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Users' Perception of using Web Search Engines and their Impact on the Perceived Intention to reuse the Systems

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ABSTRACT

In today's world of information-driven society, many studies are exploring usefulness and ease of use of the technology. The research into personalizing next-generation user interface is also ever increasing. A better understanding of factors that influence users' perception of web search engine performance would contribute in achieving this. This study measures and examines how users' perceived level of prior knowledge and experience influence their perceived level of satisfaction of using the web search engines, and how their perceived level of satisfaction affects their perceived intention to reuse the system. 50 participants from an Australian university participated in the current study, where they performed three search tasks and completed survey questionnaires. A research model was constructed to test the proposed hypotheses. Correlation and regression analyses results indicated a significant correlation between (1) users' prior level of experience and their perceived level of satisfaction in using the web search engines, and (2) their perceived level of satisfaction in using the systems and their perceived intention to reuse the systems. A theoretical model is proposed to illustrate the causal relationships. The implications and limitations of the study are also discussed.

Keywords: *Human-computer interaction, web searching, user perception, user satisfaction, user technology acceptance, technology acceptance*

1. INTRODUCTION

For every second over one hundred thousand information searches are performed on web search engines. People use the web to find information on almost everything from day-to-day information, such as city council bus timetable to long-term vacation places and flight information. Internet of things has become part and parcel of our day-to-day life. However, many questions linger over the minds of many people. How accurate and reliable are the information they retrieve from a web search engine? How does a person make decision to use information from a particular search engine or web site?

In today's world of information-driven society, many studies are exploring usefulness and ease of use of the technology. The research into personalizing next-generation user interface is also ever increasing. There is urgent need to better understand factors that influence users' perception of web search engine performance and their perceived intention to reuse the system. Measuring users' perception about their web search experience would provide useful information for many purposes, such as evaluating the success of retrieving information from web search engines; other information systems; building personalized web search user interface.

A large number of studies have been conducted to identify factors influencing adoption and use of new information technology [1-5], and web sites design and usability[6-9].It is believed that investigating the factors that influence user acceptance of system (or search engines) and adoption in different contexts continues to be a focal interest in information systems (IS) and information science research [10]. However, these studies have emphasized on factors that influence user acceptance of technology or systems. Limited studies have explored how user's contextual factors such as prior knowledge

affects their perceived level of satisfaction and perceived intension to reuse the systems. Limited studies have also conducted on usefulness and ease of use of web sites and search engines.

This study examines how users' perceived prior knowledge and experience of using search engines influence their perceived level of satisfaction in using the systems, and how their perceived intention to reuse the system is affected by their perceived level of satisfaction in using the search system. This paper describes an impact study, aimed at establishing the causal relationships between different attributes such as perceived prior knowledge, perceived level of satisfaction involving technology usage and perceived intension to reuse.

The findings from this study will provide insights into information seekers' perception about using web search engines and their perceived intention to reuse the systems. The results will help information systems and search engines designers to improve the system performance and build optimized search engines. It is also expected that IS, human-computer interactions, IS and information science researchers will benefit from this study to better understand users' interaction with the search engines and explore further research identifying other factors that affect user perception and success of using the systems. This will, in turn, provide insights into designing next-generation user interface to bridge the semantic gap between the system and its perspective users.

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2. LITERATURE REVIEW

2.1 Factors Affecting Web Search Interaction and Performance

Several existing studies have reported factors that influence web search performance such as task type complexity [11, 12], individual differences[examples: 13, 14-16], users' cognitive styles [17, 18], attitudes and approaches [19], perceived prior knowledge and experience [20, 21] and demographic factors amongst others. Important factors considered in the areas of human-computer interactions, and technology acceptance and usage, including intelligent information systems management are individual's perception, user adaptation, user satisfaction, user perception and behavioral intensions.

Previous studies suggest that users prior knowledge and experience in using Web search engines can influence their web search interaction and their perceived level of satisfaction. Lazonder and team [20] reported that users with Web search experience are more proficient in locating information on the web than their novice peers. The observed differences were credited to the experts' superior skills in operating web search engines. From the analysis of a large-scale data of real-world interactions, White, Dumais, and Teevan [21] reported that domain experts utilize different search strategies and are more successful in finding what they are looking for than non-expert users. The study also suggested that there is a good correlation between level of expertise and degree of search success.

Ford, Miller and Moss [22]reported that information retrieval effectiveness linked to the Internet perceptions of not finding one's way around, and lack of control and feelings that the Internet is too unstructured. In a study aimed to investigate behavioral intention to use an IS, Jackson, Chow and Leitch [4] reported that attitude seemed to play a central mediating role in the sense that attitude may be necessary but not sufficient condition for system success. Behavioral intention is understood as behavioral towards an information system predicted by their intentions to use the system.

