research findings, regarding the necessity of having information search skills among academic researchers to easily manage information overload (Barry, 1997; Harrison, 2009; Savolainen, 2015; Yan, Zha, Yan, & Zhang, 2016).

Regarding the second issue among personal factors, more than half of the participants (56%) have declared that the unclear research objectives or forgetting lead them to be trapped in IO. As clarified by (P15): "I download a lot -information- in fact, somethings I download them without actually going directly to topic specifically I'm looking for." And as testified by (P10): "The first one we lost our research objective, or we forgot our research objectives what we want to achieve actually so we lose where is our direction what we want to achieve actually then we can filter this information relevant or not relevant." Unsurprisingly, some previous studies have approached such causes as factors that not only cause IO, it even causes frustration and anxiety and negatively impact

Figure 4.



the information-seeking process. These results are in accord with Savolainen, 2015 when he identified low self-efficacy, poor search skills and individual's unawareness of relevant information sources as an obstacle that inhibited them to deal with information overload (Savolainen, 2015). Therefore, to reduce IO while academic information searching, research objectives should be clear and reflected in the information research process through repeatedly revised keywords until the desired results are acquired. However, this seems difficult for the researchers who are lack of knowledge domain as they are not enough skilled to express their interests and evaluate whether a paper fits their purpose (Zhao, Ma, Hua, & Fang, 2018). At this stage, the role of the academic supervisor should be appeared to be more supportive as guidance.

Regarding the third issue among personal causes of IO, is the communication gap between supervisor and postgraduate researchers, which leads the second party to be misguided or suffer the absence of necessary supervisory support. Nearly (45%) of the participants conveyed that the way they communicate or receive instructions from their supervisors play a critical role either to increase IO or reduce IO. For example as participant (P8) stated that: "So if supervisor (did not) – give an appropriate authentic and accurate direction to student, will be overloaded with too much information why because he/she will go and read this and that article too much articles and he/she will differ from the main theme of the research." Another participants (P1) mentioned about other communication perspective and said: "why during the search process I still cannot find the right information that is relevant to my research, maybe there is a gap between me and my supervisor, maybe during meeting some contexts were not very clear to me, I couldn't 100% to get from him/her, this gab lead to wrong searching keywords the first step was wrong. Other aspect regarding communication gap with supervisor that might reduce the cause IO was described by participant (P15): "My own opinion supervisor should be in constant contact with student let says weekly contact or consultation and the supervisor give you a task to do and of course there should be kind of guidance when it comes to be searching. The supervisor should be able to explain as what some workshops in the library content. So, if the supervisor able to project the research topic with specific protocol and specified objectives with the students or maybe group of them that's will reduce a lot of information overload. This part

of results is matching with previous researches which confirmed that, supervisors are perceived as having key responsibility for the research guidance, support and training of Postgraduate, the realization of the research problem size in terms of the information needed and skills required should be assisted through experienced supervisor, therefore, transferring skills from supervisor to post graduate is impossible if one of the parties specially supervisors remain invisible, unconscious and undisclosed (Bent, Gannon-Leary, & Webb, 2007; Draper & Harrison, 2011; Okpala, Benneh, Sefu, & Kalule, 2017; Vezzosi, 2009).

