

Computer Equity for Young Women in Rural Schools

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The authors define computer equity as equal access to computer literacy for *each* person. It involves both awareness and action; it implies differing approaches to meet differing needs. Their concern is for the unmet needs of young women—especially those in rural schools, many of whom continue to follow stereotyped role patterns that limit the definition of what a woman can become. While computer literacy is fast becoming a survival skill for a rapidly approaching future, many rural females remain basically unaware of the computer's impact on society and of its impact—both present and potential—on their lives. This article describes persistent external and internal barriers regarding computer literacy that are limiting rural women. It outlines action that rural schools can take to eliminate these factors, thus providing more freedom for rural women to pursue the multiple life options that are beginning to open for their urban counterparts.

While young women in rural areas have always had survival skills for the world in which they live, they also have traditionally missed some opportunities that have been more readily available to their urban sisters. And in today's rapidly changing society, this rural-urban gap is widening. Differences become apparent when comparing rural schools to their urban-suburban counterparts. Rural schools (and their students) suffer economically and educationally due to a lack of effective access to government programs, private agencies, and universities [21].

Data on rural women are limited, but a recent source reported that this group's income was significantly below that of metropolitan women [28]. A study of the aspiration level of rural youth (an indicator of possible future earnings) predicted no closure of this economic and sociological gap: rural youth had lower ambitions than their urban counterparts—ambition that had actually declined over a six-year period [9].

Hampered by restricted self-confidence and economic status, combined with fewer nontraditional role-models, these 35 million rural women more readily conform to stereotypical expectations. Girls named fewer occupations than did boys in a study of aspiration level of rural youth. From 50 to 75 percent of elementary girls listed sex-stereotyped jobs: nurse, teacher, secretary. A decline in girls' ambitions from elementary school to high school has also been noted [9]. Dunne did find that young rural women stereotype occupations less than young rural men, but this situation appeared to differ on a regional basis. She also noted that men in "gatekeeper" roles (educators, employers, and spouses) can restrict the attainment of those aspirations [10].

If a conflict is anticipated between a career and homemaking, women seem more likely to choose the traditional role of homemaker if it is economically feasible. Even women who did pursue a career, based their decisions to a large extent on what they perceived as tolerable to men [2]. Thus, being a woman relegates career to a low priority. In following this unexamined assumption, many young rural women fail to realize that their possible future is not singular, but plural.

The Report of the National Advisory Council on Women's Educational Programs found that rural women who wanted the opportunity to become independent persons and control their own lives continued to be viewed and treated primarily as wives and mothers. Their need to understand and participate in the larger political and economic world remained virtually unrecognized by those around them [8]. These rural young women remain victims of a cultural lag, where home and school continue to condition them to accept a role definition that is no longer valid [18]. Such future-deprived circumstances eliminate the option of choosing preferable life patterns.

The Future

What does lie ahead in the 1990's for today's rural school age females? Labor statistics show that *now* more than half of all adult women are working full-time, accounting for more than 42 percent of all workers [25]. It is estimated that 70 to 80 percent of all women will be employed by the late 1980's [18]. Muriel Cantor, head of the sociology department at American University, stressed that women must do more work as supplementary wage-earners in the future. High male death rates, high divorce rates, and the high cost of living all mean one thing: women must be able to support themselves [18].

Present sociological trends forecast a change in the structure and function of the family unit rather than a disintegration of it. Changes affecting urban families are also changing rural ones, but at a slower pace. Rural women still marry earlier, have more children, manage larger households, experience fewer divorces, and earn less money. The proportion of life spent outside the family, however, is growing for all women [5].

Today's young woman enters a future in which her role is already being expanded and redefined. She may or may not marry; she may or may not have children. She most probably will be employed outside the home.

In addition to these cultural traditions, the contemporary rural woman's worldview is further circumscribed

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by the discrepancy between the many ways technology increasingly touches her life, and her understanding of these contacts. Computers already are found in urban supermarkets and department stores as well as automobiles and microwave ovens. Services such as 24-hour banking and travel/motel reservations are computerized. Paychecks, credit card transactions, sweepstakes' entry forms are all designed around computers. While we may debate the social impact of computers, it is already impossible to imagine present-day society without them. And there appears to be no turning back from an approaching age when computers will be used as a direct tool in most people's daily lives.

Computer literacy is fast becoming a necessary life skill. One writer already views computer literacy "as much a social obligation as reading literacy," [16] and in 1979 Minnesota became the first state to do statewide computer literacy testing of eleventh-grade students. John Nevison, an educational consultant, claims that "(t)o get along in today's technological society people must have hands-on experience with computers before they leave their formal schooling"[1].

While some schools are attempting to meet their students' needs for these future survival skills, the female student in rural schools remains basically unaware. What factors contribute to this lack of awareness? They seem to stem from two sources: resistance from the educational system and resistance from the young women themselves.

