The potential impact of the World Wide Web on the way we communicate with each other

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Abstract

Present forms of communication media have only been evaluated long after their use has become popular. By then any inadequacies in them are too deeply entrenched to be easily solved. Better use of a medium can be made if its possible impacts are known beforehand.

The use of the World Wide Web as a communication medium has grown dramatically over the past year. Its uses extend well into all aspects of human communication that are available through other existing media. It is used for the most personal forms of communication but it can also be used in commercial and academic spheres as well. However, there has been practically no research done to assess the impact the Web will have on the way we will communicate in the future. This research is necessary so that maximum benefits can be obtained from this promising medium.

This paper evaluates the potential impact of the Web by first analyzing the forms of communication media presently available. Using this information, an assessment of the Web on future communication will be given.

Introduction

The objective of this paper is to identify the aspects of communication that need to be addressed in order for the Web to be used at its full potential. The impact that this medium will have on the way we will communicate is then assessed. This objective is important for several reasons. The first is *availability*. The Web is used by millions of people daily. It thus has the ability to influence our lives much like how other forms of electronic mass media have done in the past.

The *limitations* of the present communication media should be clearly indicated so that these problems are not perpetuated in this new medium. A better understanding of the *theory* behind communication is necessary so that the content and presentation of Web pages is optimal. There is a need to *assess the impact of the Web* on the way we will communicate. This is necessary to maximize its benefits and to minimize the disadvantages.

To achieve these goals, a thorough evaluation of the present forms of communication needs to be done. This evaluation will then provide criteria that will serve as the basis to evaluate the Web.

Background Information

The Study of Communication

This section provides an understanding of the theory behind communication. It is important to do so because this will identify the criteria necessary in evaluating communication. These criteria will then be used to assess the effectiveness of the World Wide Web as a medium of human communication.

Definition of Communication Communication is a *discipline*; an *activity*; a *science* or an *art*. Ruben (Ruben 1984) defines communication as information-related behavior. The study of communication is the study of information-related behavior. The concern of this paper is with human communication and how it is facilitated via computers. Any future reference to the term communication is taken in this context.

Modes of Communication

Humans communicate using the five senses: sight, touch, sound, taste and smell. Sight, touch and sound are currently the only ones applicable to computer mediated communication. The effectiveness of any one mode is determined by the situation to which it is applied. In combination they provide a powerful set of data which the brain can interpret.

Characteristics of Communication

Permanence and Portability Symbols are used to represent physical entities or concepts. They remove the need for the objects being described to be physically present in order to convey their meaning. Hence they are portable. Humans draw on their knowledge of symbols from the past and present to create new messages and symbols for the present and future (Norman & Draper 1986).

Symbols are permanent in that they are accumulated by the person and the entity or concept to which they refer never changes. This is true even though the context of the symbol may differ (Ruben 1984).

The influence of our physical and symbolic environment The environment influences the symbolic representations and languages used in a community (Ruben 1984) e.g. the many types and dialects of spoken languages. In sign language this is also the case.

The meaning of symbols The environment determines the context of the meaning of symbols. To communicate, symbols are shared and their contextual meanings standardized. This process is known as intersubjectification (Ruben 1984).

Self-reflexiveness The use of symbols, enables humans to reflect upon their own actions and the actions of others.

One aim of this section was to highlight what makes it possible for symbols to be created and used effectively. The other aim was to identify the chief obstacle that hinders communication: these same symbols.

Theories of Communication

The Source → Message → Channel(with noise) → Receiver (S → M → R) Paradigm Aristotle formulated this first theory. He used it to explain how speech and rhetoric were used in communication. The concept was that a source (sender) had a message which he wanted to transmit to some receiver. The source formulated the way the message was to be presented and using techniques of persuasion, transmitted the data to influence the receiver in the desired manner. The receiver would then interpret the data in the way that the source envisioned. The assumptions were that the message sent was identical to the message received, and that the effect was the one desired. Communication was one way only from source to receiver. No channel was mentioned in this theory.

As communication theory became more of an academic study, the concept of a channel (Schramm 1954) was included. The theory now covered face to face as well as electronic and printed communication. However the direction of communication was still one way and there was no mention of feedback.

Shannon and Weaver (Shannon & Weaver 1949) added the concept of noise and the notion of feedback from receiver to sender. Noise is any incidental data transmitted over the channel, whether oral or visual, that affect the interpretation of a message. Schramm (Schramm 1960) was the first to create a nonlinear view of this theory. The feedback sent by the receiver was used to modify the message transmitted by the sender. The flow of information was circular, going from source to receiver as well as from receiver to source.

