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Development of the Web Users Self-Efficacy Scale (WUSE)

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Abstract

The aim of this research was to develop a scale that could evaluate an individual's confidence in using the Internet. Web-based resources are becoming increasingly important within higher education and it is therefore vital that students and staff feel confident and competent in the access, provision, and utilisation of these resources. The scale developed here represents an extension of previous research (Cassidy and Eachus, 2002) which developed a measure of self-efficacy in the context of computer use. An iterative approach was used in the development of the WUSE and the participants were recruited via a web site set up for this purpose. Initial findings suggest that the scale has acceptable standards of reliability and validity though work is continuing to improve the psychometric properties of the scale.

Introduction

The construct of self-efficacy has emerged as a central facet of social cognitive theory. Bandura (1986) suggests that behaviour is best understood in terms of "triadic reciprocity", where behaviour, cognition and environment exist in a reciprocal relationship and thereby influence, or are determined to a great extent, by each other. Self-efficacy can be defined as the beliefs a person has about their capabilities to successfully perform a particular behaviour or task. Levels of self-efficacy are thought to be determined by such things as previous experience (success and failure), vicarious experience (observing others' successes and failures), verbal persuasion (from peers, colleagues, relatives) and affective state (emotional arousal, e.g. anxiety). Self-efficacy levels have been shown to be related to choice of task, motivational level, and effort and perseverance with the task. Because self-efficacy is based on self-perceptions regarding particular behaviours, the construct is considered to be situation specific or domain sensitive (Cassidy and Eachus, 2002). That is, a person may exhibit high levels of self-efficacy (indicating a high level of confidence) within one domain, for example sport, whilst simultaneously exhibiting low levels of self-efficacy within another domain such as academic ability. The suggestion made by Bandura (1986) is that the perception that one has the capabilities to perform a task will increase the likelihood that the task will be completed successfully.

Self-efficacy beliefs have been shown to influence behaviour in a wide variety of contexts, for example, mental and physical health, (Bandura, 1986; Schwarzer, 1992), stock market investment (Eachus, 1994), academic achievement (Eachus, 1993; Eachus and Cassidy, 1997; Cassidy and Eachus, 2000) and computer use (Cassidy and Eachus, 2002). The current paper examines self-efficacy beliefs within the context of e-learning with specific reference to Internet or Web based resources.

Access to the Internet is becoming increasingly commonplace and although the human computer interface is becoming increasingly intuitive, for inexperienced users there are still formidable problems. The Internet has the potential to impact on many facets of our daily lives, but for many people the ability to exert that power is limited by an inability to control that potential. This inability may be real – in that the individual genuinely may

not have the necessary skills or abilities – or it may simply be a belief which results in incapacity and poor motivation as in the case of self-efficacy expectations.

The nature of self-efficacy as an ego-centric construct demands that it be measured directly, rather than indirectly and for this reason self-efficacy is usually measured using self-report scales. In recent years a number of scales have been developed to measure various aspects of Internet self-efficacy. The early measures tended to focus on a few specific types of Internet behaviour, for example creating bookmarks or entering the address of a web page correctly (Nahl, 1996). Similarly Ren (1999) reports on a self-efficacy scale designed to evaluate searches for government information. A more general measure of Internet self-efficacy was developed by Eastin and LaRose (2000) and although the psychometric properties of this scale were adequate the domain of behaviours examined was very limited and the scale itself only contained 8 items.

The purpose of the research described here is to extend the work on Internet self-efficacy by developing a scale that will have broad utility. If students, and others who choose to learn online, are to gain maximum benefit from the experience it is important that tutors know something of their perceived capabilities before they embark on this form of learning. In this way it will be possible for tutors to identify students who could benefit from additional support before they face the frustrations of trying to tackle course material via a medium for which they are not best prepared.

Method

The construct of web user self-efficacy was sampled using items suggested by Nahl (1996), Ren (1999) and Eastin and LaRose (2000). In addition it was felt important that the items reflect four domains of Internet self-efficacy, Information Retrieval, Information Provision, Communication, and Internet Technology. It was suggested that these four domains would cover aspects of Internet self-efficacy from the simplest retrieval of a web page up to the more complex issues associated with the design and construction of whole web sites. Examples of items from the four domains are shown below. The first item is worded positively and the second negatively in each case:

Information Retrieval:

I rarely have problems finding what I am looking for on the Internet.

I sometimes find using search engines like Google and Yahoo can be difficult.

Information Provision:

I wouldn't have any problems creating a simple web page.

Using ftp to upload web pages to a server is quite complicated.

Communication

I find using email easy.

I much prefer using letters or the telephone to communicate with people rather than the Internet.

Internet Technology

I can usually sort out any Internet access problems I may have.

I am not really sure what a modem does.

From the items generated a 40-item scale was constructed where respondents were required to indicate their level of agreement/disagreement to each statement along a 5-point Likert scale. Affirmation bias was controlled for by wording half of the statements in a negative manner so that a disagree response was needed to add positively to the composite self-efficacy score. Hence a high score would indicate high self-efficacy on each of the four domains which in turn could be totalled to provide an overall Web Users Self-Efficacy (WUSE) score.

