GENDER DIFFERENCES IN COMPUTER EXPERIENCE, SKILLS, AND ATTITUDES AMONG INCOMING COLLEGE STUDENTS

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ABSTRACT: This study provides evidence that there are gender differences in computer experience, skills, and attitudes among incoming freshmen in a business college. This evidence is based on a survey given to incoming students in the summers of 1989 and 1990. Although there were no gender differences in ever having used the computer, males had more experience and skills than females in specific types of computer usage, particularly programming and games. There were gender differences in attitudes towards computers as well. Females perceived computer skills as more useful for their careers than males, but males were more willing to purchase a computer than females.

KEYWORDS: Computer, computer experience, computer attitudes, computer skills, gender, college students.

INTRODUCTION

Is there a gender gap in computer usage and attitudes? A growing body of research suggests that there are significant differences between males and females in their experience with and attitudes toward computers. Although a few studies have found no significant gender differences in ever having used a computer [2, 18, 20], most studies have shown that males of all ages are more likely to use computers than females [3, 4, 5, 8, 14, 15]. Gender differences in computer usage are apparent when one looks at the type of usage. Males are more likely than females to use the computer voluntarily, to plan to take elective computer courses, to use the computer at home and school, to spend more time weekly on the computer, to use the computer for more purposes and for personal reasons, to use computer centers, and to attend computer camps [5, 7, 13, 15]. When specific types of computer experience have been assessed, all studies have found gender differences. Males are more likely than females to have taken computer courses [12], have programming experience [12, 18, 20], and have used the computer for games [12, 18].

Similarly, in those studies of attitudes towards computers that have found gender differences, males have been found to have more positive attitudes towards computers than females. From grade school through high school and college, males are positive about the computer while females are more likely to be disinterested in, dislike, or fear computers [1, 3, 5, 6, 15, 16, 19, 20]. Negative attitudes towards computers could be expected to lead to avoidance of the use of computers and may account for lower involvement with the computer on the part of females when computer use is optional [9, 14, 17].

The current study is an exploration of gender differences in computer experience and attitudes among incoming undergraduate college students at a small business college in Rhode Island. During orientation in the summers of 1989 and 1990, incoming freshman were asked to complete a survey which assessed their computer experience and attitudes. The survey was administered on a voluntary basis by the Academic Computing Department to assess the college's computer needs. The survey (see Table 1), which was voluntary, measured students' experience and skill levels with various computer applications and hardware as well as their attitudes towards computers and demographic information. In both years, 45% of the incoming freshmen completed the survey (619 of 1363 students). In 1989, 41% of the male students (161 of 396), and 51% of the female students (157 of 310) completed...
the survey. In 1990, 43% of the male students (165 of 386), and 50% of the female students (136 of 271) completed the survey. Although participation in the survey was voluntary, it is assumed that the sample is representative of incoming students of the college.

Previous research has shown gender differences in computer experience and attitudes with college students. In order to address any imbalances that might exist between male and female students in the college, the authors of the current study analyzed the original data to assess for gender differences in computer experience and attitudes.

PROCEDURE

For each of the years, 1989 and 1990, frequencies were run and all variables carefully examined to determine how students were answering the various questions on the survey. Frequencies indicate how many students selected each of the possible values for each question. Percentages were also determined. In addition, various descriptive statistics were requested. Of particular interest were the mean, median, and standard deviation of quantitative variables, and the mode of qualitative variables.

To assess the possible effect of gender on the dichotomous variables (yes/no) in the survey, cross-tabulations were run for each year and examined. The Chi-square statistic was utilized to test for significance at the .05 level. This statistic was used to determine whether gender and the qualitative variable under consideration were independent or not.

In order to assess the possible effect of gender on the rank order (1-4) variables, the analysis of variance (ANOVA) procedure was run for each year to determine whether the mean values of each quantitative variable were different for males and females.

After the above analysis was accomplished for each of the 2 years in question, namely, 1989 and 1990, an analysis of variance was run on the combined quantitative data with 3 variables of interest: gender, year, and an interaction term of gender x year. There was no significant interaction between gender and year. In addition, the year of the survey was found to have no significant effect on any of the quantitative variables. Hence, results are reported on the combined data (1989 and 1990) with gender being the only factor of interest. To be consistent with the quantitative variables, cross-tabulations were also run on the combined data (dichotomous variables) for 1989 and 1990 and Chi-square results are reported.