Only Schramm incorporated feedback into how the message is transmitted. All of the others viewed the flow of data as one way. This paradigm viewed communication as the persuasion of the receiver with the message from the source.

The Individual ↔ Data ↔ Environment (I ↔ D ↔ E) Paradigm This more recent paradigm is a result of the initial work done by Theodore Newcomb (Newcomb 1961). He viewed the communication process as consisting of the relationship between the following three entities: the sender, the receiver and the common ground which they are both formulating. This common ground represents a mutual understanding of the data from the sender and the receiver to each other. This was the first theory that moved the concern away from the transmission of information between people to the interpretation of the information inside individuals. This two sided view of the process of communication lead to the development of other models. However, the underlying theme of aiming for a mutual understanding was common to them all.

Forms of communications

Communication uses verbal and nonverbal information. This section explains these terms so that the applications of communication can be assessed.

Verbal Information This consists of language and paralanguage. Language is the verbal coding of a message and has the following characteristics (DeVito 1981): *specialization* - the sole purpose of language is communication; *productivity* - sentences are created at the time when they are uttered; *displacement* - the ability to discuss things that are temporally and spatially remote; *rapid fading* - speech must be received at the time of utterance or the meaning they convey will be lost; *arbitrariness* - words do not possess any properties of the things they represent, and *cultural bias* - the form of any language is determined by traditional and geographical factors.

Paralanguage is the use of vocal signs in communication (Littlejohn 1983). In speech it is illustrated by tone, pauses, pronunciation etc. In written language it consists of punctuation, spelling, cross-outs, the amount of space between words, sentence structure, legibility, ink color etc. These all play a major role in influencing the reaction of a person. Paralanguage can lead to assumptions about the background of a person. It can also give an idea as to the emotional state of an individual.

Nonverbal Information This includes *appearance*. The face, eyes, physique and dress contribute towards this. *Action* which consists of gestures also affects the type of message being sent. The level of *touch* and *space*, the distance between individuals, conveys a great deal of information about the message transmitted. *Timing* is also significant. *Timeliness*, the time in which the message is delivered, is also important in the impression conveyed to the receiver (Ruben 1984).

Applications of Communication

This section identifies the types of communication. The role of each is described. The purpose for doing this is to show how these roles are fulfilled when the existing media of communication are surveyed.

Intrapersonal Communication This form facilitates the communication of an individual with himself (DeVito 1981). Self-evaluation described in the section dealing with language is applicable here. This is a special form of the I $\leftrightarrow$ D $\leftrightarrow$ E paradigm.

Interpersonal Communication This is communication between an individual and one or two other people. The communication process is multidirectional, in that the various parties contribute their ideas to create a common understanding. This follows the I $\leftrightarrow$ D $\leftrightarrow$ E paradigm. This is the kind of communication present in relationships, whether personal or professional. The roles (Littlejohn 1983) of interpersonal communication are : to link the individual to their environment; to facilitate thinking; to regulate behavior, and to fulfill social functions i.e. "the establishment, maintenance, and modification of relationships" ((Littlejohn 1983) p. 191)

Serial and Small Group Communication Small group communication is very similar to interpersonal communication. The difference being the size of the number of people involved in the relationship. It too follows the I $\leftrightarrow$ D $\leftrightarrow$ E paradigm.

DeVito ((DeVito 1981) p. 167) defines serial, sometimes called sequential, communication as "communication that takes place through some linear kind of sequence, going from A to B to C to D and so on. It is a kind of small group situation but the participants do not meet at the same time; rather, the messages, passed from one person to another create a kind of group network." This follows the paradigm of Aristotle. Serial communication can be found in organizations, where directives from upper management are filtered down to the employees.

Public Communication This usually refers to public speaking but it can also apply to theater as well. The purpose of public communication ((DeVito 1981) pp 217-8) is to: *inform* - the goal is to pique the interest, educate or clarify a topic of which the sender (the speaker) is knowledgeable. The next purpose is to *persuade*. The aim is to convince the audience to support the beliefs, execute the actions or provide inspiration about the theme. The final purpose is to *entertain*. The goal is to present the subject matter in a manner that is enjoyable, humorous or interesting.

Some authors put public communication into a category called machine assisted interpersonal communication (Dominick 1983). The term machine refers to any man-made tool of communication e.g a pen or a microphone. This follows the Aristotle paradigm.

Mass Communication This is "the process by which a complex organization with the aid of one or more machines produces and transmits public messages that are directed at large, heterogeneous, and scattered audiences."((Dominick 1983) p. 19) This follows the Aristotle paradigm.