In a similar study, Liaw and Huang [9] proposed a model of individual attitude towards search engines as a tool for retrieving information. The model illustrated that experiences using word processing packages and operating systems, quality of search engines and internet response time influenced users perceived enjoyment of search engines and perceived ease of use of search engines. The perceived usefulness of search engines influenced the intention to use search engines. Although the study provided insights into user attitudes towards search engines, the results were based on data collected by a questionnaire, which does not necessarily represent user interaction with the search engines. In the current study, users were assigned with three real-life search tasks to perform and their perceived level of prior knowledge and experience were gathered prior to the information searching experiment, and their perceptions of using the search engines were collected immediately at the end of the search task experiment.

2.2 Technology Acceptance Models (TAM) and IS Success

Several models were design to study success measures related to information use and ease of use of technologies. These models include but not limited to Web Success Model [23, 24], IS Success Model [25], Technology Acceptance Model (TAM) [26] , and Unified Theory of Acceptance and Use of Technology model [27] amongst the others.

TAM, the theory introduced by Davis [3], are developed and been widely utilized to depict how users accept and use a technology such as a new IS system. From a wide variety of fields including diffusion of innovations, marketing, human-computer interaction and self-efficacy theory, Davis investigated the causes underlying user adoption of information technology. Figure 1 illustrates TAM adopted from [26]. The TAM model suggests that when users are presented with a new technology, a number of factors influence their decision to either accept or reject. Davis and his team [26] reported two constructs, perceived usefulness and perceived ease of use, which are theorized to be fundamental determinants of user acceptance of technology. The TAM (Figure 1) explains the role of perceived ease of use and perceived usefulness in their relation with the system. Perceived usefulness is defined as the degree to which an individual believes that using a particular system would enhance his or her job performance. Perceived ease of use is defined as the degree to which an individual believes that using a particular system would be free of physical and mental effort. Perceived ease of use has a causal effect on perceived usefulness.

DeLone and McLean [25] developed a model of DeLone and McLean (D&M) IS Success model, in which they identified six categories of IS success: systems quality, information quality, use, user satisfaction, individual impact, and organizational impact. Since then, studies
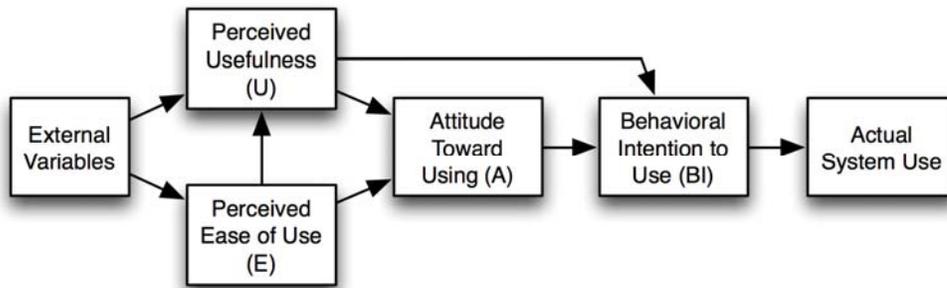

Fig 1: Technology Acceptance Model (TAM) (Davis, et al., 1989)

have reported relationships between user satisfaction and performance of IS. Based on analysis of a questionnaire survey of a large number of senior managers, Gelderman [28] found that user satisfaction is significantly related to performance of information systems. The systems that are more easy to use were used for longer and more frequently. Users who were more satisfied with timeliness of the information provided by their information systems were found to be using the system more frequently.

2.3 Users' Perceived Usefulness and Perceived Ease of Use of Web Search Engines

During information searching on the Web sites, users tend to accept or reject a web site and their acceptance is affected by the features of the Website, such as information quality of a web site, response time and system accessibility provided by the web site [29]. Chuan-Chuan Lin and Lu [29], further reported that the information systems quality was found to have impact on both perceived usefulness and ease of using a Web site. The user's beliefs also influenced his or her preference for a particular web site as well as the intension to reuse the web in future.

Using known constructs developed in the previous research models, Matheus [24] investigated perceived ease of use of web sites, perceived usefulness, perceived information quality, and perceived system quality. The study reported that perceptions of system quality of a web site are correlated to perceptions of information quality of a web site. Perceived information quality of a web site was found to be determinant of perceived usefulness. Perceived usefulness of the web site was also found to influence the usefulness of the website.

