

# Uses of the WWW by Adolescents in Public Schools

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The introduction of a new medium into society has frequently been a flash-point for media effects research focusing on children and adolescents (Wartella & Reeves, 1985). In each case children have been recognized as a special audience, one that deserves special consideration (Dorr, 1986; Wartella, 1995). The introduction of television prompted numerous studies (e.g., Schramm, Lyle & Parker, 1961), and provoked much discussion and public debate over its proper place in society. The effects of the media on children's mental development has been a common theme (e.g., Van Evra, 1990). From early on, media effects researchers have focused the attention of the nation on the media's dysfunctional effects. From the Payne Fund studies on the effects of motion pictures (e.g., Charters, 1933; Dale, 1935) to Dr. Fredrick Wertham's (1954) exposé of comic books to the Surgeon General's (1972) report on television and violence, social scientific researchers have frequently examined how the media have served to undermine the positive influences of family and social institutions (McLeod & Reeves, 1980; Wartella & Reeves, 1985). Television, since its inception, has been derided by some for its believed adverse affect on children's cognitive and social development (Morgan, 1980; Healy, 1990).

Researchers exploring the effects of educational media, however, have argued from a similar set of assumptions

to reach dramatically different conclusions. Instead of exploring the possible negative effects of the media, proponents of "powerful effects" have heralded the positive results promised by the use of educational media (e.g., Kozma, 1994; Salomon, 1978). The history of educational technology, specifically the use of mass media in an educational context, is infused with promises of revolutionary proportions (Cuban, 1986). Access to books, instructional motion pictures, radio, and more recently television and interactive multimedia has been envisioned as the panacea for all that ails our educational system. Libraries, along with the liberating technologies of the postal service and telephones, were once envisioned as facilitating the elimination of schools (Illich, 1970). Educational films, radio and television programs, and educational computer software have all been employed with similar hope and optimism. The most recent savior of education is the global, interactive, multimedia database known as the Global Information Infrastructure, the Internet, and the World-Wide Web (WWW).

## **Statement of the Problem**

The Internet, and more specifically the WWW, is being eagerly adopted by school districts, administrators, and teachers almost without exception. However, the use of the WWW in the classroom marks the first deployment of an educational medium in which the end

user can access a virtually unlimited breadth of content. Hecht (1997) argued, “having the Internet in the classroom is like equipping each classroom with a television that can be turned on at any time and tuned in to any of 100,000 unrestricted channels, only a tiny fraction of which are dedicated to educational programming (and even those have commercials).” And while the resource is huge—Lawrence and Giles (1999) estimated 800 million web pages—some have argued that only a fraction of the millions of Web pages hold any educational value for this K-12 audience (see, for example, Bennett, Wilkinson, & Oliver, 1996; Tillman, 1998; and Kirk, 1996).

Just as early studies on the effects of television on young viewers focused on the introduction of the medium into society, studies of the introduction of the WWW into society, and more specifically our public schools, ought to address critical issues. For example; how do student attitudes regarding the WWW’s defining characteristics affect WWW use? Do students perceive the WWW to be primarily a source of information or entertainment, and how does this perception affect usage? Is affinity for the WWW and skill level at using the WWW correlated with specific uses? And, how do students describe their own use of the WWW at school, and how does this compare to actual sites visited?

Recently there have been calls for research to determine the effect of computers with Internet access on student achievement (Kozma & Quellmalz, 1996). Linda Roberts, Director of the Office of Educational Technology, spoke at the SchoolTech Exposition and Conference and

reminded educators of the need to collect data that will support or reject the spending of billions of dollars for computers and wiring (Mendels, 1998, April 27). A recent US Department of Education report (National Center for Educational Statistics, 1998) concluded by listing four challenges that remain for educators and school districts as they embrace this new educational technology. The challenges are: technical support for hardware and software; teacher training and development; “increasing effective use of the Internet to enhance student learning; and protecting students from inappropriate material on the Internet” (n.p.). Inappropriate content available on the WWW has received renewed attention in the wake of the tragic events at Columbine High School in Littleton, Colorado in April of 1999. A Gallup poll commissioned by NBC and the Wall Street Journal found that 82% of those polled believed the Internet to be at least partially to blame for the shootings (Bowman, 1999).