Business Communication

Though not directly identified by the authors in the communication texts, this form is identified in business texts. It is a combination of all of the various forms of communication identified previously. The aim of this form of communication is to earn money for the company.

In the I $\leftrightarrow$ D $\leftrightarrow$ E paradigm, the company can be viewed as an entity (individual). Intrapersonal communication occurs when the company evaluates its own operations. To set its own goals the company issues directives to its employees. To earn revenue, interaction with other companies and individuals must occur. This is equivalent to interpersonal communication.

The purpose of these different applications of communication varies. Social, academic, professional, political and cultural needs are satisfied, while the need for individualism is also maintained.

Summary

This Background Information section gave an introduction to the theory behind communication. The terms and concepts that were explained here will be used repeatedly throughout the remainder of the paper to evaluate the various forms of communication media available.

Communication Media

This section identifies the various forms of communication media. It also identifies the way humans learn from the respective media. Using criteria from the above sections, the characteristics of these media will be evaluated. The categories of communicating using communication media (Gaines & Shaw 1984) are: the direct, indirect and the mediated experience.

The Direct Experience

This involves the interaction between the individual and the environment and uses all of the senses. Data transmission is two way. This is how humans learn about their environment. Self-reflexiveness, i.e introspection fits into this category. This follows the I $\leftrightarrow$ D $\leftrightarrow$ E paradigm, applying the intrapersonal method of communication.

The Indirect Experience

This occurs when the individual communicates with others. The following methods of communication are used: conversation, correspondence, drama, the telephone and the print media.

Conversation This is a form of interpersonal communication. It can follow either the Aristotle or the I $\leftrightarrow$ D $\leftrightarrow$ E paradigms. The paradigm selected depends on the nature of the conversation: whether it is a two or one way flow of data i.e. whether both parties in the conversation get an equal say in the shaping of the dialogue. Conversations involve the use of speech and are real-time, thus exhibiting the productivity and rapid fading properties of language.

Verbal information is communicated to the parties in the conversation. All of the aspects of verbal information described previously are critical factors in the transmission of the data and the reception of information (DeVito 1981). The relationship between the parties, the sender and the receiver; the physical environment in which they are conversing; the purpose of the conversation; and their emotional states all determine the messages that are received.

The use of nonverbal information is also relevant. Space and the effective use of timing and the timeliness of the data presented all contribute to make conversation one of the most effective communication media available. However its strengths are also its weaknesses.

The same paralanguage that can be used to forcibly illustrate a point can also serve to detract from it as well (DeVito 1981). A similar problem exists with the use of language, especially where the sender and receiver have different cultural backgrounds. The arbitrary nature of language can make it difficult to explain concepts that are spatially or temporally remote. Since conversation is spoken it means that items discussed at an earlier point may not be remembered when needed. Nonverbal information can also serve as noise in the transmission of data. Excessive gesticulation can focus attention on the gestures rather than the message.

Drama This form of public communication follows the S $\rightarrow$ M $\rightarrow$ R paradigm. A play depicts the opinions of an individual or individuals. The original aim of theater was to entertain. It can also be used to educate and to persuade. Verbal and nonverbal information are used to relay the message.

Drama is live and each performance is slightly different. Even though the reaction of the audience will have an effect on the performance of the cast, no major changes to the original plot will occur. Hence the play exhibits the property of closure. Some authors believe that this idea of closure should play a stronger role in user interface design (Laurel 1991).

Since a play is a representation of opinions, interpretation is a problem with this medium. The task of conveying the intended information is dependent on the intellectual level of the audience, and the skill of the actors as well as the playwright.

Public speaking This is a special application of drama where the sole performer is the speaker. The orator has a goal that he wants to relay in his speech. The use of rhetoric is very common when the goal is to persuade the audience. Public speaking can also serve to entertain and to educate. This medium generally follows the S $\rightarrow$ M $\rightarrow$ R paradigm. However, some forms follow the I $\leftrightarrow$ D $\leftrightarrow$ E paradigm e.g. teaching.

The effectiveness of this medium depends greatly on the ability of the speaker to motivate his audience to keep listening. Skill is required to present the message in a manner that is understood by all. The speaker must use a careful mixture of verbal and nonverbal information to be effective. The problems associated with conversation are also applicable.

Correspondence This is interpersonal communication between two individuals using writing tools to record the message. The message is then transported to the intended receiver, who is not physically present. A reply is then sent to the source by the receiver. The message is generally textual in nature and there is a time lag involved in the transmission of the message and the reception of a reply. This medium of communication generally follows the Aristotle paradigm.

