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Further Development of the Web User Self-Efficacy Scale (WUSE)

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Abstract

The aim of this research was to develop a short version of the WUSE scale (Eachus and Cassidy, 2004) without compromising its psychometric properties. Using item analysis the original 40-item WUSE scale was reduced to 20 items, which were then incorporated into a questionnaire, which was used in a survey of students in higher education.

Extensive testing of the new scale used a diverse sample in order to further refine the scale and establish a comprehensive bank of normative data. The results of this survey suggest that the scale has acceptable standards of reliability and validity and should therefore have wide utility in higher education.

Introduction

In their exploration of factors affecting the success of online learning, Blocher, Sujo de Momtes, Willis & Tucker (2002) considered whether online learners need specific skills and strategies to be successful. They examined factors including cognitive and metacognitive learning strategies and motivation and found that the online programme included in their study tended to attract students who were young and who were confident in their technology skills. Cassidy & Eachus (2002) have also identified confidence, or self-efficacy, as a pertinent factor in the context of computer use, with higher levels of computer user self-efficacy associated with greater self-rated computer competency and experience. Computer user self-efficacy relates specifically to an individual's judgement of their capabilities to use computers and is derived from Bandura's (1986) social cognitive theory in which he defines the general construct of self-efficacy as "peoples judgements of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with the judgements of what one can do with whatever skills one possesses" (p.391). Simplified, self-efficacy represents an individual's beliefs regarding their perceived capability to successfully complete a particular behaviour or task. The impact of positive and negative self-efficacy beliefs has been demonstrated in a range of contexts including academic achievement (Eachus, 1993; Eachus and Cassidy, 1997; Cassidy & Eachus, 2000), health behaviour (Bandura, 1986; Schwarzer, 1992), stock market investment (Eachus, 1994) as well as more recently computer use (Cassidy & Eachus, 2002).

Within the context of computer use, positive self-efficacy has been shown to be related to willingness to choose and participate in computer-based activities, expectations of success, perseverance when faced with difficulties and computer-based performance (Holcomb, Brown, Kulikowich & Zheng, 2003). The effects of both gender and experience with computers have also been reported, with males and experienced computer users showing higher levels of computer user self-efficacy (Cassidy & Eachus, 2002).

According to Bandura (1986), self-efficacy beliefs develop in response to four sources of information: 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). 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). To illustrate domain sensitivity Cassidy & Eachus (2002) provide the example of an individual who 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. Bandura (1986) suggests that the perception that one has the capabilities to perform a task will increase the likelihood that the task will be completed successfully.

It is within the specific context of information and communication technologies and e-learning that the current paper examines self-efficacy beliefs, with specific reference to Internet or web-based resources. We are amidst a revolution involving virtual learning environments and identifying, measuring and manipulating any factor which might impede our access to, utilisation of, or success with virtual learning should be a principal concern of educational research and pedagogical practice.

There are many reasons or factors which make both access to, and utilisation of the Internet both desirable and necessary. Its ubiquitous nature has deemed access to and familiarity with the Internet an assumption of the modern age; not using the net may even be, as suggested by Wolfinbarger, Gilly & Schau (2005), socially undesirable. However, 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 (Cassidy & Eachus, 2002). In their study examining internet usage in older individuals, Wolfinbarger et al. (2005) have already demonstrated the effect of self-efficacy beliefs in determining propensity and intensity of internet use, with positive beliefs associated with earlier adoption of and increased use of the Internet.

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 (Cassidy & Eachus, 2002). Over the past decade 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 short form of the Web User Self-Efficacy scale (Eachus and

Cassidy, 2004), and to evaluate its properties across a wide range of students. The final scale will assist academics in evaluating student beliefs in their capabilities of benefiting from online learning resources. Thus it should be possible for tutors (and students) to use this scale to identify those who might usefully gain from additional support. It is suggested that this will help to alleviate the frustrations that can result when students attempt to learn using resources for which they are inadequately prepared.

Method

The 40 item WUSE scale samples across four components of web based self-efficacy, Information Retrieval, Information Provision, Communication, and Internet Technology, 10 items for each component. These four components represented the starting point for the new scale and item analysis was used to select the 5 items from each component that would make up the new shorter, 20 item scale. A five point Likert scale ranging from strong disagreement through to strong agreement was used for participant responses. To control for affirmation bias, half the items were worded positively and half negatively. In addition to the main scale, data was also gathered on age, gender, course of study, Internet experience and expertise, and finally Internet accessibility, i.e. from where the participant was most likely to access the Internet. This data was used in the validation studies.

Sampling

The participants in this study were all students at the University of Salford studying a variety of courses across the four faculties of the University. Convenience sampling was used with the aim of achieving a sample with a wide age range, adequate gender representation, and a good cross section of courses from across the University. It was anticipated that this would also result in a wide range of computer and Internet capabilities.

Procedure

The WUSE scale and the accompanying demographic data sheet were distributed to students during the normal course of a lecture. The front page explained what the research required of the student and emphasised that participating was entirely voluntary, that no names or other personal identifiers were required, and that all data would remain anonymous. If a student agreed to participate they were asked to complete the demographic section of the questionnaire first, followed by the WUSE scale itself. Completing the whole questionnaire took no more than 10 minutes. The Statistical Package for Social Sciences (SPSS) was used for processing the data.

The Scale

The 20 items of the revised scale are shown below. For clarity the 5 point Likert scale is only shown on the first item.