Research into the use of the WWW in public schools has important implication for local, state, and national policy and funding initiatives. While a study such as this is only a beginning in the quest to assess the value of this new medium, it is an important first step in that it allows for the identification of motivations of individual users. This study can also help to identify crucial points where intervention may be necessary in order to realize the WWW’s full potential as an educational resource. Once we understand what motivates students to utilize this medium, we can better design incentives that encourage educational use and discourage use that distracts students from that goal.

## WWW Uses and Typologies

Few studies have taken a uses and gratifications approach to study the Internet and even fewer have narrowed their focus to look at the WWW (e.g., Charney, 1996; Setter, 1997; Yoo, 1996, and Kaye, 1998). December (1996) identified “communication, interaction, and information” as the three broad categories for why people use the Internet. Charney (1996) concluded from a study of university students that the Internet is used “to keep informed, for entertainment and diversion, to maintain communication, and to look at the sights and sounds of the 'Net” (p. 88), but most frequently for entertainment-diversion (p. 90). In a pilot study conducted by Hyunoh Yoo (1996) the author found six gratifications dimensions relating to use of the Internet: “Entertainment, Information, Sociability-building, Sociability-maintaining, Transaction-general, and Transaction-task” (n.p.). Of these, entertainment, information, transaction-general, and sociability-building were related to WWW usage. Hunter (n.d.), writing about uses and gratifications of the WWW, cited three gratifications: browsing, information seeking, and entertainment. A 1995 study of college students’ WWW usage resulted in “six motivational categories: entertainment, social interaction, pass time, escape, information, and Web site preference” (Kaye, 1998, p. 34). According to the 9th WWW User Survey conducted by Georgia Tech (GVU’s 9th WWW user survey, 1998), the WWW’s youngest users (11-20) use the web mainly for “entertainment” (81%), “education” (70%), “time wasting” (67%), and “personal information” (60%).

## Design and Methodology

Combining qualitative and quantitative approaches, this research project employed open-ended questions, interviews, two types of survey research, and content analysis of WWW sites visited by students. Some of the data was collected with the active participation of the subjects, while other data was collected using passive data collection techniques. Using multiple methodologies allowed for increased richness of data and a clearer picture of the phenomena under investigation.

The population for this study was comprised of middle-school and high-school students at selected public schools in five districts in a western state. The districts were selected in consultation with the state’s Department of Education to reflect a cross-section of schools in urban and rural settings that have Internet access. The participants for this study were selected using two different approaches. For the first survey, which was administered on paper, a stratified convenience sample was employed. At one middle school and one high school in each district a class representing each grade (sixth, seventh, eighth, ninth, tenth, eleventh, and twelfth) was selected to take the paper survey. The second survey was administered electronically at the computer. Students attending middle and high schools in these districts have access to the WWW using computers available in classrooms and in the schools’ media centers. However, not all students have parental permission to access the WWW. Only students who have been granted parental permission and who have signed and submitted the required forms to their local school administrators are permitted to access

the computer-administered survey. Of these, participation in the second phase of the survey was voluntary and by self-selection. The survey was installed as the default home page for a period of time sufficient to gather approximately 100 responses from each school.

### **Survey Data Collection**

The first phase of survey data collection was actually a part of the pilot study. Open-ended questions addressing the possible uses of the WWW were administered to a small group of students in two public schools. Responses to these questions were then fashioned into WWW “use” statements that became part of the paper survey instrument. A principal components analysis of responses to the paper survey was conducted and the resulting “use” categories were then used to construct the computer-administered survey instrument.