The only type of nonverbal information possible is the timeliness of the information presented. Verbal information is restricted to those associated with written language. Paralanguage is possible with the use of appropriate punctuation and the format and structure of the letter. This media has several advantages in not being real-time: the letter writer has the option of formulating what he wants to say in the manner that he chooses. This is not so with conversation where responses must be almost instantaneous so as to keep the discussion interesting. Since the message is written, permanence is now attached to it. So in addition to being portable the receiver can refer to the letter at a later time and be refreshed about the message.

A problem with this medium is that the time delay prevents both receiver and sender from getting immediate feedback. The delay also limits the timeliness of the message. The problems associated with cultural differences and arbitrariness still persist. The lack of nonverbal information also reduces the amount of feedback. The only possible feedback is through the letter itself. Inaccurate assumptions about the person can be made based solely on their style of writing. Writing style, legibility and the level of neatness constitute noise in this medium.

Telephone This real-time form of interpersonal communication is very similar to the conversation style of communication. It follows the same paradigms as well. The major difference is that the two individuals need not be in the same geographical location. The channel used to communicate is the telephone. Since the two parties are not physically in the same location no nonverbal information can be transmitted to them. Their only source of feedback is from the verbal information. Language and paralanguage play major roles.

This lack of nonverbal information has several advantages. Sender and receiver need not be intimidated by the physical presence of each other. The parties are free to take part in other activities while engaged in the conversation.

However, the disadvantages of conversation are still present. Complex concepts requiring the use of visual images for clarification are difficult to convey. The use of the telephone as the channel introduces its own problems. This new channel introduces new noise sources. The ability to simultaneously perform other actions can be a source of distraction. The channel also removes some of the intimacy present in a face to face conversation.

The Mediated Experience: the Mass Media

In this way of communication, the messages sent to the receiver are first filtered by other individuals. The channels used are all machines i.e they may be printed and read; recorded and listened to, or recorded and viewed. The mass communication industry is based on this use of filtering. Dominick puts the print media under this category (Dominick 1983) since there is a filtering process i.e. the use of editors. The media covered in this way of communication are: the print media, radio, television, film and the recording industry. The $S \rightarrow M \rightarrow R$ paradigm is applicable to mass media. Mass media not only just report on the facts and events in society, but also offer an interpretation of this data. The sheer number of receivers means that mass media have the potential to shape public opinion and values (de Kerckhove 1995), (McLuhan & Fiore 1967).

The Print Media The print media can be divided into two general areas: books and periodicals. Periodicals include newspapers, magazines and journals. Dominick groups journals under magazines (Dominick 1983). An author (source) prints the message that he wants to present using one of the tools of writing. The message is recorded for public viewing and distribution. Correspondence generally is not for public distribution or viewing. The nature of the message is generally textual but the use of graphics is also done. There is a time delay between the creation and the distribution of the message. Any feedback elicited from the readers is also time delayed. This medium would fall under the category of machine assisted interpersonal communication described by Dominick (Dominick 1983). Brian Gaines groups this category under the indirect experience (Gaines & Shaw 1984) way of communicating.

The goal is to entertain, persuade or inform the readers. The use of rhetoric and other skills of journalism might indicate that the writer is attempting to inform or persuade his intended audience. Humor would suggest entertainment was the primary function. This is not always the case and a good writer can perform these three functions by using a combination of the skills of play writing and journalism.

One problem associated with this medium is that articles are censored to reflect the views of publishers. This is especially true for state-owned newspapers (Dominick 1983). Another problem is the dependence on the credibility of the writers as validation for their articles. Yet another problem is what Dominick calls the status conferral process. He explains this as, "...[the belief of] the audience that if you (the subject of an article) really matter, then you will be at the focus of mass media attention, and if you are at the focus of mass media attention then you really matter." Knowledge of this fact leads individuals and groups to try extremely hard to obtain this media attention((Dominick 1983) p. 37).

Misinterpretation is a potential difficulty. Not having the writer around to explain his message, the reader must formulate his own interpretation of what he is trying to say. The competitive nature of the print media can lead to the sensationalism of the events reported on.

The Sound Recording Industry This began during the late 1800's. Music, speeches, educational works, books etc. are recorded for sale. The primary purpose of this medium is to provide entertainment upon demand for the listener. However, some musicians have also used the medium to advance their own causes.

The medium suffers from the same limitations as all media that follow the Aristotle paradigm. Data transmission is one way only. Unlike in other forms of mass media, which will be discussed later, there is no use of feedback.

