

# **Representation of Gender and Race in Images of Information Technology in Magazines Popular with Middle School Students**

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## **Abstract**

### **Representation of Gender and Race in Images of Information Technology in Magazines Popular with Middle School Students**

Middle school students devote more than 8 hours a day to media use, including reading magazines; and, during these middle school years, girls are most likely to discontinue studies in mathematics, science, and information technology. This paper reports on part of a National Science Foundation project that maps the media environment of middle school students for linkages between media content and the aversion of girls to courses leading to careers in computer and information technology. First, a national survey of media specialists and a survey of students in three middle schools in Ohio, Washington, and Wisconsin identified 28 favorite magazines of middle school students. Second, a content analysis of 4,210 editorial and 840 advertising images of people in current issues of these 28 magazines found only 86 editorial (2%) and 339 advertising (40.4%) images were associated with information technologies. Of these images associated with information technologies, most editorial images (58.1%) were associated with entertainment devices (television, CD players, music recordings) and most advertising images (52.8%) were associated with video games. Females appeared in only 46.5% of editorial and 30.7% of advertising images. Only in editorial and advertising images connected to cellular telephones did females appear more frequently than did males.

## **Gendered Images of Information Technology in Magazines Popular with Middle School Students**

### **Introduction and Literature Review**

Many studies have documented the under-representation of women and people of color in the information technology (IT) workforce. For example, a recent AAUW-sponsored report noted that women hold only 20% of IT jobs (AAUW, 2000), and a study of computer science education attributed the low percentage of female computer science majors to an alienating, competitive environment (Margolis & Fisher, 2002). A recent National Science Foundation report also indicates that the educational pipeline for people of color also is narrow. In 1996 of all bachelor's degrees in computer science earned by U.S. citizens and permanent residents, only 10.9% were earned by African Americans, 5.7% by Hispanic Americans, and 0.4% by Native Americans; the percentages for graduate degrees were even lower (National Science Foundation, 2000). The AAUW (2000) report, *Tech Savvy*, recommended that, to identify reasons for the absence of women in IT, the socialization process that leads girls and women to IT careers be examined, and that this examination include such environmental factors as family, teachers, counselors, peers, and media. The inclusion of media in this list is hardly surprising, given the significant amount of time girls spend with various forms of media, especially girls of middle school age.

A national survey of media use by children found that the age group of children that includes the middle school years lived in homes with high rates of media penetration: 99% had a television, 97% had a VCR, 96% had an audio system, 82% had a video game

player, 74% had a cable/satellite TV connection, and 69% had a computer. This same survey found that the middle school years fell in the period of highest total media exposure, a total of 8 hours and 8 minutes a day. Television accounted for a dominant 3 hours and 37 minutes of this exposure; but print media, including popular magazines, accounted for 32 minutes of exposure, the second greatest amount of time this age group spent with media (Kaiser Family Foundation, 1999).

This extensive exposure is significant because media play a unique socializing role. With other socializing agents, adolescents must interact with adults, but with media they can themselves exercise control of the socialization process through their individual media choices, isolated from authority figures and peers (Arnett, 1995). Moreover, media researchers have found that those people who depend most heavily on media, especially television, are most influenced in their views of the world. According to the cultivation theory of media use, heavy users of television adopt a view of reality that comports with the description of reality presented in the media. Research based on cultivation theory suggests that children (Swan, Meskill & DeMario, 1998) and adolescents (Signorielli, 1990, 1993; Huston & Alvarez, 1990; Wroblewski & Huston, 1987) learn about the workplace from the unrealistic and stereotyped images they view on television, especially if they are heavy viewers. While these cultivation studies have focused on television, it can be argued that other media, such as popular magazines, also contribute to the formation of views about reality and workplace.

That a middle school student spends, on average, half of his or her waking hours with a variety of media is especially important because the middle school years are such a crucial time in a child's development. Clewell and Braddock (2000) note that the

“middle school years have been identified as the most crucial in influencing membership in the math/science talent pool.” A period of significant developmental change, the middle school years also are when students decide whether to embark on an academic track that can lead to an IT career; it is during this period that students make key decisions about course selections that affect future educational and career choices. The middle school years also have been identified as the time when the interest of female and minority students in such technical areas as science and math declines (Clewell & Braddock, 2000).

