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Middle School Students' Technology Practices and Preferences: Re-Examining Gender Differences

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Previous research has suggested that a host of factors such as lack of role models, access, learning styles, social expectations, and the absence of gender-sensitive computer games are, in part, responsible for differences in female representation in technology fields. Recently, video game and software creators have turned their attention to the gender preferences that would increase access and spur participation in the technological milieu among girls as well as boys. Additionally, the advent of the World Wide Web (WWW or Web) and its ever increasing presence in homes and schools of differing socio-economic levels has made a variety of functions (e-mail, chat, games, etc.) available to both genders. This article suggests that the gender gaps that once existed with regard to computer access, use, and perceived expertise are narrowing significantly. These findings are based upon survey data from 512 middle school students in three areas: (a) self-perception of computer skills and their acquisition; (b) exposure to technology at home and at school; and (c) media style and content preferences. The conclusions suggest that the rapidity with which acculturation to the Web is taking place among America's youth may be responsible for less gender-biased technology outcomes in schools and, eventually, in the workforce.

Much has been written about gender differences as they relate to learning styles with computers, computer software use, and entry into the technology fields (American Association of University Women (A.A.U.W.), 1997; Brunner, 1997; Brunner & Bennett, 1997, 1998; Sutton, 1991; Johnson & Swoope, 1987; Sashaani, 1997; Schofield, 1995; Campbell, 1989; Levin & Gordon, 1989; Martinez & Mead, 1988; Ward, 1985). Each of these factors has contributed to male stereotypes characterized as computer savvy, while females are often characterized as more reticent to embrace technology. Research has demonstrated that the lack of gender-sensitive computer games and lack of girls' early exposure to technology have compounded this gender gap. Recently, researchers have explored ways in which technological preferences of females can be incorporated to spur participation in the digital environment by both genders (Brunner, Bennet, Clements, Hawkins, Honey, & Moeller, 1990; Cassell & Jenkins, Eds. 1998; Miller, Chiaka, & Groppe, 1996).

With the advent of the Internet and its ever-increasing presence in the schools and homes of differing socio-economic groups, the delivery of educational information via the Web has become extremely feasible (CNN, 1999a, 1999b; National Center for Educational Statistics (NCES), 1999; Kaiser Family Foundation Report, 1999). By incorporating formats that have appealing game-like features but deliver well-grounded educational content, numerous educational Web sites are attempting to reach adolescents not only in their classrooms, but in their homes and other informal settings as well. New information technology holds the promise of profoundly changing the ways in which schools function and, more importantly, the ways in which adolescents conceptualize their own learning. Perhaps, as enthusiasts claim, computing and telecommunications can facilitate a shift from teaching to learning, thereby better preparing youth for life in the Information Age (Schank & Jona, 1991; Papert, 1993).

As Turkle (1984) has explained, "when different people sit down at computers, even when they sit down at the same computer to do the 'same' job, their styles of interacting with the machine are very different" (p. 15). Nowhere are the style differences more dramatic than between the male and female approaches to use of computer technology and the programming for this computer technology (Kafai, 1993; Huff & Cooper, 1987; Turkle, 1988). Studies throughout the 1990s found relatively similar evidence of differential perceptions of computer use. Giacquinta, Bauer, and Levin (1993) found that boys conceptualize computers differently than girls. Males are more likely to play games, to program, and to see the computer as a playful, recreational toy. Girls tend to view the computer as a tool, a

means to accomplish a task such as word processing or other clerical duties. Boys gravitate toward open-ended play while girls favor experiences that repeat patterns they are familiar with and for which they already know the outcome. Some researchers suggest that this difference in perception stems from a slanted market and differential access in the home and schools (Ogletree & Williams, 1990; Culley, 1993). Typically, the media has depicted males as the expert users of computers while girls are depicted as less than enthusiastic users (Ware & Stuck, 1985).

Even from an early age, males are more "computer advantaged" as evidenced by the fact that families with male children are more likely to own a computer (Campbell, 1989; Levin & Gordon, 1989). The role models and helpers for computer use are also more likely to be males. In particular, Ogletree and Williams (1990) found that among college students, a male was more likely than a female to be reported as helping most with the computer.

Kiesler, Sproull, and Eccles (1985) claimed that computing is "an alien culture for girls" (p. 452) and the gender differences in social and technological knowledge prevent female entry into the technology professions. The contrast between the male and female approach to technology is explained by Brunner and Bennett (1997), who propose that "the feminine attitude toward technology looks right through the machine to its social function, while the masculine view is more focused on the machine itself" (p. 48).