User's perceptions of web search engines are seen as having an influence on their searching strategies and interactions. Knight and Spink [30]proposed a micro model of human information retrieval behavior on the web and included a component of user perceptions. User perception of self, the system, and expected interactions between their self and the system, and their prior knowledge of searching strategies and retrieving are proved to be having an effect on the web searching performance.

The above-mentioned studies indicated that a large number of research have been conducted to identify those factors that influence user's acceptance of technology usage and their perception about ease of use, and develop models to measure technology acceptance and IS success. However, limited studies have been conducted to illustrate causal relationships between perceived prior knowledge and experience, perceived level of satisfaction of using web search engines and perceived intension to reuse the systems. Determination of factors affecting user perception or intention to use a system and modeling these attributes are important to our understanding of their role in the successful implementation of the systems. This will also provide feedback to system designers, researchers and practitioners. This study examines and models these aspects of perceived prior knowledge, usefulness and perceived ease of use of search engines from users' perspective.

2.4 Research Aims and Hypotheses

The main purpose of the study is to theorize the attributes of prior knowledge and experience, perceived satisfaction, and perceived intension to reuse a system from users' perspective. It broadens our understanding of the factors affecting a user's perceived satisfaction with the web search engines and perceived intension to reuse

the systems. This will have implications for future research, systems design and systems implementation.

This research is based on a number of attributes and theoretical assumptions that are drawn from the literature review. This study focuses on three attributes:

A1: User's perceived level of prior knowledge and experience in using web search engines,

A2: User's perceived level of satisfaction with web search engines in terms of satisfaction for search retrieved results and search engine response time, and

A3: User's perceived intention to reuse the system.

The ultimate goal of the study is to illustrate causal relationship between these three attributes.

2.5 Research Hypotheses

The research proposes the following hypotheses.

H1: Perceived level of prior knowledge and experience of an individual in using keyword, Boolean and advanced web searching (A1) influences his or her perceived level of satisfaction of the web search engines (A2). Several studies have shown that a number of factors influence usefulness of a system, such as user's cognitive style, attitudes and approaches. While searching information on the web, users tend to accept or reject a web site and their acceptance is affected by a number of factors. Therefore, it is assumed that a user's prior knowledge and experience in using Web search engines is one of the determinants of their perceived level of satisfaction of using search engines.

H2: Perceived level of satisfaction of using web search engines (A2) of an individual influences his or her perceived intention to reuse the system (A3). Literature reviews have reported that several factors, including perceived usefulness and ease of use involving technology influence user's acceptance of the technology. It is

believed that a user's perceived level of satisfaction in using web search engines influences their perceived intention to reuse the system. If users are satisfied with the results of the retrieved web searches, they are likely to continue using the search engines in future to perform similar search tasks.

Figure 2 represents the graphical representation of the research hypotheses developed for this paper. In the model, the two hypotheses are denoted by H1 and H2, while three attributes are represented by A1, A2 and A3. In the model, unidirectional arrows linking two variables together represent the hypothetical causal relationships.

3. METHODOLOGY

3.1 Procedure

50 volunteers consisting of students, academics and professional staff from Queensland University of Technology were recruited in this study between January 2010 and April 2011[31]. An invitation to participate in the study was sent via university email. Participation to the study was confirmed via email returns. The sampling target of the study was the general university population. It is believed that students, academics and professional staff of a university can be expected to represent the target population. Therefore, efforts were made to include equal number of males and females across different age group and occupations, such as student, academic or professional staff; this was done following the responses from the prospective participants prior to participation in the study.

