Gender, Culture and Learning

by
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Foreword

In this monograph, Eileen Kane presents a probing, insightful, and clear analysis of the differences in how boys and girls learn and the implications of those differences for the design and delivery of classroom instruction. She points out that, across cultures and national boundaries, males' and females' cognitive abilities and learning processes are more alike than different, but there are consistent differences that have important implications for instruction.

To design and deliver effective instruction and to formulate sensible education policy, it is essential to understand how children learn. At the same time, it is often difficult for educators to chart a sensible course through the massive (and sometimes contradictory) literature on individual differences in learning. This monograph synthesizes and interprets an impressive amount of research and draws a series of conclusions that have immediate practical implications for those seeking to improve the quality of classroom instruction. Along the way, Dr. Kane challenges conventional wisdom -- and challenges us to look at the learning process in new ways.

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David W. Chapman
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Girls' Education and the Development Process

Research shows that investing in girls' education is the single most important investment which developing countries can make toward improving their quality of life. Yet around the world, nearly 300 million school-aged children aren't getting an education, and 60% of them are girls. Of course, education is not simply a means to an end—it is also an end in itself, providing a basis for lifelong personal fulfillment. Many girls will never know this fulfillment.

Education for a boy is often seen as a right which is sometimes denied; for girls, it is a privilege to be earned. If funds are available after her brothers are educated, if parents' fears about her security and maintenance of traditional values can be met, if the school is not too distant, if she can continue to carry out her domestic tasks, if she doesn't have to marry early, if she doesn't become pregnant, if she does well on exams despite having little time to study—then she may get an education. Few girls can meet these requirements; few boys are asked to.

Educators can't solve all of the problems which prevent girls in developing countries from getting an education. But we can address some of the more pernicious causes—for example, the belief held in many countries that girls are less intelligent than boys—and we can make education more relevant to their needs, so their performance is enhanced, they choose subjects which expand their options in life, and they understand their worth as people and as members of their community. This can encourage girls to stay in school, do well, and show the community that it is worthwhile to educate them.

Girls' and Boys' Learning: What We Know

What can be done to improve classroom practice and to prepare better learning materials for girls and boys? This paper makes a few suggestions. But first, because we are working with many cultures, we need to understand how children everywhere learn and behave. Then we need to look at what we know about differences between the sexes.

Children Around the World

Do children learn the same way everywhere? This isn't one question. It's at least four:

• Are cognitive processes universal?
• Do children everywhere pass through the same developmental processes when learning?
• Are children taught the same way everywhere?
• Do people want children to learn the same content everywhere?

There is no evidence that people's cognitive capabilities differ from one country, culture, race, ethnic group, or social class to another. If we have learned anything in the past 150 years about human cognitive differences, it is that no group is inferior or superior. Everywhere, people have the same mental "equipment." However, as we will see, what people use this equipment for, what they think is important to learn, and how they teach it does differ. For example, we know that people categorize things differently, based upon what is important to them. A group of Kpelle farmers grouped a set of tools and foods according to which tool went with which food. The researcher wanted them to group them into "food" and "tool" categories—the test protocol suggested that this was the most sophisticated way of doing it, because it led to the fewest groupings. They refused. A wise man would do it their way. "How would a fool do it?" the researcher asked. They told him: By food and tool-ies. (1975)
Do children pass through the same developmental stages everywhere? Once again, there’s no reason to think they don’t. Human beings have to master certain basic skills in order to survive and function as members of a community. What are these stages? We aren’t certain. You may be familiar with the developmental theories of Piaget, Wiltikin, Vygotsky, and others. Each gives us important insights. These are Euro-American theories which may or may not be universally applicable. Although a lot of cross-cultural research has been carried out on them, major questions remain. We do know that, for purposes of cross-cultural comparison, testing most of these theories is hindered by the fact that human development always occurs in a social and cultural context, and that context may give a different shape to development. We’ll look at this and the following points in more detail in the “Discussion” section of this paper.

Children are not taught the same way everywhere. The processes by which information is passed on differ from one culture to another. Learning can proceed through observation and imitation, abstract instruction, memorization, and many other ways. In some societies, although people can certainly understand abstract concepts, they are considered irrelevant in the teaching process. In others, subtle analogies are used to convey information. Some people work from the abstract to the particular, others do it from the particular to the abstract. Some people give an account chronologically; others pick a central point and work backward and forward. Some people refuse to work with hypothetical examples, or with questions designed to test logic, as in this example of a syllogism, where the researcher and the respondent are using two different approaches as to what constitutes evidence. The researcher begins:

In the far North, where there is snow, all bears are white. Novaya Zemlya is in the Far North and there is always snow there. What color are the bears there?

"We always speak only of what we see: we don’t talk about what we haven’t seen."

"But what do my words imply?" [The syllogism is repeated.]

"Well, it’s like this. Our tsar isn’t like yours, and yours isn’t like ours. Your words can be answered only by someone who was there, and if a person wasn’t there, he can’t say anything on the basis of your words."

"But on the basis of my words—in the North, where there is always snow, the bears are white, can you gather what kinds of bears there are in Novaya Zemlya?"

"If a man was 60 or 80 and had seen a white bear and had told about it, he might be believed, but I’ve never seen one and hence I can’t say. That’s my last word. Those who saw can tell, and those who didn’t see can’t say anything." (Luna, 1976, quoted in Rogoff, 1990)

The way people teach in the western world is not necessarily the only way to learn. Although western educational research is very sophisticated, it is still based on western cultural assumptions about the nature of the child, how people learn, what reinforces learning, and what the learning outcome should be. For example, Kipsigis children in Kenya, like children in many parts of Sub-Saharan Africa, are encouraged to be silent in the presence of adults or higher status people. Parents believe that in the normal course of development, children will learn to speak anyway—their concern is that their children learn to comprehend, and that is accomplished by insuring that the child listens. Such training will affect children’s performances on different kinds of tests—those which are dependent on verbal expression may not work well in such situations. (Harkness and Super, 1982) The methods by which children are taught are also culturally embedded: Wolofs in
western Africa believe that it is rude to ask a question to which one already knows the answer—you can imagine the consequences for using western-style teaching practices.

Finally, do people want children to learn the same content in every culture? Obviously, people everywhere want their children to be able to function competently in their environment. They want them to mature in their thinking and be able to perpetuate the group’s knowledge and activities. However, ideas about what constitutes competence, and indeed, what constitutes intelligence, differ from one society to the next. IQ tests were developed in the western world, and obviously reflect the areas of intelligence which westerners think are important. However, even in the west, there is, as you probably know, a major debate today on the components of intelligence, and whether current IQ tests address these. To take but one recent example, research indicates that girls outperform boys on measures of planning processes (Bardos, Nardieri, and Prewitt, 1992), which at least one author suggests may represent the most complex form of human behavior (Das, 1984).

Yet planning processes are not addressed on standard measures of intelligence. Most experts feel that IQ tests fall short in one way or another—if not in relation to this example, then in relation to something else. If they fall short for westerners, we can be pretty certain that they are missing the subtleties of intelligence which people in other societies think are important. Many societies value both knowing about things and the ability to do things—do westerners? What about the western "genius" who is an expert in the molecular structure of water but who lets the bathtub overflow? Or the nuclear physicist who can’t find his way home from the store? Robert Serpell, who has done much of the research on this subject, shows that Zambian parents feel that “sendability”—the ability of a child to carry out a task responsibly—is an important characteristic of intelligence. (Serpell, 1982) Rural Ugandans associate intelligence with being slow, careful, and active. (Wober, 1972) To most western minds, “slow” and “active” don’t even go together.

So the answers to our questions are that while human beings share a common potential for cognitive abilities, and children probably pass through similar developmental stages, culture plays a big role in terms of the processes of teaching and the content of learning.

Gender Differences

Now let’s look at the subject of this paper—gender differences. Before we do, we should make one thing clear: In relation to cognitive abilities and learning processes, males and females are more alike than different. There are greater differences within the genders than between them. So we are not talking about two different species when we talk about boys and girls. The differences which researchers in biology, psychology, anthropology, and education have found between the sexes are simply variations on a common human process of cognition and learning.

Often, when we look at boys and girls, men and women, it is the physical differences between them which catch our attention first. The second thing which may strike us is that in most places in the world, males and females have different rights, roles, and statuses. To connect these two ideas, we construct a chain of “evidence,” without really giving it much thought: Males and females have different rights, roles and statuses. This must be based on the “fact” that they have different abilities and aptitudes. This in turn must be based on the “fact” that they have different personality behavioral characteristics. And, finally, that must be based on the fact that there are biological differences between them. The line of reasoning looks a bit like this chain of balloons:
Why is this chain of argument worth examining more closely? One reason is that the links in the chain of balloons are not well established through research, particularly the link between biology and everything else. The biological component is important because if a characteristic is rooted in biology, it's very difficult to change. However, if a characteristic is learned, we can examine what it is that we are teaching, and decide whether we want to develop some other characteristics instead.

