

Confident Men - Successful Women: Gender Differences in Online Learn- ing

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assessment results and online behaviour of the different demographic groups of students.

ABSTRACT

This paper describes gender differences in a cohort of undergraduate computing students studying a course that is taught flexibly. We consider differences such as online material usage rates, formative and summative assessment completion rates, communication skills, confidence levels, student motivation and learning strategies.

The Internet and Web Development course is available as either classroom sessions or as a completely remote online course and students are free to choose how to study and which sessions to attend. The option of online learning has proven to be very popular with the students, particularly those with work and family commitments.

We report three years of research using pre- and post- course questionnaires, focus groups,

We found that our online course favours women and older students, who seem to be more motivated, better at communicating online and at scheduling their learning. In contrast, the male students and younger participants need the discipline that classroom sessions provide – perhaps these students approach the course and its assessments with over-confidence. The ongoing challenge continues to be encouraging loner male “nerds” to succeed with self-paced online study.

KEYWORDS

gender, online learning, flexible learning, WebCT

1. INTRODUCTION

Gender based differences in performance and learning have long been recognised as an important focus for research, (Herring 1997, Weinman and Cain 1999, Richardson and French 2000). As many tertiary institutions experiment with online learning (Bates, 1995), and with the trend towards “life-long learning” causing an increase in self-study online, it

is important to profile which demographic groups of students succeed with online study. Our previous research has shown that older women studying our course score better than younger men (Young *et al*, 1999, McSporrán *et al*, 2000). In this paper we seek to identify reasons why this may be.

We believe that the young men are over-confident of their computing ability and that this impacts on their grades in several ways:

- men are less likely to follow instructions in the learning materials and are less likely to utilise all the learning materials provided to them.
- men tend to leave their assignments to the last minute, to not complete all parts of the assignment or to not submit it at all.

On the contrary, in our experience, women tend to methodically complete all exercises, read all course notes and complete all parts of assignments. We will attempt to provide evidence for this thesis in this paper.

2. ABOUT THE COURSE

Internet and Web Design (IWD) is a popular first year introductory course in the Bachelor of Computing Systems degree. Students with a wide range of ages, ethnic backgrounds, life and work experiences study it. At first it was taught by traditional means of lectures and practical classroom sessions. Then in the first Semester of 1999 we changed to a more flexible method of teaching (Young *et al*, 1999). As well as classroom sessions, we offered our students the choice of working remotely; that is, working through the lecture notes, practical exercises and weekly formative self-assessment questions online. Students could access the website in the practical sessions or offsite at any time of day or night. If they had a problem they could attend a classroom session or use electronic communication to seek specific help. The option of this flexible learning format proved to be very popular with the students.

In the 1999-2000 and 2000-2001 Summer Schools, the course was offered completely remotely (Dewstow *et al*, 2000). There were no face-to-face (F2F) sessions in the summer school 1999-2000 except an

introductory session, the project presentations and final exam. If students had problems, they had to seek help electronically. We built in 3 extra F2F sessions in the summer school 2000-2001 in the hope that it would enhance learning for those not coping with distance delivery.

The IWD course is assessed by means of a group research report, an individual practical exercise (production of a 10 page website) and a written exam. Part of the group research report mark is attributed to electronic communication.

3. STUDY METHODOLOGY

Data for the study was collected in three ways:

- 1 *Pre- and post-course surveys.* This study is part of an ongoing program of research using pre- and post- course questionnaires, which seek both qualitative and quantitative answers. On the first day of the course the students are asked to fill out a questionnaire, from which we gather information on their ethnic background, age, gender, previous education and Internet experience, self-perceived HTML ability, and ask them to choose whether they would study online, or in traditional classroom sessions. At the end of the course the students complete another survey which determined their actual method of course participation, and also gathered their comments about the experience of online learning. Students scored items on a five point Likert scale, ranging from 1 'strongly disagree' to 5 'strongly agree'. For continuity, the summer school questionnaires used the same questions as previous semesters, but additional questions relevant to the unique situation of the Summer School were added.
- 2 *Student assessment results.* We report student results from both formative and summative assessments completed during the course, and compare the results from the different genders.
- 3 *Course website usage statistics:* The WebCT course building shell gives data on the students' usage of the online materials. We report number of accesses to the course notes and number of discussion forum postings read and posted.

There is a difference between the total number of pre- and post- questionnaire responses for each semester. Reasons for this include student dropouts,

non-attendance at the project presentation sessions when the post-questionnaire is filled out and students not filling in their names on the questionnaire. In Semester 1, 1999, there were 71 first questionnaires and 54 matched second questionnaires. In Semester 2, 1999, there were 90 first questionnaires and 63 matched second questionnaires. In the Summer School, 1999-2000, there were 27 first questionnaires and 19 matched second questionnaires. In Semester 1, 2000 there were 88 first questionnaires and 68 matched second questionnaires. In Semester 2, 2000 there were 83 first questionnaires and 58 matched second questionnaires.