Initially sixty-five (65) responses were received either by phone or email return, of which 50 participants were recruited for the study. Therefore, the response rate was 76.92%. The target population was approximately 5000 staff and students. The whole data collection procedures and process, including data collection instruments and data analysis techniques, was first tested during a pilot testing. Following the pilot study, necessary changes to the research design were made.
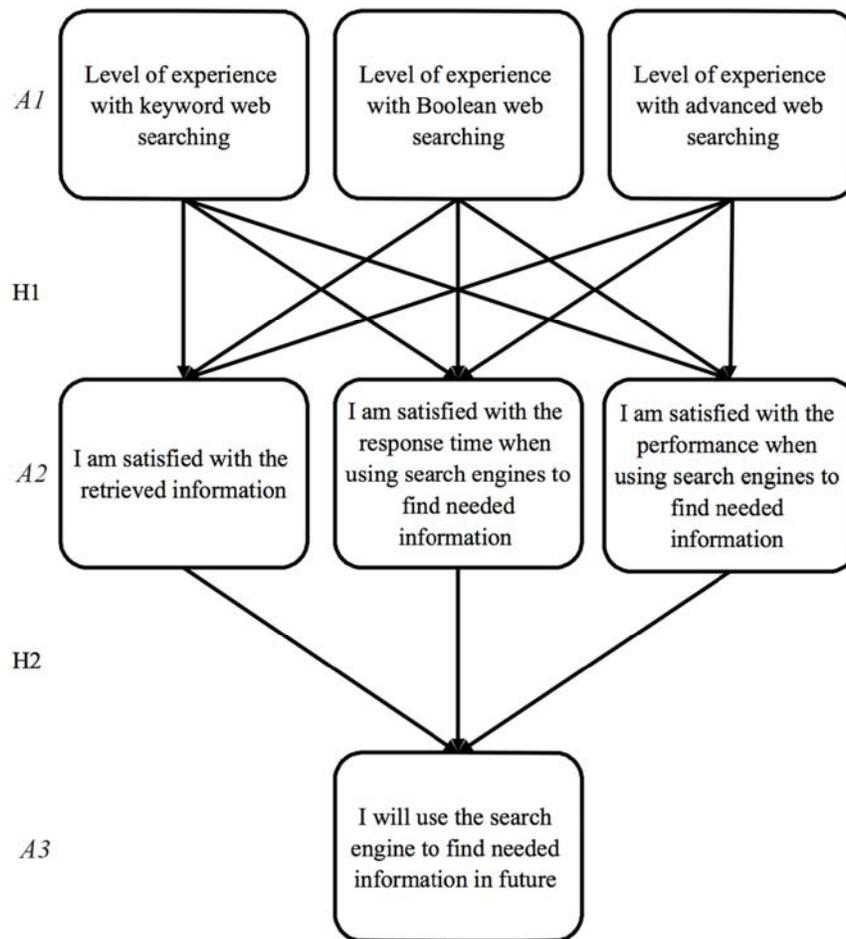
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Fig 2: Research Hypotheses

3.2 Search Tasks

Each study participant was assigned with three sets of information searching tasks. Each participant was provided with a laptop with Internet access for the search task experiment. Participants were free to choose whatever search engines they wish to use to search the required information. Although the participants were never stopped while performing their search tasks, it was recommended that they spend between 10 and 15 minutes on each search task

Three sets of search tasks were developed for the study as illustrated below.

Task 1: You have recently moved to Austin, Texas, USA, and would like to know the relevant laws passed by the Texas State government regarding child safety while travelling in vehicles. Identify three such rules.

Task 2: You, with your two friends, are planning a trek for one week in Solukhumbu in Nepal. The trekking will occur next month. You are told that tourists trekking in the place may get high-altitude illness. You decide that you should know more about the place, and the symptoms, seriousness and prevention of high-altitude sickness.

Task 3: You recently heard about the Bermuda Triangle mystery, and you are curious and want to know more about it. So you want to search any relevant information(articles, images and videos) about it and what effect it has on the travelers in the region.

Based on Borlund and Ingwersen's [32] concept of a "simulated work task situation" or scenario, the search tasks were designed to ensure that these tasks would be as close as possible to real world situations. The simulated work task situation provides each searcher with the context, which ensures "a degree of freedom" to react in relation to his or her interpretation of the given situation [32]. It was also assumed that such tasks will provide searchers the avenues to use keyword, Boolean and advanced search depending on the prior search experience and skills of the user.

3.3 Data Collection

Table 1 illustrates the variables identified in this study. Prior to their information searching experiment, participants were asked to complete a questionnaire. This questionnaire has two parts 1) demographic information including gender, age group, status, web information search experiences measured in terms of number of years, and 2) perceived level of experience in information searching using (1) keyword searching, (2) Boolean searching, and (3) advanced searching. These variables of perceived level of prior knowledge and experience are outlined in Table 1 Part A.

Once the participants had completed their search task experiments, they were given a second set of questionnaire to complete. The post-search task questionnaire collected data about the users' perceived level of satisfaction in using search engines and their perceived intention to use the system in future. These variables are defined in Table 1 Part B and Part C, and assessed using a five-point Likert scale.

3.4 Data Analysis

In order to examine associations between users' perceived prior level of knowledge and perceived level of satisfaction in using the web search engines, a series of statistical analyses were performed. A parametric Pearson correlation analysis was performed to establish correlations between users' perceived level of prior knowledge (see Table 1 Part A), perceived level of satisfaction (Table 1 Part B), and perceived intention to use the system in future (Table 1 Part C).