The intersection between high media exposure and critical academic decisions marks the middle school years as important to an analysis of the socialization processes that affect the views of girls and students of color about their academic and career choices. During this period, middle school students are inundated with media while they are making pivotal academic choices. An examination of the content of those media is useful in identifying the messages to which girls and students of color are exposed during this crucial period in their development.

Before these media can be examined, however, the media environment surrounding middle school girls first must be identified. Recent studies have attempted to quantify children’s media usage. The already noted Kaiser Family Foundation (1999) study looked at the media environment of children 8-to-18 years old; an Annenberg study (Woodard & Gridina, 2000) measured the media use of children between the ages of 2 and 17 and the attitudes of their parents; a Roper Starch study (November 1999) examined the use of the Internet by 9 to 17 year olds; a Gallup poll (CNN/USA Today/National Science Foundation/Gallup, 1997) surveyed children in grades 7 through

12 regarding their familiarity with computers and the Internet; a PEW study (Levin & Arafeh, 2002) used focus groups with middle school and high school students to gauge their educational use of online resources; a telephone survey of Silicon Valley youth between the ages of 10 and 17, conducted jointly by the San Jose *Mercury News* and the Kaiser Family Foundation (2003), assessed attitudes toward, and uses of, the Internet; and a Department of Education study (DeBell & Chapman, 2003) analyzed computer and Internet use by students between the ages of 5 and 17. While informative, these media usage studies utilizing interviews and surveys have looked at a wide range of age groups, have focused on a variety of variables, with gender and race only two elements of study.

Unlike these studies, the research presented here focused on the content of one media used by middle school students, magazines popular with middle school students. These popular magazines were identified by surveying 2 groups: sixth, seventh, and eighth grade students and also school media specialists who work with this age group. This study concentrated on editorial and advertising images in magazines reported as being most popular with middle school students both by the students themselves and media specialists in middle schools. Finally, in examining the content of these identified magazines, this study focused on differences in representation of gender and race in advertising and editorial images associated with the following information technologies: cellular telephones, computers and computer accessories and related IT devices, including the Internet; entertainment devices; and video games. Unlike other studies cited, in which adults surveyed or interviewed students and parents, in this study students surveyed other students. The survey was part of a curriculum project that represented a major component of a three-year, NSF-funded study analyzing the middle school media

environment. In this curriculum project, students learned survey methods and refined their use of spreadsheet and presentation software, while at the same time identifying their own media environment through closely supervised student-conducted surveys of media use patterns.

Researchers who have involved students in research projects have found that, “Students who are engaged with their learning . . . exhibit enthusiasm, optimism, curiosity and interest [and] are willing to exert intense effort and concentration . . .” (Groundwater-Smith & Downes, November 1999) The students involved in this project, both as survey interviewers and survey respondents, exhibited these same characteristics, showing a high level of concern regarding the proper execution of the project, the importance of its purpose, and the significance of its outcomes. As part of the curriculum project, students analyzed the responses to the survey questions. The principle investigators of the NSF project, who are also the authors of this paper, conducted their own analysis of the responses to the survey administered by the students. The authors also administered a survey to media specialists regarding the middle school media environment. From these 2 sources, the authors identified for content analysis magazines that were most popular with both girls and boys of middle school age.

***Research Questions.*** This resulting content analysis examined all advertising and editorial images related to information technologies in 28 magazines identified by middle school students and middle school media specialists as most popular and asked the following research questions:

**RQ1:** What proportion of editorial and advertising images in these magazines popular with middle school students include people who are associated with information technologies?

**RQ2:** What proportion of editorial and advertising images associated with information technologies in these popular magazines focused on computers, computer accessories, Internet use, and other “serious” IT devices?

**RQ3a:** What was the proportion of females and males represented in editorial and advertising images associated with information technologies in these popular magazines?

**RQ3b:** What was the proportion of Caucasians and people of color represented in editorial and advertising images associated with information technologies in these popular magazines?

**RQ4:** Did the proportion of females and males represented in editorial and advertising images involving information technologies differ depending on whether the magazine was selected as a favorite of girls, boys, or girls and boys?

**RQ5a:** Did the proportion of females and males represented in editorial and advertising images associated with information technologies differ by type of information technology portrayed?

**RQ5b:** Did the proportion of Caucasians and people of color represented in editorial and advertising images associated with information technologies differ by type of information technology portrayed?

