

Comparing Social Fitness and Technology Use at the High School and College Level

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Introduction

Research has suggested that high levels of technology use may interfere with real-time interpersonal relationships and increase shyness and loneliness (Carducci & Zimbardo, 1995; Kraut, 1998). As researchers who have been engaged in the study of shyness, and the prevention and treatment of problematic shyness, we wanted to know if shyness was increasing with technology use in our local high schools. If so, did this present a special problem for shy students? We have begun to address these questions in the Palo Alto, California School District. We have so far conducted two student survey studies and two interview studies. We also conducted an ethnography of a student web team who designed and maintained a local high school's website under the direction of the school's technology coordinator. We observed the web team over a period of several months, and simultaneously interviewed mentor teachers who were helping other teachers learn to use technology in the classroom, and how to take more advantage of places to gather information on the internet. The study we present here is an interview study conducted at two high schools and one university.

Review of Previous Research

Study 1

As a first step we conducted a survey of over a hundred and fifty students at Gunn High School (Henderson, Zimbardo, Smith, & Buell, 1999; www.shyness.com).

Students responded to questionnaire items about technology use and patterns of face-to-face interaction. We predicted that shy students would use computers more than non-shy

students and experience more loneliness. Our predictions were not confirmed for the moderately shy. A few extremely shy students, however, did spend more time using technology. They played more computer games, and tended toward more use of email. They endorsed email as a communication medium more than other students, and more frequently chose to deal with interpersonal conflict via letters, email, and the telephone. They also reported more loneliness than the moderately shy and the non-shy. However, our recent findings, and those of others, suggest that technology use, particularly in groups, such as computer-supported collaborative learning projects, and virtual environments on the internet may reduce shyness (Dietz-Uhler & Bishop-Clark, 2001; Parks & Floyd, 1996; Roberts, Smith, & Pollock, 1999).

Study 2

We wondered if what we were seeing in the high school students was also true at the college level, so we conducted another questionnaire study of 249 Stanford students. These results will be included in the next report.

Study 3

Ethnographic observations and interviews with teacher mentors at Palo Alto High School (spring, 2000) revealed interesting and contrasting patterns. Students' technological expertise seemed to be increasing during 1999 and 2000, and to be contributing to both academic and social learning, as they gathered information in small groups via the internet during computer labs and engaged in computer-supported learning projects. The student-run Web team designed and maintained the school's web pages as part of a technology class. Students from another class also maintained the school's technological infrastructure. Students who were sophisticated computer users, some of

whom were shy, were “stars”, often being called “computer jocks”. They were leaders and collaborators in various outstanding school projects, several of which were described in glowing terms in a Fortune magazine article in the spring of 2000. Some of the results of these projects were presented by the Technology Coordinator, Charles Merritt, at the first Conference on Universal Usability sponsored by the Association for Computer Machinery (ACM) held in Washington, DC. (Henderson, Adler, Merritt, Gingras, & Scott, 2000, November).

Study 4

As part of our investigation in the spring of 2000, Stanford undergraduates from our Psychology of Shyness Honors Class interviewed twenty-two Palo Alto High school students using a structured interview developed through previous research. A vast majority of the students liked having technology in their lives, but over half the students acknowledged times when they wished they had less. Overall, technology use had increased over the prior year and was a significant vehicle for socializing as well as for academic and technical learning, with students spending an average of one to three hours per week corresponding with others via email. While shy students were similar to non-shy students in overall use of technology, they were not taking as much advantage of its potential for social practice and learning. Shy students received up to three emails per day while non-shy students received up to six. Shy students estimated that 20 percent of their time was spent contacting others while non-shy students said they were communicating with others 40 percent of the time they were on a computer.

The Current Study: A Comparison of Three Schools

Method

This study compared the results of two other schools with the Palo Alto High School sample. In order to see how students in a different high school might vary in their use of technology we interviewed students from a private high school in Southern California. We also interviewed Stanford students, to examine differences between students at the high school and college level.