Gender issues in the use of computer games and programs have been documented as well. A study of adolescent girls by Miller, Chiaka, and Groppe (1996) determined that there were a number of behaviors and preferences which seemed to be common to most girls using computer games and programs. To overcome the cumulative effects of these persistent patterns in computer game preferences, some companies such as GirlGames and Purple Moon responded to such gender differences by producing "girls only" computer games. If, however, Web sites and web-based computer games are to incorporate the best techniques to attract and retain the interest of both genders, then it is necessary for their designers to understand what each gender is bringing to the computer experience. Additionally, the greater prevalence of computer technology in the daily lives of middle school-aged students may play a factor in changing adolescents' perceptions from those described in previous research. Are there any signs of technology acculturation at work? Have computer prevalence and increased exposure translated into any appreciable closing of the previously documented technology gender divide?

METHOD

Participants

Between October 1998 and April 1999, 568 middle school students were surveyed from eight different Houston-area public and private middle schools covering four different school districts. The students ranged in age from 11 to 15 years (M = 12.59, SD = 0.66). Students who did not report essential demographic information were dropped from the analysis for a final sample of 512 students. Of the final sample, 43.4% were male (n = 222) and 56.6% were female (n = 290). Schools were recruited to obtain a diverse student population representative of urban and suburban schools, as well as all ranges of socio-economic status (SES). In order to validate the representation of SES diversity in the sample, students in the sample were assigned to one of three economic groups as operationalized by free/reduced lunch percentages of the total school population. Schools were categorized as high disadvantage (three schools where more than 60% of students received Free/Reduced Lunch), middle disadvantage (three schools where 29-59% of students received Free/Reduced Lunch), or low disadvantage (two schools where less than 28% of students received Free/Reduced Lunch). The final sample contained 31% high disadvantage students (n=158), 33% middle disadvantage students (n=170), and 36% low disadvantage students (n=184). Within each SES category, male and females were represented nearly equally. Table 1 indicates the school profile, sample size, and each school's Free/Reduced Lunch (Economically Disadvantaged) percentages.

Table 1
Profile of Sample

Campus	District profile	Enrollment	Sample size	Percentage surveyed	Economic Disadvantage
1	Inner city	400	30	7.5	76.8%
2	Suburban	148	97	65.5	62.6%
3	Suburban	405	31	7.7	60.8%
4	Inner city	562	37	6.6	40.1%
5	Suburban	385	85	22.1	31.8%
6	Inner city	116	47	40.5	29.1%
7	Inner city	275	142	51.6	20.6%
8	Suburban	72	43	59.7	0.0%

Design and Procedure

Based on a series of small focus groups with middle school students, the authors compiled a 68-item questionnaire, both closed and open answer. Students answered the paper and pencil questionnaire during either a science or computer technology class period. Typically, the questionnaire took 30 minutes to complete.

RESULTS

Self-Perception of Computer Skills and Their Acquisition

An overwhelming 97% of students (498 out of 512) indicated that they "know how to use a computer." There was no significant gender difference—97.6% of females and 98.2% males responded affirmatively. Though it was not the focus of the current study, the effects of school disadvantage on this variable were also explored. There was a slight difference by level of disadvantage; however, overall reported knowledge of computers was strikingly high. In schools with low levels of disadvantage, 100% of students reported that they knew how to use a computer compared to 97% in schools with high levels of disadvantage (X^2 (2, N = 512) = 11.60, $p < .01$). Although we did not attempt to define the term "use," it was clear that in the students' minds they had sufficient command of a computer to respond positively. When asked to rate how much they "liked using a computer,"(from 1=*I love them* to 5=*I hate them*), students of both genders were extremely positive. The mean overall response was 2.11, with girls being only slightly less favorable (M = 2.19; SD = 1.14) than boys (M = 1.95; SD=1.09) $t(496) = 2.36, p < .05$.