The two primary survey instruments employed in the proposed study will be referred to as the “paper survey” and the “computer survey.” The paper survey was a 75-item survey instrument to be administered to students in their classrooms at selected public middle schools and high schools. The paper survey contains sections designed to measure the students’: 1) affinity for the WWW, 2) assessment of the value of the WWW for various purposes, 3) skill level for computer and WWW use, 4) use of the WWW, 5) avoidance of the WWW, and 6) demographics. Following this, the computer survey was administered to the students at the time and place of their access to the WWW—specifically the school’s media center or library. This phase of data collection made use of a four-item computer-

administered, WWW-based, fill-out form that was installed as the default home page on computers with WWW access. When a student launched the WWW-browsing software the default survey page loaded and the student was presented with a request to respond to the four-item questionnaire before continuing. Questions addressed the following: grade, gender, how much the student uses the WWW, and the student’s purpose for using the WWW at that particular time. This survey instrument was installed for a period of between one and three weeks at each school with the goal of receiving approximately 100 responses from each school. This survey was intentionally kept very short in order to prevent frustration by students and a perception of “time-off-task” that may have jeopardized the support of school administrators.

### **Passive Data Collection Design for This Study**

December (1996) and Newhagen and Rafaeli (1996) recognized the fact that the Internet provides excellent opportunities for data collection. As Rafaeli noted, any social scientist who has looked at an Internet server must be struck by the research possibilities present in the data that is passing through that computer (p. 6). To take advantage of this unique feature of the WWW this study followed survey research with passive data collection. Both Netscape Navigator and Microsoft’s Internet Explorer browsing software generate a cache or “global history” file that resides on the user’s hard drive and which retains a list of addresses (Uniform Resource Locators or URLs) of WWW sites last visited. This list of URLs listing WWW pages

and graphics visited most recently is fairly extensive and can be thousands of sites long.

At the beginning of the data collection period for the study the cache files on the computers in the school's open lab were deleted. At the end of the collection period the cache files were retrieved and the data prepared for analysis. First, the number of occurrences of web sites from the five commonly accessed domains: edu, com, gov, net, and org, were noted. Next, the lists of URLs were processed using a UNIX grep script to delete URLs that were locators for graphic files. These URLs were identified as those ending in gif, jpg, or png. The justification for this step is that graphically rich WWW sites generate several listings in the cache file, one for the page itself and one for each graphic contained on that page. Since the unit of analysis is the complete WWW page, discarding URLs representing images contained on a page would more accurately reflect the frequency with which a page was accessed by students. Additional script lines were written to remove URLs that linked to banner advertisements.

Once graphic files and links to banner ads were discarded, the remaining lists of URLs from each of the 10 schools were randomly reduced to 70 sites using the skip-interval method. These WWW pages were visited and reviewed by the researcher to determine if any sites had been removed or were otherwise unavailable. The first 50 accessible WWW pages from each list of seventy were then combined to create a representative list of 500 URLs. These URLs were assembled as a list of hyperlinks on a single WWW page which was then made available to the

coders for the purpose of content analysis.

The content analysis was performed by technology specialists from another public school district. For each WWW page a coder assigned a "use" category and a rating for "suitability as a source for academic research" on a scale of 1-3: 1 = not suitable, 2 = questionable, 3 = suitable. The coders were instructed to look at each site with consideration given to the grade level of the student participants. Also, for each site a use category was assigned by a coder.

## Results

Respondents to the paper survey ( $N = 791$ ) ranged in age from 10-21 years ( $M = 14.45$ ) and were enrolled in the 6th grade ( $N = 91, 12\%$ ), 7th grade ( $N = 130, 17\%$ ), 8th grade ( $N = 123, 16\%$ ), 9th grade ( $N = 106, 14\%$ ), 10th grade ( $N = 120, 15\%$ ), 11th grade ( $N = 93, 12\%$ ), and the 12th grade ( $N = 125, 16\%$ ). Average self-reported grade point average (GPA) was 3.28, and 51% were male. Respondents to the computer-administered survey ( $N = 1083$ ) were enrolled in the 6th grade ( $N = 50, 5\%$ ), 7th grade ( $N = 216, 21\%$ ), 8th grade ( $N = 192, 19\%$ ), 9th grade ( $N = 142, 14\%$ ), 10th grade ( $N = 155, 15\%$ ), 11th grade ( $N = 123, 12\%$ ), and the 12th grade ( $N = 162, 16\%$ ). Of these, 59% were male.