It was decided to present all statistically significant as well as pertinent nonstatistically significant results in graphical form. Since there is only one factor of interest, gender, and since there are only two genders, male and female, it was felt that bar charts would convey clearly the results of these tests of significance. In the case of the Chi-square tests, the percentage response are illustrated for male versus female. With the ANOVAs, the mean responses will be shown for the two genders. In addition, the value of Chi-square (with the p value or observed significance level) will be given for cross-tabulations, and the F statistic, along with its p value, will be given for ANOVAs.

RESULTS

Based on research results cited in the introduction and the authors' observations of business college students, some results were anticipated. Thus, some of the results were as expected, but there were some deviations from earlier studies.

The first 5 questions of the survey assessed previous exposure to computers (Figure 1). Over 90% of both male and female students had used a computer in high school with over 80% having taken a course requiring the use of the computer. Approximately 50% of students had used a computer at home. It was anticipated that there would be gender differences in the amount of computer use. However, there were no gender differences in ever having used the computer in high school or in hav-
ing taken a high school course requiring the use of computers. Although males were more likely to have used the computer at home, the differences were not statistically significant at the .05 level \((p = .152)\). These results, although not what was expected, are in agreement with some earlier studies, including 2 national surveys [2, 18, 20]. Although there were no gender differences in having any computer experience, there were differences in specific types of computer usage, as well as the skill level acquired and amount of experience in specific computer applications.

Questions 7-21 asked students to indicate the specific computer applications that they used (Figure 2). Although there were no significant gender differences in having taken a course in computer programming or applications, males were more likely than females to have experience in writing both BASIC programs \((p = .002)\) and PASCAL programs \((p = .002)\), which are the most common languages used by high school students. Males also were more likely than females to have used a computer in a science course \((p = .037)\), although not in a mathematics or English course. Finally, males were more likely than females to have used a computer to write graphics routines or games \((p = .041)\). Overall, the pattern that emerged is that when there are gender differences in computer experiences, males are more experienced.

On questions 22-28, the students rated the skill level that they have acquired in computer applications, from 1, "poor or none," to 4, "expert." (Figure 3). Males reported a significantly higher level of programming skills than females \((p = .018)\) while females reported a significantly higher level of typing or keyboarding skills than men \((p = .0001)\). Although not precisely significant at the .05 level, males also reported a higher skill level than females using DOS \((p = .0547)\).

Students rated the amount of experience they have had with specific computer applications, using a scale ranging from 1, "little or none," to 4, "a lot," on questions 29-36 (Figure 4). Males reported greater experience than females on 3 of the 8 applications including playing computer games \((p = .0001)\), and writing computer programs \((p = .0227)\). Males also reported more experience using a Macintosh computer \((p = .0319)\), although there were no gender differences in using the IBM PC or compatible or the Apple computer.

Overall, the results of the study indicate that though there are no gender differences in ever having used the computer, there are significant gender differences in specific computer applications. Males consistently reported greater experience and skill level in programming than females, despite the lack of gender differences in ever having taken a computer course. This result is similar to other studies which have found males to have greater programming experience than females [12, 18, 20]. Males also reported greater experience in playing computer games than females, which also is consistent with previous research [12, 18]. Additionally, male students were more likely than female students to have used a computer to write graphics routines and games. One area of inconsistency in the results of the present study concerned keyboarding and word processing. Females reported a greater
Survey of Computer Use

This questionnaire is designed to help us understand your computer background and your experiences and attitudes about using the computer. Your responses are completely anonymous. Please be as accurate and as honest as you can. Circle or fill in your response as appropriate.

1. Have you used a computer in your high school? Yes No

2. Do you use a computer at home? Yes No

3. Are you planning to bring your own computer to Bryant? Yes No If so, what kind? ____________________

4. Have friends or your parents helped you learn how to use a computer? Yes No

5. Have you taken at least one high school course that requires the use of a computer? Yes No

6. Please check the major that you are most interested in:
   Accounting    Actuarial Math    Business Communication
   Computer Information Systems Economies    Finance
   Hotel/Institutional Management    Management    Marketing

I have used a computer: (please check all that apply)

7. ___ in a course about computer programming.
8. ___ in a course about computer applications.
9. ___ in a math course.
10. ___ in an English course.
11. ___ in a science course.
12. ___ to write BASIC programs.
13. ___ to write COBOL programs.
14. ___ to write Pascal programs.
15. ___ to write FORTRAN programs.
16. ___ to write Assembly Language programs.
17. ___ to write graphics routines or games.
18. ___ for word processing.
19. ___ to create and use spreadsheets.
20. ___ for desktop publishing.
21. ___ in a business or accounting course.