Table 1: Variables

Variables	Levels
Part A: Perceived level of prior knowledge and experience in web searching	
LEK	Level of experience with keyword information searching
LEB	Level of experience with Boolean information searching
LEA	Level of experience with advanced information searching
Part B: Perceived level of satisfaction in using the web search engines	
SIR	I am satisfied with the retrieved information
SRT	I am satisfied with the response time when using search engines to find needed information
SPF	I am satisfied with the performance when using search engines to find needed information
Part C: Perceived intention to use the systems (web search engines) in future	
IUF	I will use the search engine to find needed information in future

In order to examine the influence of users' perceived level of satisfaction in using web search engines on their perceived intention to use the systems in future, a series of linear regression analyses were performed with SIR, SRT and SPF as independent variables and IUF as a dependent variable; the definitions of these variables are described in Table 1. Regression analysis is a statistical method used to identify the relationships between dependent variables and one or more independent variables. It identifies the extent to which variation in dependent variable can be predicted by variations in the independent variables.

4. RESULTS

This paper focuses on associations between users' prior knowledge and perceived level of satisfaction in using the web search engines and their impact on the perceived intention to reuse the web search engines.

4.1 Demographic

A total of 50 participants comprising students, academics and professional staff from Queensland University of Technology participated in the study. Out of 50 participants, 26 were males, accounting for 52 % of the study sample and 24 were females (48%). 50 % of them were students, 28% of them were staff, while 22% of them were both a student and staff at the university. More than 58% of the participant populations were aged between 26 and 35 years of age. 4% of them were between 46 and 55 years of age, while only 2% of the participants were over 56 years of age. 6% of the participants were under 20 years of age. The study benefited by including participants from different age groups; it was therefore not focused on a particular age group, but rather targeted users of all ages.

4.2 Prior Knowledge and Experience with Keyword, Boolean, and Advanced Searching

Participants' level of prior experience with keyword, Boolean and advanced information searching using search engines were collected by a pre-task questionnaire and assessed by a five-point Likert scale. The frequencies of participants who scored between 1 (no previous experience) and 5 (extensive experience) on a five-point Likert scale are illustrated in Figure 3. The descriptive statistics, i.e., means and standard deviations (SD) of the participants' level of information searching experience with keyword searching, Boolean and information searching using advanced search features on a five-point scale are further illustrated in Table 2.

Table 2: Descriptive frequencies and statistics (means and standard deviations (SD) on a five-point Likert scale') for participant's level of information searching experience

Variables	Min	Max	Mean	SD
LEK	3	5	4.50	.707
LEB	1	5	3.42	1.197
LEA	1	5	3.16	1.167

As shown in Figure 3, participants' perceived level of prior experience with keyword information searching was very good, with a mean of 4.5 on a five-point scale. 31 participants (62%) were found to have extensive keyword search experience (scoring 5 on Likert scale), 6 (12%) with average skill, and 13 participants (26%) between average and extensive experience. However, as illustrated in Table 2, their information searching skill with the use of Booleans and advanced web search features was not so good as compared to keyword information search experience; the means for Boolean and advanced search were 3.42 and 3.16 respectively compared to 4.5 out of 5 for keyword searching experience. The number of participants with extensive experience, scoring 5 out of 5 on

Likert scale, in Boolean and advance information searching is fairly less compared to their experience with keyword searching. Out of 50 participants, only 12 participants (24%) and 6 participants (12%) had extensive experience in Boolean and advanced searching respectively, compared to 31 participants who scored 5 out of 5 in keyword searching experience.

4.3 Level of Participants' Perceived Satisfaction and Perceived Intention to Reuse The System

Information on the participants' perceived satisfaction with the search efficiency and intention to use the system were collected by using by a post-task questionnaire, and measured using a five-point Likert scale, 1 being the least (strongly disagree) and 5 being the most (strongly agree). Table 3 illustrates the participants' perceived level of satisfaction and perceived intention to use the system in future in terms of the four variables: SIR, SRT, SPF, and IUF; these variables were defined in Table 1.