Environmental Cause

The environmental factor was among the IO causes, which were described by some of the participants. The environmental factor in this study refers to the specific educational department and its culture and educational plans and strategies, this educational department could be a college, school, faculty or institution. Some participants (45%) have declared that their research environment still lacks of necessary structured research courses and training and has an unsatisfactory level of academic social life and activities. As reported by the participant (P2): “I think our school should do something about how to standardize the research process for every student together with supervisors. To make everything clear and smooth school must organize courses and workshops that help students themselves what are really this course needs”. Participant (P8) stated: “We have many shortcomings in our school we are doing Ph.D. even we don’t have a single course of research methodology sorry to say that. Unless and until you make this thing systematic” and furtherly added that: “school should range programs arrange seminars engage students, give them tasks, since I’m here one year and half there is no single picnic in our school. You will become flexible When you meet your supervisor examiners, now what is the problem here I’m always afraid of my examiners why because we never talk to each other I don’t know the personality they have created an environment that many researchers are afraid of the big academician here what do you think if I’m afraid can I be creative can I have a potentials.”. The results here emphasized the importance of enabling good educational environment and culture for postgraduate students to reduce any form of pursuer, stress, and confusion resulted from IO. These results are consistent with the several messages of recommendations that emerge from the previous studies on research and researchers in university about the importance of the supportive culture and environments, facilitation to access information and advice and integration of research staff into institutions (Bent et al., 2007; Campbell, Crook, Damodaran, Kellett, & Valerio, 2003). Educational institutions are encouraged to offer chances for ensuring that all researchers are gaining competence in knowing how to learn and how to assess potential sources of information and to how to organize information (Okpala et al., 2017).

Technological Cause

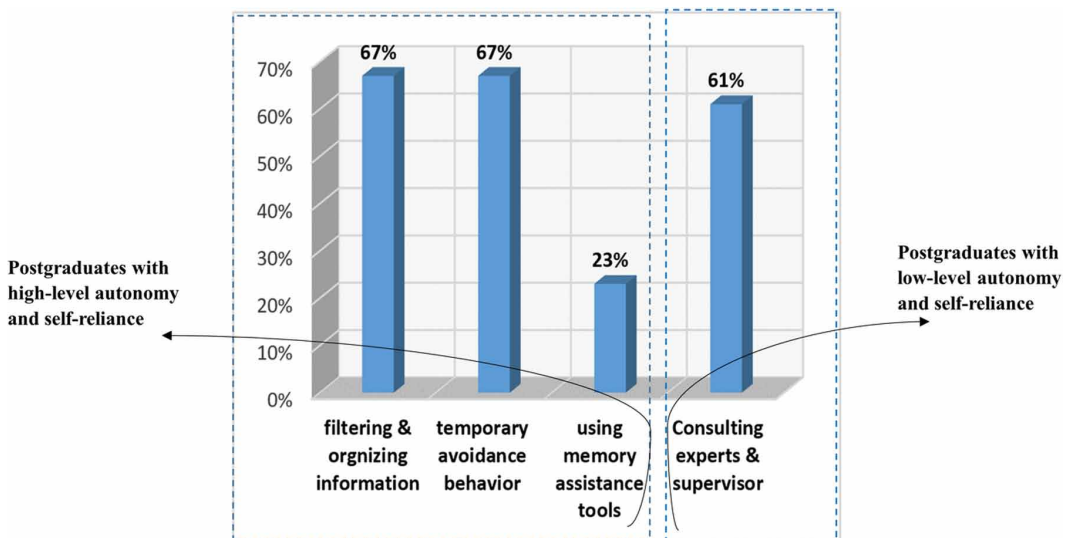
Third, technological cause, which refers in this study to the online rapid growth of massive academic information through fast-automated production and dissemination of scientific articles due to internet technology advancement. Six participants (34%) out eighteen have mentioned that, for example, participant (P17) stated that: “the entire world is overloaded with information, so being overloaded with information is a normal in this 21st century, [...] the causes been overloaded with information is the multiplicity sources of the information, for example of you go to university library if you go into resources site to download, you will see many journals, books, thesis ...so forth. So, this one of the causes there are a lot of sources of information because the channels that you can tap the information cause a lot of overloads.” Another participant (P9) stated that: “defiantly, sometimes we use many databases as a source of data, if the data is not reliable my data is not relevant means my results will be biased so that why there is overload there are many databases but still we need to get the reliable data to get your paper accepted by international journals”. This result is in line with some previous research, that viewed a huge amount of academic information exist on the internet and available in the online database channels as a cause of information overload (Haddow & Klobas,