Education must spring from an image of the future [24]. And today the future is arriving faster than ever before. While in the past, curriculum changes could evolve slowly, today the educational system must respond readily to future images that soon become the present reality. Computers have not been integrated into school systems as rapidly or extensively as it was predicted in the 1960's. This educational resistance to computer-use in the schools was based in part on their relatively high cost and early technical problems. But teachers also viewed computers with fear — an attitude that slowed the effective entry of computers into the curriculum. Almost a decade later, educators are being called upon to "shake off past prejudices against machine technology..." a tool that is "... becoming a part of the body of knowledge that all liberally-educated people must share." [27]

The Microcomputer Revolution

The cost of computers declined sharply in late 1977 with the marketing of the microcomputer, a small stand-alone unit used by an individual. Today, more than 200,000 microcomputers have been sold by one company alone (Radio Shack) for under \$500. Recently TIMEX has begun marketing a microcomputer for less than \$100. At these reduced costs, many personal computers are finding their way into homes and schools, especially in urban areas. Teachers and administrators, as well as students, are enjoying these microcomputers, as well as benefiting from them. Computer-assisted instruction is cost-effective, produces measurable learning gains, and frees teachers rather than replaces them [3].

Viewing the microcomputer market as an "exploding

field," textbook companies now offer computer software packages [13]. The National Institute of Education and the National Science Foundation fund projects to develop microcomputer software for all levels of school learners. And the Northwest Regional Educational Laboratory has a federal grant for MicroSIFT, a clearinghouse for computer software in education. Such trends increase the probability that the microcomputer will become the major focal point of educational activities in the future.

Young Women and Computers

Educational resistance concerning computers may be overwhelmed by this rush of new technology, but female resistance continues, especially in rural areas. Such resistance to computers is due in part to the misunderstood nature of this universal machine. Computers, sometimes referred to as "number crunchers," are generally equated with mathematics. The literature documents that sex-stereotyping casts a male shadow over mathematics [12], and that compared to males, females have less confidence in their ability to learn mathematics [11]. Women who have trouble learning mathematics tend to avoid situations involving computations: they feel "dumb" and develop "math anxiety" [29]. Sheila Tobias contends that these habits of avoidance spill over into other anxieties such as fear of machines and fear of power. [23]

Recent research by Benbow and Stanley reported that sex differences in achievement in and attitude toward mathematics were not due simply to environmental factors, but to biological differences as well [4]. Other researchers, however, think that this study of gifted junior high students did not adequately take environmental factors into account [15]. In synthesizing the literature, Patricia Campbell and her associates found that male superiority in spatial relations and mathematical reasoning skills does not appear until adolescence. Campbell argued that mathematical experiences both within and without school (shop and mechanical drawing vs. home economics; Boy Scouts vs. Girl Scouts) provide males with training that girls never receive. Added to this fact are the less-easily measured stereotyping influences of television, books, and personal interactions with teachers, parents, and peers. Boys, therefore, received both encouragement and experiences in mathematical areas that were not deemed "necessary" for girls. [7]

Mathematics serves as a critical filter into the sciences, therefore math avoidance prohibits female entrance into these fields. Lucy Sells reported that current trends of employer recruitment on college campuses require a mathematical component in the prospective employee's education. Only 16 percent of the job recruiters at the University of Maryland recently considered undergraduates who did not have a calculus background [20]. Yet males who had taken four years of high school mathematics — and thus were eligible to take college calculus — out-numbered females by more than seven to one [19].

Starting salaries in mathematical and scientific fields are highest and unemployment in these occupations is the lowest [26]. Stereotyping, however, plagues even the math-oriented computer field due to lack of proper

TABLE 1**PERSISTENT BARRIER I: The Institutionalized Sexism in Rural Schools Concerning Computer Technology****GOAL I:** To Sensitize Educational Leaders of Rural Schools to the Need for Young Women to Obtain Computer Literacy and Experience.**OBJECTIVES:**

- I (1) To provide educational leaders of rural schools with information concerning the need for computer literacy as a necessary survival skill for young women.
- I (2) To provide educational leaders of rural schools with information about traditional female patterns of avoiding technology.
- I (3) To provide educational leaders of rural schools with information on microcomputers: Why they are needed, what they can do, how they can be obtained, and how they can be used in a school to promote women's educational equity through computer literacy.

PERSISTENT BARRIER II: The Negative Self-Concept of Young Women in Rural Schools Concerning Computer Technology**GOAL II:** To Enhance the Self-Concept of Young Women in Rural Schools ... Concerning Computer Technology.**OBJECTIVES:**

- II (1) To help young women in rural schools overcome computer anxiety through "hands-on" success with microcomputers.
- II (2) To increase the computer knowledge of young women in rural schools.
- II (3) To provide young women in rural schools with knowledge of female role models who have made significant contributions in the computer field.

