

Men Are From The Server Side, Women Are From The Client Side

A Biblical Perspective On Men, Women and Computer Science

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Abstract

The percentage of women in computer science is small and has decreased over the last twenty years. Why is this the case, when computer science is a wonderful and growing field with many opportunities? I believe that the situation has its roots in the basic differences between men and women, differences that were present from the beginning of creation and are part of the way that God made male and female uniquely. In order to ensure that both talented men and women are attracted to computer science, we need to understand the differences between men and women, and how those differences affect the way we approach computer science.

1 Introduction

The percentage of women in computer science is small and has decreased over the last twenty years. Why is this the case, when computer science is a wonderful and growing field with many opportunities? Much has been written regarding “the shrinking pipeline” of women in computing [4, 5, 13, 15]. While there has been much speculation regarding discrimination and societal and cultural causes, there has been little work that explores basic male/female differences.

I believe that the shortage of women in computer science has its roots in the basic differences between men and women, differences that were present from the beginning of creation and are part of the way that God made male and female uniquely. These differences can be found in scripture and have also been documented in secular literature. Men and women approach computer science differently, and for different reasons, because of their inherent differences. The approach that a woman takes to computer science is neither better nor worse than the approach that a man brings; the field needs both approaches to be complete and relevant for current challenges and growth. However, because the field is currently dominated by males, it is currently more oriented toward the male approach. This has the effect that it is less attractive to women, creating a vicious cycle.

In order to ensure that both talented men and women are attracted to computer science, we need to understand the differences between men and women, and how those differences affect the way we approach computer science. We need to bring out and highlight those factors that attract women if we are to bring balance and completeness to the field of computer science.

2 Biblical Perspectives on Men and Women

To examine biblical perspectives on the differences between male and female, we first look to the narrative of the creation of Adam and Eve. In Genesis 1 we find a general account of the six days of creation. It is in the sixth day that man and woman are created. "So God created man in his own image, in the image of God he created him, male and female he created them" (Genesis 1:27)¹. Here we see that men and women are each created in the image of God. In his commentary on Genesis [17], John Walton explains that in the ancient world, an image was believed to carry the essence of that which it represented. Being made in the image of God means that men and women carry, reflect, and mirror the attributes of God.

We go on to read of the blessing that God bestowed upon the man and the woman. "God blessed them and said to them, 'Be fruitful and multiply; fill the earth and subdue it ... I give you every seed-bearing plant on the face of the whole earth and every tree that has fruit with seed in it. They will be yours for food'" (Genesis 1:28-29). Walton [17] notes that there are two parts of the blessing: reproduction and food, or human fertility and land fertility. The blessing involves the privilege of filling the earth and subduing it, and of being nourished by the food on it, all with the ultimate purpose of serving God.

How man and woman were each uniquely created, and for what purpose each was created, is explained later in Genesis 2, when the sixth day of creation is described in more detail. "And no shrub of the field had yet appeared on the earth, and no plant of the field had yet sprung up, for the Lord God had not sent rain upon the earth, and there was no man to work the ground" (Genesis 2:5). "The Lord God formed the man from the dust of the ground, and breathed into his nostrils the breath of life, and man became a living being" (Genesis 2:7). "The Lord God took the man and put him in the garden of Eden to work it and take care of it" (Genesis 2:15).

Here we learn some specifics regarding the creation of man. First, it is noted that there are two reasons why there are no shrubs or plants: there is no rain, and there is no man to work the ground. This sets up the next event, where we see that God creates the man and puts him in the garden to work it and take care of it. Thus, the task for which man was created was to work the soil and to tend the garden. We also see the material out of which man was created: dust of the ground, or inorganic material. Walton refers to the dust as "created stuff" and describes it as that to which people return when they die.

We then come to the first time that God says something about his creation is "not good." "The Lord God said, 'It is not good for the man to be alone; I will make him a helper suitable for him'" (Genesis 2:18). Having solved the dilemma that there is no man to work the ground, God now describes the next dilemma.