2004; Herman, 2004; Özkan & Tolon, 2015). An additional, an obvious confirmation of this result was recently testified by considering “the rapid growth of online academic information” as a cause of “information overload to readers and authors alike due to the quick growth of scientific articles, especially in academia”(Zhao et al., 2018). The literature suggests that internet and search engines are among major contributors to the information overload formation (Özkan & Tolon, 2015), while other studies indicate that the internet only increases the problem of information overload and the problem existed even before the internet appearance (Edmunds & Morris, 2000). Nevertheless, too much information does not always lead to quality of information (Benselin & Ragsdell, 2016).

Theme III: Ways to Cope IO

There was a combination of personal techniques has been identified through analyzing participants’ narrations on how to cope IO. Based on our observation, these techniques were summarized into two categories relying on the level of participants’ autonomy and self-reliance to deal with IO phenomenon as shown in Figure 5: First, participants who have high-level autonomy to cope IO, they used to solve IO problem using three strategies: (a) Two-third of the participants (67%) use strategy of information searching and management by following their own ideas on how to use variety of relevant keywords then how to filter, categorize and reorganize information. (b) The same number of the participants (67%) were practicing the behavior of temporary avoidance of information searching for getting rest and refreshing their minds by engaging themselves in other entertainment or sport and even spiritual activities, then re-engage themselves again in information searching. (c) (23%) of the participants were using some memory’s assistance tools such as writing memos or using some programs and software to help in managing IO. In the first category of participants who have high-level autonomy to cope IO, we believe that they are in fact reflecting their level of academic information literacy and self-efficacy, which have been discussed in some details in the following section of research conceptual model development. However, in regard to the temporary avoidance strategy, it relies more on the subjective norm of a participant. The second category was the participants who represent (61%) of the informant with a low level of autonomy to cope IO. They might still use some of the three strategies were explained in the first category, but they are more dependence on others like supervisors, peers, and experts to help in coping IO. For the second category, we stated it as “experts’ consultation” and

Figure 5.



one of the possible IO moderators in the section of research conceptual model development. Here are some of the participants narrations for example one of those first category participants (P17) stated: “I just plan that I’m going to do today a,b,c that’s I’m interested in, so and so concepts, and review certain items, so I strictly become selective, then just doing download and keep it, when later I have some files and some information I normally categorize them”. Other participant described how he copes IO by temporary avoidance (P1): “Just I stop and switch to another mood, I cannot continue, I feel not comfortable” another participant (P3) added: “ When I’m overloaded, I leave the work take step back, relaxed, then when I’m in much more relax I go back and decide on what I want to choose among the information”. Some of the second category participants (P8) stated that: “when I’m overloaded, the best option I consult my supervisor”. The results that have been found relevant to the first category of the participants regarding personal techniques and strategies they follow to cope with IO were in accord with the findings in the previous research. For example, Savolainen (2015) has considered and reemphasized that filtering strategy and withdrawal strategy are among the main strategies for coping IO. Other research by Yan (2016) and his associated researchers suggest leaving the information world and information research activities to survive information overload. The results and that have been analyzed through some of the participants; narrations relevant to the second category whom they depend on others to help in overcome IO are in line with the previous studies that considered consulting others whom they might have greater experience will assist information seekers to cope IO (Aljukhadar, Senecal, & Daoust, 2012; Bent et al., 2007; Vezzosi, 2009)