## **Method**

*Survey of Middle School Students.* The student survey was conducted at 1 middle school during the spring of 2002 and at 2 other middle schools during the spring of 2003.

The schools included a middle school in Chillicothe, Ohio, a small Midwestern city; 90.4% of the students in this middle school were Caucasian and 50.6% were eligible for the reduced or free lunch program. Also included was a middle school in Port Angeles, Washington, a small town in the Pacific Northwest; this middle school included a relatively large percentage of Native American students (12.1%) with one third of the school population eligible for the reduced or free lunch program. The third school was a technology and communication magnet middle school in Milwaukee, Wisconsin; two thirds of the students in this school were African American or Hispanic and two thirds of the school population was eligible for the reduced or free lunch program. The authors collaborated with teachers who volunteered in each of these schools, working with seventh grade science, math, and language arts teachers in Chillicothe; with a sixth grade language arts, math, science, and social studies teacher in Port Angeles; and with video production and media literacy teachers in Milwaukee. The teachers explained the concept of surveys and survey techniques to their students; discussed the survey questions provided by the authors; worked with the students to formulate survey questions of their own; supervised the administration of the surveys; and oversaw the students' analysis of the survey results. The authors were in frequent email and telephone contact with the collaborating teachers and visited each of the middle schools at least once during the project. At the end of the project, the authors received the completed survey forms for their own analysis.

A survey with 30 questions about media use was administered in each school. Twenty-five of the questions were formulated by the authors; these questions, in addition to demographic data, asked about students' television, movie, and video viewing; reading

habits of newspapers, popular magazines, and books; computer access; and library use. In the survey, 1 question asked students to identify their 3 favorite magazines. These questions were tested with a small group of seventh grade students in Chillicothe, Ohio, before the surveys were conducted. The students in each school generated 5 additional questions that reflected their own media interests. These questions asked about a range of issues, including interest in televised sports, cellular telephone use, and music preferences. Teachers in each of the schools selected students to conduct the surveys, and trained them in how to explain and administer the surveys. The teachers also selected the classes in which the surveys would be conducted.

A total of 588 surveys were completed. Of the students who responded to the question regarding gender, 305 identified themselves as female, while 280 identified themselves as male. Of the students who indicated their grade, 256 reported being in the sixth grade; 140 reported being in the seventh grade; and 190 reported being eighth graders. Of those who identified their ethnicity, 61.7% indicated Caucasian; 6.7% indicated Black; 12.5% indicated Hispanic; 8.1% indicated Native-American; 6.2% indicated Asian; and 4.8% indicated "other."

The middle school girls responding to this survey identified *Cosmo Girl*, *J-14*, *Pop Star*, *Seventeen*, *Teen People*, and *YM* among their top 3 favorite magazines. The middle school boys identified *BMX*, *GamePro*, *Hot Rod*, *Motocross*, *Nickelodeon*, *Playstation*, and *Sports Illustrated for Kids* as their favorite magazines. Both middle school girls and boys indicated *People*, *Teen*, *Reader's Digest*, and *WWE* as favorite magazines.

Responses to this student survey also offered further justification for examining the content of popular print media, such as the middle school students' favorite magazines, a

medium with which the Kaiser Foundation study found children spent more time than any other than television—32 minutes a day. This student survey revealed statistically significant gender differences in the frequency reported for magazine readership. Of the middle school students surveyed, 38.6% of the girls but only 27.1% of the boys said they read a magazine 1 or more times a week; and only 16.4% of the girls but 28.2% of the boys surveyed indicated that they never read magazines.

**Survey of School Media Specialists.** School media specialists who were members of the American Association of School Librarians (AASL) were sent a mail survey in spring 2002 and asked to list five titles of magazines they considered most popular with middle school girls and five titles of magazines most popular with middle school boys. Of the 370 school media specialists who responded, 71 worked at the middle school level. The magazines these 71 respondents listed as most popular with middle school girls were *American Girl*, *Girl's Life*, *Seventeen*, *Sports Illustrated for Women*, *Teen People*, *Time*, and *YM*. The magazines media specialists identified as most popular with middle school boys were *BMX*, *Car and Driver*, *Dirt Bike*, *ESPN*, *Hot Rod*, *Motor Trend*, *Skateboarding*, *Sports Illustrated*, *Sports Illustrated for Kids*. The middle school media specialists identified 3 magazines—*Ebony*, *People*, and *Teen*—as most popular with both girls and boys.