This issue of whether a characteristic is biologically based or taught should be easy to resolve but it isn't, for several reasons. First, although we can measure physical differences, and are becoming better able to do so all the time, it's difficult to link physical differences to personality and aptitude differences. Physical differences can be measured through very precise chemical, neurological, and other measures. But when researchers have tried to match these precise differences up with personality differences or differences in ability, they have often found themselves in trouble. For example, intelligence is not one item which can be neatly matched to a physical characteristic—it's a complex bundle of items which differs from one society to another. Words like passive, sociable, dependent, leadership, dominance, etc., are also bundles of separate components. (The fact that different people mean different things by these words, and that researchers have not defined them clearly, and cannot measure them as precisely as they measure physical characteristics, doesn't help, either.) Also, although we can measure physical differences, that doesn't necessarily tell us what they mean; for example, in most females, the index finger is longer than the ring finger. In males, the ring finger is the same length, or longer. What, if anything, does this tell us? (Probably nothing, if we're forced to guess.) We'll look more at what we do know about physical differences toward the end of this paper. But already, the first link in our chain of balloons is suspect.

And there's one last problem: Suppose we do define our terms carefully, and develop a test which really measures something like independence or dominance, to take two examples. People in different societies will respond differently to our test. The concepts won't mean the same thing in all societies; some important dimensions of independence or dominance in that society may be left out of the measure; or people may want to take the test as a group (after all, in most societies people cooperate and work together on important things). Consequently, no test or measure is valid in all cultures, so how do we get an accurate picture of whether something exists everywhere?

So in many cases we are left to work "backwards"—boys and girls behave and sometimes perform differently, and since they are different biologically, these differences must be because of biology. But everywhere in the world, boys and girls are brought up differently. (That doesn't mean, however, that they are always taught the things which we think they should be taught.) Differences in behavior and aptitude could be a result of this different upbringing. Performing experiments to prove this one way or another is difficult because everywhere nature (the biological sex of the child) and nurture (the way the child is brought up) go together—if you are born a girl, you are brought up as a girl. People aren't prepared to experiment with their children and allow a boy to be brought up as a girl would be, just to satisfy some scientists.
One way around this is to look at children who have been exposed to unusual circumstances; for example, girls who have been accidentally exposed in the womb to extra amounts of the hormone androgen (the predominant hormone in males). If these girls are better at skills usually associated with boys, or behave more like boys, we might conclude that male hormones have produced these results. One problem is that often, girls who have had this exposure also look different from girls who have not, and as a result may be treated differently. The research on children who have experienced these unusual hormonal developments is complex, but affected girls tend to score higher on aggression, spatial ability, and timed tasks, characteristics associated with males in most hormonal research. On the other hand, boys who have experienced abnormal exposure to estrogen showed greater strength in semantic-dependent tasks, usually associated with females. (Mccardle and Wilson, 1990)

This relationship is not clear-cut; however, research indicates that decreasing one form of “female” hormone in females improves spatial abilities, but to improve them in males, one needs to increase the same hormone.

But, there is another way to set up a laboratory. We can look at other societies, where people bring their children up in different ways. If a characteristic is biologically based, it will be found everywhere, since we are all members of the same species. Suppose we discovered that despite the ways people around the world brought up their children, boys were always good at the same things that boys in our own society were, had the same personality characteristics, and behaved the same way. We might agree with the old adage “Boys will be boys”—that biology is the basis of these characteristics, not upbringing, since the upbringing is different. But there’s still another possible explanation: People in every society, in order to survive, need to instill certain characteristics in their males and others in their females, and that although people may appear, superficially, to be bringing their children up differently, in fact there are some common elements everywhere. Then we are back to our original quandary—it is nature or nurture?

Discussion

Now that we’ve reviewed the general argument, let’s look at what we can conclude from the various disciplines which relate to these issues—biology, psychology, anthropology, and education. It’s useful to do this because some of the ideas for improving instructional materials and teaching practice which are presented at the end of this paper are not hard and fast rules. They have to be applied intelligently, and to do that, you need a basic understanding of what current research shows, and how it relates to education and the educational literature.

Lessons From the Anthropological Literature

Let’s start with the anthropological perspective, since anthropologists try to study all known societies and therefore provide us with a big laboratory.
Development Stages Cross-Culturally

As we saw earlier, human behavior always occurs in a social and cultural context. That context varies from one society to another. When we develop a successful program for one culture, it may have no effect at all in another. So doing single-culture studies on gender-related abilities isn’t terribly useful—we can’t assume that what is true for middle-class American children (the group most frequently studied) is universally true for children of other cultures—it may not even apply to American children of other classes.

The various theories of child development illustrate this problem. Kohlberg’s universal stages of moral development, which were originally developed from research on a small number of American boys, involve six stages, grouped into three general categories: preconventional, conventional, and postconventional. While some authors argue that Kohlberg’s stages are cross-culturally applicable, requiring only some adaptation (Snarey, 1985), others feel they are more appropriate to societies in which individual concerns are preeminent over collective concerns (Dien, 1982; Wu, 1982).

Research in Kenya (Super, 1981) supports the idea that only the first three stages apply there (a lot more research would be needed to see if these three are universal). It has been argued that the last three appear to be tied to American notions of the legal-judicial system, not universal notions of moral reasoning, and are unlikely to be found in places with other kinds of legal-judicial systems. (Super and Harkness, 1980: 9-10) Shweder, in an analysis of an interview in India (1991) also finds problems with the inability of Kohlberg’s stages to deal with what he calls an “alternative” form of moral reasoning. And while cross-cultural research supports some aspects of Piaget’s theory of cognitive development also developed on boys—for example, the idea that the sequence and properties of developmental stages seem to be universal, as well as the underlying cognitive properties—not all the stages are reached at the same time. Indeed, in some places, Piaget’s last stage, that of formal-operational thinking, may not occur at all. The question remains, therefore, of whether all of these stages are culturally relevant. (Werner, 1979; Berry, Dasen, and Witkin, 1982; Light and Perret-Clermont, 1989) Other authors make similar kinds of arguments for the theories of Vygotsky.

Certain aspects of child development which we might assume are universal are also suspect. For example, although infant motor development is based on maturation, the point at which children do various things differs, not only between individual children, but more significantly between cultural groups. In many African societies children are discouraged from crawling and are trained to sit and walk earlier than American children. Zaírean children are taught to handle tools as soon as they are afoot—one of the most astonishing photographs in the child development literature is a Zaírean infant, 11 months old, calmly standing up and cutting a large fruit with a machete nearly the same size as himself. (Rogoff, 1990)

These kinds of differences become important when a theory is involved. Harkness (1980) argued that after the first month when infants sleep about four hours at a stretch, their sleep periods extend until at four months they are sleeping for eight hours at a stretch. It has been argued that this reflects a period of physical development in the brain. If this is the case, it should be true for children everywhere. However, rural African children sleep about three hours at a stretch for the first eight months of their lives, so this difference in sleep patterns has less to do with universal stages of development and more to do with how long people try to get their infants to sleep, and the arrangements they make to achieve this.

This is not to say that children do not experience universal development stages—it’s just that these stages reflect the impact of social and cultural practices, and many “universal” models either ignore
non-western cultures or are applied in non-western settings without sufficient reflection as to why the results may be different. Doing more studies to see if these models do, in fact, work out crossculturally may be less productive than trying to develop theories that incorporate cultural differences—this is where a wedding of anthropology and psychology might be useful.

**Gender Socialization and Behavioral Differences Cross-Culturally**

Although we don't know as much as we would like to about developmental stages, we do know something about socialization and behavioral differences cross-culturally, and between the sexes. Much of this information has a foundation in early works by Whiting and Edwards (1973, 1988) and Barry and his colleagues (1957, 1971). A lot of what they found has been supported by later studies. Here are some of the results.

The first one is the most surprising, particularly to those who think that spreading western culture is the solution to improving the status of women and girls. Whyte (1978, 1980) has shown that women and girls tend to have higher statuses, relative to those of men of the same group, in less complex societies. Less complex societies have simpler political, economic, technological, and social systems. More advanced societies have used their complexity to control resources and maximize production. In the process, great inequalities have arisen for all kinds of groups, including females.

There are gender-related differences in the behavior of children but they are not as large or as consistent as western research would suggest. Through detailed cross-cultural observations and meticulous coding of the behavior of children aged 3-11, Whiting and Edwards investigated some common western stereotypes: boys are more aggressive and dominant; girls are more sociable, passive, nurturing, and responsible. They found few differences: boys engaged more in rough and tumble play; girls sought more help and attention. They hypothesized that these might simply be two different styles of establishing skin contact. The boys and girls were equally dominant, but once again, they differed in style. Boys dominated "egoistically"—in effect, they got others to do what they wanted by saying "I want...". Girls dominated "prosocially" by invoking authority, assigning chores, or reprimanding for the good of the individual or the group. (You may recognize this when you hear girls say "Mother wouldn't like that," "You'll get sick," or "You'll cut someone.") Whiting and Edwards concluded that most of the differences which they found can be explained by task socialization. For example, four of the five behavior patterns found in girls (seeking or offering physical contact, seeking help, prosocial dominance, nurturance, and cooperation) are associated with the kinds of work assigned to girls—tasks involving frequent interaction with adults and children, and tasks involving the care of others. In the one society where girls were not assigned these tasks as frequently, they scored lower on the "feminine" behaviors. In the one where boys were assigned domestic and infant care tasks, several of the characteristics for boys and girls were reversed, and in general, sex differences were reduced.