Theme IV: Consequences of IO

According to the participants’ narrations about the IO consequences, there were different types of unpleasant effects have been reported. Two major effects of IO on postgraduate students’ life were detected. First, the negative effect of information overload on students’ research performance that could cause: (a) poor research quality, (b) Time consuming, (c) paying extra study fees (d) low productivity (e) less innovation. Second, the negative effect of information overload on students’ health and personal relations. When the effect of IO phenomenon hits health issue of postgraduate students, the size of the problem turns out to be doubled, and the influence becomes transitive on other aspects of life, especially if it is mentally affected. Unfortunately, it is, as reported by more than (50%) of the participants, the feeling of stressful, dishearten, disappointed and confusion was described by the participants who suffer IO and words like “stressed”, “frustrated”, “confused” and “sleepless” were repeated many of times. For instance, these are some narrations, when some of the participants were asked to describe their situation while they are overloaded with information, Participant (P7) stated: “I feel stressed and I feel so little because a lot of things I need to study, I need more time to study”. Another participant (P8) reported: “it will psychologically damage you, you feel you stay longer, I couldn’t do good research framework too much information was there, I could not make a decision, you see other people doing very good and others praise them with supervisors and you feel guilty and it happens”. Subsequently, these mentally negative consequences are triggering for other problems related to participant’s relations with others and physical effects such as feeling tardiness and sleepless. For instance, participant (P15) declared: “Information overload makes me isolated, the kind of social person I used to be before, I used to be a person who likes social activities but information that is on my table makes me less attention some of social life” another participant (P5) have added his own feeling : “ Information overload influence not just your time not just your money but also mental wellbeing because the family members and friends from outside always ask you why you haven’t come to your proposal defense or why you haven’t finished your study”. These results about the negative consequences of IO are in consistence with loads of previous literature that associated the phenomenon of IO to a series of problematic outcomes (Mai, 2016; Peter Lueg, 2014). These problematic outcomes which resulted from IO were represented in the previous researches in a form of anxiety, confusion, and disturbance (Özkan & Tolon, 2015; Walsh & Mitchell, 2010), tiredness, stress, frustration, reduced efficiency (Farhoomand & Drury, 2002; Yan et al., 2016). However, the

majority of the previous studies that were conducted on IO notion and its consequences were mostly in the field of consumer behaviors and very limited studies in the field of academic information overload were introduced.

Theme V: Strategic Solutions for IO

According to the data was collected and carefully analyzed through participants' narration, two main strategic solutions were introduced. First, technical solutions. Second, managerial solutions. The reason being named by the researcher as "strategic" because these solutions should be implemented, performed and enforced by the institution's authority and deployed as part of their long-run plan in a well-structured manner. In fact, these two strategies for overcoming IO among postgraduate students were reintroduced as a reflection of participants' response to the question was given to them on how their schools or institutions could help in reducing and managing IO. The term technical solution in this research context, refer to the technical skills postgraduate students must acquire in the early stage of their research. These technical skills such as IT skills, how to search in online databases to achieve a high level of information literacy should be enforced by their schools through regular and affordable training. According to (50%) of the participants' narration, technical skills training and workshops on how to search information effectively and how to manage, filter and organize information is crucial to minimize the negative impact of IO. For instance, as a response to the role of the institution to help in coping IO, the participant (P1) in her second year Ph.D. research she stated: "kind of training is very necessary for fresh Ph.D. students. Training to show Ph.D. what is Ph.D. is doing for example if information overload happened what we should do? what kind of solution and ways can be taught to help us don't waste the time and directly go to our goals". Another Ph.D. final year participant has emphasized on enforcing such technical skills training, he reported: "I think a mandatory workshop, mandatory initial workshops yes it should be mandatory when you come in the first month you should be taught maybe searching methodology, how to search for information". Regarding to the managerial solutions, it refers in this research context to institution strategies to enhance postgraduate research performance and to improve and develop their research capabilities through (a) offering research structured courses (b) research consultation session (c) motivating teamwork research environment and sharing knowledge culture (d) providing postgraduate students with sufficient guidance for research process and good research planning. More than third of the participants (40%) demanded an early research structured courses, almost third of the participants (35%) have requested their schools to organize and plan for consultation, motivations and sharing sessions more frequently. As these findings were confirmed and described by participants for example (P8) stated: "When I'm a Ph.D. student, when I came to school, I should have some introductory session of doing Ph.D., I should be given the time, I should be told what Ph.D. research and research problem? I should be told how to write the methodology and literature review". Participant (P2) third-year Ph.D. students she added about how to reduce IO effects: "I think our school should do something about how to standardize the research process for every student together with supervisors". The strategic solutions that have been introduced in this study as a result of analyzed data are in line with the findings in a few studies were previously conducted. For instance, Bawden (1999) and his associated researchers found that the solutions to survive IO cannot be in a single method and they divided the solutions as managerial and technical as well (David Bawden, Holtham, & Courtney, 1999; Yan et al., 2016). Another studies have matched with these results in term of confirming that the unfamiliarity of Ph.D. students with the formal information searching procedures and techniques should be addressed(Naveed, 2016), by training them on how efficiently and effectively use the right keywords, setting proper research methodologies, figuring out research problems and objectives(Barry, 1997; Bent et al., 2007; Yan et al., 2016).