**Content Analysis of IT-Related Images in 28 Favorite Magazines.** The surveys of middle school students and middle school media specialists together identified 28 magazines that were most popular with middle school students. The most popular magazines with middle school girls were: *American Girl*, *Cosmo Girl*, *Girl's Life*, *J-14*, *Pop Star*, *Seventeen*, *Sports Illustrated for Women*, *Teen People*, *Time*, and *YM*. The most

popular magazines with middle school boys were: *BMX*, *Car & Driver*, *Dirt Bike*, *ESPN*, *GamePro*, *Hot Rod*, *Motocross*, *Motor Trend*, *Nickelodeon*, *Playstation*, *Skate Boarding*, *Sports Illustrated*, and *Sports Illustrated for Kids*. *Ebony*, *People*, *Teen*, *Readers' Digest*, and *WWE* were identified as favorite magazines of both girls and boys. Issues of these 28 magazines were purchased from a newsstand in April, 2003. In content analyzing the editorial and advertising images related to information technologies in these popular magazines, each magazine was considered the unit of analysis. Each magazine was coded for title; for whether it was identified as a favorite of girls, boys, or both girls and boys; and for whether it was identified as a favorite through the student or the media specialist survey. The month of publication was coded as were the total number of editorial and advertising images in each magazine. Each editorial and each advertising image associated with information technologies and containing a representation of a person was coded for type of information technology portrayed (Cellular Telephones, Computer/Computer Accessories, Entertainment Devices, Handheld Computer/Palm Pilot, Internet Providers, Video Games, and Other IT Images), and for ethnic background (European or Person of Color), and for gender of person represented. Two graduate students in mass communication coded 4 magazines to test the coding instrument's inter-coder reliability. Inter-coder reliability, based on percentage of agreement was 91%. All images analyzed in this study were coded by one of the authors.

### **Findings**

Overall, the content analysis of the 28 magazines identified as being the most popular with middle school students found 4,210 editorial and 840 advertising images of people in the issues examined. The proportion of editorial images associated with information

technologies was extremely small, especially when compared with the high frequency of advertising images associated with information technology appearing in these magazines. Only 86 of these editorial images (2%) but 339 of these advertising images (40.4%) represented people in association with information technologies (RQ1). As a group, these editorial and advertising images, which associated people with information technologies, were least likely to focus on computers, computer accessories, the Internet, and other “serious” IT devices and most likely to emphasize use of entertainment devices, video games, and cellular telephones (RQ2). Males dominated editorial and advertising images associated with information technology in these popular magazines (RQ3a). By comparison to the number of students of color who responded to the survey identifying their favorite magazines, Caucasians were over-represented in editorial images and only slightly over-represented in advertising images associated with information technology (RQ3b). Editorial images associated with information technology appeared most frequently in magazines popular with girls, but advertising images associated with information technology most frequently appeared in magazines popular with boys (RQ4). Males dominated editorial images associated with video games and “serious” computing and dominated advertising images associated with entertainment devices and video games. Females dominated editorial and advertising images associated with cellular telephones and, somewhat surprisingly, advertising images associated with “serious” computing (RQ5a). People of color dominated in editorial images associated with video games, were slightly over-represented in editorial images associated with cellular telephones, and were substantially under-represented in editorial images associated with “serious” computing and entertainment devices. People of color were equitably

represented in advertising images related to video games and entertainment devices and substantially under-represented in advertising images associated with “serious” computing and cellular telephones (RQ5b).