The sample

Twenty students from the private high school, Santa Fe Christian, and fifteen Stanford students were interviewed in depth. These samples were combined with the previous sample of 22 students from Palo Alto High School for the purposes of statistical analyses, resulting in a sample of 57 students.

Procedure

The same structured interview developed through previous research in the Palo Alto School district, and used for the Palo Alto High School students, was used in this study. Stanford undergraduate research assistants were trained by Dr. Henderson to administer the semi-structured interview, and they interviewed all students during the spring and summer of 2000. Students rated their shyness on a scale from 0 to 4, from not at all shy to very shy. Time spent using various types of technology in particular activities was defined in terms of categories denoting an average range of hours. For example, category one indicated one to three hours of use per week, category two, four to six hours per week, category seven, over 20 hours per week.

The Sample

There were 24 shy students and 33 non-shy students in our sample. Age and gender data was missing for the Stanford students. The age range of the high school students was from 14 to 19 years, with a mean age of 16 (SD = 1). Gender data was also missing for two high school students, leaving 20 males and 20 females who reported their gender.

Results

Shyness and Technology Use

Students were equivalent in average shyness ratings across high schools, with the mean of the sample 1.5, (SD = 1). The mean rating of shyness by students in the shy group was 2.6, with a standard deviation of .7. The mean shyness rating of the non-shy group was .76, with a standard deviation of .4. Due to our small sample size, and the skewed nature of our data (scores were clustered primarily at the low end of the scale) non-parametric statistics were used, specifically, a Mann-Whitney U test to compare shy and non-shy students, and median tests with Yates' Continuity Corrections to compare the schools.

Consistent with our previous findings, there were few differences in overall computer use between shy and non-shy students across schools, except that shy students replied to 36% of the emails they received while non-shy students responded to 53%, a trend that approached statistical significance $\chi^2(1, N = 57) = 3.1, p < .08$. They did not, however, differ in the number of emails they received per day, in contrast to the earlier findings with Palo Alto students only. They also did not differ in the total time they spent using email. While shy students reported that they spent 25% of their time contacting others while they were using computers in contrast to 37% of the time for the non-shy,

but this difference was not statistically significant, partially because of the large variability in both groups.

Differences Among Schools in Technology Use

We did find differences among schools. In contrast to Palo Alto students, who spent one to three hours per week on the computer doing schoolwork, private high school students spent more time, four to six hours, and Stanford students spent seven to ten hours $\chi^2(2, N = 57) = 10.53, p < .01$. The pattern of use at the high school level was reversed for other kinds of computer activities, which included surfing the web, communicating via email, playing games, and participating in chat rooms. Private school students spent less time than Palo Alto High School students engaging in activities other than school work, one to three hours per week in contrast to four to six hours, and Stanford students spent considerably more time, 11 to 15 hours per week $\chi^2(2, N = 57) = 13.24, p < .001$.

More than half the Palo Alto students reported surfing the web from one to three hours or more per week and some as much as four to six hours per week. The average for both high schools was one to three hours. In contrast, Stanford students spent four to six hours, significantly more than the high school students $\chi^2(2, N = 57) = 8.54, p < .01$.

Palo Alto High school students spent an average of one to three hours per week corresponding with others via email. Interestingly, private school students spent less than an hour. Stanford students spent four to six hours, double that of the high school students $\chi^2(2, N = 57) = 9.80, p < .01$. Because Stanford students were away from home, it is logical to assume that the extra hours were spent corresponding with friends and family in other locations. Santa Fe Christian students spent significantly less time in chat rooms

$\chi^2(2, N = 56) = 33.50, p < .0001$. Palo Alto students reported playing computer games less than one hour per week, and both Santa Fe Christian and Stanford students played for one to three hours a week, a difference which was not statistically significant. The use of ICQ and chat rooms was less popular with all three schools in that students used this feature less than an hour a week. We did not ask about instant messaging, however, and ICQ appears to be less popular than other instant messaging systems.