Radio Originally music was the main ingredient of programming. Programming has changed from purely entertainment to include drama as well as educational material (Dominick 1983). During the second World War, radio was a social educator. Its war coverage significantly swayed public sentiment (Dominick 1983). The real-time nature of radio was a main reason for this. Radio stations are primarily privately owned.

Networks also use this effect on mass sentiment to promote their services. The growth of network radio meant that locally owned stations had to adapt to remain viable. While network programming aims at a broad cross section of society, local radio reflect the interests of their communities.

A distinct advantage of radio, like the telephone, is the ability to use the medium while doing other tasks. Specialization is also an advantage since the audience can listen to a station that suits their respective needs. Network radio introduced the globalization idea that Marshall McLuhan spoke of (McLuhan & Fiore 1967). This occurs when the knowledge of our environment is not limited to our immediate geographical location. Rather, information is known about the world. It is this awareness of the affairs of the world that McLuhan calls the "global village" idea (McLuhan & Fiore 1967). The commercialization of radio introduced a new way for companies to sell products: the jingle. The techniques developed in the creation of these first jingles form the foundation of the modern advertising industry. Radio has an advantage over the print media in that there is no dependence on the level of literacy or the quality of sight of the audience.

The problems with radio are similar to those of the telephone and print media. The edited nature of the programming can influence the audience. The technology introduces new sources of noise. Specialization is also another problem. If the programming does not appeal to an individual then the flow of information is limited, if not impossible. The use of feedback is primarily for business purposes and not to gauge the interpretation of the message sent. An exception to this use of feedback is Talk Radio. Here the audience can interact with the radio host and express their opinions. The communication is usually done via telephone. In addition to the disadvantages of the telephone, there is also the removal of some of its interpersonal nature as well. The interaction with the caller is usually controlled by the host, once again serving to limit the flow of information.

Film Film, like the recording industry and theater is the expression of the ideas of an individual or individuals. It is audio-visual in nature and the fact that it is stored means that the exact same performance, unlike theatre, can be viewed repeatedly. The purpose of film is identical to the purpose of drama and the music industry: to entertain, inform or influence.

One problem associated with film and television is the sensationalization of undesirable aspects of society e.g violence (Lloyd-Jones 1972). Another problem is the American bias presented by the studios, mainly located in the United States (de Kerckhove 1995).

Television This began in the 1940's, after the film industry. It soon overtook radio as the preferred medium of mass communication. Radio networks saw the benefits of this audio-visual medium and created television networks as well. Initially the networks regulated themselves. Programming consisted of news, drama and game shows. However, government regulation became stricter after the Quiz Show scandals of the 1950's ((Dominick 1983) pp 155-6).

As in radio, specialization has occurred. Local television caters to the needs of their communities, but get stiff competition from the networks, which provide a global view of the world. Cable television caters to very specific interests.

Television gave birth to the television commercial, a visual extension of the radio jingle. Competition for viewer attention has led to news sensationalism and glorification of the bizarre. Anti-social behavior has been blamed on television by some authors (Lloyd-Jones 1972).

The social impact of television is greater than that of radio. The public opinion effect on the Vietnam (Dominick 1983) and Gulf (de Kerckhove 1995) wars are two examples. Television has been accused of stereotyping (Dominick 1983), promoting a North American bias in the programming, and has led to some distortion of the news (Altheide 1976).The status conferral effect is very prevalent in this medium. Since television caters to a mass audience, programming content is determined by the averaging of what the public likes. This determination is based on feedback in the form of ratings (de Kerckhove 1995). As a result, another problem with television is that the programming does not suit the preferences of all viewers.

Computer Video Games

These are a special form of the mediated experience. A game is a "closed, formal system that subjectively represents a subset of reality." In this form of communication, the computer "acts as opponent and referee in most of these games" (Crawford 1984). Games have a set of rules that if properly constructed, cover all possible situations that could arise while playing them. The rules should make the game a self-sufficient entity. Thus the game should require no outside assistance to describe what action should be taken when a player makes a decision.

The study of computer games is important because the techniques involved in the playing of a game can be employed in other aspects of computer use as well. The developer should include this approach to design in order to take full advantage of any skills his intended audience possesses.

The human interaction involved in playing games can vary from practically none, in the case of a game of Solitaire, to a very high level e.g. in a Sega-type combat game between two or more individuals.