**Table 1: Information Technology Representations in Editorial Images in 28 Favorite Magazines of Middle School Students by Gender and Race**

|  | European       |              | People of Color |              | <i>Total</i> |
|--|----------------|--------------|-----------------|--------------|--------------|
|  | <i>Females</i> | <i>Males</i> | <i>Females</i>  | <i>Males</i> |              |
| <b>Cell Telephones</b>   |                |              |                 |              |              |
| <i>Favorite Magazines of Girls</i>   | 2              | 0            | 4               | 0            | 6            |
| <i>Favorite Magazines of Boys</i>  | 0              | 2            | 0               | 0            | 2            |
| <i>Favorite Magazines of Both</i>  | 0              | 0            | 0               | 0            | 0            |
| <b>Computers, Computer Accessories,<br/>Other IT Devices, Internet Providers</b> |                |              |                 |              |              |
| <i>Favorite Magazines of Girls</i>   | 6              | 1            | 0               | 0            | 7            |
| <i>Favorite Magazines of Boys</i>  | 0              | 4            | 0               | 0            | 4            |
| <i>Favorite Magazines of Both</i>  | 1              | 3            | 2               | 3            | 9            |
| <b>Entertainment Devices</b>   |                |              |                 |              |              |
| <i>Favorite Magazines of Girls</i>   | 20             | 18           | 2               | 5            | 45           |
| <i>Favorite Magazines of Boys</i>  | 0              | 0            | 0               | 0            | 0            |
| <i>Favorite Magazines of Both</i>  | 2              | 1            | 1               | 1            | 5            |
| <b>Video Games</b>   |                |              |                 |              |              |
| <i>Favorite Magazines of Girls</i>   | 0              | 0            | 0               | 0            | 0            |
| <i>Favorite Magazines of Boys</i>  | 0              | 1            | 0               | 7            | 8            |
| <i>Favorite Magazines of Both</i>  | 0              | 0            | 0               | 0            | 0            |
| <b>TOTAL</b>   | <b>31</b>      | <b>30</b>    | <b>9</b>        | <b>16</b>    | <b>86</b>    |

Of the 86 editorial images that associated people with some form of information technology, the overwhelming majority did not represent “serious” computing. Fully 50 of these (58.1%) were associated with such entertainment devices as televisions, CD players, and music recordings (table 1). Of the remaining editorial images associated with information technology, 20 associated people with computers, computer accessories,

Internet use, or other serious IT devices (23.3%), 8 associated people with cellular telephones (9.3%); and 8 associated people with video games (9.3%).

Males (46 or 53.5%) appeared slightly more frequently than did females (40 or 46.5%) and Caucasians (61 or 70.9%) appeared substantially more often than did people of color (25 or 29.1%) in editorial images associated with information technology, but 58 of the 86 (67.4%) editorial images related to information technology appeared in magazines most popular with girls. Only 14 (16.3%) of these editorial images were found in magazines most popular with boys and only 14 (16.3%) were found in magazines identified as most popular with both girls and boys. The most extreme example of this pattern was found with editorial images associated with entertainment devices: 45 of the 50 images of entertainment devices (90%) were found in magazines popular with girls, none were found in those popular with boys, and only 5 (10%) were found in magazines popular with both girls and boys. The only exception to this placement of editorial images was that the 8 editorial images (9.3%) associated with video games were found only in magazines most popular with boys.

Although males appeared slightly more frequently than females and Caucasians substantially more frequently than people of color in the 86 editorial images associated with information technology in these magazines popular with middle school students, this pattern did not hold for all types of information technology portrayed. Males dominated in editorial images of “serious” computing and especially in images of video games. In the 20 editorial images that portrayed computers, computer accessories, Internet use, and “serious” IT devices, males appeared 11 times (55%) and females 9 times (45%); and, in the 8 editorial images portraying video games, males appeared in all eight (100%). There

was an equal distribution of males and females, however, among the 50 editorial images portraying entertainment devices. Only among the 8 editorial images portraying cellular telephones was a majority of females found; females were represented in 6 of these images (75%) and males in 2 (25%). People of color (all male) were overwhelmingly represented in editorial images for video games, with 7 of the 8 (87.5%) including people of color; and people of color (all female), appearing in 4 of 8 images (50%), were substantially over-represented in editorial images associated with cellular telephones. People of color, however, were substantially under-represented in images associated with entertainment devices, with 9 people of color appearing in 45 images (20%). They were also substantially under-represented in editorial images associated with “serious” computing, being represented in only 5 of 20 images (25%).

Similar patterns were found in advertising images in which people were associated with information technology. Of the 339 advertising images that associated people with some form of information technology, only a handful represented “serious” computing. Fully 179 of the 339 (52.8%) advertising images were associated with video games, and 129 (38.1%) were associated with such entertainment devices as televisions, CD players, and music recordings (table 2). Of the remaining editorial images associated with information technology, 22 associated people with cellular telephones (6.5%); and 9 associated people with computers, computer accessories, Internet use, or other serious IT devices (2.7%).