Participants, in general, were satisfied with the information being retrieved, with the response time and performance of the search engines, as indicated by their score on the variables SIR, SRT and SPF. The mean value of these variables was 4.10 on a five-point scale with very little variations (standard deviation) between the values (less than 0.85). The minimum score for these variables was 2 on a five-point scale, while the maximum was 5 out of 5. The table also indicates that among the four variables, on an average the participants scored high for the IUF (mean = 4.45), while they scored least for the SIR (mean = 3.86). This indicated that users, in general, are more likely to use the system in future to find similar information.
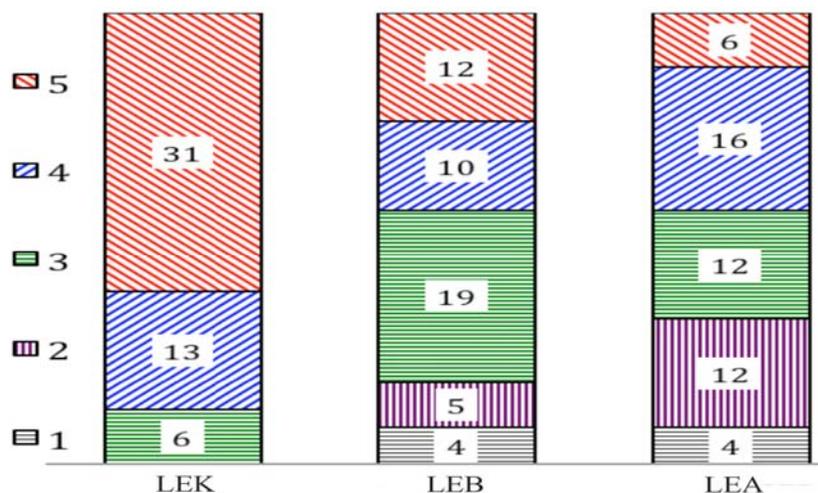

Fig 3: Descriptive frequencies of participants who have scored 1 (no previous experience) to 5 (extensive experience) on a five-point Likert scale for their level of information searching experience

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Table 3: Perception of satisfaction and future intention
Means distributions

Variables	N	Min	Max	Mean	SD
SIR	50	2	5	3.86	.645
SRT	50	2	5	4.10	.848
SPF	50	2	5	4.02	.829
IUF	50	2	5	4.45	.679

4.4 Associations between Users' Perceived Prior Knowledge and Perceived Level of Satisfaction

In order to test the research hypotheses illustrated in Figure 2, a number of quantitative analysis tests were performed to establish relationships between different variables defined in Table 1. A parametric Pearson correlation analysis was carried out to find out if there is correlation between these variables. The correlation coefficients among the variables are illustrated in Table 4. The results indicated that there is a significant correlation between certain variables. For example, there is a significant association between level of experience with keyword and the level of experience in using Boolean.

The main aim of the correlation analysis was to identify associations between users' perceived prior knowledge and their perceived level of satisfaction (hypothesis H1). The Pearson correlation test showed a significant linear relationship between users' perceived level of experience in information searching using Boolean (LEB) and advanced search features (LEA) ($r = .565$, $p < 0.05$), and between user's perceived level of prior knowledge in using keyword information searching (LEK) and their perceived level of satisfaction with the information being retrieved by the system (SIR)($r = .330$, $p < 0.05$), between the level of experience with keyword information searching (LEK) and their perceived satisfaction of the response time of search engine (SRT) ($r = .327$, $p < 0.05$), and between the level of experience in information searching using keywords (LEK) and SPF ($r = .477$, $p < 0.05$). This clearly shows that, in general, there is a significant association between the independent variables, such as LEK, and the dependent variables, such as SIR, SRT and SPF.

Table 4: Correlations between variables

	Variables	2	3	4	5	6	7
1	LEK	.422[*]	.247	.330[*]	.327[*]	.477[*]	.336[*]
2	LEB		.565[*]	.324[*]	.014	.142	
3	LEA			.086	.025	.018	
4	SIR				.408[*]	.512[*]	.482[*]
5	SRT					.620[*]	.426[*]
6	SPF						.465[*]
7	IUF						
[*]p <0.05							

4.5 Associations between Perceived Level of Satisfaction and Their Perceived Intention to Reuse the System

As illustrated in Table 4, the Pearson correction coefficient test revealed that there was a significant correlation between SIR, SRT and SPF, and IUF. In order to examine the effects of users' perceived level of satisfaction of using search engines on their perceived intention to use the system in future (hypothesis H2), a series of linear regression analyses were performed with SIR, SRT and SPF as independent variables and IUF as the dependent variable. Factors that affect other factors, known as 'dependent variables', or that influence the outcome of an experiment are known as independent variables. Dependent variables are factors that are affected during an experiment or factors that depend on the independent variables chosen.

Although there is a significant correlation between the dependent and independent variables (see Table 4), the regression analysis result showed that only the independent variable SIR could predict users' perceived intention to use the system in future IUF ($F(3, 45) = 6.93$, $p < 0.001$, $R^2 = 0.32$). In other words, the users' perceived level of satisfaction in searching the information and in using the search engines could significantly predict the use of the information systems in future. The results demonstrated that users who believe that they are satisfied with their information searching experience with the search engines are more likely to use the systems in future to perform similar tasks.