Please indicate the skill level you have acquired in each of the following. Use the scale:

1 - poor or none    2 - fair    3 - good    4 - expert

<table>
<thead>
<tr>
<th>Skill</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typing Skill (Keyboarding)</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Using DOS (PC or compatible)</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Programming skills</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Word Processing skills</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Spreadsheets skills</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>General math skills</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>Accounting skills (with or without computer)</td>
<td>1 2 3 4</td>
</tr>
</tbody>
</table>

Table 1. Survey of Computer Use
Please rate the amount of experience you have had with the following applications. Use the scale:

1 - little or none  2 - some  3 - more than average  4 - a lot

29) Using the IBM PC or compatible    1 2 3 4
30) Using the Apple computer         1 2 3 4
31) Using a Macintosh                1 2 3 4
32) Using word processing            1 2 3 4
33) Using spreadsheets               1 2 3 4
34) Using accounting programs        1 2 3 4
35) Writing computer programs        1 2 3 4
36) Playing computer games           1 2 3 4

Please indicate the extent that you agree or disagree with the following statements. Use the scale:

1 - strongly disagree  2 - disagree  3 - agree  4 - strongly agree

37) Computer skills are essential in the modern business world    1 2 3 4
38) Computers are important only if you work in a field closely related to computing    1 2 3 4
39) All business college students should be taught how to use the computer    1 2 3 4
40) All business college students should be taught to use spreadsheets    1 2 3 4
41) Knowing how to use the computer will make it easier to get a job    1 2 3 4
42) Knowing how to use the computer will help increase my earning power    1 2 3 4
43) Knowing how to use the computer will help me to do my job better once I get a job    1 2 3 4
44) Knowing how to use the computer is cool    1 2 3 4
45) The computer will help me to write better essays    1 2 3 4
46) The computer will make it easier to write essays    1 2 3 4
47) I expect to use computers for most of my courses at Bryant    1 2 3 4
48) Bryant's computer facilities influenced my decision to come to Bryant    1 2 3 4
49) It is important to have my own computer rather than use the computer labs    1 2 3 4
50) I am willing to purchase a computer for my own use    1 2 3 4
51) My parents are willing to purchase a computer for me to use at Bryant    1 2 3 4

Please fill in the following information:

52. How old are you?______
53. Are you male or female? Male Female
54. In what year did you graduate from high school?______
55. Approximately how many students go to your high school?______
56. Approximately how many microcomputers does your high school have?______

Table 1. Survey of Computer Use (continued)
APPLICATIONS EXPERIENCE
GENDER DIFFERENCES

AMOUNT OF EXPERIENCE WITH

<table>
<thead>
<tr>
<th>Activity</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using a Mac</td>
<td>3.42</td>
<td>3.46</td>
</tr>
<tr>
<td>(F = 3.79, p = .041)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Writing Programs</td>
<td>3.01</td>
<td>3.05</td>
</tr>
<tr>
<td>(F = 5.27, p = .029)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Playing Games</td>
<td>3.35</td>
<td>3.36</td>
</tr>
<tr>
<td>(F = 34.81, p = .0001)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AVERAGE RESPONSE
1 - little or none 2 - some 3 - more than average 4 - a lot

Figure 4. Applications experience - gender differences.

level of keyboarding or typing skill than males, but there were no gender differences in word processing experience. This may reflect the wording of the questions as students were asked to assess “typing skill (keyboarding)” and experience in “word processing.” The former term takes into account non-computer and computer skills. There were no gender differences in other computer applications including experience using accounting, desktop publishing, or spreadsheets, nor in having used computers in specific high school courses other than science courses.