What is the significance of God saying that it is not good for the man to be alone? "When something was 'good' it was functioning as God intended it to function. Thus the statement that 'it is not good for the man to be alone' is one of nonfunctionality. Just as 2:5-6 indicated the nonfunctionality of the food aspect of the blessing, verse 18 indicates the nonfunctionality of the reproduction aspect of the blessing" [17].

As we read further, we see the way in which God remedies this situation of non-functionality. "So the man gave names to all the livestock, the birds of the air, and all the beasts of the field. But for Adam no suitable helper was found. So the Lord God caused the man to fall into a deep sleep; and while he was sleeping, he took one of the man's ribs and closed up the place with flesh. Then the Lord God made a woman from the rib he had taken out of the man, and he brought her to the man. The man said,

¹All Scripture quotations are from the Holy Bible, New International Version [1].

‘This is now bone of my bones,
and flesh of my flesh;
she shall be called ‘woman,’
for she was taken out of man.’ ” (Genesis 2:20-23)

The resolution to the dilemma that it is not good for man to be alone is the creation of woman. The purpose for which woman was created was to be a helper, or a companion, to man. Walton uses the terms “partner” and “counterpart” as conveying the sense of the word “helper” [17].

We also observe that the material out of which woman was created is the rib of man, and thus is organic material. Walton says that the word “rib” conveys the idea of “by his side,” and that it refers to the general area of ribs, including flesh and muscle as well as bone. Adam implies this when he refers to Eve as “bone of my bone and flesh of my flesh” [17].

As noted by Steve and Erica Lawry [11], the purpose for which man was created is one of function: cultivating the garden. The purpose for which woman was created is one of relationship: being a companion to man. It is important to note that these differences occurred *before* the fall. I believe that, on the whole, men are more *functional*, and women are more *relational*. Even the very material of which they were made, inorganic material versus organic material, suggests function versus relation.

This is not to say that men are not relational, or that women are not functional. However, I believe their primary orientation, the way they find their primary fulfillment, is related to the original purpose for which they were created. This is not to say that you cannot have a particular man who is more relational than a particular woman. But, on the whole, we can generalize men as more functional and women as more relational. In their book *Intimate Allies*, Allender and Longman say that men and women each reflect more of a specific part of God’s nature. Men and women both mirror the attributes of God, but each has specific attributes that are more visible. “Adam is called to engage the chaos in the world more directly than Eve is ... Adam was created with the physical and internal makeup to enter, create, and shape form out of chaos.” “Eve was created with the physical and internal makeup to receive, gestate, and shape relationships out of the beauty of form.” “A man is to plant his stamp on ideas, objects, and institutions ... A woman is to incubate relationship. She is to make connections” [3].

As we read in Genesis 3, even the results of the fall are expressed in terms of the man’s and the woman’s primary makeup. “To the woman he said,

‘I will greatly increase your pains in childbearing;
with pain you will give birth to children.
Your desire will be for your husband,
and he will rule over you.’ ” (Genesis 3:16)

The results of the fall described to Eve are that she will find pain in relationships. First, childbearing will be painful to her. The very process of bringing another life into the world will be difficult. I would even generalize this to include child rearing. Walton says that the word “pain” here does not typically refer to physical pain, but to mental or psychological anguish [17]. Second, there will be difficulty in her relationship with her husband. The word translated as “desire” is used again with regard to Cain and his struggle with sin. “Sin is crouching at your door; it desires to have you, but you must master it” (Genesis 4:7b). I believe that the similar usage in the passage referring to Eve indicates struggle in the relationship between Adam and Eve.

The results of the fall that are described to Adam involve his function with regard to tasks. “To Adam he said ...

'Cursed is the ground because of you;
through painful toil you will eat of it
all the days of your life.
It will produce thorns and thistles for you,
and you will eat the plants of the field.' " (Genesis 3:17-18)

The word translated here as "painful" toil has the same root as the word translated as "pains" in childbearing. The curse on the ground refers to its removal from God's favor, protection, and presence [17].