Games facilitate some of the needs of humans (Crawford 1984). They fulfill some *fantasy.* They provide a means of *overcoming some social restriction.* This is closely related to the fantasy fulfillment role. Games provide a socially acceptable forum for an individual to play the role of a character with qualities that would not be socially acceptable in reality e.g. a thief. They provide some *evaluation of self-worth* when the player accomplishes some task. Games facilitate *social interaction* between individuals They also facilitate *mental or physical exercise* The interaction involved can provide an *acknowledgement of the personalities* of individuals.

These points illustrate that games can assist in the intrapersonal and interpersonal applications of communication. With the increasing popularity of networked games, the influence can only increase. Computer games can follow either the Aristotle or the The I $\leftrightarrow$ D $\leftrightarrow$ E paradigms. The paradigm is determined by the purpose and type of game that is required.

The World Wide Web

This section begins with a description of the World Wide Web. Then the possible impact that this communication system will have on the way humans communicate will be expressed.

Michel Sénécal (Sénécal 1995) gives some criteria that must be met in order for a communication system to be used democratically. He says it must be *interactive.* It must provide *"immediate and complete reciprocity in all exchanges".* The system must support a *"plurality of viewpoints".* An "establishment of *direct relations between partners* free to both transmit and receive messages" is required. There must be *decentralization* of the information sources. A *"respect for freedom of expression and for privacy"* is also essential.

None of the current electronic communication systems described previously can meet all of these requirements. A system that has great potential for achieving all of these criteria is the World Wide Web.

History of the World Wide Web

In 1989 the World Wide Web (WWW or the Web) was created by CERN, a particle physics laboratory in Geneva, Switzerland. Initially, the Web was to provide an interface that used the Internet to distribute scientific information among researchers. CERN developed the HyperText Transfer Protocol (HTTP), the protocol for the requesting and transmission of files on the Web. The Web works on a client-server basis. Using a Web browser the user (client) queries a Web site (server) for information. HTTP is used to relay the query and return the requested documents (Science_ Museum_ of_ London 1996). The documents are encoded using the HyperText Markup Language (HTML), developed at CERN. Lenny Zeltser (Zeltser

1996) defines the Web as "an Internet-based computer network that allows users on one computer to access information stored on another through the world-wide network".

Hypertext and hypermedia (Nielsen 1994) are used to interface with the user. Hypertext is defined as "electronic text in a format that provides instant access, via links, to other [text] elsewhere in a document or within a separate document" (Fry & Paul 1995). Hypermedia is the use of hypertext along with other media (graphics, animation, sound etc.) in a hypertext document.

By 1990 the first Web server and a text-based browser were developed by CERN. By 1991 the Web was being used by people other than those doing research at CERN. In 1992 browsers were made available to the general public. The work done at the National Center for Supercomputer Applications (NCSA) at the University of Illinois in Urbana-Champaign, Chicago was responsible for the phenomenal growth of the WWW (Science_ Museum_ of_ London 1996). In 1993 the NCSA created a graphical browser called Mosaic. The software was freely available and ran on all the major platforms. This was the first Web package that allowed the creation of visually appealing Web pages. HTML was easy to use and quickly became the standard document programming language.

Many of the original Mosaic programmers went to work for Netscape Communications Corporation, producers of the Netscape Web browser. Today Netscape is the most popular browser on all platforms (Nielsen 1994). The Web is the most popular Internet application, and incorporates the use of other Internet facilities e.g. telnet, email, Internet Relay Chat and Newsgroups. The strength of the Web is closely tied to the capabilities of the hypertext and the hypermedia it uses.

The Impact of the World Wide Web

This section shows what communication media can be applied to the Web. It serves as the basis for identifying the impact that the Web will have on communication. The section is divided into the applications of communication that were defined previously. Each section is then further broken down into the purposes that each of these applications fulfills.

Intrapersonal Communication

With the Web, anyone with the right facilities can be a provider/consumer to the store of information. DeKerckhove (de Kerckhove 1995) calls this the creation of the global mind, the stage after the global village (McLuhan & Fiore 1967). This can lead to a sense of self-worth and personal identity. The present anonymity afforded by the Web may also encourage the free expression of opinions. The Web allows users to operate remote devices. This along with the advent of virtual reality has great possibilities for intrapersonal communication (Caroll, Broadhead, & Cassel 1996). Being able to experience things and visit places that are physically remote can lead to a new level of learning for the individual.

However, the Web may not be beneficial to everyone. People with disabilities may be left out of the new technological age (Maddix 1990). The technologically fearful or apathetic may be isolated or excluded. The "me too" mentality (Caroll, Broadhead, & Cassel 1996) might be encouraged as people struggle to enter or remain part of the Web society. Some companies presently follow this mentality (Caroll, Broadhead, & Cassel 1996).

