ATINER CONFERENCE PAPER SERIES No: PSY2012-0247

Athens Institute for Education and Research
ATINER

ATINER's Conference Paper Series
PSY2012-0247

Experience and Self-Efficacy with Information Retrieval on the Web: Research Development Still Needed beyond the West Starting in China

Carole Rodon
Researcher
Shanghai Academy of Social Sciences (SASS)
China

ATINER CONFERENCE PAPER SERIES No: PSY2012-0247

Athens Institute for Education and Research
8 Valaoritou Street, Kolonaki, 10671 Athens, Greece
Tel: + 30 210 3634210 Fax: + 30 210 3634209
Email: info@atiner.gr URL: www.atiner.gr
URL Conference Papers Series: www.atiner.gr/papers.htm

ISSN **2241-2891**
19/09/2012

An Introduction to ATINER's Conference Paper Series

ATINER started to publish this conference papers series in 2012. It includes only the papers submitted for publication after they were presented at one of the conferences organized by our Institute every year. The papers published in the series have not been refereed and are published as they were submitted by the author. The series serves two purposes. First, we want to disseminate the information as fast as possible. Second, by doing so, the authors can receive comments useful to revise their papers before they are considered for publication in one of ATINER's books, following our standard procedures of a blind review.

Dr. Gregory T. Papanikos
President
Athens Institute for Education and Research

This paper should be cited as follows:

Rodon, C. (2012) "**Experience and Self-Efficacy with Information Retrieval on the Web: Research Development Still Needed beyond the West Starting in China**" Athens: ATINER'S Conference Paper Series, No: PSY2012-0247.

Experience and Self-Efficacy with Information Retrieval on the Web: Research Development Still Needed beyond the West Starting in China

Carole Rodon
Researcher
Shanghai Academy of Social Sciences (SASS) China

Abstract

In this paper, we introduce the difficulty to exhaustively measure experience levels in the field of Internet and information retrieval on the Web. We demonstrate that ISE research work development emerged then as a response to overcome this difficulty. Main of the ISE scales that has been developed benefit to the researcher community (in psychology, cognitive and ergonomy sciences) aiming a better understanding of Information retrieval practices on the Web. For instance, ISE scales could be useful in term of pedagogy (Internet-based learning, Internet literacy acquisition) or for the management of technologies (disuse situations). We highlight that since ISE developments mainly originate from the West, worldwide community of Internet users is only partially considered. It is argued that effort still need to be done toward more indigenous and cultural research developments while approaching the ISE factor and as a start in China. As a matter of demographic facts, Chinese internet users are the most numerous in the world.

Contact Information of Corresponding author: carole.rodon@hotmail.fr

Introduction

Internet is nowadays the interface of very numerous daily-life activities. A central one among these activities is the search on the Web for information (or information retrieval). Hence, the Web is referred as an external memory (Sperber, 2001) or a transactive memory (Sparrow, Liu & Wegner, 2011) since search engines allow to reach any kind of information whatever the field of knowledge. Without a doubt Internet changes the relationship with knowledge and the use of cognitive resources compared to the before-Internet era. A portion of our own internal memory focuses on this external memory: how to get there, where to get what, under which conditions. Dinet, Chevalier and Tricot (2012) stress out that people must develop new information searching skills so as to read them and exchange them. They argue people must become information literate; information literacy being the ability to recognize the extent and nature of an information need, then to locate and evaluate the needed information in diverse contexts (*in* Probert, 2009; Wilson, 1981). Overall, changes related to Internet still need to be described further, notably by focusing on Web search behaviours. Today one difficulty for explaining these behaviours and Internet usages generally speaking, is to be able to measure and to observe their relationships with Internet experience. In this paper we describe this difficulty reviewing the different levels of experience that might be involved for retrieving information on the Web. Then we introduce the current best alternative solution to cope with in the fields of psychology, cognitive, or ergonomy research: integrating Internet Self-Efficacy (ISE) measures to the research framework. Despite many scales have been developed we demonstrate that effort still need to be done toward more indigenous and cultural research developments while approaching the ISE factor. We pledge for embracing all internet users across the world and not being limited to Westerner users. A better understanding of Internet usages and especially information retrieval behaviors and related performance are at stake. Thus, we suggest further research development about Chinese users' ISE might be relevant; as a matter of demographic facts, Chinese internet users are the most numerous in the world.