In contrast to the nearly equitable distribution of males and females in editorial images associated with information technology, among the 339 advertising images

associated with information technology, males were portrayed as an overwhelming majority. Males appeared 235 times (69.3%) and females 104 times (30.7%) in these

**Table 2: Information Technology Representations in Ad Images in 28 Favorite Magazines of Middle School Students by Gender and Race**

|   | European       |              | People of Color |              | <i>Total</i> |
|---|----------------|--------------|-----------------|--------------|--------------|
|   | <i>Females</i> | <i>Males</i> | <i>Females</i>  | <i>Males</i> |              |
| <b>Cell Telephones</b>                      |                |              |                 |              |              |
| <b>Favorite Magazines of Girls</b>          | 9              | 3            | 4               | 0            | 16           |
| <b>Favorite Magazines of Boys</b>           | 3              | 1            | 0               | 1            | 5            |
| <b>Favorite Magazines of Both</b>           | 0              | 1            | 0               | 0            | 1            |
| <b>Computers, Computer Accessories</b>      |                |              |                 |              |              |
| <b>Other IT Devices, Internet Providers</b> |                |              |                 |              |              |
| <b>Favorite Magazines of Girls</b>          | 4              | 2            | 1               | 0            | 7            |
| <b>Favorite Magazines of Boys</b>           | 0              | 0            | 0               | 0            | 0            |
| <b>Favorite Magazines of Both</b>           | 2              | 0            | 0               | 0            | 2            |
| <b>Entertainment Devices</b>                |                |              |                 |              |              |
| <b>Favorite Magazines of Girls</b>          | 11             | 29           | 1               | 0            | 41           |
| <b>Favorite Magazines of Boys</b>           | 0              | 14           | 1               | 5            | 20           |
| <b>Favorite Magazines of Both</b>           | 8              | 18           | 7               | 35           | 68           |
| <b>Video Games</b>                          |                |              |                 |              |              |
| <b>Favorite Magazines of Girls</b>          | 0              | 0            | 0               | 0            | 0            |
| <b>Favorite Magazines of Boys</b>           | 24             | 77           | 19              | 38           | 158          |
| <b>Favorite Magazines of Both</b>           | 5              | 1            | 5               | 10           | 21           |
| <b>TOTAL</b>                                | <b>66</b>      | <b>146</b>   | <b>38</b>       | <b>89</b>    | <b>339</b>   |

advertising images. Likewise, people of color who were under-represented in the editorial images were only slightly under-represented in the advertising images associated with information technology. Of the 339 advertising images, fully 127 (37.5%) contained representations of people of color. Because 158 of the 339 (46.6%) advertising images coded were associated with video games and placed in magazines popular with boys, the pattern of placing information technology images in magazines popular with girls found

in the case of editorial images did not hold for the advertising images. Of the 339 advertising images associated with information technology, 183 (54%) were placed in magazines popular with boys; 92 (27.1%) in magazines popular with both boys and girls; and only 64 (18.9%) in magazines popular with girls. Of the 22 advertising images associated with cellular telephones, however, 16 (72.7%) were placed with magazines popular with girls. Similarly, of the 129 advertising images associated with entertainment devices 41 (31.8%) were placed in magazines popular with girls and only 20 (15.5%) were placed in magazines popular with boys. Of the 9 advertising images associated with “serious” computing, 7 (77.8%) were placed in magazines popular with middle school girls. As was the case for the editorial images associated with video games, advertising images associated with video games were nearly the exclusive domain of magazines popular with boys. Of the 179 advertising images associated with video games, 158 (88.3%) appeared in magazines popular with boys and 21 (11.7%) in magazines popular with both girls and boys. Not a single advertising image associated with video games appeared in a magazine popular only with girls.

