Computers and Major Ethical Problems in Our Society

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Overview

This paper suggests that the computer, as a highly interactive learning device, might be able to contribute to the solution of some of the major ethical problems of our society. The problem of violence receives particular attention. The fundamental idea is highly interactive learning delivered to everyone through computers, beginning in early childhood and using voice input and voice output primarily for communication.

Introduction

Much discussion about ethics and computers is concerned with new ethical problems associated with computers, such as those generated by the Internet. These include old ethical problems showing themselves in a new medium, the computer. Privacy issues are one set of such problems. These topics are important to future uses of computers, but they do not exhaust the topic of computers and ethics.

Our intent in this paper is different; we ask how interactive technology can be used to solve or reduce major ethical problems of our world. Our discussion is incomplete, and needs much further attention.

We consider in this paper only one problem, violence, as an example. Other possibilities will, we hope, come up in the discussion, and in future work in this direction.

Our society has major problems, some ethical in nature. Solving these problems is critical to improving the quality of life on earth and even to human survival. We also have a powerful new technology, changing society, the computer, that could help, we will argue, with these problems. This important experiment should be tried.

There are many reasons for violence in the world. One is the lack of a medium for people of all ages to air their frustrations. Another is the perceived lack of choices as alternatives to violent behavior. Very early childhood training, helping children to discover alternatives to violent behavior, may help to prevent future use of violence.

Computers have been used very little in the way we are suggesting. More practical experimental evidence is needed. We think the prospects are good.

Learning

Learning plays an important role in dealing with ethical problems. The approach to violence recommended is based on learning. We do not view learning as transfer of knowledge, the view of many schools and universities. We want each student, individually, to work as an explorer, a discoverer, a constructor of knowledge and ethics, so the modules proposed will not tell students how to behave, but will encourage children to create their own patterns and find solutions to their problems.

It is critical to note that learning is a far more difficult process than transmitting information. It involves major learner activity. The learning we want can be described as highly interactive. We also insist that every student succeed, perhaps with gentle guidance from the program. Family background, gender, learning styles, should not matter in excellent highly interactive learning materials. We want an environment in which everyone learns.

Violence

A major ethical problem in our society is the prevalence of violence. Throughout history, humans have been a violent species. This is seen both in everyday life, and in the wars that plague our society. Current attempts to control violence have been almost entirely unsuccessful. Humans seem to be among the cruelest of all species.

Violence goes back for most people to early childhood, before the days of school. We already find many such children who are establishing violent patterns, so we need to start with very young children if we are to reduce violence in our society. Efforts of parents

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and religions have not helped; indeed, many of these are themselves violent. If young children experience violence in their homes, they may continue this pattern later in their lives.

New technologies such as film, television, and computer games have complicated the situation, with their widespread use of violence. Many developers in these media seem to believe that one way to maintain interest in film and television is through violent situations. The current rating systems offer only slight help. Even in non-violent homes, children are often left alone (perhaps because both parents work) and are exposed to game and television violence and peer influences. Television news programs make the same assumption with adults; any violent event in the world is widely reported many times, often for several days in a row.

Violence has been a particular problem recently in schools, particularly with guns. A study from the United States National Center for Educational Statistics states that over half of all schools reported crimes in the 1996-97 school year, with one in ten schools reporting violent crimes. Schools, with all their responsibilities, cannot handle such problems without outside aid, such as that proposed in this discussion.

We would like to offer alternatives to violent behavior through the new interactive technologies, establishing that all children can learn non-violent ways that will prevail for the rest of their lives.

The Learning Development

A two-stage process is recommended in this approach to helping the problem of violence. As indicated, we believe it important to start with children of about three or four.

We suggest that at a preliminary stage special trainers work with young children and their parents, leading them interactively to understand that violence is not a desirable way to interact with other people. Careful notes should be taken of the interactions used. They might also be taped, perhaps on video. Since few such trainers are available, we should also learn from major leaders in non-violent behavior such as Gandhi and Martin Luther King. Only a few children can play a role in these first stage activities, so we need to ask how we can use the knowledge gained in this preliminary stage, carrying it over to highly interactive computer modules that can then be used with large numbers of children.

This early work is intended to guide later development of interactive units. How can computers help to produce a less violent society? The key is, as suggested, to help young children toward a non-violent way of life through learning activities. We can provide such learning with carefully prepared highly interactive multimedia computer-based learning material, using the special trainers, and others experienced with preschool children, as the designers of the learning units.