Nor is there much evidence of a biological base for most of the characteristics. Nurturance does not appear in younger girls (ages 3-6); it emerges later (ages 7-11) after girls have had considerable experience looking after others. Whiting and Edwards conclude that, among the behavioral charac-
teristics covered in this study, if any are biologically based, aggression in boys and frequent touch-
ing of others in girls are good candidates for further study. Some of the others, such as nurturance, 
only appear in the 7-11 age group, reinforcing the research which indicates that they’re based on 
socialization rather than biology. This and other studies suggest that when task assignment does not 
follow traditional gender lines, behavior does not follow “traditional” lines either.

Where do these traditional behaviors come from? Barry has used large, cross-culturally valid samples 
to look at gender differences in socialization. He found that a number of supposedly “innate” sex-
related characteristics, such as nurturance, obedience, responsibility, achievement, and self-reli-
ance, are actually taught to children and are related to the needs of a society’s economy. All 
societies do not train their children differently, but when they do they are more likely to train the girls 
in the first three characteristics, and the boys in the last two. Why? Throughout human history, 
people have generally lived precarious lives.

Survival or death were, and for many still are, the main issues facing them. In such circumstances, 
successful childbearing and child rearing call for nurturing behavior and the carrying out of tried 
and proven routines. In the case of activities which are, with minor exceptions, universally assigned 
to men, self-reliance, achievement, and a high level of skills yield important returns. However, as 
societies become more economically complex, division of labor is no longer based simply on one’s 
sex and one’s age. People are selected for jobs based on their skill. And societies which don’t make 
big gender distinctions for adults don’t make them when bringing up their children. So we can see 
that some characteristics which we thought were “innate” in the sexes are instead related to current 
societal needs. These needs change, and we change with them.

Whatever distinctions are made, we do know one thing: Cross-cultural research shows that children 
are aware of gender differences and stereotypes at around 2-3 years. By age 4-5, children want to 
show mastery of their gender roles, which are more rigid and stereotyped than they will be later. 
What are some of these roles?

**Girls’ Work, Boys’ Work: The Implications**

Work plays a big role in our discussion. The work performed by children has consequences for the 
amount of free time they have, the characteristics people think are important for them to have, and 
the cognitive and behavioral characteristics which they bring to school.

“To state the situation in the baldest terms, girls work while boys play.” (Whiting and Edwards, 
1988: 125) A recent study of children in the Eritrean lowlands showed schoolgirls, on average, 
doing four and one-half hours of non-school work daily, compared to that of schoolboys, who did 
two and one-half hours. (Kane, 1996) Here are the timetables of a Gambian girl in school, one not 
in school, and a boy in school. They are the same ages and represent a typical pattern in their 
village. (Kane and de Brun, 1993)

Child care and housework are the most common tasks for girls, and in agricultural societies where 
women farm, girls will also assist in farming and gardening. In fact, research by Davison et al. 
(1994) comparing the work patterns of a sample of Ethiopian girls and boys shows that girls not
only participate in all but one of the seven tasks which boys carry out (plowing), but are also called on to perform seven other tasks as well, which are exclusive to them.

Girls are also recruited for work earlier—in fact, some research suggests that girls under 11 are the preferred caretakers of younger siblings. (Whiting and Edwards, 1988) They are also prepared for their work earlier: by age 3, girls are being trained in hygiene and etiquette; by the time boys are being trained for these, at about 7, girls have moved on and are being trained for responsibility.

Acharya and Bennett (1981), in a study of eight villages in Nepal, provide clear evidence of this: girls work longer hours from age five, and by age 10-14, are working nearly as many hours as an adult male.

<table>
<thead>
<tr>
<th>Time</th>
<th>Girl Not in School</th>
<th>Girl in School</th>
<th>Boy in School</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 a.m.</td>
<td>Rises, bathes, prays</td>
<td>same</td>
<td>Rises, bathes, prays, revises lessons</td>
</tr>
<tr>
<td>7 a.m</td>
<td>Sweeps compound, fetches water, washes dishes</td>
<td>same</td>
<td></td>
</tr>
<tr>
<td>9 a.m</td>
<td>Cooks lunch.</td>
<td>Goes to school</td>
<td>Goes to school</td>
</tr>
<tr>
<td>9 30 a.m</td>
<td>Takes lunch to mother on farm, Works on farm</td>
<td>In school</td>
<td>In school</td>
</tr>
<tr>
<td>2 p.m</td>
<td>Working on farm</td>
<td>School day ends Lunch in school, extra studies until 6 p.m</td>
<td>Same if studies end early, plays football</td>
</tr>
<tr>
<td>6 p.m</td>
<td>Working on farm</td>
<td>Takes food to mother on farm, helps her</td>
<td>Fetches water, bathes</td>
</tr>
<tr>
<td>7 p.m</td>
<td>Returns home, cooks dinner</td>
<td>Cooks dinner, bathes</td>
<td>Vanous (play, study)</td>
</tr>
<tr>
<td>8 p.m</td>
<td>Dinner, washes dishes.</td>
<td>Dinner, washes dishes</td>
<td>Dinner</td>
</tr>
<tr>
<td>9-11p.m.</td>
<td>Vanous (rests, plays, talks to friends, does more housework)</td>
<td>Goes to teacher for extra studies</td>
<td>Goes to teacher for extra studies</td>
</tr>
<tr>
<td>12 a.m</td>
<td>Goes to sleep.</td>
<td>Goes to sleep</td>
<td>Goes to sleep</td>
</tr>
</tbody>
</table>

Expenditure of Hours per Day by Age Group and Sex

<table>
<thead>
<tr>
<th>Activity</th>
<th>5-9 years old</th>
<th>10-14 years old</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td>Work burden</td>
<td>2.9</td>
<td>3.5</td>
</tr>
<tr>
<td>Education</td>
<td>1.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Social/personal maintenance/leisure (including education)</td>
<td>12.7</td>
<td>12.1</td>
</tr>
</tbody>
</table>

(Calculated from figures in Acharya and Bennett, 1981 427-428)
This work has consequences for girls’ free time, as this quote from a Gambian girl shows:

As far as I know, boys have a better chance in education than girls. Just look at me. I have to wake up by 6 o’clock to do household work. After prayers, I sweep the compound, fetch water, wash the dishes, have a bath, and get ready to go to school. I come home and wash the dishes from lunch and then take food to my mother on the farm and help her. Then I come back at 5:30 and cook dinner. I help my mother wash the clothes. I have a bath and eat dinner at 8. Then I go for studies at a teacher’s house in the village from 9 to 11. I have no time to study at home.

Davison and Kanyuka (1990) have translated this into after-school time use by 42 school children in southern Malawi. Out of an hour, girls spend, on average, nearly 70% of their time in domestic tasks, while boys spend 38%; and girls spend only 13% of the hour in leisure activities, while boys spend 41%. Boys spend twice as much time studying. (1990: 49-50)

Work also has consequences for the kinds of behaviors for which girls are rewarded. While in many cultures, boys spend more time in undirected activity (free time, play), and are free to move further from home, girls are engaged in directed activity, in which they are expected to follow a set route and routine. This allows little time for exploration and learning about the environment. Innovation is not likely to be rewarded; experimentaton with child care and domestic routine will only land a girl and her charges in trouble. Boys also interact more with same-age companions. Girls have less leeway, since they are assigned more child care and work more with adults. Boys’ main partners in interaction are other boys; girls interact more with older people (their supervisors) and younger people (their charges). Boys also engage in more self-managed activities. Girls, on the other hand, receive more commands—people interrupt what girls are doing far more often, and feel free to redirect their activities.

Classroom observation supports many of the points mentioned here. In an American study, four-year-old boys made little eye contact when playing ball, demonstrated their skills to others, showed no direct teaching, challenged each other, and frequently announced their superiority to other boys. The following observation of girls reflects a more supportive role.