Although the appearances of males overwhelmed the appearances of females in the 339 advertising images associated with information technology in these magazines popular with middle school students, this domination was not the case for all types of information technology portrayed. Males dominated in advertising images of entertainment devices, a category for which equity was found in the editorial images, and in advertising images of video games. In the 129 advertising images that portrayed entertainment devices, males appeared 101 times (78.3%); and, in the 179 advertising images that portrayed video games, males appeared 126 times (70.4%). In the 22

advertising images that portrayed cellular telephones, however, females appeared 16 times (72.7%); and, in the 9 advertising images that portrayed “serious” computing, females appeared 7 times (77.7%). Similarly, the nearly equitable representation of people of color overall in the advertising images associated with information technology also was not a pattern that continued across all categories of information technology examined, and the variation also did not follow that found for editorial images. People of color were equitably represented in advertising images associated with video games (72 of 179 images or 40.2%) and with entertainment devices (49 of 129 images or 38%); they were substantially under-represented in advertising images associated with cellular telephones (5 of 22 images or 22.2%) and “serious” computing (1 of 9 images or 11.1%).

### **Discussion**

What emerges from this analysis of the content of editorial and advertising images associated with information technology in magazines popular with middle schools students is that girls and boys obtain entirely different images of information technology and their relationships to this technology from reading their favorite magazines. First, girls, as they read their favorite magazines, have far fewer opportunities to encounter images of information technology than do boys as they read their favorite magazines. This is also true for people of color but, for the most part, not out of proportion when compared against the ratio of people of color to Caucasians who were surveyed. More editorial images of information technology appeared in the magazines popular with girls than in those popular with boys; 58 editorial images were available for viewing in the girls’ popular magazines and another 14 editorial images from magazines popular with both girls and boys—a total of 72 editorial images. The boys only had access to 14

editorial images in their favorite magazines and 14 editorial images from the magazines popular with both girls and boys—a total of 28 editorial images. Middle school boys, though, more than made up this deficit through their access to 183 advertising images of information technology in their favorite magazines and the 92 advertising images available in magazines identified as popular with both girls and boys—a total of 275. This same combination only netted the girls a total of 156 advertising images associated with information technology. In total, girls only could access 228 editorial and advertising images, but the boys could encounter 303 editorial and advertising images associated with information technology in the magazines they were likely to read. Of the 425 editorial and advertising images found in the magazines analyzed, people of color would find representations of themselves 152 times, a percentage only slightly lower than the percentage of respondents taking the survey who indicated they were people of color.

When girls encountered the rare instance of an editorial image associated with information technology in the sea of other editorial images, they were still less likely to see themselves in that rare image since males were more likely to appear in the editorial images than were females. This situation only worsened when girls viewed the advertising images in which males were more than twice as likely to be represented than were females. This situation held for girls of color as well.

In addition to the imbalance in numbers of images and numbers of females in the images that did appear in the magazines popular with girls, when girls chanced on editorial or advertising images of information technology, they would encounter another insidious form of gender stereotyping. Only in those editorial images associated with cellular telephones and entertainment devices and those advertising images associated

with cellular telephones and “serious” computing were girls likely to find their gender included and their presence encouraged. Boys, reading their favorite magazines, were far more likely to find their gender represented in editorial and advertising images associated with all categories of information technology other than cellular telephones. Because images of video games never appeared in the magazines popular with girls and proliferated in magazines popular with boys, this chasm serves as an apt representation of just how separate are the magazine-mediated experiences of middle school girls and boys regarding the appropriateness of courses in math, science, engineering, and information technology for girls and boys. Reading their favorite magazines encourages girls to use cellular telephones and entertainment devices, encourages them to play. Reading their favorite magazines encourages boys to master video games and “serious” computing and at least consider studying subjects related to careers in computer and information technology. In the case of people of color, the images of information technology with which they were associated were related most often to video games, next often to entertainment devices, then to cellular telephones, and least often to “serious” computing. The chasm regarding the appropriateness of courses and careers in math, science, engineering, and information technology for people of color as viewed through the favorite magazines of middle school students may not be as great as that for girls but it certainly is present, especially in terms of “serious” computing.

### **Conclusion**

This study is limited in that it is based on a small sample of middle school students and their reading habits with regard to the single medium of the magazine. As this NSF project continues the sample will expand and additional media favorites of middle school

students will be examined for gender and race bias as was done in this study. Although print media, such as magazines, receive a substantial amount of the typical middle school student's attention, clearly this approach needs to be applied to the favorite television programs of middle school students since they reportedly spend more than 3 hours a day with that medium. Similar attention should be applied to the favorite movies, video tapes, and books of middle school students; these media all cultivate a sense of appropriate activity and career goals among middle school students at this most important point in their career education.

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