It is important that the learning units work with all students. The notion of highly interactive learning will be expanded in the next section. The materials developed would assume no previous computer experience, and would not assume that the children can read or type. The development process for producing highly interactive modules will be discussed further.

Highly Interactive Learning Units

A key idea in this proposed project is highly interactive learning. Very little computer-based learning material so far has been highly interactive, so this idea may not be familiar to the reader.

Human learning conversations are our models for the proposed development. By highly interactive or conversational learning units, we mean units in which the work of an individual student or a small group of students with the computer is like that of a student with a very good tutor. Weak forms of interaction, such as pointing and multiple choice, can be avoided. Such units have been developed for thirty years at the University of California, Irvine, with the strategies to be described later. It is important to emphasize that no new technology is required.

The student's native language is the key factor in this interaction. Both sides of the conversation will be conducted in this language. Our languages are the richest communication mechanisms devised by humans. They are our natural ways of communicating, important for human development.

A classical example, before modern technology, is the conversations Socrates held with small groups of students 2,500 years ago, as reported by Plato. Socrates asked questions, and the students answered them, leading to new questions. This entire interaction was in the native language of the students. Learning was non-trivial; Socrates dealt with difficult issues, some of them ethical in nature. This appeared to be a marvelous system for learning, but even 2,500 years ago it was far too expensive. More recent examples are seen in individual tutoring, again an excellent learning mode with good tutors.

Another important complementary form of interaction is that between people, particularly peers. These can be either local, in small groups, or arranged via a network. Such person-to-person interactions can be parts of interactive learning programs. Games that reward peaceful means to resolve a conflict are another possibility.

Voice

We can now use voice input and voice output with the learning units, so that the young children will not need to read or type. Communication with talking is natural for humans, and allows superior communication. Several commercial speech products are available and suitable for this project. Pictures on the screen will also

be useful, perhaps video sequences. Children are observed answering questions on non-interactive television, and this should be much superior if the 'machine' replies in a relevant manner! If this is consistently done well, the child may forget that the computer is a machine, as the conversation will resemble that with another person.

More experience is needed with speech recognition of children's voices. We have knowledge about children's vocabulary, useful in this project. Children have small vocabularies, as compared to adults; this will ease the problem of recognizing their speech. If any voice training of the computer for each user is required, that would be part of the learning material. But there is a reasonable possibility that such training will not be necessary.

Many Languages

We need also eventually to consider many languages. Violence is a world-wide problem, and cannot be solved in one country. Initial material might be in English, but other languages could soon follow if the evaluation shows that the materials are successful.

The development system should allow translations to different languages to be as easy and as inexpensive as possible. Cultural changes may also be needed in conversion to other languages.

Larger Collection of Units

Although our concern here is with helping children to non-violent ways, it might be a better idea to combine this material with other preschool learning materials, offering children a variety of learning material to prepare them for future learning. Given the success with Headstart in the United States, and worldwide education problems, we might be able to make major improvements in learning.

Developing Highly Interactive Multimedia Learning Units

In this section we discuss how highly interactive units are developed, following procedures used for thirty years at the University of California, Irvine, and the University of Geneva.

The learning units proposed are different from most existing units. Can such highly interactive learning material be prepared and used with young children and parents? Will it produce a less violent society? We believe the chances are promising, but further study is needed to answer these empirical questions.

The design and development of adaptive multimedia highly interactive units is an understood process, needing no new technology, although it is seldom done. The issue of how effective such units will be can only be decided empirically.

At least four stages enter into the production activities: project management, pedagogical design, implementation, and formative evaluation and improvement. Specialists are needed in each area for quality units. If the units are to be highly adaptive, and work with all students, great care must be taken in the production process. Pedagogical design and formative evaluation are particularly important stages in production, so they are discussed further. The four stages are about equal in costs.

Pedagogical Design

Pedagogical design can be done with small groups of people, trainers and teachers, who are familiar with the children to be reached, and are skilled in non-violent approaches, as already suggested. Groups of about four are suggested. Several hours of preliminary training will be essential.

The central problem facing the design group is to ask the right questions, to understand at each moment what the child is thinking. The purpose of these questions and the replies of the student is to decide what problems the student is having, and so to determine what learning sequences are to be presented next. Much of the questioning will be situational in nature; what would the child do in the situation? Short video sequences, an integral part of the learning units, will also be useful in creating situations for the children to react to.

Having asked the questions, and analyzed the replies, the next task of the design group is to decide what the child is to see next. Many different responses will be possible in these highly interactive units. Designers must also be concerned with maintaining the interests of the students.