Thus, the results of the fall communicated to the woman are that she will be frustrated and find pain in her relationships. The results of the fall delineated to the man are that he will find frustration and pain in his work, in his task of tending the garden.

Besides function and relation, there are other differences between men and women that can be identified in scripture. Allender and Longman refer to "the splendor of maleness and the beauty of femaleness." In the wedding song that is Psalm 45, the groom is described in terms of exercising power; of the splendor of his worth as a king and warrior. The husband is to protect his wife and his kingdom.

Gird your sword upon your side, O mighty one;
clothe yourself with splendor and majesty.
In your majesty ride forth victoriously
in behalf of truth, humility and righteousness;
let your right hand display awesome deeds.
Let your sharp arrows pierce the hearts of the king's enemies;
let the nations fall beneath your feet. (Psalm 45:3-5)

In contrast, the bride is described in terms of beauty. The wife is to draw forth delight and increase the husband's desire to praise the glory of God [3]. She is to create beauty in herself and in her surroundings.

The king is enthralled by your beauty;
honor him, for he is your lord.
All glorious is the princess within her chamber;
her gown is interwoven with gold.
In embroidered garments she is led to the king; (Psalm 45:11,13-14a)

I believe that women have more appreciation for *creating beauty*, while men have more appreciation for *exercising power*. "A man courageously creates, and a woman creatively shapes his creation into a lovely, relationally enhancing beauty" [3].

3 Secular Perspectives on Men and Women

In addition to the scriptural perspectives on men and women that we have examined, we can find similar ideas expressed in secular literature. In her book "In a Different Voice," Carol Gilligan makes the argument that women see a world comprised of relationships, and that female identity is centered in relationships. "Thus in all of the women's descriptions, identity is defined in a context of relationship" [7]. In a situation in which a boy and a girl are asked to resolve a moral dilemma, they approach it in different ways, "he impersonally through systems of logic and law, she personally

through communication in relationship." The girl sees "a world comprised of relationships rather than of people standing alone, a world that coheres through human connection rather than through systems of rules" [7].

Gilligan speaks of a woman as having an "ethic of care" as opposed to a man who uses a "logic of justice" [7]. This is similar to Allender and Longman's statement that "a man slightly more reflects God's character of order, law, and justice; and a woman slightly more reflects God's character of mystery, grace, and mercy" [3].

Even in popular literature, in his book "Men are from Mars, Women are from Venus" [8], John Gray also refers to the functional or relational orientation of men and women. "A man's sense of self is defined through his ability to achieve results ... A woman's sense of self is defined through her feelings and the quality of her relationships" [8].

Gray refers to differences in the way men and women approach problems. "Just as a man is fulfilled through working out the intricate details of solving a problem, a woman is fulfilled through talking about the details of her problems" [8]. Thus, men focus on the small details of the problem itself, while women focus on communication with others to solve problems.

Gilligan also makes some observations with regard to women's concerns about competition and the emotional cost at which success that is achieved through competition is gained. Women tend to fear the social rejection that may occur as a result of competitive achievement [7]. "Men and women may perceive danger in different social situations and construe danger in different ways - men seeing danger more often in close personal affiliation than in achievement and construing danger to arise from intimacy, women perceiving danger in impersonal achievement situations and construing danger to result from competitive success" [7]. Thus, women tend to prefer *cooperation* while men are more comfortable with *competition*.

4 How Men and Women Approach Computer Science

Having looked at some male female differences, we now examine the ways in which those differences affect how men and women approach computer science. "Given the evidence of different perspectives in the representation of adulthood by women and men, there is a need for research that elucidates the effects of these differences in marriage, family, and work relationships" [7].