Experience in information retrieval on the Web

Generally speaking, experience is a set of abilities, skills, knowledge required to achieve an activity. Theses skills are large or small depending on initial training and/or ongoing acquisitions (Rodon, 2008). Distinctively, information retrieval on the Web is a rarely formally taught activity which might provide proven performance standards. It may rely more on a voluntary use basis, on autonomous learning behaviors by trial-errors strategies or even vicarious learning. Referring to Ericsson & Charness (1994) the opportunity to engage in deliberate search activity on the Web for its intrinsic interest may be beneficial to the experience. However, based on some studies examining the

role of experience in searching for information within hypermedia and Web sites, it appears difficult to describe the experience of finding information on the Web (see several references *in* Rodon, Chevalier & Meyer, 2008). There is no consensus among authors which poses many challenges. Especially, the nature of the relationship between experience and level of performance in this area of activity is difficult to establish. While performance can be measured, inferences about which skills are involved in the performance are ambiguous. It is difficult to conclude for example if a search session failure is due either 1/to a lack of experience and knowledge in seeking information, or 2/to some technical properties of the Web such as its dynamic nature (Rodon & Meyer 2012a), or 3/even to the semantic formulation of the search question. Finally, it is difficult to establish the classical continuum between novice, experienced and expert users (Rogalski & Marquié, 2004; Shanteau, 1992a, 1992b). All in all, it is still hard to describe all the different and exhaustive abilities features that compose the information retrieval on the Web literacy. Classically, authors refer to seniority and frequency of use since ability to search for information on Internet will be nurture along time and according to how often one uses the Web. Besides, having a look at the different types of knowledge involved in the Internet search activity suggests that any research study investigation should not call the sole seniority and frequency of Internet use criteria to define levels of experience in this field (Rodon, Chevalier & Meyer, 2008). First and foremost, interacting with Internet regardless of the goal pursued implies to have a minimum of operating knowledge in computer and secondly to have knowledge in the use of Internet. At a specific level, the initial level of experience with the domain of knowledge to interrogate on the Web shall be considered. Whether the Web search is related to a field of information that is totally unknown or for which internet users already possess some insights will affect on-line behaviors and performance as well. Additionally, previous experience of search on the Web in a given knowledge domain is another level of experience that may play a role. Experience in a given field of knowledge and experience of search on the Web related to this same field of knowledge are two levels of experience that mutually reinforce each other under certain conditions. A good level of knowledge in economics facilitates investigation in this area on the Web (Hölscher & Strube, 2000). Prior possession of relevant conceptual knowledge allows, in certain cases to determine the best strategies and select relevant information (Dinet, Chevalier & Tricot, 2012; Chevalier & Kicka, 2006; Ihadjadene & Martins, 2004). One's previous experience or no previous experience of search for information in the Web and one's initial level in the field of knowledge may condition assessment of the task difficulty. The point is that an attempt to comprehensively measure Internet experience and Web search experience factors clearly weighs down any based-on questionnaire or interview protocol for examples in social psychology, cognitive psychology or ergonomy, because it leads to multiply variables. An alternative idea is to proceed to a cutting *a posteriori* of experience levels from real performances. Otherwise, levels of experience can be stated retrospectively on the basis of strategies for finding information (Rodon,

Chevalier & Meyer, 2008; Aula & Nordhausen, 2006; Leroy, Lally, & Chen, 2003). This methodological choice for the analysis of strategies found support in the approach of Shanteau and Stewart (1992). For these authors, this is the type of information used, relevant versus irrelevant, that distinguishes most experienced individuals (experts) from others. Plus, what is relevant in one context may not be in another one. However these two alternative methodologies also turn out from an operational point of view very costly.

Taking into consideration the self-efficacy factor instead of multiplying measures of different experience levels.