Questions 37-51 assessed attitudes toward the computer on a Likert Scale (Figures 5 and 6). For each statement, respondents indicated the degree of agreement from 1, “strongly disagree,” to 4, “strongly agree.” Gender differences were found on 9 of the 15 questions. In general, females were found to expect that the computer would help them more with jobs than were males (Figure 5). Females agreed significantly more that, “knowing how to use the computer will make it easier to get a job” (p = .0066), and, “knowing how to use the computer will help me do better once I do get a job” (p = .0041). Females were more likely than males to perceive the computer as an important tool in industry while men were more likely than women to perceive computers as important only in computer-related fields. That is, females agreed more that, “computer skills are essential in the modern business world” (p = .0161), that, “all business college students should be taught to use the computer” (p = .0001), and that, “all business college students should be taught to use spreadsheets” (p = .0093).

Figure 5. Attitudes towards computers in business - gender differences.

APPLICATIONS EXPERIENCE
GENDER DIFFERENCES

IMPORTANCE OF COMPUTER

<table>
<thead>
<tr>
<th>Activity</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skilled in Business</td>
<td>3.01</td>
<td>3.04</td>
</tr>
<tr>
<td>(F = 5.23, p = .049)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Related Field Only</td>
<td>3.04</td>
<td>3.09</td>
</tr>
<tr>
<td>(F = 16.24, p = .0001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>All Students Taught</td>
<td>3.04</td>
<td>3.09</td>
</tr>
<tr>
<td>(F = 36.83, p = .0001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spreadsheet Taught</td>
<td>3.04</td>
<td>3.09</td>
</tr>
<tr>
<td>(F = 36.83, p = .0001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help with Job</td>
<td>3.03</td>
<td>3.07</td>
</tr>
<tr>
<td>(F = 17.36, p = .0001)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AVERAGE RESPONSE
1 - strongly disagree 2 - disagree 3 - agree 4 - strongly agree

Questions 37-41 AND 43

Figure 6. Attitudes toward owning a computer - gender differences.

while males agreed more than females that, “computers are important only if you work in a field closely related to computing” (p = .0001).

Finally, males more than females agreed that owning a computer is important (Figure 6). Males agreed more than females with all 3 questions (49-51) favoring computer ownership. Males were more likely to agree that, “it is important to own my own computer rather than go to the computer labs” (p = .0001), “I am willing to purchase a computer for my own use” (p = .0017), and, “my parents are willing to purchase a computer for me to use at Bryant” (p = .0203). Despite greater male agreement on these questions, there were no gender differences when students were asked if they were planning to bring their own computer to college.
CONCLUSION

In this report of the results of a study of gender differences in computer experience, skills and attitudes of incoming undergraduate business college students, interesting patterns of differences between male and female students were found. Although there were no absolute difference in ever having used a computer between male and female students, male students were more experienced and skilled than female students in specific types of computer usage, namely, programming, games, graphics routines, and applications in science courses. This finding highlights two important points to educators and future researchers. First, computer usage is multidimensional. Most previous studies have not delineated specific areas of computer experience, although Lockheed [12] and the current study have found gender differences in specific applications. There are different types of computer experience and skills which should be considered in assessing students for placement. Second, to the extent that gender differences in computer experience and skills exist, they may affect students’ achievement and motivation. Previous research has found that experience is related to student performance and withdrawal in college-level introductory computer courses [3, 10], and that computer experience is a predictor of computer anxiety, confidence and liking [11].

There also were gender differences in the students’ attitudes towards computers. Female students were more likely to believe that computer skills would be useful for their careers than males, who were more likely than females to believe that computer skills were important only for careers in computer-related areas. Additionally, male students reported that they were more likely to purchase a computer than female students. Although the relationship of attitudes to performance is not certain, it is possible that these differences in attitudes may affect both motivation and achievement in computer-related courses. This deserves further study.

Gender differences found in the current study suggest that perhaps different kinds of assistance will be necessary in working with male and female students. In addition, researchers may want to determine the reasons for these gender differences. Follow-up efforts may then try to minimize these gender differences by introducing computers and appropriate training into schools at the high school and elementary school levels.

As stated above, some research has indicated that computer experience, skills, and attitudes may be related to course achievement. The authors presently are conducting a study to test this hypothesis.

REFERENCES


**BIOGRAPHICAL SKETCH**

Janet Moran-Martin is a Professor of Psychology at Bryant College. She holds an AB in Psychology from Rosemont College, a MEd in Special Education from Tufts University, and a PhD in Counseling Psychology from Boston College. Her research interests are in the areas of gender differences in computers, attitudes towards computers, motivations for childbearing, and the teaching of psychology. She is a member of the American Psychological Association and the National Social Science Association.

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