Although I will be drawing many generalizations, I want to reiterate that the gender differences I have described are general trends and do not apply equally to every male and female. I like to visualize the differences as two overlapping standard distribution ("bell") curves; the mean values are different for each group as a whole, but there is considerable overlap of individuals within the groups.

4.1 People or Machines

We have made the argument that men are functional, women are relational. How does this impact the approach that each brings to computer science?

Men come to computer science through the machine itself, as something to be played and tinkered with, and that is worth pursuing for itself. This makes sense given their functional nature. In their book "Inside the Clubhouse," Margolis and Fisher state "many more boys than girls get inside the machine and become tinkerers. They learn it inside and out, whereas more girls stay on the outside and limit their involvement" [13].

Women, on the other hand, come to computing from many directions. Some of the key interests for women are those of helping people and social concerns. This follows from their relational

nature. "Women students' descriptions of why they are majoring in computer science are a 'counternarrative' to the stereotype of computer scientists who are narrowly focused on their machines and are hacking for hacking's sake. Instead, these women tell us about their multiple interests and their desire to link computer science to social concerns and caring for people" [13].

Women have a strong need to be needed and wanted, and to make a difference in the lives of others. They want to help and nurture people and to work together with others. These needs and desires arise from their fundamental relational orientation. In general, women don't want to sit alone in front of a computer all day; they want to be with people. They also need to make connections with other fields, and have a desire to relate what they are learning to their personal experiences. Problem solving plays an important role in all of these areas. Women enjoy helping people solve problems and working in groups to solve problems.

When I was a summer intern trying to figure out a future career path in technology, my mentor (an engineer) showed me a circle on which the words "people," "ideas," and "things" were positioned evenly around the perimeter. He asked me to place myself anywhere in the circle in terms of my interests. I chose a location on the perimeter, equally between "people" and "ideas," and as far from "things" as possible. It is my belief that many women would position themselves similarly, while many men would choose a location much closer to "things" and further from "people."

Many women prefer cooperation to competition. As we noted in Section 3, many women fear the emotional and social costs that can come with competitive success. Women also tend to be more highly developed in language and expression than their male counterparts. This is reflected in their enjoyment of the computer as a tool for communication and expressing ideas. "As early as kindergarten, girls use the computer eagerly and skillfully for writing their stories, but boys race to the computers for free time and play" [13]. These differences all stem from the fundamental relational orientation of women.

4.2 Mastery or Conceptual

We made the argument in Section 2 that women desire to create beauty while men appreciate exercising power. This generalism reflects differences of which we are all aware. For example, most women care more about creating beauty in their surroundings than do most men. If there is any doubt about the truth of this observation, just compare the dorm rooms of male and female students. Female students are much more likely to decorate, color coordinate, and generally beautify their rooms. On the other hand, the enjoyment that most males find in playing with a piece of equipment and exercising its power can be readily observed by handing a man a television remote control.

What does this mean in terms of responses and attractions to computer science? One day, I asked my all-male advanced data structures and algorithms class how they became interested in computer science. Every one of them said, "through playing computer games." Most of the female computer science students to whom I have posed the same question reply, "because I like math." My sample sizes are admittedly small, but I do believe there is a general trend. Women are attracted more to the mathematics, logic, linguistic foundations, and beauty in computer science. Men are attracted more to the computer as something that can be played with, tested, experimented with, and pushed to its limits [9]. They approach the computer as something to be mastered. "Discovering and exploring the computer are truly epiphanies for many of these male students. They start programming early. They develop a sense of familiarity; they tinker on the outside and on the inside, and they develop a sense of mastery over the machine" [13].

My male students often want to start up a recursive algorithm using enormous parameters and see how long it takes for the computer to either solve it or overflow the stack (i.e., run out of

memory). The first thing they want to do with a new algorithm or program is to "try it out." When they get a new computer, they want to tinker and play with it. These are responses that I seldom see my female students exhibit.

In contrast, my female students more often want to talk about a solution. They want to understand it by discussing it. If there is a visual means of representing an algorithm, they are very interested in what it looks like. Where the men might ask "how long does it take?" the women might say "what does it look like?"