CONCLUSION

The main objective of this study was to comprehensively understand the phenomenon of information overload and its influences on postgraduate students' life and research performance. A collection of results and findings have been introduced in this study through analyzed data and observations and reported in five main themes were answering the research questions. These five main themes were presented as: *First, the forms of information overload* were faced by postgraduate students and categorized as the too much quantity of information, difficult to filter quality of information and inability to process and make use of information. *Second, causes of information overload* during postgraduate students' research activities, these causes were divided into three main sources of information overload as technological, personal and environmental. The technological source of information overload described as the availability of a huge amount of information in a countless academic and non-academic online database. The personal causes of information overload were divided into three subthemes relevant to the personality of students for having insufficient research skills, lack of clear research objectives and the communication gap with their supervisors. Then the final source of information overload was the environmental source represented through the school's lack of standardized research guidance, structured courses, training, and well-planned research process orientation. *Third, the ways postgraduate students try to cope with IO*. There were two main ways: consulting technique and using personal skills technique. The consulting technique was reflecting on how postgraduate students rely on others such as supervisor, experts, seniors, and peers to cope IO. The personal technique was reflecting on how postgraduate students are enough independent to use their own gained skills to cope IO. These personal techniques were represented in three skills, information management skills which reflect postgraduate students' ability to filter, categorize and organize information as a mirror of their level of information literacy. Then, the temporary avoidance behavior of seeking information that performed by postgraduate students when they are in overload situation for the purpose of rest, break and refreshing of mind. The last personal technique postgraduate students use to cope IO was to use some memory assistance tools like writing notes, memos and using some software for managing IO. *The fourth theme, the consequences that IO has* on postgraduate students' life and research performance which include two important subthemes, the negative impacts of IO on postgraduate students' research performance and the other negative impacts on their health and personal life's well-being. *The fifth theme was about the strategic solutions* were determined through participants' narrations and comprised two strategies, technical and managerial solutions.

Implications

This study identified a few essential implications that could be practice by postgraduate students and serve as guidelines for academic supervisors and decision-makers in higher education institutions to manage and reduce the negative consequences of information overload. Overcoming IO enables postgraduate students to achieve good quality research in a short time, allow them to be more innovative and productive due to the low level of stress and confusion. The inquiry in this exploratory study has shown different causes of IO among postgraduate students that could represent major sources of the phenomenon; these causes were technological, personal and environmental. By handling these causes using the strategic solutions, techniques have been proposed in this study, it will help to minimize the negative effects of IO among postgraduate researchers. This study has recommended three types of solutions to manage IO and reduce its negative effect on postgraduate students. *First*, top managers in higher education institutions should focus more on developing student's personal skills of information literacy and self-efficacy among postgraduate students to help them to deal with IO. The skill of information literacy improves academic researchers' performance through offering relevant research workshops, training and by involving postgraduate students in knowledge sharing sessions and research group works. *Second*, higher education institutions should play a major role in helping postgraduate students to manage and reduce IO by developing students' technical skills.