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

Strongly disagree 1 2 3 4 5 Strongly agree

2. I find using email easy...

3. I am not really sure what a modem does...

4. I know how to use software (e.g. Dreamweaver or Frontpage) for creating web pages...

5. I would never try to download files from the Internet, that would be too complicated...

6. Using messenger software, like MSN or ICQ always cause me some problems...

7. Finding my way around web sites is usually easy for me...

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

9. I wouldn't know how to capture pictures from the Internet...

10. Adding an image to a web page would be very difficult for me...

11. I know how to test my computer for the presence of spyware...

12. Adding hypertext links to an image (i.e. an image map) is quite straightforward...

13. If my computer became infected with a virus, I wouldn't know how to get rid of it...

14. Using the Internet makes it much easier to keep in contact with people...

15. Using ftp to upload web pages to a server is too complicated for me...

16. I sometimes "get lost" when trying to navigate through the Internet...

17. I regularly exchange music and/or video files with friends...

18. I have no security worries when it comes to buying things over the Internet...

19. I know how to deal with annoying advertisements that appear while I'm using the Internet...

20. I can usually sort out any Internet access problems I may encounter...

Results

The findings reported below represent data gathered to date as part of an ongoing survey. 302 participants have completed the scale, 99 male and 200 female, mean age 22 years with a range of 18 – 53 years. This data is sufficient to analyse the psychometric properties of the scale and report on validity and reliability. The additional data still to be gathered will allow a wider cross section of students to be represented but it is not anticipated that the psychometric properties of the scale will be significantly changed.

Each of the four components of the scale has five items scored on a five point Likert scale. Thus the minimum that can be scored on any of the components is five and the maximum is 25. For the WUSE scale in total, this would be 20 and 100 respectively.

Table 1 shows the means, standard deviations for each of the four components and the total self-efficacy score (WUSE). Reliability, measured using Cronbach's Alpha is also shown for both the 20 item and 40 item versions of the scale.

Table 1. Web User Self-Efficacy Scores

Domain	Mean	Standard Deviation	Alpha20	Alpha40
Information Retrieval	17.97	2.88	0.282	0.769
Information Provision	13.57	3.57	0.398	0.821
Communications	18.72	3.87	0.670	0.599
Internet Technology	15.48	4.49	0.677	0.675
WUSE	65.8	11.44	0.801	0.896

As can be seen from Table 1, for the revised 20 item scale the reliability of the individual components is low, though that of the WUSE scale as a whole does reach acceptable levels. To some extent this decrease in reliability is to be expected since the number of items in each of the four components has been halved and this will usually reduce reliability to some extent.

The validity of the scale was initially assessed by correlating the total WUSE score with age ($r = -.246$), hours per week spent on the Internet ($r = .392$), length of time a regular Internet user ($r = .405$), and self rated level of expertise ($r = .590$). All these correlations were statistically significant ($p < 0.01$) in the directions predicted. Age is negatively correlated with self-efficacy indicating that older people are less confident in their Internet expertise. Hours per week and length of time as a regular user of the Internet were positively correlated indicating that the more experienced Internet users have a stronger sense of self-efficacy. Similarly those people who rate their own level of expertise as high, also score more highly on the WUSE scale.

The validity of the scale is also supported by the gender split in WUSE scores. Although gender differences in Internet experience is probably diminishing, at present Internet use is a predominately male activity and it was therefore predicted that males

would score more highly on measures of Internet self-efficacy. This was confirmed by the data, which shows that on all four components and on the WUSE in total, males score significantly higher than females (see Table 2).

Table 2 Gender differences in WUSE scores

Domain	Males	Females	t	df	p
Information Retrieval	18.78	17.55	3.516	294	0.001
Information Provision	14.48	13.05	3.296	291	0.001
Communications	19.44	18.33	2.347	292	0.02
Internet Technology	17.71	14.36	3.516	291	0.001
WUSE	70.69	63.20	5.388	280	0.001

The validity of the scale is also supported when differences between Faculties is examined. Data from three faculties have been obtained to date, Health and Social Care, Business and Informatics, and Arts Media and Social Sciences. Intuitively we would predict that Business and Informatics students, who are often studying computing as part of their courses, would score more highly than students from the other two faculties. A one way ANOVA showed that this was indeed the case. The mean WUSE total scores were 63.37, 72.02, and 70.45 for the faculties of Health and Social Care, Business and Informatics, and Arts Media and Social Sciences, respectively ($F = 15.563$, $p < 0.001$).

Conclusion

The aim of this research was to revise the 40 item WUSE scale to produce a shortened version which would have more utility for both academics and students. The preliminary data, reported here, has shown that although the reliability of the individual components of the scale has to some extent been reduced, overall the new 20 item WUSE scale still retains adequate levels of reliability and validity. Like computer user self-efficacy, assessing web user self-efficacy will allow some insight into the implications and impact of positive and negative belief systems for individuals in many areas including both personal and professional functioning, and enable consideration to be given to interventions which will alleviate the effects of inhibitory beliefs systems such as low or negative web-user self-efficacy. Specific examples might include tutors or trainers who are thinking of using Internet based resources as either part or even the whole of a course, and who wish to evaluate web-user self-efficacy in their students as either a criterion for recruitment or to identify the need for further skill development. There is sufficient evidence within the self-efficacy literature to support the argument which suggests that negative web-user self-efficacy beliefs will inhibit successful internet use and thus limit utility of ICT in such areas as virtual learning. As further evidence is gathered—both practice-based and through research activity—the authors are optimistic that the WUSE will establish itself as robust, domain-specific tool for assessment of self-efficacy in the context of internet use. Where students are being

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asked to use web based resources, it is suggested that the WUSE scale may be of some use to tutors in evaluating their capabilities of doing so.

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