## Reasons for Using the WWW

Questionnaire items 21 through 60 addressed reasons why students might choose to use the WWW. These items were generated from statements made by middle school and high school students who responded anonymously to an open-ended questionnaire. Additional use statements were taken from fill-in-the-

blank responses to the computer survey questionnaire in the pilot study.

Because of the paucity of research in uses and gratifications of the relatively new WWW, exploratory factor analysis (SPSS Principal Components Analysis with Varimax rotation) was employed to group these use statements into categories. A preliminary principal components analysis was performed on an incomplete data set in order to arrive at a list of "use statements" that became part of the computer-administered survey instrument. Those seven use statements were: "for research and learning," "to communicate with other people," "for access to material otherwise unavailable," "to find something fun or exciting," "for something to do when I'm bored," "for sports and game information," and, "for shopping and consumer information." Once the complete data set was collected via the paper survey instrument, another principal components analysis was conducted. This time the result was eight factors with eigenvalues greater than 1.0 accounting for a total of 58% of the total variance. These factors differed slightly from those derived from the earlier analysis.

### **Results of the Computer-Administered Survey**

Unlike the nearly even split by gender in the paper survey, the respondents to the computer-administered survey were slightly more than 59% male. This could indicate that males are heavier users of the WWW at school, or that they were more likely to respond to the survey.

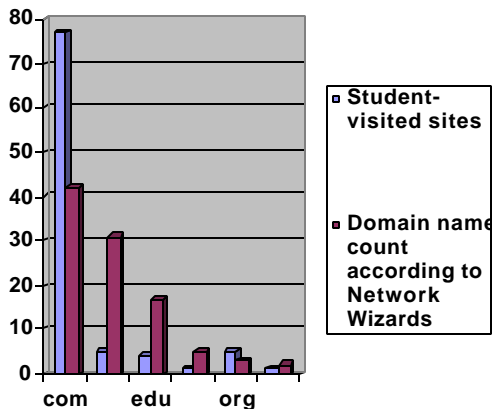
Respondents to the computer-administered survey gave the following reasons for using the WWW: "for

research and learning" (N = 541, 52%), "to communicate with other people" (N = 74, 7%), "for access to material otherwise unavailable" (N = 55, 5%), "to find something fun or exciting" (N = 85, 8%), "for something to do when I'm bored" (N = 56, 5%), "for sports and game information" (N = 65, 6%), and, "for shopping and consumer information." (N = 10, 1%). In addition, 165 students (16%) chose not to select from the seven options presented. Of these, 94 students elected to write-in a response to this question. The write-in responses offered by students to explain their purpose for using the WWW were grouped into categories as follows: specific research topics (N = 20), sexually explicit material (N = 20), games and amusements (N = 14), general research and learning (N = 11), combinations of things (N = 10), communication (N = 5), and other unclassified (N = 14).

### **Content Analysis of Sites Visited**

Because there are normative expectations for media content consumed in schools, content analysis of sites visited by students was employed to better understand the nature of the content being consumed. At the beginning of the data collection phase of the study the cache files on the computers in the schools' Media Centers were deleted. At the end of the collection period the cache files were copied to a disk and the data prepared for analysis. A total of 123,071 URLs were collected from the more than 80 Macintosh™ and Windows™ personal computers on which the survey instrument had been installed. First, the number of occurrences of web sites from the five generic top-level domains (commercial [.com], educational [.edu], governmental

[.gov], network [.net], and organizational [.org]), and the United States (.us) domain was computed. Of the total URLs collected, 77% ( $N = 94,426$ ) were from the .com domain, 5% ( $N = 6,289$ ) were from .net, 5% ( $N = 5,704$ ) were from .org, 4% ( $N = 4,842$ ) were from .edu, 1% ( $N = 1,640$ ) were from .gov, 1% ( $N = 1,403$ ) were from .us, and 7% ( $N = 8,767$ ) were from another or unidentified domain name. These numbers stand in contrast to the distribution of domain names that makes up the current state of the WWW. According to the latest survey of WWW domain names by host count, conducted by Network Wizards in January of 1999, the actual make-up of the WWW is not as heavily skewed towards the commercial domain sites as the student sample would suggest.