When asked, "Who played the biggest role in teaching you to use a computer?" and given choice categories ranging from "self" to "siblings," there were no gender differences among the responses. The categories receiving the largest number of responses were *self* and *teacher*, each garnering 29%. *Siblings*, *dad*, *mom*, and *friend* were less frequently mentioned. Responses to the question "How did you learn to use the computer?" also did not differ significantly by gender. Eight response options were provided for this item as well as an "other" category and students were asked to "check one." The majority of these adolescents said that they "messed around on it" (33% of girls and 32% of boys), followed by school classwork (12.7% of girls and 11.3% of boys) or by watching a parent (14.1% of girls and 10.8% of boys). Combining four categories involving watching a

teacher, parent, friend, or sibling, 32% of girls and 33% of boys indicated they learned through watching someone else. "Playing games" was not often indicated as a way to learn how to use a computer, only 3.6% of girls and 8.5% of boys selected this option.

Ninety-five percent of all students indicated that they had used the Internet, either at school or at home, affirming the massive change in access that has occurred over a relatively short period of time. Again, though there was a statistically significant effect of level of economic disadvantage in the school, reported use was still high in all schools. One hundred percent of students in schools with low disadvantage versus 87% of students in schools with high disadvantage reported having ever used the Internet [X^2 (2, N = 496) = 30.37, p < .001]. There were no gender differences in reported use. The prevalence of Internet access at home was of interest, since much has been written about the "digital divide," differentiating those who have connectivity and those who do not. Remarkably, 80% of the students in the sample, the same percentage of boys and girls, reported Internet access at home.

With regard to Internet use, we asked students to rate their expertise (1=*I am an expert* to 5=*I am not very good at it yet*). Here, there was a statistically significant gender difference with girls' mean of 2.73 (*SD*=1.14) and boys' mean of 2.27 (*SD*=1.08) t (479) = 4.51, p < .001. Internet expertise was significantly correlated with liking to use the computer (r =.437, p<.001). Of those who reported liking the computer, more reported high levels of Internet expertise.

Additionally, when asked how they decide which Web sites to visit, there was a significant difference between males and females, with girls slightly more prone to follow the recommendations of teachers than boys were, [X^2 (2, N = 495) = 12.97, p < .001]; however, it was clear that both genders relied most heavily on search engines (60%) to find their sites of interest (Table 2). This finding supports the students' own self-ratings that they are beyond the novice category when it comes to Internet expertise.

Table 2

How Do You Decide Which Web Sites to Go On? (Check all that apply.)

	Girls (%)	Boys (%)	Total (%)	X^2
Go to Web sites the teacher shows us	38.1	22.9	31.5	12.972***
I learn about Web sites from friends	53.4	45.1	49.8	3.328
I go to Web sites I hear about on advertisements	42.3	43.7	42.9	0.094
I use a search engine	60.5	60.0	60.3	0.013

* p < .05, ** p < .01, *** p < .001

Exposure to Technology at Home and at School

The prevalence of computers in both homes and schools is remarkably high. A large percentage of the students, with no significant difference between genders, reported that they used a computer at home (84.1% of girls and 80.7% of boys) and among the students from the schools with the highest levels of disadvantage, 72% had home access to a computer.

The majority of students who had a computer at home used it for 30 to 60 minutes per day (36% of girls and 38% of boys). As a further probe, students were asked to estimate the number of "times per week" they used the computer at home. A significant gender difference emerged. While girls reported a mean of 3.69 times per week (SD= 1.72), boys reported a mean of 4.24 times per week (SD= 1.85), $t(390) = 3.07$, $p < .01$.

The major competing at-home activity reported in the literature is television watching (Kaiser Family Fundation, 1999). It was important to determine whether the more interactive computer was weaning students from the more passive television watching phenomenon. When computer time was compared to television watching time for students who use a computer at home, TV dominates. Students on average indicated that they spent more time daily watching television than they did using the computer at home. The majority of both genders (33.5% of girls and 31.6% of boys) watch between one and three hours of television per day. A smaller percentage (17.8% of girls and 19.6% of boys) report watching television five or more hours per day. Boys and girls were equally represented among heavy users of computers (i.e, using a computer at home two or more hours per day). Among those students identified as heavy users of computers, 13% of the sample, 49% were girls and 52% were boys.

The use of the computer at home appears to be a largely solitary experience. As reported by both genders, approximately, 74% of girls and 77% of boys "use it alone" (Table 3). It is interesting to note, however, that of those who report parental involvement with computer use, Moms and Dads are represented almost equally with both male and female youth.