Today, it is a worthy solution to use as a complement to seniority and frequency of use for examples, a measure of self-efficacy. Indeed, self-efficacy (Bandura, 1997, 1977) is a renowned concept of the social cognitive agent perspective since the most influential factor on performance expectations and real performance in general is not so much the experience or the skill themselves, but rather the individual's judgment on his own abilities. Bandura (Bandura, 2002, 1999; Debowski, Wood, & Bandura, 2001) concerning electronic inquiry to get knowledge, supported that those who have a high sense of self-efficacy 1/have better strategies, 2/waste less time in missteps and redundancies and 3/gain greater knowledge than those who have an approach in the doubt concerning their skills for achieving a task. In other words, information search behaviors and performance depend more on how individuals think they have the abilities to search information on the Web than their seniority and/or frequency of Internet use. This explains jointly with Internet's expansion, the large interest for development of Internet Self Efficacy (I.S.E) measures. It testifies to the high usefulness and relevance of this factor. Reviewing literature, those measures can be classified according to their global or specific considerations of Internet self-efficacy. On one hand, there are scales of *global or generalized Internet Self-efficacy*, meaning that Internet is considered globally in its full aspects (Eachus & Cassidy, 2004; Hsu & Chiu, 2004; O' Malley & Kelleher, 2002; Torkzadeh & Van Dyke, 2001; Eastin & LaRose, 2000). Most of them refer directly to the computer self-efficacy of Compeau and Higgins (1995) by suggesting spreading it to the Internet domain. On another hand, some Internet self-efficacy scales are *applied to an activity or a domain*: for a system or a specific Web site (Hsu & Chiu, 2004; Yi & Hwang, 2003), for on-line purchase (Kuo, Chu, Hsu & Hsieh, 2004; O' Cass & Fenech, 2003), or for an on-line inquiries tool (Huang & Liaw, 2005). Finally, there is ISE measures *applied to on-line information retrieval or documentary search*. Ren (2000) deals with students' self-efficacy for information search via electronic sources of a university library. The scale of Monoi, O'hanlon and Diaz (2005) specifically deals with the ability of students for searching information on-line. Rodon (2008) highlights these scales differ significantly in their form. It may seem conceptual differences are thin and without consequences between *"I believe I have the ability"*, "*I can*",

"I could", and *"I feel confident"*. However these sentence starters have to be examined according to the level of abstraction of these items. Some describe a behavior to a general level (*"I feel confident trouble shooting Internet problems"*, Eastin & LaRose, 2000) when others precisely described one task (*"I feel confident creating a digital signature"*, Torkazadeh & Van Dyke, 2001, 2002). Besides, some items rely heavily on past experience by using a technical vocabulary (*"hardware"*, *"software"*, *"FTP Sites"*). Then, the risk is to define a simple measure of skills (such as *"I can do or not"*) instead of an actual measure of self-efficacy, the judgment of its own ability to perform behavior to achieve a result. On the basis of these critics about operationalization of ISE items, Rodon and Meyer (2012a, 2012b, 2005; Meyer & Rodon, 2004) design the Information Retrieval on Web Self-Efficacy (IROWSE) scale. Distinctively, it solely informs about the value attributed by an individual to its capacity to organize and to execute an information search on the Web. It does not consider Internet in its whole aspect and functions, only the Web as an encyclopaedic database. Moreover, the IROWSE scale can be applied to retrieval information on the Web whatever the knowledge fields. With only eight items, it allows overcoming the Internet experience factor measurement matter in an economic way by avoiding weighing down research protocol. It intends to French student population but not only. It is also suitable for worker population and even Web searcher professionals (experts). Furthermore, as proposed by Pajares & Schunk (2001, *in* Tsai, Chuang. Liuang & Tsai, 2011), the IROWSE scale predictability is more relevant in research related to information search on the Web since the self-efficacy is then assessed at a domain-specific level.

Toward indigenous and cultural development of ISE: The case of Internet users from the People's Republic of China (PRC)

All in all, it must be stated that ISE tools development and in general research investigation on Web information retrieval mainly originates from Western countries for Westerner Internet users. Aiming to develop a better understanding of this specific Internet usages, effort still need to be made toward more indigenous and cultural research development (Ward, 2007). At least, the ISE literature published at an international stage and accessible to international readers does not fairly represent the world internet users' population. As the best example, today Chinese internet users are the most numerous and count for 22% of the world Internet users' population. The Chinese official language, Mandarin, is the second language on Internet (Internet World Stats, 2012) after English. However, interest for ISE development in China still appears as low. Only three very recent studies provide validation to the Chinese context of ISE tools. Zhao and colleagues adapt ISE items from Hsu and Chiu (2004) aiming to investigate the high school students' intrinsic motivations (enjoyment and curiosity) to use Internet and related outcomes (Zhao, Lu, Wang & Huang, 2011) or the digital divide