These technical skills such as IT skills, how to search and filter information in online databases to achieve a high level of information literacy. *Third*, the higher education institutions well planning, and strategies play a major role to help postgraduate students to manage and reduce IO is through by offering the most necessary research structured courses, training and standardized research process to the postgraduate students.

Limitations and Directions for Further Research

In this study, there was an attempt to explore the phenomenon of Information overload among postgraduate students through investigating many aspects, such IO causes, forms, consequences, and remedies. Although, this study has introduced an essential contribution of findings and proposed a comprehensive view to define and manage the IO phenomenon in the context of postgraduate students and HEI, yet it has some limitations that could open several chances for further research. First, up to the date, the research on information overload took place in the field of marketing and information science, nevertheless still need for more empirical studies in the field of higher education and research institutions. Second, this study has been conducted in a limited population, which has been taken from only one research university. Further research might investigate the IO phenomenon through a wider range of population sampling using different research methods. Third, authors of this research found that there are possible factors that could have a moderation role between IO and students' research performance, these factors as reflected by participants' narration could be personal, technological and environmental institutional factors that need to be explored and empirically measured. Fourth, as an extension to this research work, it would be interesting to assess the effect of information overload on the social life of postgraduate students. Finally, other associated dimensions of information overload such communication and work overload could be investigated.

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APPENDIX

EXPLORATORY STUDY ON PERCEIVED INFORMATION OVERLOAD AMONG UNIVERSITY POST GRADUATE STUDENTS

Postgraduate Participants' Form

Section 1

Participant's Number: -----
(Please leave it empty) Age: -----
----- Gender: ----- Nationality: -----
----- Field of study: -----
----- Level of study : -----

Semester No: ----- Year no: -----

* Number of Supervisors : 1- Main -----
2 - (if any) Co-supervisor----- *Having Information Research
Skills : -----

----- Number of papers
published: ----- Number of Average
meetings with supervisor per month: -----
----- Using any support software or computerize method to help
in research process -----

Section 2

Presented in Box 1.