When these adolescents used their computers at home, there were only three purposes which revealed significant gender differences. Boys used their home computers for simulation experiences more so than girls, while girls used their home computers for homework assignments and e-mail more so than boys (Table 4). While not statistically different, it is of special interest to note that both males (70.1%) and females (72.8%) indicate that "playing games" is the number one use of the computer.

Table 3

When You Use the Computer at Home, Who Do You Use It With?

	Girls (%)	Boys (%)	Total (%)	X^2
I use it alone	74.3	76.6	75.3	0.342
Friend	21.7	23.9	22.6	0.305
Grandparent	1.8	4.0	2.7	2.063
Dad	17.0	14.4	15.9	0.587
Mom	21.7	16.4	19.5	2.098
Brother	18.5	13.4	16.4	2.164
Sister	14.1	12.9	13.6	0.141

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 4

What Do You Use Computers at Home For? (Select all that apply)

Activity	Girls (%)	Boys (%)	Total (%)	X^2
Playing games	72.8	70.1	71.7	0.411
Searching Internet	62.0	57.2	60.0	1.090
Homework assignments	60.1	45.8	54.1	9.676**
Word processing	59.4	53.7	57.0	1.536
Using CD-ROM materials	47.8	44.8	46.5	1.435
Using e-mail	47.5	38.3	43.6	3.964*
Projects	44.6	45.3	44.9	0.024
Using chat rooms	34.1	28.9	31.9	1.450
Simulation experiences	7.2	17.4	11.5	11.784***
Checking out books from the library	4.0	6.0	4.8	0.998

* $p < .05$, ** $p < .01$, *** $p < .001$

The ubiquity of computers at school matches that of the home. Eighty-eight percent of girls and 90% of boys report that they use computers at school. The average number of times students reported using computers at school each week is 2.5 (SD = 1.57) with no significant difference between males or females. There was variation in the frequency with which computers were used in specific types of classes. Students were asked to check the one class in which they used computers the most. History/social studies was indicated for 33% of the students and language arts was indicated as the class with the most frequent use by another 20% of the students. There was no difference between the male and female responses.

Students were asked to select from a list of options all the things they use computers for at school (Table 5). The order of use is the same for both genders. The order of computer purposes are: searching the Internet (boys 62%; girls 66%), word processing (boys 53%, girls 52%), projects (boys 42%, girls 43%), playing games (boys 36%, girls 33%), homework assignments (boys 21%, girls 29%), using CD-ROM material (boys 19%, girls 20%), checking books out from the library (boys 19%, girls 17%), simulation experiences (boys 10%, girls 11%), and other (boys 11%, girls 24%).

Table 5

What Do You Use Computers at School For?

Activity	Girls (%)	Boys (%)	Total (%)	X^2
Word processing	51.8	52.8	52.3	0.047
Searching Internet	66.3	61.8	64.3	1.057
Checking out books from library	17.2	19.4	18.2	0.393
Simulation experiences	10.6	9.5	10.1	0.171
Using CD-ROM materials	20.1	18.5	19.4	0.210
Playing games	33.3	36.0	34.5	0.380
Projects	43.2	41.7	42.6	0.112
Homework assignments	28.6	21.3	25.4	4.158

* $p < .05$, ** $p < .01$, *** $p < .001$

Media Style and Content Preferences

Given the self-reported comfort level students describe themselves as having with the Internet, we wanted to probe further into the types of Web sites they prefer and some of the characteristics they profess liking. Table 6 indicates the preferred characteristics that were offered as options when students were asked to "check all that apply." Of the 18 options available, girls differed signficantly from boys on seven of the options. Girls were most interested in being able to print out things from Web sites (70.2% of girls and 51.6% of boys), [X^2 (2, $N = 309$) = 17.92, $p < .001$] and to create things on the Web sites (65.6% of girls and 47.4% of boys), [X^2 (2, $N = 287$) = 16.49, $p < .001$]. Girls were eager to take quizzes on Web sites to see what they knew (46.5% of girls and 24.7% of boys), [X^2 (2, $N = 184$) = 24.87, $p < .001$]. Being able to work with other people online was a good feature (according to 37.6% of girls and 29.8% of boys),[X^2 (2, $N = 170$) = 3.32, *ns*], as was having a table of contents or index (36.9% of girls and 26.0% of

boys), [X^2 (2, N = 160) = 6.558, p <.01]. Girls wanted the goal of a Web site to be easy to understand (30.5% of girls and 20.9% of boys), [X^2 (2, N = 131) = 5.75, p < .05], and they also wanted the Web site to offer suggestions for things that they could do at home (29.4% of girls and 15.8% of boys), [X^2 (2, N = 117) = 12.57, p < .001].