The teacher tossed the ball to Rosie. Rosie placed her arms and hands in front, but did not attempt to catch the ball. The ball went right through her arms. Immediately, she turned to her friend Mary and laughed. They changed, including Mary. Then the ball was sent to a boy, and he caught the ball using only his hands. The teacher told him, "Good catch, you caught it with your hands." The girls all laughed. Becky claimed she wanted a turn. The teacher tossed the ball to her. Becky let it go through her arms, without even attempting to use her hands or arms. Quickly, she turned her face to see her friends and laughed. (Garra 1994: 217)

It’s often thought that boys are more “active”—they initiate more acts, while girls respond more to acts initiated by others. The cross-cultural research doesn’t support this in children 3-6. Boys 7-11 do initiate more acts, although the findings are not statistically significant. However, in looking more closely at this, researchers discovered that girls received more “mands”—people try to interrupt and change the behavior of girls more than boys. Girls initiate as many acts but they are also on the receiving end more, because they are responding to more frequent interruptions. (Whiting and Edwards, 1973; Whiting and Edwards, 1988) An analysis of educational radio scripts supports this: Males often initiate activities and tend to say “Do that . . .” or “I’ll do that . . .” Girls tend to be told what to do, or they say “Let’s do that . . . .” (Hartenberger and Bosch, 1996)

All of these have consequences for what children learn. Research has shown that children who travel farther from home in their daily activities perform better on tests of spatial ability and field independence. Nerlove and others (1974, 1981) found that there is a relationship between self-
managed activities and analytical ability, especially spatial ability. Boys obviously have the advantage here. However, girls’ work with children, and their responsiveness to their adult supervisors, has some consequences. The behaviors children learn at home transfer to school, and girls tend to bring a more “prosocial” approach to their peers—when they want to change the behavior of other children at school, they invoke the common good, authority, etc., as seen above. Boys dominate others by sheer force of personal will: “I want. . . .” Girls bring sociability and helpful and supportive behavior to their interaction with other girls; boys bring sociability, dominance, and challenging behavior. If the status of males is extremely high in their society, they are also more likely to bring assaulting behavior. Children who look after younger siblings also bring more nurturing behavior to peer interactions—this is true for both boys and girls, but since girls look after siblings more often, it is more common in girls. As a result, boys are more likely to see their peers as competitors, rather than people with needs. Since girls interact more with adults, work cooperatively with them, take direction, and use a more prosocial approach, they are likely to show more school-readiness and to fit into the teacher-pupil interaction process. (Whiting and Edwards, 1988)

Boys have a different kind of problem. Women, who are the primary caretakers of children, assign tasks from their own workloads to them. This means that young boys have women as their models, and are doing “women’s work.” Various researchers (Chodorow, 1974, is the most prominent example) argue that boys have to establish their own identity. For the most part, they do this without the help of adult men, who rarely involve themselves in child care anywhere. They accomplish this in a variety of ways—such as engaging in dominance struggles with their mothers and other females and devaluing female activities. Boys’ initiation ceremonies have as a major function boys’ movement away from the world of women and women’s control. Girls’ ceremonies tend to focus on signaling marriageability, protecting virginity, and preparing girls for men’s control.

All of these factors lead to more disruptive behavior on the part of boys in school. Classroom observation, both western and non-western, shows that a lot of teacher-pupil interaction is based not on the learning needs of children but on other factors: the need to give boys more attention and reinforcement in order to gain cooperation from them, the belief on the part of some teachers that boys are better or more valued students, and the belief that girls will not object. Perhaps most importantly, teachers reading this will recognize an additional reason— as one teacher asked the author, “What on earth would the classroom be like if we allowed girls the same freedom as boys?” In a three-year study of American third, fourth and fifth graders, Sadker and Sadker (1985) found that boys dominated classroom discussions, received more attention from teachers, were praised more, and were eight times more likely to call out answers. In Malawi, in a study of 36 classrooms, Davison and Kanyuka (1990) found that teachers of Standard 5 and Standard 8 called upon boys more often than girls in most subjects. In English classes, the boys were asked questions twice as many times as girls. Moreover, 90% of teachers felt that boys knew the answers to questions more often, and that their
academic performance was better. They were also verbally rewarded more often than girls. Something similar was found by Kane and De Brun (1993) in The Gambia, and Kane (1996) in Eritrea: Boys were rewarded more often for correct answers, and when they gave incorrect answers, were helped more often to get the correct answer.

Lessons From the Psychological Literature

This discussion gives us some idea of the behavioral differences between boys and girls cross-culturally, but not cognitive differences. There are very few cross-cultural studies of gender-related cognitive differences. Indeed, there are few cross-cultural studies of cognitive differences of any sort. A major reason for this is the fact that child development studies tend to be based in academic, experimental psychology, in which non-western cultures tend to be ignored. Anthropology, which does take a cross-cultural perspective, has placed little emphasis on child development studies. We are left, therefore, with many carefully constructed European and American studies, but little notion of how applicable they are in other societies.

Even though these studies concentrate on only one or two societies, they are useful to us because if something is supposed to be universal and isn't found in that society, the claim is disproved. This section looks at what, among the psychological studies, seems to be supported by the cross-cultural research, and what, at least, has not been disproved by it.

Cognitive differences

A landmark study done by Eleanor Maccoby and Carol Jacklin in 1974 identified some gender-related cognitive and behavioral differences which have become the basis for much of the more recent research. They reviewed 1,400 studies of supposed differences and found that only three cognitive differences were well-substantiated by research and not contradicted by cross-cultural evidence. (This does not mean that future cross-cultural research will not contradict them—only that none existed at the time of their study.) Some of their findings have since been disputed, partly on the grounds that a few of the differences, particularly those relating to greater verbal ability in girls, are now disappearing. An examination of the literature which claims this, however, shows that in part it is based on a number of artifacts of the research itself. (For a review of the debate on the possible decline of certain gender differences in performance, see Appendix 2.)

But, many of the differences appear to remain. What are
Halpern (1992) has outlined certain findings in these areas:

Verbal abilities. These probably represent the smallest of the cognitive differences between the sexes. In general, the evidence is that:

- Girls are more verbally precocious.
- Females aged 1-5 are more proficient in language skills.
- Girls maintain their superiority in verbal skills through elementary school.
- Males form a disproportionate number of people at the extreme low end of verbal abilities, such as stuttering retardation.
- Females excel at anagrams, general and mixed verbal ability tests, speech production, and associational fluency (generating synonyms).
- The only male advantage is in solving verbal analogies (commonly used in math problems).

Quantitative abilities. These fall in the range of medium-size differences, between verbal and visual-spatial. Research has shown that generally:

- The highest end of mathematical ability distribution is male.
- There is a male advantage in mathematical problem solving.
- There is a female advantage in computation during elementary school.
- Research has shown that when spatial ability is statistically controlled, sex differences in quantitative ability become nonsignificant (this does not contradict the previous point—computation is not a spatial task).

Visual spatial ability. This is the most robust of the cognitive differences—it is found consistently. In some cases, it is so large that no statistical tests of significance are required.

Four types of visual-spatial ability have been identified by researchers. Males consistently excel in the first three, and generally in the fourth.

- Visual perception (locating the horizontal or vertical when distractions or irrelevances are present—the Water Level Test mentioned below is an example).
- Mental rotation (this difference is among the largest in literature). This involves imagining how objects would look if they were rotated, how solid objects would look if unfolded, or how a flat object would look if it were folded.
- Spatiotemporal ability (interpreting and responding to moving displays).
- Spatial visualization (finding hidden and embedded figures, paper folding, spatial relations).

A huge variety of tests has been used to measure these. Some of the differences found seem to depend on the type of test used. Male advantage in some appears as early as the fourth grade; there is some evidence as well that these decline more readily in older women than in older men. (Halpern, 1992: 63-73)

One instance of a difference in visual-spatial ability is Piaget's Water Level Test. Imagine a drawing of a drinking glass in an upright position. Then imagine a glass tilted slightly. Females have more trouble drawing an imaginary water line in the second glass—they are less likely to indicate that water remains horizontal, even in a tilted glass. This finding has been made with American college students over and over. It appears that about 50% of college women get it wrong, and research in India shows that women there also have trouble with such tests. (Halpern, 1992) On the other
hand, research among Baffin Island Eskimos shows no differences between the sexes in relation to a variety of spatial tests, possibly because the sexes perform similar activities related to travel and hunting. (Berry, 1966) Both sexes also carve objects which involve “visual puns” which are dependent upon highly developed shifts in visual perspective.

Behavioral Differences

Maccoby and Jacklin found a fourth well-substantiated difference, a behavioral one: aggression in males.5

Cross-cultural research supports this. Whenever research differences in aggression are found, they are found in the direction of males. And just as the cross-cultural research suggests, some behavioral differences are socialized. For example, a study of 156 American children in the early school years found that initially, girls' and boys' behavior didn't differ much, but teachers' responses to them caused a change. Teachers responded more to assertive behavior in boys, and to communicative behavior in girls. A year later, boys were performing more aggressive acts, and girls were communicating more with the teacher (Fagot, 1994)

Learning Styles

Once again, much of the research on learning styles is American or European. Here, we are including only research which disproves common stereotypes (single-culture studies can disprove but not prove), and research which throws further light on existing cross-cultural research.

Supporting the cross-cultural research, American research suggests that girls participate more in structured activities with a lot of feedback by adults and observation of adults performing the activities. As a result, they learn rules and how to adapt to the environment; boys, in less structured activities, are forced to adapt in new ways to their environment. (Carpenter and Huston, 1980; Carpenter, 1983) Boys' toys reinforce this: Their toys, such as blocks, tools, and machine-like toys, require spatial manipulation, force them to develop their own schemes, encourage them to learn how the toys work, and how to use them for instrumental purposes. Girls' toys allow them to imitate and rehearse adult life activities. (Block, 1983) This may give them more school-readiness, but does not serve them as well in intellectual development.