LETTER OF SOLICITATION

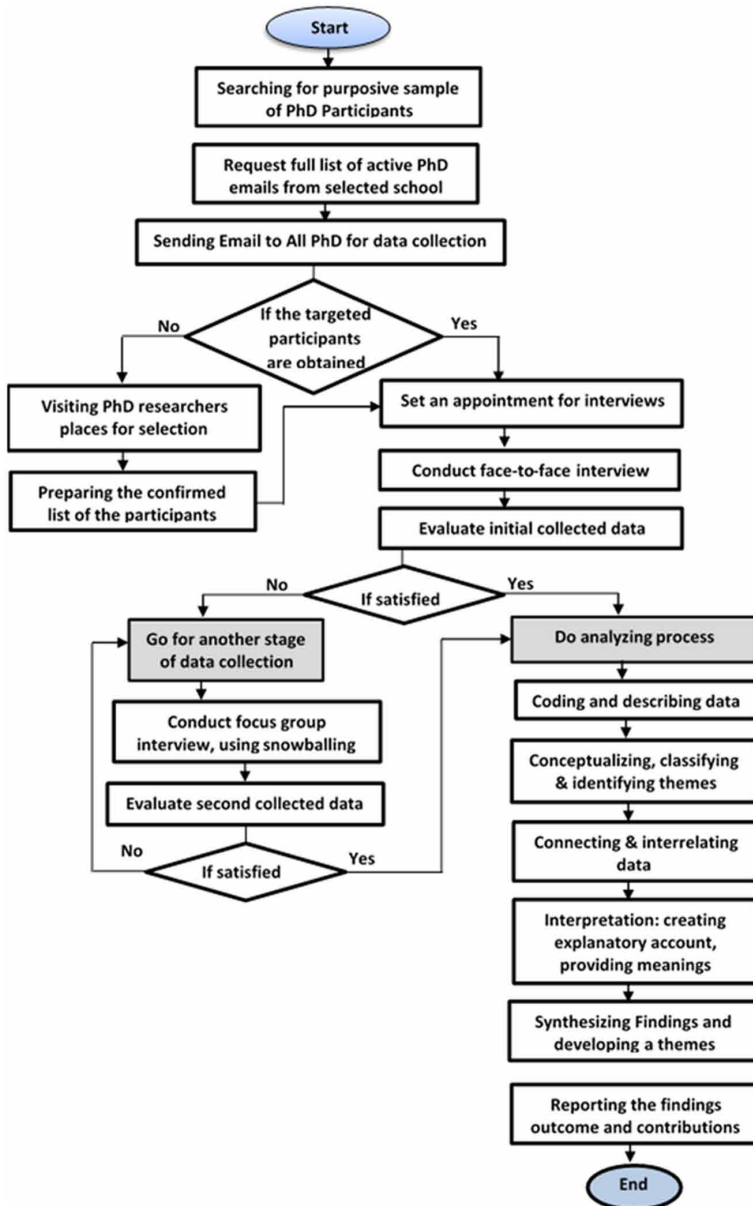
Dear potential participant,

We have the pleasure to invite you to participate in a phenomenological research study, titled *exploring the inescapable suffering among postgraduate researchers: Information overload conceptual model and implications for future research*, conducted by Nabil Hasan Saleh Post doctorate fellow at the University Science Malaysia, under the supervision of Assoc. Prof. Dr. Siti Hasnah Hassan

Your participation will include attending an interview session which will take approximately 40 minutes. This session encompasses an informal discussion regarding your experience dealing with information overload during your research activities, your experiences with information overload, and the perceived influence that these experiences have on your research performance, personal health and on your overall levels of research productivity. Upon completion of the interview you will be asked to provide the names of other possible participants that the researcher could contact. Furthermore, in order to ensure the accuracy of your statement's interviews will be audio-recorded and you will also be asked to review the transcript of your interview, and the corresponding themes, once they have been provided to you electronically by the researcher.

It is important to note that the information you provide will be kept confidential and anonymous. Your participation in this study is entirely voluntary. If you wish to withdraw at any time from the study, you are permitted to do so. At that time any information you have already provided to

Figure 6. Feature design flowchart



the researcher will be safely discarded. Only the researcher and supervisor will have access to the information you provide.

If you agree to participate or have any inquiries, please feel free to contact me.

Thank you & sincerely,
Nabil Hasan Saleh

Table 1. Postgraduates interviewee profile for the first stage data collection

Participants	Age in Years	Field of Study PhD	Gender	Observed Self-Efficacy	Level of Study	Nationality	Search Skills
P 1	29	Islamic Finance	Female	Medium	2nd year	China	Traditional
P 2	33	Organizational Behaviour	Female	High	3rd Year	Malaysia	Traditional
P3	31	Human Resource Management	Male	High	1st year	Nigeria	Advanced
P4	31	Islamic Finance	Male	Low	1st year	Pakistan	Traditional
P 5	30	Finance	Female	Medium	2nd year	Malaysia	Traditional
P6	38	Marketing	Female	Low	1st year	Saudi	Traditional
P7	28	Management	Female	Low	1st year	Malaysia	Traditional
P8	33	Business	Male	High	2nd year	Pakistan	Traditional
P9	37	Operation Management	Male	High	3rd Year	Bangladesh	Advanced
P10	43	Management	Male	High	2nd year	Malaysia	Traditional
P 11	40	International Business	Male	Low	2nd year	Pakistan	Traditional

Table 2. Postgraduates interviewee profile for the second stage of data collection