Table 6

I Like Web Sites That. . .

Activity	Girls (%)	Boys (%)	Total (%)	X^2
Have cartoon artwork	48.9	51.6	50.1	0.354
Have different languages	17.1	10.7	14.3	3.967*
Let me print out things	70.2	51.6	62.2	17.916***
Let me give feedback	28.4	22.8	26.0	1.975
Are easy to figure out the goal	30.5	20.9	26.4	5.751*
Let me do role playing	22.7	20.0	21.5	0.524
Have a table of contents or index	36.9	26.0	32.2	6.558**
Have games	76.6	74.0	75.5	0.460
Let me work with other people online	37.6	29.8	34.2	3.316
Have animation	58.2	60.0	59.0	0.171
Don't have a goal, just have information	17.7	20.6	19.0	0.635
Change on a regular basis	34.0	29.3	32.0	1.260
Have a map so I can see where I am	17.7	20.0	18.7	0.413
Have a story to them	16.7	15.8	16.3	0.065
Make suggestions for things I can do at home	29.4	15.8	23.5	12.570***
Let me create things	65.6	47.4	57.7	16.490***
Have quizzes so I can see what I know	46.5	24.7	37.0	24.872***

* p < .05, ** p < .01, *** p < .001

Since playing computer games was a frequent activity for both genders, the researchers were interested in the specific games and some of the game features to which the students were most attracted. When asked their favorite computer game, students provided the names of 147 different games, which were categorized by type of game. The most frequently mentioned types for girls were cards or arcade games (47% for girls, 15% for boys) and skill/simulation games (18% for girls, 34% for boys). For boys, the most frequently mentioned types of games were action/adventure (42% for boys, 16% for girls) and skill/simulation. Educational and creative games were mentioned infrequently by both boys and girls, 10% and 5% for girls respectively and 3% and 2% for boys respectively.

Of additional interest was whether computer games had supplanted other types of games. Significantly more girls than boys said that they liked games which were not computer games or video games (88.3% of girls and 76.6% of boys) [X^2 (2, N = 427) = 12.02, p < .001]. While they were not asked whether they preferred these games to computer games or video games, the findings would suggest that these middle school-age students did not consider themselves too old for any kind of game and that perhaps game styles which have not yet been adapted to computer or video format might still interest them. For example, over half of all students reported that they liked to play puzzle games in particular (boys 66.4%, girls 73.5%). Nearly all of the students agreed that if they liked a game they would play it over and over again (boys 92.2%, girls 90.3%).

Another question attempted to probe the types of people and characters the students preferred. This data might influence the construction of multimedia material with high appeal to adolescents. When asked the open-ended question "Who is your favorite famous person?" the responses were diverse; examples ranged from Stone Cold Steve Austin (a wrestler) to Mother Teresa; however, after catagorizing the responses by type, performers/musicians garnered over 73% of the response. More girls (87%) than boys (56%) selected performers or musicians, while boys (34%) were more likely than girls (5%) to select athletes, [X^2 (2, N = 290) = 61.89, p < .001].

DISCUSSION

The data suggested several observations about the current state of computer acculturation among adolescents. Students of both genders and schools of all socio-economic levels are well on their way to becoming part of the digital culture. The high percentage of Internet access is a promising sign that the digital divide will also be conquered in the near future among the adolescent population. The rapid rise in the availability of computers in both homes and schools appears to be making inroads in the previously held notions that males can and do dominate with regard to computer use and perceived expertise. The demography of computer ownership and access reported by our sample of students is reinforced by national data indicating that 89% of schools were connected to the Internet in the fall of 1998. This is an increase of 11 percentage points from the 78 percent reported in 1997 (NCES, 1999). With the increase in wired schools, girls appear to be empowered to use the school computers with equal access. Males and females report similar time spent on the computer and almost identical uses of the technology in the school settings.

With regard to home use, a recent survey (Kaiser Family Foundation, 1999) indicated that 45% of students surveyed lived in homes with Internet access and 7% of those surveyed had Internet access in their bedrooms. This is somewhat less than our sample that indicated 80% of the students having home Internet access. The national goal of every school-age child having Internet access by the year 2000 is remarkably close to realization among the students in our sample. The more telling question is "what are the students doing with this newly acquired access?"