Technology Use and Social Activity

Students at both high schools reported spending four to six hours per week talking on the telephone, while Stanford students averaged one to three hours $\chi^2(2, N = 57) = 10.37, p < .01$. Palo Alto students and Stanford students spent eleven to fifteen hours socializing with friends, with the private school students reporting seven to ten hours, a difference which was not statistically significant. The average number of social events attended per week were between one and three for all students. Hours spent dating were between one and three for Palo Alto and Stanford students, and less than one for Santa Fe Christian students, also not statistically significant. Palo Alto high school students spent the most time with a significant other, between four and six hours a week, and private school students spent less than one hour $\chi^2(2, N = 56) = 15.06, p < .001$. Stanford students were in the middle, spending from one to three hours with a significant other. Stanford students received, on average, significantly more email per day, between 11 to 15 messages, while Palo Alto students received four to six, and Santa Fe Christian students received one to three $\chi^2(2, N = 53) = 25.31, p < .0001$. However, they responded to a lower percentage, 30% in comparison to 55% for Santa Fe Christian students and 48% for Palo

Alto High School students and the difference was significant $\chi^2(2, N = 57) = 7.37, p < .05$, possibly because college students are likely to be on a greater number of email lists, many of which are conveying information and do not require a response. Notably, the percentage of game time alone was higher for Santa Fe Christian students, 56% of the time in contrast to 29% for Palo Alto students and 42% for Stanford students, approaching significance, $\chi^2(2, N = 57) = 7.68, p < .05$.

Discussion

Consistent with our earlier studies, and contrary to our initial hypotheses, shy students did not use technology more than the non-shy, but they responded to significantly less of their email than the non-shy, again suggesting that they were not using technology to practice socializing as much as the non-shy, losing out on a valuable means of communication, and suggesting that shyness may extend to less socializing online as well as offline. It is interesting to note that in our combined sample from two high schools and one university, shy students overall did not receive less email or spend less time using email than non-shy students. Perhaps this implies that they respond to a smaller group of acquaintances, and correspond more often with close others, but those questions were not covered in the interview. Because this is self-report data only we also do not know to what degree their self-perceptions match their actual behavior or how responses to an interviewer reflect their actual behavior. Future research should address more specifically how email is used by students through interviews, self-report questionnaires and behavioral observations.

Private school students and Stanford students spent more time doing homework on the computer than Palo Alto High School students. In computer activities not

academically related, private school students spent less time than the other schools.

Surfing the web was more frequent for college students than high school students, as was corresponding with others. Palo Alto students spent less time playing computer games and Stanford students spent less time on the phone.

Private school students spent less time corresponding via computer, received less email and spent less time socializing overall. Palo Alto students spent the most time with a significant other and the least time playing games alone. Overall the data suggest that the public high school students spend more time socializing and less time engaging in computer activities alone than private school students, and that college students spend more time corresponding, surfing and socializing. Our ability to detect differences between shy and non-shy students is limited by our small sample size, which gives us less power to detect differences between the groups. However, these results are consistent with our earlier questionnaires study with a larger sample. Furthermore, when we examined differences between the upper and lower quartiles of the sample, there were still no large differences between average hours spent in specific activities. The computer still seems to be simply another tool for developing social competence.

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Table 1

Average Range of Hours of Technology Use Across Schools

	<u>Palo Alto High</u>	<u>Santa Fe</u>	<u>Stanford</u>
	<u>School</u>	<u>Christian</u>	<u>University</u>
	Average range of	Average range	Average range of
	hours spent	of hours spent	hours spent
•Hours			
Schoolwork	1 - 3	4 - 6	7 - 10*
non-schoolwork	4 - 6	1 - 3	11 - 15*
surfing the web	1 - 3	1 - 3	4 - 6*
email *	1 - 3	< 1	4 - 6*
computer games	< 1	1 - 3	1 - 3
games with friends	1 - 3	< 1	4 - 6
ICQ	< 1	< 1	< 1
chat rooms	< 1	1 - 3*	< 1
telephone	4 - 6	4 - 6	1 - 3*
significant other	4 - 6*	< 1	1 - 3
•Number of			
received email	4 - 6	1 - 3	11 - 15*
•Percentage of			
<u>game time alone</u>	29%	56%	42%

Note: asterisks indicate that the difference is statistically significant at $p < .05$ or less.