Semester	Female		Male	
	no.	(%)	no.	(%)
Semester 1, 1999	21	29.6	50	70.4
Semester 2, 1999	32	36.0	57	64.0
Summer School, 99-00	7	28.0	18	72.0
Semester 1, 2000	23	26.1	65	73.9
Semester 2, 2000	29	34.5	55	65.5
Summer School, 00-01	3	13.6	19	86.4
BCS Degree mean 1999		23.0		77.0

4. RESULTS

4.1. Gender of Students Studying IWD

More women study IWD than the mean for all the courses in the BCS degree as shown in Table 4.1. This discrepancy could result from students from other degree programmes studying our course, people working full time studying IWD as a Certificate of Proficiency (COP) or just that it is more popular with women within the degree than other courses.

The popularity of IWD among women is presumably due to the nature of the course - it involves a great deal of interpersonal and visual communication and it is currently a very popular and highly hyped subject. Anecdotal and focus group evidence points to the female students thinking ahead to the workplace. They see web-page design as an opportunity for home-based or part-time employment. Margolis *et*

Table 4.1

Gender of students studying IWD 1999-2001.

al (1999) describe this concept as “Computing for a purpose”. Indeed the Australian Information Industry Association (1999) promote IT careers for women by stressing the possibility of contract, part-time and home working.

4.2 Gender Differences in the Choice of Working Remotely or in Class

Apart from Semester 2, 2000, there is a consistent difference between the sexes as shown in Table

Semester	Class	Female (%)		Class	Male (%)	
		Remote	Maybe		Remote	Maybe
Semester 1, 1999	57.1	38.1	4.8	80.0	10.0	10.0
Semester 2, 1999	62.5	31.3	6.3	63.2	26.3	10.5
Summer School, 99-00	-	100.0	-	-	100.0	-
Semester 1, 2000	52.2	39.1	8.7	64.6	27.7	7.7
Semester 2, 2000	67.7	32.3	0.0	52.7	40.0	7.3
Summer School, 00-01	-	100.0	-	-	100.0	-

Table 4.2: Gender differences in the choice of working remotely or in class

4.2. Between 30-40% of the women taking IWD choose to work remotely compared with 10-40% of the men. The men also appear to be more uncertain – they were more likely to say maybe, whereas the women were more definite that they wanted to work online. However in Semester 2, 2000 there was a reversal.

As stated above the higher popularity of studying remotely among women could be due to a number of factors. The women may have family and work commitments making travelling to campus more costly in time as well as finance. Typical of the favourable student comments was: “its available anywhere even from home. It’s very handy to study at your own speed.”

4.3. Gender Differences in the Assessment Results

There are differences in the mean assessment results between the genders as summarised in Table 4.3. We have data that shows that the women consistently scored considerably better than the men in both assignments, while in the final exam the men scored slightly better on average.

We assumed that the women would score more highly on the group “research project” which involves communication, report writing and teamwork. We surmised that the “webpage project”, which is more technical, would favour the males. However this turned out not to be the case and the women out-scored the men on both assignments.

Perhaps this is because the men are more likely to be over-confident, leave assignments to the last minute and therefore score less well. Or perhaps this is due to the females being more diligent in completing all parts of each assignment. For example, 45% of the webpage project is attributed to a storyboard, a design report, an explanation of HTML coding and a presentation of the webpage to the class. We believe that the men were more likely to fail to submit one or more of these parts. Certainly the men are more likely to fail to submit a whole assignment. We have evidence that the women nearly always submit every assignment, whereas the men were more likely to not submit assignments. Further evidence comes from the self-assessment results (see 4.5). The women seem to follow our instructions, while the men felt the quizzes were unnecessary for them. We intend to investigate this further in future focus groups, when we will ask students why they didn’t complete all parts. Also we will email students who did not complete the course to ascertain the reasons why.

4.4 Gender Differences in Previous Internet and HTML Experience

In the pre-course questionnaire we gather information on the student’s previous experience of the Internet and HTML. We ask them: which web browsers they have used; where they have accessed the Internet from (i.e. home, class, library, work, cyber-café); how many hours a week they access the Internet; whether they have created a web page; whether they have coded in HTML; and how experienced they are at coding in HTML.