The statistical analysis results (Table 4) moderately supported the research hypotheses presented in Figure 2. Based on the analysis results, the hypothesis research model presented in Figure 2 was modified. The new model, presented in Figure 4, illustrates the

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significant associations between users' perceived prior knowledge and perceived level of satisfaction, and associations between their perceived level of satisfaction in using search engines and their perceived intention to use the system in future.

This study produced results, which corroborate the findings of many previous studies in user search experience research and IS evaluation studies[8, 25, 28, 33, 34]. The study findings supported previous research that users' perceived level of prior knowledge and satisfaction affects their perceived intension to reuse the system[24].

5. DISCUSSIONS AND IMPLICATIONS

A parametric Pearson correlation analysis and linear regression analyses were performed to find (1) the associations between different variables in general, (2) correlations between users' perceived prior

knowledge of using the system and their perceived level of satisfaction, and (3) associations between users' perceived level of satisfaction in using the web search engines and their perceived intention to use the system in future.

In general, the results from the Pearson correlation analysis show that users' prior level of experience with keyword information search affected their perceived level of satisfaction with the retrieved information, response time of the search engines and their perceived satisfaction of the performance of the search engines. The users' perceived level of experience with Boolean information searching influences their perceived level of satisfaction with retrieved information. This indicates that users with high level of perceived prior knowledge of search experience in using keywords or Booleans are deemed to be satisfied with their search experience, search engine's response time and performance.
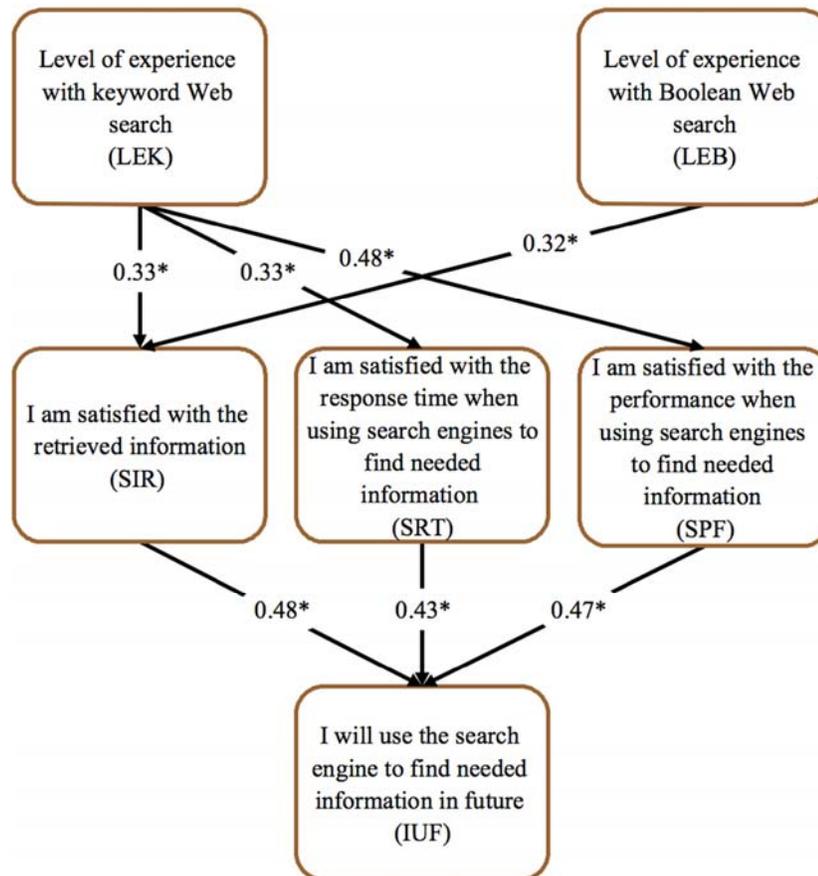

Fig 4: Correlations between users' prior knowledge, perceived level of satisfaction, and perceived future use of the systems * $p < 0.05$

Thus, the statistical analysis results partially supported the hypothesis H1 of the research hypotheses (Figure 2). As illustrated in Figure 4, hypothesis H1 was partially supported as the study results found significant correlations between (1) level of experience in using keyword web searching (LEK) and perceived level of satisfaction (SIR, SRT and SPF), and (2) between level of experience in using Boolean web searching (LEB) and SIR. However, there was no significant correlation between (1) LEB, and SRT and SPF, and (2) level of experience in using advance web searching (LEA) and level of perceived level of satisfaction (SIR, SRT and SPF).