Interpersonal Communication

Conversation The art of conversation need not be lost with the increased use of the Web. Most Web information is obtained via word of mouth. WWW chat forums can simulate real conversations.

Correspondence Letter writing, in the form of email, is still one of the most used Internet and Web facilities. Email might even become more popular as people fear revealing more personal information about themselves. Web and email use have led to new types of paralanguage and language e.g. smileys and Internet jargon, respectively. This method of communication once again alienates those who are unable to use the medium e.g the illiterate. The problems with correspondence still exist, the time delay is only reduced.

Telephone Telephone over the Web is already a possibility. At present the medium is only one-way, but technological advances can make this medium follow the paradigm of the I $\leftrightarrow$ D $\leftrightarrow$ E, like a real telephone conversation.

The providers of this service allow any one of their registered users to speak to another registered user. Thus it is possible to receive calls from friends. However, it is also possible to receive calls from strangers who just happen to belong to the same telephone service provider (Caroll, Broadhead, & Cassel 1996).

This highlights a possible problem of the future: the privacy of the individual. It has always been possible to use the telephone directory to call strangers, but as more information is stored on-line, the risks become even greater. It is not clear if the question of privacy can be so easily solved.

Serial and Small Group Communication

Big companies already use the Web to send directives and information to their employees. e.g. IBM. An advantage of this is that the likelihood of the message being incorrectly transmitted is reduced, since it is in stored form. In small group discussions the anonymity offered by the Web suits the passive partners of a conversation. Those who are bolder will be able to express their viewpoints more freely. Video-conferencing could be used in discussions between close acquaintances and also where the topic is best expressed with visual aids e.g distance education and scientific research (Caroll, Broadhead, & Cassel 1996).

However, this does not solve the misinterpretation problem. The use of this technology might introduce a new source of distraction for the employees. Some companies have restricted Web usage by their employees after they spent too much time perusing the pornographic content of the Web.

The small group discussion benefits offered by the Web may lead to the formation of cliques and the bullying of clique nonmembers. The most vocal member of the discussion will usually be selected as a leader of the group. This is not always in the best interest of everyone involved.

Public Communication

Drama Drama is possible on the Web with the use of video-conferencing. It would be distinct from television and film because the performance would be done live. Though possible to view drama using this technology, the effect of being in a theater surrounded by other people will not be the same. However, it may be possible to simulate the atmosphere through the use of artificial reality techniques.

Public Speaking Using the Web, verbal and nonverbal information from the speaker can be transmitted. However, verbal and nonverbal feedback e.g. reactions from the crowd, used by the speaker to tailor the presentation of his message are missing. This could be simulated using software that allows the Web browser to give an approval or nonapproval rating the instant the speaker makes a statement.

The Print Media There are great possibilities for electronic publishing. A restriction on on-line publishing is the difficulty in transferring print layouts and fonts to the on-line documents (Caroll, Broadhead, & Cassel 1996). Advances in technology will solve this. Many institutions e.g. governmental and private agencies e.g. newspapers (Caroll, Broadhead, & Cassel 1996), as well as individuals are Web publishing. Web publishing is advantageous because of the number of people that can be reached and the significant cost reductions.

Mass communication

Sound Recording Industry Studios already offer sound and video clips from their stars e.g Sony Music. Other unknown bands are using the Web to promote their music (Caroll, Broadhead, & Cassel 1996). The process of presenting sound over the Web is currently cumbersome and the quality limited. Improvements should be made as technology advances.

Radio Stations have already begun to put radio clips on the Web (Caroll, Broadhead, & Cassel 1996). The limitation on Web radio is the technology available. If this is overcome it may only be a matter of time before traditional radio stations can be heard over the Web.

Film Current technology prevents the viewing and downloading of full-length movies. However, some studios have used the Web to post the trailers for their productions e.g Toy Story from Disney Studios. The premiere of the film "Tank Girl" in real-time over the Web (Caroll, Broadhead, & Cassel 1996) is an indication of future possibilities.

Television This suffers from the same constraints as sound, film and radio on the Web. Television network presence on the Web is similar to other commercial sites. The main purpose is advertising and obtaining marketing information As technology increases, real-time television broadcasts could become part of the Web.

Business Communication

Businesses use the Web to advertise products to potential consumers. Statistical information gained is used for financial decision-making. The accumulation of this information can have a major impact on the livelihoods of customers and Internet security is a major concern. When security issues are solved, the Web may become a major source of revenue for companies.