**Figure 1. Student visited sites vs. by domain name**

In order to facilitate content analysis of the sites visited, URLs ending with .gif and .jpg were first stripped from the list and then a UNIX grep script was written and applied to the remaining sites to

reduce the list to a number that could be evaluated and coded given the time and resources available. The subsequent 500 URLs were then collected into a single WWW page and two educators/media specialists, one male and the other female, from a nearby school district were asked to analyze these WWW pages and serve as evaluators. The pages were assigned a “use” category based on the same choices that had been presented to the students on the computer-administered survey and were rated for “suitability as a source for academic research” on a scale of 1-3; 1 = not suitable, 2 = questionable, and 3 = suitable. The evaluators were instructed to look at each WWW page with consideration for the grade level of the students being studied. Intercoder reliability was tested by first having each evaluator rate a randomly selected sample of 50 pages and comparing results on the three-step scale for suitability as an educational resource. Alpha reliability for the “suitability” assigned by the two evaluators was .92.

Once intercoder reliability was established at an adequate level, the 500 WWW pages coded by the educational media specialists were analyzed for educational value and use category. Of the 500 sites, 82% ( $N = 410$ ) were from the com domain, 5% ( $N = 25$ ) were from org, 3% ( $N = 16$ ) were from edu, 2% ( $N = 12$ ) were from net, 2% ( $N = 9$ ) were from gov, 1% ( $N = 5$ ) were from us, and 4% ( $N = 22$ ) were from another domain name. These percentages were judged to be sufficiently similar to the percentages found in the entire population of 123,071 sampled URLs to provide additional assurance that the smaller sample was representative of the larger initial sample. The “suitability” rank most often assigned by the coders was “not

suitable” (N = 262, 57%), followed by “suitable” (N = 135, 29%), and “questionable” (N = 65, 14%)

The use category most often assigned by the coders was “for research and learning” (N = 126, 27%), followed by “access to material otherwise unavailable” (N = 102, 22%), “to find something fun and exciting” (N = 76, 17%), followed by “for shopping and consumer information” (N = 61, 13%), “for something to do when I’m bored” (N = 45, 10%), “for sports and game information” (N = 30, 7%), and finally, “to communication with other people” (N = 22, 5%).

When compared to the use categories self-reported by the students responding to the computer-administered survey there is clearly a disparity between the way that students and media specialists view the content and potential use of these WWW sites. Students’ self-reported uses of the WWW was as follows: “for research and learning” (N = 541, 52%), followed by “to find something fun and exciting” (N = 85, 8%), “to communication with other people” (N = 74, 7%), “for sports and game information” (N = 65, 6%), “for something to do when I’m bored” (N = 56, 5%), “for access to material otherwise unavailable” (N = 55, 5%), and finally, “for shopping and consumer information” (N = 10, 1%).

The disparity between self-reported uses of the WWW and evaluators’ assessments of actual sites visited invites several possible explanations. First, students may simply be responding to the survey with answers that they believe are socially acceptable. Even with the anonymity provided by the computer survey technique, students may feel

some pressure to respond in a manner that is congruent with the stated purpose of the WWW in school as elaborated in the school district’s Acceptable Use Policy—namely, academic research. However, there may be another factor at work here. It could be that students are starting out with intentions of conducting academic research, but are finding themselves frustrated or distracted by the other offerings so readily available on the WWW.

Analysis comparing domain name and “suitability for academic research” indicated low ratings for .com and .net, with higher values for .org and .gov (see Table 1). In fact, the most frequently visited domain name (.com) had the lowest educational value and one of the least frequently visited domain names, (.gov), had the highest educational value as determined by the evaluation of the media specialists who served as coders.