		Ass1		Ass2		Exam		Total
	Mark	NS	Mark	NS	Mark	NS	Mark	
Female	63.7	0.0	62.4	0.3	62.3	2.6	60.0	
Male	54.1	0.9	58.1	1.4	63.3	7.0	55.0	

NS = % non submission

Table 4.3: Weighed average Mean assessment results 1999-2001 by Gender

Semester	Female (%)					Male (%)				
	0	1	2	3	4	0	1	2	3	4
Semester 1, 1999	71.4	19.0	9.5	0.0	0.0	72.0	18.0	4.0	4.0	2.0
Semester 2, 1999	83.9	16.1	0.0	0.0	0.0	71.2	15.4	9.6	1.9	1.9
Summer School, 1999-2000	57.1	42.9	0.0	0.0	0.0	83.3	5.6	5.6	5.6	0.0
Semester 1, 2000	81.8	13.6	0.0	4.5	0.0	70.3	18.8	9.4	1.6	0.0
Semester 2, 2000	86.7	6.7	6.7	0.0	0.0	66.0	26.4	3.8	1.9	1.9
Summer School, 2000-2001	50.0	50.0	0.0	0.0	0.0	78.3	13.0	4.3	4.3	0.0
Weighted Average	79.1	16.5	3.5	0.9	0.0	71.5	18.1	6.5	2.7	1.2

Table 4.4.1: HTML Experience Level by Gender

Weighted Average	No. of different web browsers used				
	0	1	2	3	4
Female (%)	6.1	52.2	40.0	1.7	0.0
Male (%)	3.5	46.2	46.2	3.8	0.4

Table 4.4.2: Weighed Average Number of Browsers Used by Gender

Weighted Average	No. of different places Internet used					
	0	1	2	3	4	5
Female (%)	7.0	48.7	32.2	5.2	4.3	2.6
Male (%)	4.2	36.9	30.4	14.2	9.2	5.0

Table 4.4.3: Weighed Average Where Internet Used by Gender

Weighted Average	Usage (hours per week)				
	0	0-5	6-10	10+	NS
Female (%)	3.5	55.7	13.9	23.5	3.5
Male (%)	2.7	40.0	21.9	31.9	3.5

Table 4.4.4: Weighed Average Internet Usage Levels by Gender

	Female (%)		Male (%)	
	No	Yes	No	Yes
Created Web Pages				
Weighted Average	86.1	13.9	76.5	23.5

Table 4.4.5: Weighed Average Created Web Pages by Gender

	Female (%)			Male (%)		
	No	Yes	NS	No	Yes	NS
Created Web Pages						
Weighted Average	82.6	17.4	0.0	75.0	24.8	0.8

Table 4.4.6: Weighed Average Coded HTML by Gender

Semester	Hits	Female			Male		
		Read	Posted	Hits	Read	Posted	
Semester 1, 1999	-	-	-	-	-	-	
Semester 2, 1999	217.9	0.0	0.0	144.6	0.0	0.0	
Summer School, 1999-2000	498.9	120.3	5.0	342.8	68.7	3.9	
Semester 1, 2000	416.9	38.5	4.3	249.2	16.2	2.6	
Semester 2, 2000	307.3	26.1	2.8	217.4	21.7	3.2	
Summer School, 2000-2001	184.0	11.0	2.7	164.8	17.1	3.5	

Table 4.5.1

Average total semester WebCT page views and bulletin board access by gender.

As can be seen in Tables 4.4.1 – 4.4.6 the men on average rated themselves more experienced with the Internet and web page creation in all the questions we asked them. To condense this paper we only report results by semester for the HTML experience level question. All other questions are reported as weighed averages. These are the average score across all semesters, adjusted for the numbers of students in each semester. Table 4.4.1 shows the level of experience of HTML given by the students. It can be seen that apart from the two summer schools, the men rate themselves as more experienced in HTML than the women. As mentioned above the summer school semesters are not statistically valid due to small numbers of students.

Many researchers report women's lower levels of confidence with computing generally. For example Selby *et al*, (1997) found that women rated themselves lower in terms of confidence and control over computers than the men. This is also reflected in online learning. Lund *et al*, (1997) found that female students studying an online Energy Studies course retrospectively rated themselves less confident than men in using the Internet at the beginning of the course whereas at the end of the unit there were no difference between the genders. The mean confidence ratings for use of the Internet before and after the unit were: men before, 2.0, men

after, 2.0; women before, 0.8; women after, 2.3. We are considering adding this question to our end of course questionnaire.

4.5 Gender Differences in Student Access to the Learning Materials on the Course Website

The logfiles from WebCT show that on average women attempt more of the weekly self-assessment quizzes, view more pages of the course Web site and read more bulletin board messages as shown in Tables 4.5.1 and 4.5.2. The females' page views are consistently higher across the semesters than the males by a factor of 1.5. The average number of bulletin board messages read by females is also more than the males by a factor of 1.7 in Summer School, 1999-2000, a factor of 2.3 in Semester 1, 2000 and a factor of 1.2 in Semester 2, 2000. We believe that the anomalous result for the Summer School, 2000-2001 is due to the fact that only three women completed the course, all Asian, and that these students would be less likely to post in a web-based discussion forum.