Conclusion

After describing the impact of the Web an assessment must be made of these communication changes. The categories used to evaluate this impact will be advantages and disadvantages.

Intrapersonal Communication

Web usage can lead to personal education and fulfillment. The level of freedom and anonymity on the Web are some of its strongest features. They promote a freedom of opinion that has never been experienced before using any form of public medium. Anyone with the right facilities can be a publisher on the Web, making a contribution to the collective pool of knowledge. Minorities can find persons with similar backgrounds.

The fate of minorities, the technologically illiterate, the disabled, the apathetic and the poor is uncertain (Mattelart 1995). The gap between the poor and the wealthy may increase. If restrictions are imposed on the Web that reduce the level of freedom, minorities may once again be alienated.

Interpersonal Communication

Face to face conversation cannot be replaced but telephone conversations can be improved. The Web can fully replace old methods of correspondence being faster and cheaper than traditional mail. The grouping of people with similar interests can lead to the formation of special interest groups (SIGs) that promote a common good e.g. the Oklahoma bombing support group. Academic information will be easier to disseminate and research should be made easier (Caroll, Broadhead, & Cassel 1996).

SIGs also bring their own disadvantages. SIGs can lead to the formation of cliques and the intimidation of non-clique members. A difficult question to answer is who determines the leaders of these groups. Another SIG-related danger is the proliferation of dissident groups e.g. racists.

In addition to the formation of SIGs, is the formation of actual Web communities. These would mimic and fulfill all the roles and tasks of their real-world counterparts. The Web could also lead to the creation of artificial communities, fantasy creations of the developers. Ideas from the role-playing done in computer video games would be very useful in this situation.

Inherent in the use of the Web are the disadvantages of the media it applies. Since the Web is globally accessible cultural, political and social barriers must be removed for there to be a democratic flow of information. The use of symbols must be done with the receivers in mind. This is necessary since the symbols might not be understood or have a different meaning in their world.

Serial and Small Group Communication

The WWW can improve the *accuracy* of information reception. A Web page provides a public document for reference. Individuals still have the option of being either passive or active partners in a discussion (*optionality*). However, sites generally only reflect the views of the developer (*the Aristotle paradigm*).

Public Communication

Performers now have more people who can hear their messages. However this increase in audience size has come at a price. Both performers and audience have lost some of the atmosphere that is very important to this medium.

Mass Communication

As technology advances, the emergence of the Web as a competitive alternative to television and the other forms of electronic media will become a reality. Newspapers, books and periodicals may be published on the Web instead of being printed. The use of multimedia means that the format of the printed media can and may include audio and animated data. The democratic nature of the Web should ensure that local stations can still remain viable and be on the Web. It may be possible to view full-length films over the Web with comparable quality to that of state of the art video.

The networks will have a new medium to influence society with. The size of the audience means the potential effect could be greater than anything that television is capable of doing.

Business Communication

The Web presents new revenue sources for businesses and individuals alike. This new source of marketing information is more accurate than any of the sources used today. The global nature of the Web creates new opportunities for small and large companies alike.

The legal system must be changed to protect the interests of both company and customer. Copyright laws must be updated. Better network security will be necessary to minimize fraud and other such crimes.

Unresolved issues and future research areas

The Web increases the possibility for *misinformation* to be spread easily to the readers. *Security* must be increased as the volume of users will make it a tempting target for hackers. *Loss of individual privacy* is also worthy of mention. The more information we put about ourselves on the Web, the less privacy we will have.

Whether or not the Internet has the *capacity* to support the new uses for the Web has been questioned by some scientists (Caroll, Broadhead, & Cassel 1996). The issue of *who controls the Web* is still unresolved. The United States Government is in the process of passing legislation censoring the Web. Corporate giants are scrambling to control it but there are no clear winners yet. At present, the majority of the Web is based in the United States, the same problem that affected other forms of electronic mass communication.

The Web has created a whole new society with its own language, rules and customs. The creation of Web communities, whether on-line representations of actual or fantasy cities, both fulfilling all the needs and roles of their real-world counter parts will soon be a reality. The moral, legal, political and social issues of any such communities need to be urgently addressed if their full potential is to be utilized.

This paper highlighted the likely impact that the Web will have on the way we communicate. It identified areas that need to be addressed in order for the Web to be truly democratic and interactive.

Some of the general issues mentioned above could not be addressed by this paper. Future research would focus on the solution to some of these problem areas. More precisely, the study of on-line communities is an area that needs a great deal of work. The issues raised have no easy solutions and it is not clear if there are solutions for all of them.

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