(Zhao, Lu, Huang, & Wang, 2010). As for Shi, Chen and Tian (2011), they adapt Torkzadeh and Van Dyke general ISE (2001) while investigating its relationship with sensation seeking, need for cognition, and problematic use of Internet. Finally, Rodon and Meyer (2012c) develop the Chinese version of the IROWSE scale under the support of the STF Program from the EU delegation in China. At the moment from Asian countries, the main effort appears to be made by Taiwanese researcher counterparts as it is rather difficult to find other papers from other Asian countries. Besides Hsu and Chu (2004) and Kuo and al. (2004), Tsai and colleagues (Wu & Tsai, 2006; Peng & Tsai & Wu, 2006; Tsai & Lin, 2004; Tsai & Tsai, 2003) develop the Internet Self-Efficacy Survey (ISS) to explore first relationships between Taiwanese university students' attitudes and self-efficacy toward Internet. This survey includes the General Self-Efficacy scale and the Communicative Self-Efficacy scale. The first scale measures students' self-efficacy in general, such as using Internet related tools (*"I am good at searching information on the Internet"*). The second scale assesses students' confidence and expectation of Internet based communication or interaction (*"I think I can talk to others in online chatrooms"*). The ISS is presented in Chinese traditional characters. Further, Tsai provides some adaptations of the ISS for the purpose of research studies mainly focusing on Internet-based learning (Tsai & Tsai, 2010; Kao, & Tsai, 2009; Chu & Tsai, 2009; Liang & Tsai, 2008). Hence, the ISS form may vary in terms of number of items (9 to 14) and semantic/Likert-points answering scale. It is applied to Taiwanese high school, college and university students and elementary school teachers. In summary, research effort from Taiwan is a lead to follow starting by giving a continuation to the emerging ISE research work in the Chinese context.

Conclusion

In this paper, we explained how the ISE research work development responds to the need to overcome the difficulty to exhaustively measure Internet experience levels. We illustrated that many scales have been developed to take into account the Internet users self-efficacy with this technology. Thus ISE scales benefit to the researcher community in psychology, cognitive and ergonomy sciences for example aiming a better understanding of Information retrieval on the Web practices. ISE scales could be useful in state school and public library regarding Internet literacy and Internet-based learning (IBL). In professional environment it could be useful for the management of technologies (as Knowledge Management) when there is a gap between the potential of information technology and the real use (disuse situations). Nevertheless, since ISE developments are mainly Westerner, it is like the worldwide community of Internet users is considered very partially. Thus we argue that effort still need to be done toward more indigenous and cultural research developments while approaching the ISE factor and as a start in China, if only considering the demographic argument.

Further, one work is to define application fields for which priority research should be designed on the topic of information retrieval on the Web and ISE. Researches which found application in Internet-learned base (ILB) field appear as the mainstream at the moment lead by Taiwanese researchers. But other considerations should be encouraged. For instance, another track of applied research could be the health/medical information search on the Web by elderly users as China population is aging rapidly in a context of already troubled health care system.

References

Aula, A., & Nordhausen, K. (2006). Modeling successful performance in Web searching. *Journal of the American Society for Information Science and Technology, 57*(12), 1678-1693.

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84 (2), 191-215.

Bandura, A. (1997). *Self-efficacy: The exercise of Control*. New-York: Freeman.

Bandura, A. (1999). Social Cognitive Theory: An Agentic Perspective. *Asian Journal of Social Psychology*, 2, 21-41.

Bandura, A. (2002). Social Cognitive Theory in Cultural Context. *Applied Psychology*, 51 (2), 269-290.

Chevalier, A., & Kicka, M. (2006). Web Designers and Web Users: Influence of the Ergonomic Quality of the Web Site on the Information Search. *International Journal of Human-Computer Studies, 64*(10), 1031-1048.

Chu, J., & Tsai, C. (2009). Self-directed learning readiness, internet self-efficacy, and preferences toward constructivist Internet-based learning environments among adult learners. *Journal of Computer Assisted Learning*, 25, 489-501.