Lund *et al*, (1997) found that only 36% of men used the online mode of an Energy Studies course, whereas 67% of the women used it.

We require the students to attempt the self-assessment quizzes every week, but many of them never attempt any of the quizzes. There is a wide spread of numbers of attempts ranging from none to all possible quizzes (the actual total number of possible quizzes is gradually increasing as we improve the course web site). The average number of unique attempts shows a consistent difference between the genders. The females, on average attempt more quizzes than the males. The males are much more likely to never attempt any quizzes.

It seems as though our male students are missing out on "practice and drill" and this is reflected in their assessment results (see 4.3). Perhaps men ignore our instructions and go off and do their own thing, whereas women work methodically through our instructions and do everything asked of them.

5. DISCUSSION

The student's belief in their abilities may have an effect on our course. The genders present a disparate picture regarding their perceived Internet and HTML experience. The young men report that they have more Internet and HTML experience than the women (see 4.4). In our first session we give everyone the

Semester	Total Quizzes	Female Average	Male Never	Average	Never
Semester 1, 1999	16	-	1	-	11
Semester 2, 1999	18	11.8	5	8.7	10
Summer School, 99-00	18	12.7	1	11.6	1
Semester 1, 2000	20	11.4	4	7.4	20
Semester 2, 2000	20	11.0	6	8.9	13
Summer School, 00-01	20	13.3	0	8.9	7

Never = did not record any quiz attempts over the entire semester

Average = Average total number of unique quiz attempts over the entire semester

Table 4.5.2 : Average total weekly self-assessment question attempts by gender

opportunity to take part in the online only course. Of the younger males (18 - 20) who choose this manner of learning the majority are confident of their success. Like Lund *et al*, (1997) we have found the mature women, who choose learning online do not exhibit the same confidence. We counsel the class to reflect on their learning styles and time management skills whilst reminding them that they can always contact us, or if they change their mind, attend on campus sessions.

In focus groups, which are mixed gender, when asked about patterns of learning they tell us at they set aside a weekly time to learn when interruptions will be kept to a minimum. When asked the same question either in class or in focus groups younger male students tell us they study "any time". In other words they do not set aside quiet times for study. In our in-class experience in this and other courses we note that women tend to quietly progress through a set of linear instructions whilst the men jump ahead and are frequently in trouble.

Together with self-regulated task-focused learning, is another attribute called "Resource Management". This attribute is more relevant to the life experience of mature women, who, in their day to day organisation of family matters, become adept at short-term management of events, which do not require extended mental effort. This type of management depends on family co-operation and the ability to juggle several smaller tasks within the same time frame. Could it be that women advantaged by this skill have the ability to develop cognitive flexibility in their learning styles? Has this "training", necessary for dealing with small family crises equipped them and some of our mature men to adapt to a piecemeal, event interrupted regime of self regulated learning? If mature people are more adept at resource management with background and foreground task swopping, how can we transfer these skills to our younger male students who have not yet had the opportunity to develop such skills? As Campbell (1997) found, focus, motivation and time management skills displayed by a number of her students equated with success for learning online, whereas a lack of educational focus led to side-tracking.

We have taken some over-confident students aside and explained to them that "in our experience" their

group has been less than successful as their cohorts who are less confident but work harder. We have not insisted that they become F2F learners. We supplied extra tuition and motivation on how to "learn successfully online". As we constantly strive to allow choice, we keep a wary eye out for evidence of non-performance and attempt to motivate and enthuse via feedback whilst offering extra tuition to prepare all our students for this new technology assisted delivery.

6. CONCLUSIONS

Mature women studying our course appear to have the study skills necessary for learning online. The basic skills of self-regulation and time management would appear to be under-developed within the group of young males learning online. This is evidenced by non-performance in our online self-assessment quizzes, assessment results and site usage. The mature women who have these skills choose to work on line because of convenience, flexibility and "Computing for a Purpose".

We agree with Lund *et al*, (1997) that the evidence suggests that a well-designed online unit may assist in overcoming gender-related differences in confidence in both studying online and using the Internet in general.

This paper is a platform for discussion of the implications of online learning for both genders. There is a need for more research on who is more successful learning online so that we, as online instructors, can facilitate the transfer of the necessary skills to all participants whatever their gender, age or ethnicity. The investment in hardware, software and time by both institution and learner is high enough to warrant research on who learns best and how everyone can benefit from this new teaching and learning approach.

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