The study results from the correlation analyses show that users' perceived level of satisfaction in using web search engines with search experience determines whether they intend to use the web search engines in future. Users who believe that they are satisfied with their searching results and retrieved information with the search engines are more likely to use the web search engines in future to search perform similar task. The factor, perceived level of satisfaction, was determinant of whether users will use the systems (search engines) in future or not. Thus, the hypothesis H2 was supported. As indicated in Figure 4, there was a significant correlation between perceived level of satisfaction (SIR, SRT and SPF) and perceived intention to use the system in future (IUF).

The results from this study provided insights into users' perceived level of satisfaction in using the search engines and their impact on perceived intention to use the system in future. Based on the track record of users' prior knowledge of information searching, it is possible to predict their perceived level of satisfaction in using the search engines and information systems. Similarly, based on the users' perceived level of satisfaction in using the search engines, it is possible to predict whether the user intends to use the information systems in future to perform similar tasks. The earlier study reported that the acceptance and use of technology by users appears to be limited due to fear of technology, resistance to new technology, and not understanding the importance of technology [8]. It is believed that understanding and improving users' perceived level of satisfaction could overcome this resistance faced by them.

Therefore, the study findings may help information systems and search engines designers and developers to build a better search engines (or any information systems) for users. Improving and optimizing search engine interaction interface could minimize the issues faced by users while interacting with the search engines, and subsequently increase user acceptance of the web search engines or any other information systems.

Information systems, human-computer interactions and information science researchers may also benefit from this study to better understand users' interaction with the search engines. They could explore further research to investigate user satisfaction, acceptance and use of web search engines and provide insights into designing next-generation user interface to bridge the semantic gap between the system and its perspective users. Information managers and librarians can also utilize the study's findings to guide and support clients' online information searching.

6. CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH

This study investigated search engine users' perception of their prior knowledge in using Web search engines, their perceived level of satisfaction with the retrieved results and the search engines, and its impact on their perceived intention to use the system in future. The study results revealed that users' level of prior knowledge and experience in using keyword search affected their level of satisfaction with the retrieved results, response time of the search engines, and the performance of the search engines. Information searchers' perceived level of satisfaction with retrieved search results, response time, and performance of the search engines influenced their perceived intention to use the system in future. Users who are satisfied with their search results, search engines' response time and performance, indicated that they will use the search engines in future.

Based on the results from the statistical analyses, a hypothesis-based model (see Figure 4) was developed to illustrate the causal relationships. The model depicts causal relationships between user's prior knowledge and experience, perceived level of satisfaction of the search results and search engines' response time, and perceived intension to reuse the system. The model provides insights into users' web search behavior and their acceptance of the technology, i.e. web search engines.

The study results provided significant results on prior knowledge, perceived satisfaction and perceived intension to reuse systems - web search engines, from user's perspective. However, there were some shortcomings in the overall conduct of the study. Study participants were assigned three pre-designed search tasks. Although the assigned search tasks were designed as close as possible to real-world situations [32], and with a diverse area of topics, the subject motivation was a key issue. Some participants were familiar with certain topics, while others were not. These differences in prior knowledge about the subject might have inferred the study's findings.

The researcher is concerned about participants' information needs due to the fact that the search tasks were pre-designed, as these search tasks might have limited the participant's information need. Their information need was limited to what was required to perform the assigned search tasks, rather than being given a choice to search their own personal information need. The time limit for performing the search tasks was also limited. Although the participants were never stopped while performing their search tasks, it was recommended

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that they spend between 10 and 15 minutes on each search task. 50 participants comprising students, academic and professional staff from Queensland University of Technology participated in this study. Although the participants represented target sample distribution of gender, age, and occupations (i.e., staff or students), the researcher is concerned about whether this could be considered to be representative of general web searchers or information system users.

As noted earlier, this paper focuses on the three aspects: user's prior knowledge and experience with search engines, perceived level of satisfaction of the retrieved search results and search engines' response time, and perceived intention to reuse the system. Therefore, other aspects of users' interaction with web search engines, such as modeling web search behavior or impact of search task complexity on users' web search interactions, are beyond the scope of the current paper.

The study results as well as its limitations offer theoretical insights and research directions for future studies. Future studies could include open search tasks by asking participants to come with their own sets of questions and identified information problem and then finding solutions. Literature review indicated that, besides prior knowledge and experience, there are several factors that influence user's interaction with technology or a system, and perceived ease of use, which we aim to investigate in our future study.

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