When students are asked what they like about programming, "Women are more likely than men to cite the satisfaction of getting their program to work, the problem-solving aspects of programming, and the challenge ... many also report their enjoyment of programming involves its mathematical aspects" [13].

I got into electrical engineering and then computer science exactly because I love math. As a high school senior, I planned to major in mathematics. Then, the summer between high school and college I worked as an intern for an electrical engineer at a high tech firm. He told me that electrical engineering was a way to use my math to solve interesting problems. I loved what I did that summer, so I decided to major in electrical engineering. However, the curriculum was difficult. I especially felt at a disadvantage in laboratories. I didn't grow up playing with equipment and building radios like my male counterparts. I was afraid of the equipment. Sometimes I felt like I didn't belong. But, the time that I really knew I wanted to continue in electrical engineering was the day that, in my introduction to circuits class, we wrote and solved a differential equation to describe an RC circuit [9].

The appreciation that women have for creating beauty is expressed in finding a love for the mathematics, beauty, and elegance of computer science. The appreciation that men have for exercising power is expressed in their desire to exercise mastery over a computer and to push it to its limits.

4.3 Confidence Level

Women seek affirmation through relationships, while men seek affirmation through task. When they are insecure, women turn to relationships, while men seek to control the world around them.

One of the biggest hindrances to women in computer science is lack of self-confidence in their abilities. This confidence gap for women can be seen in many academic areas. Long ago, I read about a study in which men and women were given a general intelligence test and then were asked how they thought they had done on it. While the men and women did equally well on the test, the women all thought they had done worse than they actually did, while the men all thought they had done better than their actual performance indicated.

The confidence gap is even more pronounced in computing. Many boys know from early age that they want to do computer science, while women come in more through an interest in math and through random events. As a result, the men are more likely to be comfortable with the computing culture. Using the computers themselves can also be intimidating to women who didn't grow up playing with computers the way men do. "Interest in theoretical Computer Science, programming, and design, is not necessarily the same as interest in computers themselves, as gadgets. Most of the men we spoke with who were interested in CS became interested early on because they were fascinated by the computers themselves. They tended to have more experience working with computers before coming to college, and at home in a 'hacker' culture. Women, in contrast, often accidentally discovered an interest in Computer Science later in their academic careers than their male counterparts. On the one hand it could be potentially alienating to enter a field in which many people, most of them men, have much more experience than yourself" [2].

As a result, the men often feel more comfortable in the computing culture. In classes, because more male students have "grown up with" computers, they tend to know a lot of "computerese," as jargon and acronyms related to computers is sometimes called. In class, when the male students speak "computerese," it can be very intimidating to the female students (and even female professors!) that are not as immersed in the computing culture.

Women have a high need for support and encouragement, particularly when they are in a technical field. One thing that helped me as an undergraduate in electrical engineering was doing summer internships at a high tech firm. After a long school year of feeling discomfort in labs and questioning my abilities, receiving mentoring and encouragement from the engineers I worked with during the summer helped me to keep going. "According to one professor, industry can seem much more overtly eager to hire women than academia, and more willing to support them once they're there: 'industry is a very attractive proposition. Women who go off to summer internships discover that companies are desperate to have them and will constantly reassure them, which won't happen in academia where it will be challenging and frustrating'" [2].

Another thing that helped me during my master's degree year was a women's Bible study, prayer, and support group. Although the other women involved were not from technical fields, they were very helpful in listening to, praying for, and encouraging me. An aspect that was particularly important to me was that of gaining insight from other mothers who were balancing academic lives with family responsibilities.

After graduation I worked as an engineer at the company at which I had done summer internships. I suffered from acute insecurity about my work. After a while, we few female engineers started getting together for support, and we came to the discovery that all of us were experiencing the same anxieties. One thing that we realized is that, if not told, men assume they are doing well. Women, on the other hand, assume they are *not* doing well unless they are told otherwise. Because all of the engineering managers were male, they were operating under the male assumptions of not saying anything to their engineers if they were doing a good job. This was just fine for the male engineers, but not for the females.