Contrary to popular belief, and some research hypotheses, girls appear to use learning-focused strategies more than boys. Learning-focused students are interested in completing and understanding tasks for their own sake; ability-focused students are more concerned with appearing able and with grades. Learning-focused students use deeper processing strategies; ability-focused students use surface-level approaches such as memorization. Six hundred students in an American study of sixth and seventh graders showed that girls applied a learning focus to English, math, and science; both sexes used ability-focused and surface strategies for social studies. (Young and others, 1992) Meta-analyses (combining the results of large numbers of studies) of adult studies support this. Women were more interested in learning for learning's sake, men for the qualifications they offered. (Consult Appendix 1 for some cautions on interpreting meta-analyses.) This is not surprising—cross-cultural research shows that an emphasis on achievement is socialized, and when societies have made a distinction between the sexes, it is in the direction of males.
Now comes the final question: Are these biologically based? What do we know about gender and biology?

**Lessons From the Biological Literature**

If cognitive and learning-related differences between the sexes are biologically based, addressing them in schooling requires different strategies than if they are the result of socialization. Remember that if something is biologically based, it must be found in all known societies. And even then, it doesn't have to be biologically based—it may be a cultural universal. For example, every known society makes some distinction between men's and women's work, but what is "men's work" or "women's work" may differ from one place to another. Anthropologist Claude Levi-Strauss (1967) explained this universal practice by pointing out that societal survival requires the mutual interdependence of men and women: a division of labor by gender ensures this.

Let's look at what is known about biology and cognition. First, researchers have been wary of this topic. "Scientific biological" explanations have been used for at least the past 150 years to justify racism, slavery, colonization, ethnic discrimination, class discrimination, and sexism. As recently as five years ago, studying the biological foundations of human differences was still stigmatized, and responsible researchers working on the topic were keeping a low profile—they didn't want their results to be misused. Today, we know a little more about some gender-related differences, although what they mean is not always clear.

Sex is biologically based; gender is socially assigned. Sex is reflected in our chromosomes, our hormones, our gonads (ovaries and testes), and our internal and external form. In most people these go together, but it may surprise you to know that no one is 100% male or female. For example, both sexes have both "male" and "female" hormones, although in different combinations. Some sex differences are clearly related to reproduction; others are more baffling. Why, for example, are males of any one population darker, on average, than females? Why do women have a better sense of smell? Why are men more adaptable to temperature changes?

But what interests us in this paper is whether any of the differences which have been found relate to cognition or cognitive learning styles. The main areas researchers have been looking at are genetics, hormones, and brain structure. For example, people who are genetically male but appear, externally, to be female, tend to have cognitive abilities associated with females. And we have seen earlier that people exposed to abnormal amounts of hormones normally associated with the other sex tend to exhibit some cognitive characteristics associated with that sex—females exposed to excessive male hormones in the womb tend to score higher on tests of spatial ability and aggression. During menstruation, when estrogen levels are low, females also score higher. In relation to the brain, current research is looking at several features, including brain lateralization—which half of the brain performs which tasks. It appears clear that sex differences appear here—when lateralization differences are found, they are more marked in men—that is, one side of the brain deals with spatial abilities, and one with verbal. However, in women, it is more likely that the two functions are spread across both hemispheres of the brain. Recent research using magnetic resonance imaging shows that for certain verbally related tasks, males are lateralized toward the left hemisphere, while females have a more diffuse pattern. (Shaywitz, 1995) One practical consequence of less lateralization is that when one hemisphere is damaged, women have a better chance of recovering functions than men do.

Although socialization certainly plays a role, brain lateralization does tend to affect performance in certain tasks. We know this from research on left and right handers, who are probably not social-
ized differently from one another. Research shows that left-handed females and right-handed males are better at spatial abilities; but left-handed males and right-handed females are better at verbal abilities (compared to their same-sex counterparts who use the other hand). (Halpern, 1992)

This discussion simplifies the extent and complexity of the research, but it is fair to say that hormones and brain structure have a role to play in some of the cognitive and learning-related differences between the sexes. However, what we do not know is how these differences relate to ideas about dominance, independence, nurturance, leadership, or any of the other large behavioral categories which we have assigned to the sexes. In fact, it is probably fair to say that this is exactly what they are—assigned.

Some Possible Explanations for Cognitive, Cognitive Learning Style, and Behavioral Differences

In this paper, we’ve considered two kinds of explanations for gender-related learning differences—biological and environmental (learned). This section summarizes some of the major findings to date:

Sex differences are not deficiencies.

Biological explanations seem most likely for:

- Spatial/verbal abilities, and sex and handedness (more boys are left-handed),
- The organization of cognitive abilities by hemisphere,
- The high rate of stuttering and reading disabilities among males, and
- The male advantage on some spatial tests, especially Piaget’s water level (water jar) test.

Psychosocial explanations seem most likely for:

- Performance data which show changes over time,
- The finding that females get higher grades even in areas where males excel,
- Studies which show spatial abilities amenable to training,
- The low participation rate of females in higher professions requiring verbal fluency, and
- The fact that 80% of all doctorates in mathematics in the United States are earned by Asian and white males (but the differences in mathematical abilities between the sexes are too low to account for these numbers, or for the absence of males from other ethnic groups).

There are no explanations, currently, for the following:

- The fact that girls perform better on some mathematics tasks; boys perform better on some verbal tasks,
- The decline in female intellectual achievement in later grades, and
- Sex differences in timed tests. (Halpern, 1992)

Conclusions for Education

All people everywhere need to learn and wish to learn. However, there is no single road to learning, no single body of material, and no single way to transmit it.

While all humans have the same cognitive abilities, what people emphasize as important to learn, and how they go about it, differs from one society to another. It’s essential that educators know and
respect the culture of their audience for two reasons: 1) no single culture, including western culture, has all the answers; and 2) people everywhere reject solutions which don’t fit their problems. Research shows that girls’ participation and performance in education is influenced by a number of factors which have little to do with the education process per se. Political, religious, cultural, and economic factors each have a role in restricting girls’ access, persistence, and achievement. But gender-biased educational theories, systems, processes, and practice also contribute to poorer outcomes for girls. The recommendations in this paper deal with the school-related issues.

Developing an understanding of the self in relation to the larger world is an important goal in a child’s development. Gender is a part of that self. People in all cultures have clear-cut ideas about gender-appropriate behavior and roles. (The fact that these differ from one society to another shows that with few exceptions, these ideas are not founded in “innate” laws of nature.) The aim of the recommendations in this paper is not to undermine or alter these cultural ideas, but rather to create conditions in which children of both sexes can learn to the best of their abilities. Gender-neutral education is the aim. “Gender-neutral” does not mean that we should assume that both sexes are identical. Instead, it provides learning conditions which are not biased toward one sex or the other in terms of content, presentation, reinforcement, or evaluation. Its aim is to ensure optimum opportunities and outcomes for children of both sexes. Creating systems which are in harmony with this principle means recognizing that much of current education is designed, at various stages, for one sex or another, and on balance, toward boys.

Finally, to repeat the note on which we began, males and females are more alike than different in their abilities. Cognitive differences within the sexes are greater than those between them. It is likely that socialization plays a larger role in sex-differentiated abilities than do biologically based factors.

**Recommendations for Education**

**Program Development**

Schooling cannot be separated from the social and cultural environment. Instructional materials and classroom practice must be embedded in an understanding of how people in a particular culture perceive the function, content, process, and outcomes of education.

Therefore, it makes sense to take a “problem” rather than a “program” approach to tackling the issues of girls’ education. Taking a program approach means developing a single supposedly successful strategy and applying it everywhere whether it fits or not. This kind of thinking has been a curse in many areas of development practice, and education is no exception. On the other hand, taking a problem approach means working with all the stakeholders, including local people, to discover what people need and want, and to develop appropriate responses.

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**Checklist for local participatory approaches**

Find out what people think about these questions:
- What is the nature and capability of children?
- What is important to learn?
- How should it be taught?
- Who should learn?
- Who should teach?
- What outcomes do people expect?
- What do they think this education will lead to?
- What do people consider a “good girl” and a “good woman”?
- Does this conflict with girls’ successful participation in education?
- If so, how can parental and community concerns be addressed?
- How can different views be reconciled?
- How can learning and teaching be managed and organized?
- How can it be evaluated?
- How will it be sustained?
Participatory research and planning are essential to a successful learning program. There is no single, objective view of reality. All the stakeholders—educators, government representatives, parents, and children are “experts.” Each brings a unique and complementary perspective. Local people are often invisible in the process. The use of participatory approaches, such as Participatory Learning and Action (PLA), allows all of these views, particularly local views, to emerge and to create, monitor, and evaluate stronger, more relevant, and more sustainable programs. A manual and video, *Groundwork*, available from the Economic Development Institute of the World Bank, shows how to apply participatory approaches to issues of girls’ education. These methods can be adapted to the problem of what people think is important to be taught, ways of teaching, how to involve community support, how to improve ongoing programs, and how to evaluate a program when it is completed.