PERSISTENT BARRIER III: Young Women in Rural Schools Lack Knowledge about and Experience with Computer Technology**GOAL III:** To Provide for Young Women in Rural Schools Computer Literacy as a Survival Skill.**OBJECTIVES:**

- III (1) To provide young women in rural schools with the understanding of the computer as a universal machine.
- III (2) To have young women in rural schools understand why the computer is important, what it is, what it does, and how it works.
- III (3) To provide young women in rural schools with an understanding of why computer literacy is important now and crucial for the future.

PERSISTENT BARRIER IV: The Sex-Stereotyped Attitudes of Young Rural Women about Computer-Related Careers**GOAL IV:** To Expand the Career Orientation of Young Women in Rural Schools.**OBJECTIVES:**

- IV (1) To make young women in rural schools aware that the field of computer science can be open to them.
- IV (2) To provide information to young women in rural schools about the kinds of emerging careers in the computer field.
- IV (3) To provide information to young women in rural schools about emerging computer uses in traditional careers.
- IV (4) To provide information to young women in rural schools about the areas and paths of study that can lead to computer and computer-related jobs.
- IV (5) To provide young women in rural schools with "hands on" experiences with microcomputers.
- IV (6) To provide young women in rural schools with knowledge of female role models who have made significant contributions in the computer field.

qualifications on the part of women. Degrees in computer and informational science show an overwhelming numerical dominance of males over females which increases with level of degree to 10 to 1 [6].

On the other hand, associate degrees in the low-paying/low-skill field of keypunching are disproportionately awarded to women 9 to 1 [6]. Being filtered out of (or to the bottom of) these technological and scientific career options poses a major barrier to women's occupational and economic equity.

This pattern of avoiding mathematics and science can then lead to computer anxiety, the feeling that computers are too complex to be understood by the average woman. Not only are career opportunities for women emerging within the field of computer science, but many traditional jobs now require on-the-job computer training to qualify for advancement. Too frequently, however, women do not take advantage of opportunities for learning about computers as evidenced by the fact that computer courses at all levels remain predominately male.

It is unfair to ask the young contemporary rural woman to change her math/science/computer avoidance patterns without changing some of the influences operating on her. To meet this need, mathematics and science intervention programs for school-age girls have been developed. Many of these are successfully encouraging change in young women through workshops, films, tapes, and printed material. Sherman encouraged such positive intervention no later than the ninth grade—after that girls tend to self-select out of the courses [22].

A basic, hands-on computer literacy program holds the similar promise of decreasing computer avoidance behavior on the part of young females. Computer literacy materials that we have reviewed, however, are missing an essential element: none are tailored to overcome the barriers that persist in keeping females functionally illiterate in computer technology. An exceptional program does exist at the Lawrence Hall of Science at the University of California at Berkeley, where math, science, and computer workshops are specifically aimed at girls [14]. This program impacts the surrounding female population and could serve as a model (with some modifications) for non-urban areas where most girls and women continue to self-select out of computer courses and other computer-related growth opportunities. Teachers College at Columbia University has established a Microcomputer Resource Center that invites school personnel to try out hardware and software, thus attempting to overcome institutional reservations concerning this technology. Programs in such major metropolitan areas are necessary and commendable—but they also serve to widen the urban-rural gap. Rural women's needs for computer equity are being neither recognized nor met at present.

There exists a need, then, to design, develop, and validate microcomputer materials that will promote awareness of and provide opportunities for the use of these universal machines by female students—especially those in rural schools. To accomplish this goal, there is a preliminary need to sensitize rural leaders to the persistent barriers preventing young women from gaining computer literacy.

The Persistent Barriers

We see four persistent barriers blocking equal access to computer literacy for rural women. (1) The institutionalized sexism in rural schools concerning computer technology plagues the educational system as a persistent barrier to women's equality: women are not seen as needing to know about computers.

In addition, unsubstantiated attitudinal barriers persist within the women themselves. (2) The pervasive, negative self-concept of many women in rural schools concerning computer technology interacts with (3) a lack of knowledge about the experience with this technology to block their awareness of the crucial need for computer literacy. Furthermore, (4) the sex-stereotyped attitudes of young rural women about computer-related careers eliminates possible career orientations that demand prerequisite educational equity opportunities which could provide future occupational and economic—thus social—equity.

The persistent barriers we believe can be eliminated through the stated goals and objectives are presented in Table 1. Certainly these barriers are not unique to rural schools: all schools must be concerned with them; and they are not applicable only to female students: all students must be considered with respect to them; but the students *least* likely to benefit from the computer revolution of the 1980's are younger women in rural schools. Educators, parents—all citizens—have a responsibility to be alert to those barriers and work to eliminate them, thus promoting not just computer literacy in rural schools, but *computer equity*: equal access to computer literacy for each student. Then contemporary rural women will have more freedom to pursue the multiple life options that are beginning to open for their urban counterparts.

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