Participants	Age in Years	Field of Study PhD	Gender	Observed Self-Efficacy	Level of Study	Nationality	Search Skills
P12	37	Chemical Science	Male	Low	3rd Year	Nigeria	Traditional
P 13	45	Chemical Science	Male	Low	2nd year	Nigeria	Traditional
P14	29	Pharmaceutical clinical	Male	Medium	2nd year	Yemen	Traditional
P15	31	Pharmaceutical clinical	Male	Low	1st year	Nigeria	Traditional
P16	30	Pharmaceutical clinical	Male	High	1st year	Syrian	Advanced
P17	40	Social Sciences	Male	Medium	3rd Year	Nigeria	Advanced
P 18	36	Pharmaceutical clinical	Male	High	4th Year	Nigeria	Advanced

CONSENT FORM

Exploring the inescapable suffering among postgraduate researchers: Information overload conceptual model and implications for future research

*Researcher: Nabil Hasan
 School of Management*

Box 1.

#	Question
1	As an academic researcher could you please describe when and where do you find yourself overloaded with too much information?
2	What forms of Information Overload (IO) you face sometimes?
3	Could you please describe your situation being overloaded with too much information?
4	Explain how usually you try to cope with Information overload?
5	From your own experience and perspective, what do you think are the causes of being overloaded with information?
6	Could you please describe how IO could influence or effect your research performance?
7	Does IO during your PhD research process influence or effect other sides of your life?
8	Could you please suggest any solutions you think your school or institution can do to help PhD researchers to reduce IO?
9	Could you please tell me to which extent do you think supervisor can help to manage or reduce IO for PhD researchers?

Postdoctoral Studies
University Science Malaysia
Supervisor: Assoc.Prof. Dr. Siti Hasnah Hassan
School of Management
Postdoctoral Studies
University Science Malaysia

Invitation for participation: I am invited to participate in the abovementioned research study conducted by Nabil Hasan and supervised by Associated Professor. Siti Hasnah Hassan.

Purpose of the Study: The purpose of this study is to explore the information overload and its impact on research performance among university postgraduate students.

Participation: My participation will consist of attending a face -to -face interview session, scheduled at a time of my own convenience, which might take approximately 40 minutes. During this time, I will be asked to involve in an informal discussion with the researcher regarding my experiences dealing with information overload during my research activities. The researcher will also inquire about the influence of these experiences on my research performance, personal health and on my overall levels of research productivity. When the interview is finished, I will be asked to suggest names and contact information of other possible participants whom I think they could have relevant experience and might contribute to this research phenomenon. Lastly, I am aware that my interview session will be audio-recorded and that I will be asked to review the interview transcript, and corresponding themes, which will be sent to me electronically via email. Once received I will be given one week to review and either to confirm my agreement with or to provide any additional information or clarification. I will be able to report back to the researcher via his University email address.

Confidentiality and Anonymity: I have been assured by the researcher that that the information I will provide will remain completely confidential, and my confidentiality will be guaranteed as only the researcher and supervisor will have access to my information.

Conservation of Data: I understand that the information I will provide will be included in a paper that will be published in researcher’s future work, and my personal information will be anonymous

kept by the researcher and no privacy or personal declaration or conflict of interest with any other party will be exposed.

Voluntary Participation: I participate in this study's interview voluntarily and I have the choice to withdraw from the interview at any time and/or refuse to answer any questions, without suffering any negative consequences. If I choose to withdraw, all the information gathered from me will be safely vanish immediately afterwards.

Acceptance: I, _____, agree to participate in the above research study conducted by Nabil Hasan and supervised by Associated Professor. Siti Hasnah Hassan.

If I have any questions about the study, I may contact the researcher or his supervisor. University Science Malaysia, School of Management, Room 134, Pinang, Tel.: (0060) 04-657-6520. Email: nabil.h@usm.my

I understand that signing and returning this form implies consent. Participant's name:

Participant's signature: _____ Date (YYYY/MM/DD) _____
Researcher's signature: _____ Date (YYYY/MM/DD) _____

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