In some situations parents may work part of the time with the children at the computer. The design should allow for this possibility. But we cannot assume that parents will want to spend this time with the children. We will also allow the possibility that several children will work together at the computer, bringing the advantages of peer learning.

The results of the design sessions are recorded as 'scripts,' a graphical representation of how the program is to behave. Scripts can be either on paper, or stored in the computer.

Implementation

Implementation follows design. Much of the writing of computer code will be done automatically, from the design, if the script is stored in the computer. Media specified by the designers must also be prepared in this stage.

Formative Evaluation and Improvement

In formative evaluation the goal is to see how well the material works with the intended students. A full range of students is needed. Weak places can be improved, and the process should then be repeated.

Motivational issues must also be evaluated; we want the units to hold the attention of all students. Interaction helps in keeping the children involved.

Much of the information required can be gathered by the computer. Professional evaluators would be involved in designing the evaluation and in gathering some of the data.

The Future

We have proposed a dramatic new approach to solving major problems in our society. Why is this not done?

The process of producing highly interactive learning units, essential to this idea, is not inexpensive, so major financial support is necessary even for an initial trial of the direction suggested. Further, little highly interactive material has been developed, so many people may not understand the possibility of this approach.

If we want the material to be fully warranted, years may have to pass and the behavior of the growing children re-evaluated against control groups. We do not claim that this is an easy solution. But we do not know of any possible plan that has equal or greater promise.

We have used violence as an example. Many other human problems might be helped by similar approaches. Effective interactive learning is the key, learning that does not take place today. This learning must be available for everyone on earth.

This very important experiment should be tried. The promise of non-violent youth in a more ethical society is invaluable.

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For further thoughts on the computer as a learning tool, we have the following e-mail from ***David Kanecki****.—JM*

Dear John and Suzette,

For the *S3* section of *SIMULATION*, it might be interesting to see what others think of the current use of computers for playing games only.

Today I went to the bookstores, other stores, and the computer store at a mall. In the bookstores, there were different topics and up-to-date topics. Also, the topics included how to learn new things such as PHP programming, Linux setup and management, database server design, and application design. In other areas of the bookstore, the topics reflected a rounded diversity, which is needed.

In the past few weeks, there has been a discussion about the effectiveness of using computers to aid in learning. Based on having students use computers and interact with a fixed program: what are they learning? Are the students learning some of the older computer skills as well?

One concern I have with strictly using a fixed program and interacting as with a game, is that the student learns reflexes. But are the elements needed in life being learned? For example, decision making (selecting from a list rather than using a mouse or joystick), ability to formulate a solution, ability to understand how the program moves an object (mathematics, trigonometry and logic behind the scenes and the ability to write the equations), and other mind-to-hand-to-computer concepts.

When I started in computer programming and simulation in the 1970s, the idea of playing games was to rouse one's enthusiasm. Then later, as was done with music composition, the person would eventually enter and read the code to play the game. Later, the person would learn how to make their own game. By doing the above, the creative process and some of the life learning process was initiated. In addition, not all PCs, microcomputers (another term used) in the '70s and into the mid '80s had joysticks or pointing devices (mouse). This meant that the program was written with a selection list the user had to choose from. I think the selection list helped developed problem solving ability by showing all the possibilities and letting the user compare and contrast.

In addition, my learning of computers and simulation used the computer as the last step. Before I started programming or using a computer, some of the topics I studied were the Five Horsemen of Kipling (five basic questions: who, what, when, where, and why), music (singing and instrument (violin)), writing one's thoughts, interacting in groups (discussion starting in the third grade), and mathematics. When I came upon a computer for the first time, the skills I learned beforehand aided in learning the computer.

Finally, when I started in computing in the 1970s, one local library had a casual seating area where we would read and share with others what we found in the computer magazines of the day. By having computer magazines using new and innovative learning concepts, this encouraged a new generation. Later, I and others would move and study the more traditional and established magazines. The important point was that the computer was not used as a catch-all; the basis was learning the reading, writing, arithmetic, and art. Then the computer became a tool which we could explore and use basic foundations to grow.

P.S. Most computer games were based on working together, designing a better car, and simulating ways to make things better.