Compeau, D., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, 19 (2), 189-211.

Debowski, S., Wood, R.E., & Bandura, A. (2001). Impact of Guided Exploration and Enactive Exploration on Self-Regulatory Mechanisms and Information Acquisition Through Electronic Search. *Journal of Applied Psychology*, 86 (6), 1129-1141.

Dinet, J., Chevalier, A., Tricot, A. (2012). Information search activity: An overview. *European Review of Applied Psychology*, 62 (2), 49-62.

Eachus, P., & Cassidy, S. (2004). Development of the Web Users Self-Efficacy Scale (WUSE). In *Proceedings of Conference for Education in a Changing Environment*, 13th-14th September 2004.

Eastin, M.S., & LaRose, R. (2000). Internet Self-Efficacy and the Psychology of the Digital Divide. *Journal of Computer Mediated Communication*, 6 (1). Retrieved <28/10/2005> from the World Wide Web:http://jcmc.indiana.edu/vol6/ issue1/eastin.html.

Ericsson, A., & Charness, N. (1994). Expert performance: its structure and acquisition. *American Psychologist*, *49*, 725-747.

Hölscher, C., & Strube, G. (2000). Web search behavior of Internet experts and newbies. *Computer Networks*, *33*, 337-346.

Huang, M., & Liaw, S. (2005). Exploring users' attitudes and intentions toward the Web as a survey tool. *Computers in Human Behavior*, 21, 729-743.

Hsu, H. & Chiu, M. (2004). Internet self-efficacy and electronic service acceptance. *Decision Support Systems*, 38, 369-381.

Ihadjadene, M., & Martins, D. (2004). Expertise dans le domaine et expertise dans Internet : leurs effets sur la recherche d'informations. *Hermès*, *39*, 133-142.

Kao, P. & Tsai, C. (2009). Teachers' attitudes toward Web-based professional development, with relation to Internet self-efficacy and beliefs about Web-based learning, *Computers & Education*, 53(1), 66-73.

Kuo, F.Y., Chu, T.H., Hsu, M.H., & Hsieh, H.S. (2004). An investigation of effort–accuracy trade-off and the impact of self-efficacy on Web searching behaviours. *Decision Support Systems*, 37, 331-342.

Leroy, G., Lally, M., & Chen, H. (2003). The use of dynamic contexts to improve casual internet searching. *ACM Transactions on Information Systems*, 21(3), 229-253.

Liang, C., & Tsai, C. (2008). Internet self-efficacy and preferences toward constructivist Internet-based learning environments: A study of pre-school teachers in Taiwan. *Educational Technology & Society*, 11(1), 226-237.

Meyer, T., & Rodon, C. (2004). Trouver sur Internet une réponse à une question :auto-efficacité et illusion de compétence [Finding an answer to a question using the Web: self-efficacy and illusion of competence]. In: Perriault, J. (Ed.), *HERMES – Cognition, communication, politique : pour une critique de la raison numérique* [Cognition, communication, politics: a critical approach of the digital mind]. CNRS Editions, Paris, pp. 27–34.

Monoi, S., O'Hanlon, N., & Diaz, R. (2005). Online Searching Skills: Development of an Inventory to Assess Self-Efficacy. *The Journal of Academic Librarianship*, 31 (2), 98-105.

O'Cass, A., & Fenech, T. (2003). Webretailing adoption: exploring the nature of internet users. Journal of Retailing and Consumer Services, 10, 81-94.

Peng, H., Tsai, C., & Wu, T. (2006). University students' self-efficacy and their attitudes toward the Internet: The role of students' perceptions of the Internet. *Educational Studies*, 32, 73-86.

Ren, W.H. (2000). Library Instruction and College Student Self- Efficacy in Electronic Information Searching. *The Journal of Academic Librarianship*, 26, (5), 323-328.

Rodon, C. (2005). Le Jugement de sa capacité à se documenter sur Internet : Développement d'une échelle d'Auto-Efficacité spécifique à l'interrogation du W.W.W. Présentation de poster. *Première Rencontre du Réseau Parisien de Psychologie Sociale (REPAPS)*, Nanterre. 30 mai 2005.

Rodon, C. (2008). [translated French title] *Information retrieval on the Web: exaggerated optimism for success and exaggerated pessimism for search duration.* Unpublished Doctoral Dissertation. University Paris Ouest Nanterre La Defense, Nanterre, France.