**Specific Gender Issues**

1. Remember that research supports the conclusion that males and females are more alike than different: few cognitive, behavioral, or cognitive learning style differences are innate. We are not damaging children or going against nature by encouraging them to develop all their capabilities, including those traditionally associated with the opposite sex. *Behaviors, roles, activities, responsibilities, and privileges should be accessible to both sexes.*

2. The area of early childhood development takes on an even greater importance in the light of clear research which shows that gender socialization begins at birth. *Early childhood teacher and caregiver training, learning materials, and teaching practice should all incorporate an understanding of how to help girls as well as boys.* Family life education, adult literacy courses, domestic economy courses, and any other opportunities for reaching parents and future parents should be capitalized on so that the home environment provides a strong foundation for development of cognition, behavior, and learning.

3. Generally, people relate more to pictures and accounts of people like themselves. Boys look for boy characters in scripts; girls look for girls. (This is not surprising—even gorillas identify with pictures of gorillas.) Requiring girls to “translate” script materials aimed at boys so that they can identify with them is not productive. Research shows that children, who have more rigid gender stereotypes than adults do, appear to remember material related to their own gender better, and material which coincides with their notions of gender-appropriateness. (This does not mean that learning materials have to support stereotypical notions—neutral ones can be chosen.) Most learning materials, therefore, put girls at a disadvantage, and research on girls’ performance in math and some sciences shows this to be one cause of poorer outcomes. Both sexes should be represented equally in instructional materials throughout an entire program in a meaningful way. Merely alternating use of the sexes in examples, or within specific lessons, is not sufficient—it is often artificial.

This means that educators should.

*Consider very carefully before using any gender-related example, or invoking gender. Does it serve a good pedagogical purpose?* If not, it should be avoided.
Involve the participation of boys and girls in a meaningful way. An example from a set of educational radio scripts is instructive. Some scripts call for the boys as a group or the girls as a group to respond or to perform activities. Children of primary school age groups already form same-sex groups by preference, and in many societies, the sexes are perceived as rigidly separate in terms of roles, privileges, etc. Why this distinction should be carried into the classroom by having the girls say “I am standing up” and the boys say “I am sitting down” is not immediately obvious, unless it is thought that girls as a group do not have the same opportunities to respond. In any case, even if it has a gender-equity function, it’s not enough.

Remove irrelevant material which supports gender stereotyping, and do not draw on culturally accepted stereotypes unnecessarily. In one piece of Bolivian instructional material, for example, the author says “pretend you are driving a truck, like some fathers do.” This is unnecessary—how can most girls imagine themselves in a “role” which has already been identified as being appropriate to an adult male? Or, taking a Papua New Guinea example which teaches the concept of long and short times, it isn’t necessary to have the father making a trip out of the area, while the mother does the weekly laundry. The lesson can use neutral examples which don’t draw on gender.

Analyze learning materials for gender sensitivity. Educators may find that using basic questions in the box is one way to begin.

Examine support materials, such as teachers’ guides and manuals. Even when conventional textbooks have been improved to make them more gender-sensitive, teachers’ manuals and other accompanying materials may continue to ignore, or even aggravate, the problem. For example, although it may be thought that a manual using only masculine pronouns is intended to be female-inclusive, in practice, it may lead to more male involvement than female. “Call a child to the front of

1. Frequency and identification of characters
How many characters are female? How many male? (Animals are often surrogate people in learning materials—count them as well.) Are they central or supporting characters? How many are given their own names (“John”)? How many are simply described in relation to another character (“John’s sister”)? Does this differ by sex of characters? How else are names treated? Do some adult characters have honorific or professional titles (Dr., Judge, Mrs. Ali) while others simply have names (Mary, Auntie).

Does this differ by sex? What pronouns are used? Is “he” used to incorporate “she”?

2. Behavioral, psychological, and cognitive characteristics
What do the characters do and say? Who takes the initiative? Who distributes tasks? Who initiates discussions? Who participates? Who makes final decisions? Who agrees/disagrees? How do they influence others? Who interrupts ongoing activities or speech? Who is interrupted? What characteristics are each of the sexes portrayed as having? What is each of the sexes thought to be interested in? Good at? What is conveyed as a “good” woman/man/girl/boy?

3. Images of work/employment and family life
What occupations do men and women have? Are they named occupations (“Mr. Garcia is a paramedic”) or simply descriptions of activities (“Juan’s mother delivers babies”)? What economic and political roles do men and women have? What roles do they play in the family and community? What activities are males/females associated with? Are males associated modern or non-traditional technology/dress more than females? What do males/females own? What does each use? Is there differential access to goods, places? If so, who controls access? “Men’s work” may be shown as “opening up” to women. Do men ever do “women’s work”?

4. Information
Where do characters get their information? Who has what kinds of information? Who is considered authoritative? Who leads the final word when information is conflicting? Is information valued differently, based on the source (women’s information is considered “gossip”)? Does information which comes from women require corroboration more often than that from men?

Finally, what do the illustrations tell you in
the class. Ask him to select a friend. Tell him . . .” Or “Take the children to visit a shopkeeper. Ask him to explain . . .”

4. Some elements of pedagogy are deeper, and require a more sustained approach in learning materials. They can’t be addressed in a single lesson, and simply alternating genders and roles isn’t enough. Educators should consider the learning aims of the entire program, and the best ways to get children of each sex to learn. Both boys and girls can be trained in the characteristics which have served each sex well. For example, exploration of space and objects as a key to analytical abilities, better verbal abilities in boys, and nurturance for boys as a key to social and responsible interaction. Here are some guidelines:

Most of the research shows that boys are better and faster at tasks involving most visual-spatial abilities. How much of this is attributable to early association with “gender appropriate” toys, games, tasks, etc., needs further research. However, the finding is crucial, because research shows that when visual-spatial abilities are held constant in experiments, the differences between boys and girls in mathematical ability disappears. Therefore, visual-spatial ability is an important foundation of success in mathematics. Since training, making examples more relevant to girls, and using more congenial forms of testing have been shown to improve girls’ visual-spatial abilities and to remove some of the differences, the teaching process obviously has a large role to play. Learning materials can incorporate training in spatial abilities. Research has shown that training involving “boys” toys—blocks, geometric shapes, etc.—improves spatial ability in both sexes. (Sprafkin et al., 1983) Also, training children to recognize embedded figures can remove the sex differences in this ability, and training in mental rotation improves girls’ ability. (Connor, Schackman, and Serbin, 1978)

**Girls should be encouraged to develop a positive and confident attitude toward mathematics and its value in their lives.** Examples and problems must be drawn in a positive way from their perspectives, and be relevant to their lives (as they usually are to the lives of boys) or they will have difficulty integrating the material. The same principle holds for science and environmental studies. Role models of women using mathematics in their work, including in professional careers, should be included.

Research also suggests that girls may be using verbal rather than spatial strategies to solve mathematical problems. (Hertzog and Carter, 1982; Hyde, Geinnger, and Yen, 1975) **Students should be taught to use both verbal and spatial strategies in problem solving, and expert assistance should be drawn upon to incorporate both into instructional materials.**

**Games of strategy should be encouraged for both sexes.** Cross-cultural research shows that game types are associated with a society’s type of economy. Games of strategy are found in complex societies, and played more regularly by males. Games of chance are found in societies where people have little control over their fate, such as peasant societies, and are also played in complex societies by people with little power (consider the role of the lottery and bingo, and who plays them).

Most research shows that boys enter school with a disadvantage in verbal abilities; some may be
diagnosed as slow learners. A special effort should be made in language teaching to include materials that are interesting and relevant in that particular society to boys.

Fostering nurturance in boys affects their interactions with each other, as well as with younger children. It enables them to be more responsive to societal expectations.

Encourage the development of large motor skills, which have consequences for health in both boys and girls. Differences in such skills appear a few years after birth. Most girls are not encouraged to engage in such activities, yet many of the supposed health and stamina-related "biological" differences between males and females are markedly reduced with training.

5. As you can see from this review, our knowledge of gender-related learning differences cross-culturally is limited. Cross-cultural research suggests that one reason boys do better on some examinations is that they guess more, which leads to higher scores when "formula scoring" is used (counting only "number rights"). When "number wrongs" are subtracted, the boys don't score as well. (Goldstein, Haldane, and Mitchell, 1990; Ben-Shakhar and Sinai, 1991) Research also shows that even when girls are told it is permissible to guess, they omit more items. (But bear in mind that guessing can have a useful function in life—there's no need to eliminate it.) Gender-related performance should be assessed with a variety of diagnostic tools.

6. Different needs and strengths can be addressed during lessons in a variety of ways:

Draw upon teaching materials which use a variety of content and learning approaches to achieve an outcome. At its simplest, this might involve placing science and mathematics in contexts which are familiar to each of the sexes. At its most complex, it would involve integrating different strategies for the same subject matter—for example, using both verbal and spatial strategies for problem solving, as mentioned above.

On the theory that boys and girls sometimes use different cognitive learning styles, it is possible to offer a choice of paper activities which may appeal to each of the sexes and to both, but which lead to the same learning goal. This might be tried in verbal-related activities, and in tasks involving spatial abilities. Related to this, provide instructions to teachers which offer alternative approaches to the same end.