4.4 Social and Cultural Concerns

There are a number of social and cultural factors that affect women's willingness to pursue computer science. Among female undergraduates, there is a strong desire to get married; this has roots in the relational nature of females as well as in societal and cultural expectations. Pursuing a technical field can be seen as narrowing options for marriage and family. Laura Montgomery [14] describes the phenomena of the "mythical man" that a young woman may feel she must plan her life around (regardless of whether or not she is currently involved in a relationship).

The desire for family and a balanced life can also be seen in conflict with a demanding career in technology. Such a career requires a heavy investment in education and in the job itself. This is viewed by many women as not being compatible with family considerations. Further, high tech jobs may be seen as less likely to provide child care as well as career paths and options that lend themselves to family considerations.

In Luke 2:52 we read, "And Jesus grew in wisdom and stature, and in favor with God and men." This verse illustrates the ideal of growth and strength in all areas: intellectual, physical, spiritual, and social. However, many women view the culture of technology as one in which the participants are narrowly focused "geeks" who have no interests other than their computers. Many female students do not identify with the "geek" image, and are in fact alienated by it.

5 Response

How are we to respond to the fact that so few women are entering the field of computer science? Should we be concerned, or should we accept it as a reasonable result of the differences between men and women? I believe that it is extremely important to encourage more women to pursue computer science. First of all, the field itself will be made more complete, just as the creation was made more complete, by the presence and perspectives of both men and women. "It is not good for the man to be alone" (Genesis 2:18a). Ed Lazowska [12] says that "the quality of the solutions we achieve is enhanced by the diversity of the individuals contributing to these solutions." Johnson and Miller [10] state that it is a moral issue to make computer science more diverse.

In addition to the field being made more complete, it is important for talented women to have the opportunity to participate in the growing field of computer science. There are many ways in which women can find enjoyment, job satisfaction, and opportunities for service in the field.

As we make the field more attractive to women, there are males who will benefit as well. As I have said, the gender differences that I describe are generalities and do not apply to every woman and man. Those men who are more relational, and who appreciate the beauty of computer science, can be drawn into the field as well.

Given the differences in the way that men and women approach and view computer science, how can we make the field more attractive to women? First of all, it is important to recognize the different perspectives that men and women bring. We must talk about the differences and similarities in orientation. Men and women must be taught to value and respect the approach and perspective that the opposite sex brings to the field of computer science, rather than judging and disapproving.

Different approaches to computer science are important and complementary. However, considering the underrepresentation of women in computer science, it is worth examining our pedagogical methods to see if we can place more emphasis on the aspects of computer science that appeal more to women. A number of people [13, 5, 9] have given suggestions for this. These suggestions include redesigning the introductory courses to provide a broader view of the field of computer science (as opposed to focusing only on programming); providing support, encouragement, and mentoring opportunities; providing female role models; engaging students in undergraduate research; emphasizing the connections between computer science and other fields; and making use of cooperative learning and group projects.

In our institution, we have tried to direct the focus of the introductory computer science courses more toward concepts, mathematics, and problem solving, and less toward programming. We have developed a three semester introductory series that begins with a one-semester general introduction to computer science, which includes history and an overview of topics within computer science, ethical issues, a general study of algorithms, the use of pseudocode to represent algorithm, and some applications including web development. This course uses a CS 0 textbook [6] and includes some fun demonstrations and hands-on activities.

The second course, which can be taken either concurrently with or in the semester following the CS 0 course, is a more traditional CS 1 course emphasizing programming and problem solving and introducing C++. Even in this course, during class time I try to emphasize group problem solving, algorithm development, discussion, and writing code together in class. To cover syntax, I use a course management system (WebCT) to deliver online materials and quizzes that students access outside of class time. This strategy frees up more time in class for group problem solving and discussion. Lego robots are introduced for early programming assignments in this course, and the final programming project involves the creation of a graphical application using the CMU graphics library [16].