Rodon, C., Chevalier, A., & Meyer, T. (2008). Peut-on définir des niveaux d'expérience en recherche d'informations sur le Web à partir des stratégies des internautes ? [*Can levels of information retrieval on the web's Experience be defined from internet users strategies?*] Oral presentation. *14th JETCSIC* [Day of Study on the Cognitive Treatment of the Complex Information systems], Toulouse, France, July 2008.

Rodon, C. & Meyer, T. (2012a). Searching information on the Web and Planning Fallacy: A pilot study of pessimistic forecasts. *European Review of Applied Psychology*, 62 (2), 103-109.

Rodon, C., & Meyer, T.(2012b, research completed manuscript in progress). Development and validation of the Information Retrieval on the Web' Self-Efficacy scale (IROWSE) in French language.

Rodon, C. & Meyer, T. (2012c, research completed, manuscript in progress). The Chinese version of the information retrieval on Web' self-efficacy scale (IROWSE).

Rogalski, J., & Marquié, J.-C. (2004). Évolution des compétences et des performances. In J.-M. Hoc & F. Darses (Éds.), *Psychologie ergonomique* (pp. 141-173). Paris: PUF.

Shanteau, J. (1992a). How much information an expert use? Is it Relevant? *Acta psychologica*, 81, 75-86.

Shanteau, J. (1992b). The psychology of experts: An alternative View. *In* Wright, G. & Bolger, F. (Eds.), *Expertise and decision Support* (pp. 11-23). Plenum Press, NY.

Shanteau, J., & Stewart, R. (1992). Why study expert decision making? Some historical perspectives and comments. *Organizational Behavior and Human Decision Processes, 53*, 95-106.

Shi, J., Chen, Z., & Tian, M. (2011). Internet Self-Efficacy, the Need for Cognition, and Sensation Seeking as Predictors of Problematic Use of the Internet. *Cyberpsychology, Behavior, and Social Networking*, 14(4), 231-234.

Sparrow, B, Liu, J. & Wegner, D. (2011). Google Effects on Memory: Cognitive consequences of Having Information at Our Fingertips. *Science*, 333 (6043), 776-778.

Sperber, D. (2001). L'individuel sous influence du collectif, *La Recherche*, 344, 32-35.

Torkzadeh, G. & Van Dyke, P. (2001). Development and Validation of an Internet Self-efficacy Scale. *Behaviour & Information Technology*, 20, 275-280.

Tsai, C., Chuang, C., Liang, C., & Tsai, J. (2011). Self-efficacy in Internet-based Learning Environments: A Literature Review. *Educational Technology & Society*, 14 (4), 222-240.

Tsai, C., & Lin, C. (2004). Taiwanese adolescents' perceptions and attitudes regarding the Internet: exploring gender differences. *Adolescence*, 39, 725-734.

Tsai, G. & Tsai, C. (2010). Junior high school students' Internet usage and self-efficacy: A re-examination of the gender gap. *Computers & Education*, 54, 1182-1192.

Tsai, J., & Tsai, C. (2003). Information searching strategies in Web-based science learning: the role of Internet self-efficacy. *Innovations in Education and Teaching International*, 40, 43-50.

Ward, C. (2007). Asian social psychology: Looking in and looking out. *Asian Journal of Social Psychology*, 10, 22-31.

Wu, T., & Tsai, C. (2006). University students' Internet attitudes and Internet self-efficacy: A study at three universities in Taiwan. *Cyber Psychology & Behavior*, 9, 441-450.

Yi, M.Y., & Hwang, Y. (2003). Predicting the use of Web-based information systems: self-efficacy, enjoyment, learning goal orientation, and the technology acceptance model. *International Journal of Human-Computer Studies*, 59, 431-449.

Zhao, L., Lu, Y., Huang, W., & Wang, Q. (2010). Internet inequality: The relationship between high school students' Internet use in different locations and their Internet self-efficacy, *Computers & Education*, 55, 1405-1423.

Zhao, L., Lu, Y., Wang, B., & Huang, W. (2011). What makes them happy and curious online? An empirical study on high school students' Internet use from a self-determination theory perspective. *Computers & Education*, 576, 346-356.