Table 1

Mean Suitability for Academic Research of Sites by Leading Domain Names

Domain Name (N)	Suitability*
.com (410)	1.59
.org (25)	2.78
.edu (16)	2.44
.net (12)	1.75
.gov (9)	3.0
.us (5)	2.0
other (23)	1.94

Note: \* 1 = not suitable, 2 = questionable, 3 = suitable

## **Discussion**

In order for educators and researchers to evaluate the benefit of WWW use by students in public schools it is necessary to begin by attempting to understand how students perceive the WWW, what they use it for, and what gratifications they receive during periods of access.

Granted there is much excellent information available on the WWW. But as this study's content analysis of sites visited seems to indicate, students frequently are either not looking for it, or if they are, are unsuccessful in finding it. It is quite possible that users who approach a Web search with instrumental intentions may soon find themselves distracted by the entertainment and diversionary opportunities presented. The ease with which one can travel to any corner of this vast Web can be both a blessing and a curse. And this is not a unique observation. A study of 6th and 9th grade science students found that without substantial guidance and assistance, students were often unsuccessful in locating useful academic information on the WWW (Lyons, Hoffman, Krajcik, & Soloway, 1997). According to the researchers, "one over all theme is clear from the data: students need a tremendous amount of support to be successful in on-line inquiry" (p. 12).

### **Commercialization of the WWW**

The commercialization of the WWW and the growth of online advertising is another area of growing concern for educational technology advocates. The disproportionate use of commercial WWW sites by students in this study, as indicated by the .com suffix of the URL,

is just one indicator of the potential exposure of children to advertising.

Students are often unaware of the questionable nature and value of information from commercial WWW sites. Lyons et al. (1997) found that students "often choose a commercial site (.com in the URL) over a government (.gov) or education (.edu) site" (p. 21-22), an observation supported by this research.

While unregulated advertising itself is cause for concern, the unique capability afforded by the WWW to collect user information and track usage raises even greater concern. The Zap Me corporation announced a program to give free computers with satellite-based Internet service to schools in exchange for the opportunity to include advertising in a corner of the monitor. In a New York Times article dated February 25, 1999, Richtel described the Zap Me system, which tracks the user's "grade level, sex and Zip code" in order to "dish out age and sex-appropriate advertisements" (p. G7). At the time of the article the company had "given computers to 55 schools in eight states." This kind of targeted advertising and the collection of user data for commercial purposes should be of concern not only to privacy advocates but also to educators and parents who are concerned about the negative effects of consumer-driven culture.

### **Conclusions**

Based on this exploration of WWW use in school, several findings would appear to have policy implications for schools using or making plans to use the WWW for educational purposes. First, while students believe the WWW to be a

valuable source of reliable information, their use of the WWW suggests other motivations. Analysis of sites visited indicated that by nearly a two-to-one margin students visited sites rated “unsuitable for academic research” versus sites rated “suitable.” Seeking out “pleasurable experience” appeared to win out over “learning information” (Swanson, 1992) when students were given access to the WWW within the school setting. Furthermore, the types of sites visited most frequently, i.e., commercial sites, were rated as having the lowest educational value.

Also of note is the incongruity between students’ self-reported use of the WWW and the uses suggested by the analysis of sites visited by students. Either students falsely reported their intentions or intervening variables affected the process of searching for and obtaining relevant information. One untested hypothesis to emerge from this study is that the best of intentions may be confounded by the ease with which students can access a myriad of competing sites that vie for their attention. Another possibility is that the students’ understanding of research is more broadly defined and includes looking for content that has little or no relationship to traditional academic pursuits.

When it comes time to evaluate the appropriateness and effectiveness of media technology in the schools media effects researchers cannot have it both ways. Either media effects are real and the potential benefit of educational media must be balanced by constant vigilance against access to WWW sites that are at best a distraction and at worst a hindrance to the educational and social development of our children. Or, media

effects are limited and mediated by user motives, attitudes, and use patterns, and any potential benefit of educational media in the schools is contingent on the proper psychological and sociological predictor variables. If this is the case, attention to these factors must be a top priority and WWW literacy programs must be implemented with the goal of creating the proper climate for learning to occur.

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