Learning to use the computer is the first step toward active participation in technology's benefits. Students, both males and females, attributed their learning of computer skills largely to "messing around on it" or "watching someone." The admission by girls that they learned by " messing around on it" seems to run counter to the computer avoidance evidenced in previous research. Not only do females have the self-confidence to mess around, when asked directly about their Internet expertise, on average they rate themselves toward the positive side of Expert. Boys did, however, rate themselves even higher, a finding that supports the results of earlier research. For example, Whitley's (1997) meta-analysis of 81 studies from 1973 to 1992 indicated that boys exhibited greater sex-role stereotyping of computer use and deeper confidence with technology. However, the encouraging news is that females are now viewing the use of computers as not an exclusively male tool. Similarly, the data indicating no difference between the representation of mothers and fathers in assisting students with the computer dispels the notion that males are the dominant role models for children when the computer is used at home.

The digital divide separating the confidence levels of male and female adolescents with regard to computer use is narrowing. While some significant differences do exist, the patterns of computer use and the purposes of use are remarkably similar for males and females in our sample. As recently as 1994, one study by Sakomoto indicated that among fourth through sixth grade students considered "heavy users" of computers, the ratio of boys to girls was 4 to 1. The results of this study indicated that this gap is closing as no gender difference in heavy use was found.

The 1998 report by the American Association of University Women described an alarming gap between boys and girls within the school setting, particularly when considering the computer courses in which males and females enroll. While the enrollment in computer-related courses was not the focus of this survey similar levels of self-reported computer use between males and females in the traditional school curriculum were observed.

In contrast to previous research, both males and females indicate that games dominate the home use. Even in the school environment, games were one of the prime uses. From the types of games and the specific titles named by males and females, there are some significant changes in the types of games that females prefer. In contrast to previous research in which girls preferred less violent, more open-ended types of games (Miller, Chiaka, & Groppe, 1996), we now see similar categories of preference among males and females. Games remain an important part of adolescents' computer repertoire. These findings, in particular, argue for ways in which to infuse the gaming format with sufficient intellectual content to make the "game" a valuable learning tool. Some educators have already seized upon this notion and are producing more substantive Internet games that incorporate accepted learning theory. The theoretical framework of curriculum built around project-based or case-based learning could lend itself to a gaming environment. Crucial issues of how intrinsic the problem is to the game scenario and how well do learning objectives translate into an appealing game are among those which would need to be explored.

While the content of educational Web sites targeted for middle school students is still an issue for debate, the data from this survey pointed clearly toward Web sites as an effective delivery mechanism. Access, use, and perceived self-confidence in navigating the Internet are less constrained by gender-related concerns than they were less than a decade ago. In addition to speaking to the rapid rise in adolescent female participation in technology, the data also echo the research of others in highlighting the prominence of all types of media in the life of adolescents.

The recent Kaiser survey (Kaiser Family Foundation, 1999) found that the average amount of time each day spent using all types of media for children from 8 to 18 years olds was 6.43 hours. The influence of all media in youth's life was reinforced by our survey participants' choices of "your favorite famous person." An overwhelming majority chose performers or musicians.

While all types of media are playing a larger role in children's lives, this interaction with the media is a solitary experience. This data indicated that children are largely using the Internet and computers alone. Other research arrived at the same conclusions (Kaiser Family Foundation, 1999; CNN, 1999). The authors do know that children are largely unsupervised and often free of any parental rules governing media and its use. From the Kaiser Family Foundation Report, *Kids and the Media* (1999) the percentage of children who live in homes where there are no rules about watching TV was 49% and the percentage of time that children are watching TV

without their parents was 95%. A similar pattern seems to be emerging with regard to computer use.

One of the challenges before us is the creation of sufficient quantity and quality of digital materials to attract and retain adolescents' interest in an unsupervised environment. The materials must be free of gender-bias and bridge the gulf that currently exists between how children learn and communicate on their own and how they are taught in school. Can the production of high-quality, educationally-grounded, and content-significant materials attract adolescents to the world of learning via the Web?

The Net Generation, as they have been labeled (Tapscott, 1999), is more immersed in digital technologies than ever before. The advent of technology into the lives and culture of adolescents is not one of choice but of certainty. If the influences at work among our youth are understood, then perhaps their educational needs can be addressed in ways that maximize what is already known about how to structure effective content.

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