Structure any separate participation of boys and girls in a more meaningful way. One possibility is to engage each sex more intensively in areas which present problems, and to do so in ways that draw upon learning styles and culturally relevant domains which are attractive or meaningful to children of that sex.
Structure activities for all which are normally learned in informal settings by only one sex. This includes such things as the development of large motor skills and the exploration of space and the environment, which are usually emphasized for boys, and nurturing activities, which are usually emphasized for girls.

7. In relation to teaching practice, it is clear from American, European, and non-western studies that teachers respond differently to boys and girls. The same teacher who insists, on a questionnaire, that boys and girls have the same cognitive abilities and behavioral potential may later be observed in the classroom responding differently to children's behavior. He or she may reward and punish performance differently, socialize the sexes into "appropriate" behavior, use gender-stereotyped teaching materials without amending them, and assign gender-stereotyped school-housekeeping tasks to children, such as cooking and sweeping to girls and building fences to boys. It would be most surprising if this were not the case. There is no reason to think that while the rest of society makes gender-based distinctions almost constantly, teachers are somehow exempted from societal patterns and behave in gender-neutral ways.

While some teachers believe that the kind of differentiation described here is justified, many teachers have no idea that they are treating the sexes in fundamentally different ways. Teacher and in-service training should incorporate more informed exposure to the debate on gender differences. In practical terms, training should also include classroom observation, filmed analysis of teaching practice and role playing to make teachers more aware of the possibility of bias.

8. Finally, we can change our picture of the student from a hypothetical boy to real boys and girls. In most educational systems, "the student" is seen as a person who has time to study because his work at home is not essential to the household; who is not physically, culturally, or spiritually endangered in the school setting; who is not expected to marry early or become pregnant; who functions in an atmosphere of respect for his intellectual abilities; who has appropriate textbooks that reflect his concerns in life; and whose parents see the relationship between education and advantages in later life. (Kane, 1995) That student is a boy. Examine the entire system—are girls central participants, or are they simply accommodated in a system designed for boys?
References


NOTES:

1. Kohlberg’s stages are:

Stage 1: preconventional: “if the self likes it, it is right”
1) Obedience and punishment: avoid breaking those rules that are punished.
2) Instrumental purpose--following rules when there is a personal interest involved; to do “right” brings benefit to oneself.

Stage 2: conventional: “if the collective group of others like it, it is right”
3) Interpersonal accord--living up to what is expected of a person; acting in accordance with one’s role that is given by respected others.
4) Social accord and system maintenance--fulfilling the duties to which a person has agreed; laws are to be upheld except in extreme cases; “right” includes making contributions to others.

Stage 3: postconventional: “objective universal principles, not feelings, determine rightness”
5) Social control, individual rights--knowledge of pluralism in societal standards; most values should be upheld in one’s own group because of social contracts but some nonrelative rights such as life and liberty must be upheld in any society.
6) Universal ethical principles--self-chosen ethical principles, such as universal principles of justice, the equality of human rights and respect for the dignity of human beings as individual persons; when laws violate these principles, one acts in accordance with one’s own judgments regarding ethics and morals. (Summarized in Snarey, 1985)

2. Whiting and Edwards looked at 134 children in six cultures (1973) and added a further 433 children from three cultures (eight communities) in 1988. The research involved detailed observation and meticulous coding of actual behavior over a period of time. Barry used cross-cultural samples for each study, ranging from 104 to 180 societies.

3. Whyte’s finding appears counterintuitive, at least to the western reader. The complexity of his research makes it impossible to summarize in a footnote. However, Whyte analyzed 93 preindustrial societies drawn from Murdock’s Standard Cross-Cultural Sample (1969) on 52 measures of status, which were drawn from a wide range of the literature. Some of these included feminine roles in the cosmos, female access to positions of authority, female participation rights, female roles in kinship and marriage, female roles in productive tasks, relations of females to property, measures of relative importance given to women, restrictions on women, female procreative roles, measures of women as dangerous, socialization of girls as against boys, and measures of male dominance.

The material for analysis was taken from the Human Relations Area files (studies made by anthropologists and other qualified observers) and scored by coders. One conclusion which Whyte reached is that most aspects of the status of women relative to men are not closely related to one another--for example, knowing that women have considerable property rights in a society is no predictor of whether they hold high positions in religion or politics, as any examination of western society would easily illustrate. (The problem for most of us, in reading such research, is that we assume that if the items of status which we emphasize in our particular society receive less emphasis in another, such societies have a lower “status of women.” They, in turn, reach the same conclusion about us.)

The strongest and most consistent pattern which Whyte found was between measures of societal complexity and status of women--women in more complex societies had less domestic authority, less independent solidarity with other women, and more unequal sexual restrictions, among others.
Whyte accepts that a cross-national study of industrial and postindustrial societies would be required to see whether these findings hold for modern nation states, but points to the fact that the existing data present little reason to conclude otherwise. A summary of the variables and scales is presented in Whyte 1978 and a fuller version in Whyte 1980.

4. Some of the activities associated with males include hunting large animals and engaging in warfare, for which superior strength and freedom from child care responsibilities have been invoked as explanations; other activities arise from the fact that men tend to monopolize newly technologized and increasingly specialized tasks. This later phenomenon is associated with a society's ability to produce a surplus, and hence to be able to support specialists—not only "technical" specialists but also social and political hierarchies which can be used to control the assignment of tasks. Women tend to remain relatively "unspecialized"—in part because their reproductive and child care responsibilities remain consistent, whatever the society's level of complexity, and partly because controlling elites are almost invariably male.

5. Aggression, like all of the characteristics discussed in this paper, can and has been defined in many ways (physical aggression, verbal aggression) and has been studied in both naturalistic and laboratory settings. Gender-based findings differ by age, setting, and the part of the "aggression curve" one is studying. At the high end, which would probably include aggression involving the commission of violent crimes, there is little question that males would qualify as "more aggressive." At the other end of the curve, representing low aggression, there is no research, and no way of knowing if there is a gender difference.
Appendix 1: Some Problems in Getting a Better Picture of Gender-Related Learning Differences

Establishing the nature of gender differences, and their causes, is not a simple matter. Some reasons include:

**Experimental limitations.** A major problem in establishing causal explanations for sex differences in behavior and cognition is that in humans, social and biological factors are *confounded*—that is, genetic males are usually treated socially as males, and genetic females are treated socially as females. This makes it difficult to separate the role of biological sex and the role of social factors.

Confounding can even lead to a misunderstanding of the extent of some biological differences. As Diagram 1 shows, certain physical differences, such as blood volume per kg of body weight, almost disappear in trained male and female athletes, while they are markedly different in untrained males and females.

In gender-related research, we cannot provide causal explanations because we cannot perform true experiments. A true experiment requires that we assign subjects randomly to treatment and control groups. But we cannot change people's sex. Therefore, all sex differences research is basically correlational in nature.” (Halpern, 1992: 30) In this “weaker” form of research, two things are shown to go together, and an argument may be presented, using additional evidence, that one causes the other.

**Lack of a sound biological foundation.** Our lack of understanding of the biological bases of human behavior is, in large part, a direct consequence of a century and a half of misuse, often deliberate, of bad “science” to justify racism, ethnic and class discrimination, and sexism on biological grounds. (See Stephen J. Gould’s *The Mismeasure of Man*, 1981, for a good account of this, and Carol Tavris’s *The Mismeasure of Woman*, 1992.) As a result, responsible scholars have been reluctant until recently to get involved in the field because of negative reaction from peers and possible misuse of results. Gould points out an additional reason for concern on the part of scholars: he argues that a correlation exists between “politically regressive” periods in history and interest in finding biological bases for human behavior. Recent publication patterns support this: Despite serious objections by some scholars and disdainful disregard by others, a book called *Brain Sex*
swept Britain, and has recently surfaced in the United States. (Moir and Jessel, 1989) Its findings include the following:

Men are
- more intelligent
- more objective
- more achievement-oriented
- more aggressive
- more assertive
- more dominant
- more single minded
- better natural leaders

Women are
- more subjective
- more passive
- more sociable
- more compliant
- more obedient
- paid less money because money interests them less
- less intelligent (this is correlated with estrogen, which may prompt a rethink on the part of women using HRT)

**Poor definition of concepts.** Another problem is that researchers have tried to relate very precise, well-defined genetic, neurological, and hormonal measurements to very large, poorly defined behavioral/aptitudinal/social syndromes, such as aggression, competitiveness, verbal ability, leadership, femininity, etc. These definitions may vary from one researcher to the next. Also, some researchers (and most of the ordinary public) assume that once a label is given to a complicated phenomenon, something which may not be a single entity at all (mathematical ability, for example), it becomes a single entity for which a measure can be devised. This number can then be used to rank people "scientifically." Many people believe that anything in numbers is scientific, and since people often confuse precision of numbers with validity, any measurement expressed in numbers seems valid, no matter how irrelevant the measure may be to the subject of interest.

**Artifacts of research and sampling.** When differences occur, it is often difficult to know what a test is measuring. Sometimes the cause may be an artifact of the research itself, or of the test. In other cases, it may be due to the sampling procedure. For example:

**Research Artifacts**

- **Artificiality of experimental situations.** Much research, in an attempt to replicate the conditions for true experiments as closely as possible, created situations with high internal validity (meaningful within the research setting) but little external validity (meaningless in real life.)