In addition to the main scale items, data was also collected on age, gender, Internet expertise (novice, intermediate or advanced), and Internet education (i.e. how the user had learned to access the Internet). This data was used for validation purposes.

Sampling

Since the study was concerned with web user self-efficacy it seemed relevant to sample from the population of web users. This does create certain sampling problems, for example nothing is known about non-responders, and those who do respond obviously require a certain degree of Internet expertise and therefore completely naive respondents will probably be missed. However with the judicious use of target populations, in this case usenet news groups, it is suggested that many of these problems were minimised. The aim was to achieve a sample with a wide age range, adequate gender representation, and a good cross section of experience. In order to achieve this a number of specific newsgroups were targeted, designed to give a balance between people who were likely to be very active on the Internet and those who were less so. The final newsgroups selected were: comp.internet.net-happenings, uk.people.silversurfers, misc.consumers, soc.senior.issues, alt.computer, talk.politics.misc, misc.rural, alt.internet, misc.activism.progressive, alt.education, and humanities.classics.

Procedure

The 40 item scale was converted into an html form and uploaded onto the University of Salford server. To recruit participants for this study a message was posted on the selected newsgroup explaining the nature of the research and inviting people to participate. The URL of the web site was also provided allowing would be participants direct access.

On entering the web site and after reading the brief instructions and a statement assuring anonymity the participants were required to express the extent of their agreement with the items in the scale by clicking on one of five radio buttons ranging from Strongly Disagree through to Strongly Agree. After completing all 40 items the participant was presented with a "submit" button which on clicking sent the data to the University of Salford server. The server then responded with a "Thank You" screen before stripping the data of any identifying features and then emailing the data to the researchers.

Results

In this initial study data was obtained from 64 participants. The mean age of the group was 47 years with a range from 13 to 72 years (standard deviation 16.5). Of these, 48 were male, 13 female and the remainder did not specify. Preliminary findings are presented below. Table 1 shows the means, standard deviations and alpha coefficients for the four domains and the WUSE scale as a whole. For each domain the minimum and maximum scores are 10 and 50 respectively. For the WUSE scale the minimum is 40 and the maximum 200. The reliability of each domain was measured using Cronbach's alpha.

Table 1. Web User Self-Efficacy Scores

Domain	Mean	Standard Deviation	Alpha
Information Retrieval	44.9	4.95	0.7699
Information Provision	35.9	8.40	0.8212
Communications	38.04	5.64	0.5993
Internet Technology	41.04	5.39	0.6753
WUSE	161.76	19.72	0.8965

It can be seen from Table 1, using an alpha of 0.75 as a criterion (Kline 1986) that the domains of Information Retrieval, Information Provision and the WUSE scale as a whole all reach acceptable levels of reliability.

In order to assess the validity of the WUSE scale, the sample was divided into three groups on the basis of their self-reported levels of expertise, (i.e. novice, intermediate, and advanced). It was predicted that there would be significant differences in the WUSE scores obtained by these three groups. ANOVA was used to confirm this prediction ($F=25.77$, $p<0.001$). It was also predicted that similar differences would be obtained for the four domains and this was also confirmed (Table 2).

Table 2. Mean Self-Efficacy Scores and Level of Expertise

Domain	Novice	Intermediate	Advanced
Information Retrieval	35.00	42.50	47.13 **
Information Provision	15.67	36.23	43.90 **
Communications	31.00	34.06	39.26 *
Internet Technology	34.50	37.35	43.80 **
WUSE	116.00	149.47	174.09 **

* $p < 0.01$

** $p < 0.001$

Information Retrieval, $F=15.36$, $p<0.001$; Information Provision, $F=23.17$, $p<0.001$; Communications. $F= 4.36$, $p<0.01$; Internet Technology, $F= 14.94$, $p<0.001$.

It was also hypothesised that significant gender differences would be obtained on the WUSE scores but this was not confirmed. Of the four domains, only on Information Provision was a significant difference found with males scoring higher than females ($t=2.003$, $p<0.05$, $df=55$). In terms of number of years experience with the Internet, and hours per week accessing the Internet, again no significant gender differences were obtained.

The average age of this sample was perhaps somewhat older than might be expected since intuitively Internet use tends to be associated with young people. It was predicted that there would be a negative correlation between age and WUSE scores (i.e. older people would exhibit lower levels of Internet self-efficacy when compared with young users). This predicted relationship was tested using Spearman's rho and found to be supported ($r = -0.419$, $p < 0.004$). Similar findings were confirmed for three of the four domains; Information Provision ($r = -0.423$, $p < 0.001$), Communications ($r = -0.477$, $p < 0.001$) and Internet Technology ($r = -0.303$, $p < 0.02$). No significant correlation with age was obtained for Information Retrieval.

Conclusion

This research has attempted to develop a scale capable of assessing self-efficacy within the context of Internet use. The data collected, and the preliminary results obtained do appear to support the utility of the WUSE scale. Reliability and validity data for the overall scale reach acceptable levels although further work is needed to improve the reliability of the Communications and Internet Technology domains. The factor structure of the scale, in terms of the four domains needs confirmation but for this a significantly larger sample will be required. For tutors who might be thinking of using Internet based resources as either part or even the whole of a course, it is suggested that the WUSE scale may be of some assistance in evaluating the Internet self-efficacy of their students.

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