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More on War and Peace

***Peter Brecke**, Associate Professor at the Sam Nunn School of International Affairs, Georgia Institute of Technology, is doing an in-depth study of the causes of war and conflict resolution. As part of that effort, Peter is assembling a data set of all recorded violent conflicts since 1400 AD in which more than 32 persons were killed. The purpose of such a data set, which will contain more than 4,000 violent conflicts when it is complete, is to allow for the development of an empirically-based taxonomy of violent conflicts analogous to those in botany and zoology.*

Such a taxonomy will, it is hoped, further the development of theories explaining the outbreak of different types of war. Those improved theories will enable the creation of a new generation of computer simulations for forecasting when and where future conflicts are most likely to occur. Peter won a "Best Paper" award at the 1998 Conference on Simulation Methods and Applications held in Orlando, Florida, for a progress report on his work, probably because the Conference Committee recognized the importance of his efforts to understand the causes of war and to evaluate possible methods of conflict resolution. Because I am deeply concerned with just that, I have repeatedly sought Peter's advice.

And because war and peace are of vital concern to all of us, I believe that readers will find the following exchange of somewhat edited messages of interest.—JM

Dear Peter,

I have considered two possible approaches that I intend to examine further. One is Peace Gaming as discussed with Tak Utsumi as long ago as 1972. That approach would involve taking an existing war game, of which there are many, and changing the objective and some of the rules. The other is to use something like Barry Hughes' IFs [*International Futures: Choices in the Face of Uncertainty*, Westview Press, Boulder, Colorado] to model two opposing communities with zero-sum cross ties and examine the effect of different strategies.

John

Hi John,

Regarding the Peace Gaming approach, there are many gaming simulations done (often by some of my colleagues) that are not like the classical war games, which are focused on executing military operations. They are much more politically focused and are not oriented to ending up in a war that you have to fight. Wars are avoided if possible but fought if the players deem it necessary. I think the key is not so much to change the objectives and rules as it is to broaden the range of policy options that are considered and perhaps executed before situations get to the point of war being a preferable outcome.

Regarding using IFs to model opposing communities, the model is not structured for doing that, and major changes would have to be implemented to get that capability. The current model I have, Version 3.17, allows one to do different scenarios that result in different probabilities of war breaking out. That is probably the closest to what you want that I know of, and it is not beyond your current capabilities (you do need at minimum a pretty fast 486 running Windows 95).

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S2K—A Planned Student SCS Student Chapter

*The following was written by **Cheryl McDowell**, an undergraduate at San Diego State University majoring in Computer Science.—JM*

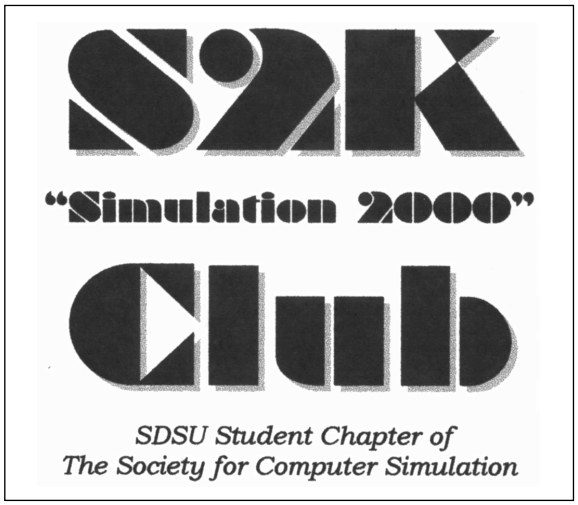
Currently in its development phase, the **S2K Club** is an upcoming San Diego State University Student Chapter of the Society for Computer Simulation. Through our club, we hope to promote simulation as a meaningful, fulfilling, and rewarding career path in today's multi-faceted computer industry. The new millennium carries with it many possibilities (or shall I say probabilities) of exciting new advancements in the simulation and modeling industry. The S2K Club

plans to provide important contributions towards these impending advancements by furnishing students with the knowledge and understanding of the power of simulation. With aid and support from the members of the SCS, I believe we will soon become an active and successful group.

The founders of the S2K Club would like to thank SCS for all their support in our endeavor. I would also like to extend a special "thank you" to John and Suzette McLeod for their unending inspiration, support, and friendship.

Comments and/or suggestions will be greatly appreciated and should be e-mailed to Cheryl McDowell, President *pro-tem*, S2K Club, at *cmcdowel@rohan.sdsu.edu*.

For information on how to start a student chapter, please contact the Society for Computer Simulation by phone at 858/277-3888, by fax at 858/277-3930, or via e-mail at info@scs.org. ■



The logo of the nascent S2K (Simulation in the 2000s) Simulation Club, a Student Chapter of the Western Simulation Council. It is planned to have the charter meeting of the S2K Club in connection with the SCS WMC 2000 Conference in January of next year.