- **Looking at differences in means only.** Gender differences are often discussed in terms of differences between mean scores. Feingold (1992) argues that sex differences in central tendency and in variability must be considered together to comprehend the true differences between male and female distributions in abilities.
• **Rare use of factor analysis in gender-related research.** Factor analysis allows us to identify underlying dimensions of what may appear to be disparate phenomena. By not doing factor analysis, we may be missing broader or more accurately labeled underlying characteristics. (Halpern, 1992: 32)

• **Null hypothesis.** The null hypothesis in a piece of research states that there are no real differences between the groups we are studying—any differences found are due to random error or chance differences in the samples chosen. We cannot prove a null hypothesis; we can only disprove or reject the null hypothesis. This, in turn, allows us to accept the competing hypothesis—that there are differences. This has obvious implications for the direction which gender research takes.

• **Ignoring developmental changes.** Cognitive abilities do not remain static over a lifetime. One early classic study (Maccoby and Jacklin, 1974) studied only young children. How and to what extent do abilities change over time?

• **Date of publication.** One point to be aware of in relation to date of publication of research is that the groups being discussed may not be the same as similarly labeled groups today. For example, females in college 50 years ago are different from those of today—they were drawn from an elite group then. Another is that until recently, scholarly journals and professional meetings were less likely to publish or present findings which showed no differences between the sexes. This was almost the equivalent of having no findings. Not only did this practice affect the direction of scholarly thought, but it also has implications for “meta-analyses” being done today.

• **Meta-analyses (analysis of large numbers of studies, using comparable categories for comparisons).** These are a valuable addition to the motley literature on gender-related differences. However, because of the bias to publish only studies that have found evidence of sex differences, a researcher doing a meta-analysis may not be aware that other studies exist. They must use Dissertation Abstracts and ERIC to get at unpublished materials. However, even these (dissertations, papers at conferences) are likely to be biased toward finding differences. By including unpublished research, however, the meta-analysis may be including material of poorer quality.

### Sampling Problems

• **Sample size.** Researchers need bigger sample sizes if there is greater variability in the population. One argument is that males are more variable in respect of certain characteristics, so in some cases samples should contain more males. This almost never happens. Also, large samples virtually ensure that statistically significant differences will be found. Many studies that fail to find differences are relying on small samples.

• **Use of university students.** The vast majority of research studies on gender, intelligence, behavior, and learning styles has been carried out on Euro-American students (“cross-cultural” or “multicultural” studies are often simply studies of ethnic subgroups within Euro-American societies). In particular, university students have been the subject of study. This has a number of consequences. For example, children with learning disabilities (more frequent in boys than girls) are automatically excluded from the studies, thus altering the shapes of distributions.

• **Use of atypical populations.** This relates to the point made above. Some research looking at gender-related differences is carried out on abnormal populations (girls or boys exposed to unusual amounts of hormones, as fetuses, for example) or animal populations.
Comparisons across time periods. When looking at male and female college students 30 years ago, the females would represent a different spectrum of the female population than the males would of the male population, since there would have been a greater representation of privileged or very gifted women. In the case of advanced math classes, more females will have dropped out along the way, so that studying males and females in a math class will give a picture of an unusual group of females (say the top 10% of all girls, as opposed to the top 25% of all boys).

There are many other kinds of statistical problems and experimental interaction effects in the literature on gender and cognition. (See Halpern, 1992, for a very clear discussion of these.)

Cross-cultural issues of measurement and content. Intelligence testing has been dominated by a western perspective. Berry (1966) has suggested that "intelligence, as presently used in psychology, to be a culture-bound, ethnocentric, and excessively narrow concept." Research shows that while certain cognitive processes may be genetically based, what is considered "intelligent" behavior or "competence" is relative: it can differ from one culture to another. (Berry, 1986; Berry and Irvine, 1986; Pellegrino, 1986) Pellegrino also argues that culture plays a role in shaping implicit notions of intelligence, and these in turn affect our judgments of the intelligence of ourselves and others.

A second issue is that within a culture it is possible that conceptions of what constitutes intelligence for males and females may differ. For example, a comparative study of Japanese and American students' views of academic and everyday intelligence shows cross-cultural differences, but also found that both American and Japanese males and females rated a large vocabulary and use of good grammar, good manners, and being nicely dressed as more important in judging the everyday intelligence of a female than a male. Also, males considered artistic ability and acting like learning is easy as more important characteristics of academic intelligence, while females rated concentrating on schoolwork, having good study habits, and helping others learn as more important. (Willey and others, 1993)

In relation to content of learning materials, some classroom subjects are seen as culturally embedded (civics, religion) but others as universal in their substance and logic. Mathematics is a case in point, while science is less clear-cut. As Fox-Keller points out, "science is neither a mirror of nature, nor simply a reflection of culture. It is the name we give to a set of practices and a body of knowledge delineated by a community . . . modern science, as we know it, has arisen once and only once in cultural history . . . the knowledge practices of other cultures do not conform to what we call science. This creates another difficulty in relation to cross-cultural testing. Even if a valid measure is created, is it measuring something which is meaningful to the culture and the student?" (Fox-Keller, 1992)

However, note the "even if" in the last sentence. Most standardized measures are culturally biased in content, format, mode of delivery, and underlying philosophy about the way the mind works and what motivates people. When measures and tests are successfully adapted to a particular cultural context, they can no longer be used for cross-cultural comparisons, since one is not using the same test everywhere.

The contribution of anthropology. A contribution which anthropology can make to this debate is to expand the "laboratory" by looking for cultural universals—practices or behaviors which occur in all known societies. For example, if a gender-related characteristic which is thought of as being biologically based is not found to be associated with that sex in a particular society, it cannot be biologically based, since all people everywhere belong to the same species. Therefore,
it's useful for anthropologists to look at characteristics which are thought to arise from biology. On the other hand, a characteristic may be found in every known society and still not be biologically based: it is possible that the characteristic is necessary for societal survival, and societies which have not practiced it have paid the penalty by becoming extinct. Thus it is possible to say that a characteristic is definitely not biologically based, but it is not possible, using anthropological evidence, to say that a characteristic is biologically based.

Appendix 2: Are Gender Differences Declining?

Maccoby and Jacklin's findings have been criticized by various other researchers (see, for example, Block, 1976; Hyde, 1981, Hyde and Linn, 1988). In fact, Hyde found similar differences, but simply concluded, on much the same evidence, that the effect of gender is not large. On a practical note, Ben-Shakhar and Sinai (1991) point out that mean differences of the sort identified by Hyde have practical significance—a difference of .5 SD (the sort of difference found by Hyde for some abilities) used in a test for personnel selection can, under certain conditions, result in a ratio of 2 to 1 between males and females.

Also, some authors (Hyde and Linn, 1988), for example, on the basis of a meta-analysis, argue that gender differences in verbal abilities have declined over the years and no longer exist. Halpern (1992: 85) has challenged this on the grounds Hyde and Linn averaged out the various components of verbal ability, "canceling out," so to speak, the differences. Halpern also points out that males tend to fall at the low end of the spectrum in verbal ability, and such males are missing from most studies of older students, since they have left school. Various researchers have also argued that while the male advantage in mathematics has remained constant, females are losing the advantage in verbal ability. A study by Feingold (1988), for example, shows that gender differences tend to decline over the years surveyed (from 1947 to 1983). On the PSAT, female advantage on verbal component declined from .12 SD in 1960 to .02 in 1983. The male advantage in mathematics declined from .34 SD to 12 SD. Others have also found this. For example, Randhawa (1991) studied a sample of grade levels 4, 7, 10 in Canadian schools, taking 10% of classes in each grade level in Saskatchewan in 1978 and 1985. A second sample consisted of Grade 10 students in a high school over the period 1987-89. The conclusions were that the gap between the achievement of males and females in language and mathematics has not narrowed between 1978, 1985 and 1987-89 for grade 10. The gender differences in mathematics were consistent, with males higher. No differences were found in reading.

However, despite evidence from SAT scores, etc., there are good reasons to think that reported differences are artifacts of research, such as sampling problems, publication policies, etc.

Specifically, some of the reasons for concluding this are:
Samples have changed. There is a greater percentage of females than males now in college. The reverse was true in the past, so early studies looked at a more select group of females.
Testing has changed. The Educational Testing Service, which produces SATs, have removed every question which they think contains sex bias. Also, other tests have been introduced (paper and pencil mental rotation tests, for example, which were not in the tests before). Hyde and Linn are particularly faulted for this by Halpern (1992: 91). The American Association of University Women (1988) found that of 24 reading comprehension passages in the SAT, there were 34 references to famous men, and only one to a woman, Margaret Mead, whose work was criticized. The SAT-V is heavily weighted with analogies, giving undue weight to the one verbal ability area in which males outscore females.
Publication of nonsignificant findings. This would cause effect sizes to decrease as a function of publication date. More journals now report nonsignificant results, in response to complaints from researchers, who felt this failure biased the results of findings—for example, the results of meta-analyses.