In the third course, which is a CS 2 data structures course, I switch to the Java language and assign regular group projects that include the design of a graphical user interface. The group projects have been very successful in terms of fostering a sense of community among the students. I assign the students who will work together, which changes for each new project. Again, I try to emphasize group problem solving, algorithm development, discussion, and writing code together in class.

In addition to curricular changes, we have been proactive in building a sense of community in our program. We have instituted weekly dinners in a reservable room of our student dining hall that both faculty and students attend. Sometimes there is a brief program planned, such as a personal testimony or report from a conference, but other times are left for free discussion. I usually bake cookies, which encourages student attendance. We also hold regular dinners and barbecues at faculty homes, which often include games such as ping pong or time in the hot tub. Faculty members are quite regular in attending campus events such as student recitals, plays, sporting events, and dances. We are active in mentoring students and in identifying and encouraging student leaders. We also have a weekly time in which the departmental faculty members meet to pray for our students.

We also recognize the importance of conference attendance, and I was able (with the help of a scholarship) to bring two female students with me to the Grace Hopper Celebration in 2002. I also brought a group of students, including a female, with me to the SIGCSE conference in 2003. These were pivotal events for all of the students involved; several students indicated that the conference attendance motivated them to attend graduate school in computer science, and traveling together as a group also served as a key time of community building.

We also have organized a support group for female students in computer science and mathematics, which is led by a female mathematics faculty member and myself. We meet two or three times a semester for social interaction, encouragement, discussion, and fun.

We are fortunate to have female faculty role models in our department. Additionally, we have the example of an alternative solution to combining career and family in that our department includes a husband/wife team who share a tenure-track faculty position in mathematics along with responsibility for two small children.

We have begun actively recruiting students, believing that many female students do not consider computer science because they do not know about the field. For the past two years, each of our incoming students, as well as our undeclared sophomores, has received a brochure. The front of it begins "Do you like to help people solve problems? Do you like to organize things? Do you want lots of options for a career after college? Then, you should consider a major in computer science!" The brochure goes on to try to dispel some common misconceptions regarding computer science by saying, "A career in computer science doesn't have to mean sitting in front of a computer all day ... You don't need prior computer experience to do well in computer science ... Computer scientists are not all nerds." Inside, we profile two current computer science majors (a female and a male) who have a wide variety of interests and are campus leaders.

Although we have instituted these efforts to attract and retain female computer science students, our female computer science majors still make up less than 15% of our total number of majors. Goals that we have yet to achieve are to involve female students in undergraduate research and to institute community service projects. We believe that attaining a critical mass of female students is one key to success in recruiting and retaining women.

As faculty members, it is important to articulate our sense of calling, and to view our teaching as an act of worship. As we use our spiritual gifts to minister to students, as we are transparent in living our lives before them, and as we are active in nurturing and caring for our students, I believe that all students, and especially females, will derive tremendous benefit.

6 Conclusion

We have examined the biblical account of the creation of man and woman and have drawn some conclusions regarding gender differences. Men were created for function, while women were created for relation. Men enjoy exercising power, and women desire to create beauty.

We have seen how these fundamental orientations affect the way in which men and women are attracted to and approach computer science. Women bring a focus on using computers to help people, and are attracted to the beauty and elegance of computer science. Men are attracted to the computer itself as a machine to be tinkered with and mastered.

Finally, we have examined the ways in which we can respond to the different male and female approaches to computer science. We advocate curricular changes that place the emphasis less on programming and more on the mathematical foundations, the beauty and elegance, and the broad range of topics within computer science. We also encourage group work and collaborative assignments. We believe building a sense of community in computer science programs is a key to success in recruiting and retaining women. We affirm student support groups, social activities, mentoring, and active recruiting of women to computer science.

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