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Ways of Knowing Computer Science

Computer science is a broad field which directly encompasses numerous professions and can be applied to numerous others. Everything from the programming of traffic control lights, to the space program and artificial intelligence have a strong connection with the computer science field. From the age of nine I have been drawn to this field, its diversity of applications, and its ability to aid both specialized professionals in their work, and everyday people carrying on in their everyday lives. As the applications for computer science grow in number, as does the need to obtain information, both on the current technological abilities of the discipline, as well as the future roles which the discipline might play upon.

Two of computer science's driving questions are as follows: How might computers be better used to benefit society? What are computers capable of, and what are their limitations? One of the most exciting respects concerning computer science is that although these questions typically remain the same, their answers are in a constant state of flux, and each question has separate considerations which must be taken into account. For example, before we are able to understand how computers might be best used to benefit society, we must first know what is best for society. Before we are able to know what computers are capable of, we must first employ our imagination and discover our technological desires before anticipating a computer's ability to handle these new potentials.

As such questions are being considered, more information is obtained which will allow the field to further advance. As research and experiments are conducted, more questions arise and more facts are obtained. Generally speaking, facts are items which the majority of members

in the field agree upon. Such facts might include that computers generally run on electricity, that they may be used for good or evil, or that they are progressively getting smaller.

Many of the questions concerning computer science have only subjective answers, while others lean towards objective results. Questions concerning how computer science may best benefit society are often subjective in nature because the question itself relies on such philosophic issues as, what is best for society? There is much subjective data which lends itself to answer this question, however there seems to be little data which is definitive and can be proven true. On the other hand, there is also much objective data in computer science when one considers the numerical test results of a specific experiment, circuit diagrams, or the specifications listing of what is inside a specific computer.

Both of these types of data, subjective and objective, are gathered in numerous fashions, including consulting with experts in the field, and conducting new and groundbreaking experiments. Experts, both within and outside of the computer science field, often prove their usefulness. Those looking for solutions to subjective questions may turn to experts in the fields of philosophy and sociology while researching how computers may best aid society. While those researching computer software performance may lend themselves to closely related technological fields, such as computer engineering, as the most efficient software will utilize and not overstep a computer's hardware capabilities.

Even the best experts, however, are not omniscient, and there is much information left to be obtained in the computer science discipline. For these new questions and areas of study, there are two main fundamental methods of inquiry: physically carrying out experiments, and solving problems using theories and mathematical formulae. Direct observation and physical experimentation is often used when considering problems such as how computers affect people.

Questions such as, “what software layouts are most easily utilized by people in the workplace?” and “what Web page colors cause the least eye strain?” are most easily tested by conducting experiments and observing their outcomes (although experts in fields such as sociology and optometry may also provide relevant insights). Other questions, however, such as whether a specific software program will function as planned, or whether a specific computer is powerful enough to run a certain type of software, are often solved mathematically, as formulae are more efficiently and thoroughly manipulated than actual hardware and software.

Those students who are interested in the computer science major have numerous career opportunities in numerous disciplines. They may work for the state in designing software which controls traffic lights; they may work for NASA by writing artificial intelligence programs which may be used in future exploration missions; or they may even work on super computers and encryption. If they decide that they do not desire to be professional programmers, then they may work at an institute such as the Patent Office, or at a university and continue their research in quickly developing technological fields. They may decide to go on to be Web designers, or managers of a software company. They may become involved in such fields as computer animation, artificial vision, or satellite mapping. They might even go on to get a law degree and work with the upcoming ethical and legal issues concerning computers, copyrighted materials, unsolicited e-mail, electronic privacy, and the like.

Depending upon their career of interest, graduated students may do many types of writing and research. If they go into the computer software design field, then they will spend much of their time coding new software and making changes to existing software. Almost all areas of expertise will require them to turn in résumés, write reports concerning their work, learn new jargon, and describe the research which they have conducted in their field. Research may consist

of studying the written reports of others, going to conferences, and conversing with one's peers. Numerous articles related to the computer science discipline may be found through organizations such as the Association for Computer Machinery (ACM) and the Institute of Electrical and Electronics Engineering, Inc. (IEEE). Television programs such as those found on *TechTV* often give useful insights into computer related topics, and magazines such as *eWeek*, *PCWorld*, *Communications of the ACM*, *InfoWorld*, and *Computer Graphics World* often contain news of interest. Professionals in the field may choose to write books on their findings, textbooks for students, memos to colleagues, or articles for organizations such as the ACM and IEEE. Many of these writings are then peer reviewed before going on to publication.

Although computer science is a relatively new field when compared to such things as philosophy and mathematics, professionals in this field have many options. Options for careers range from traffic light programmers to NASA scientists, yet each career has a common tie to the computer science field. Although the particulars vary from field to field, each occupation requires its participants to engage in research, writing, and communication, be it in the form of programming code, or written and peer reviewed articles for national journals.