Lecture- 9

Hypertext, Hypermedia and Multimedia

Module -23

HYPERTEXT, HYPERMEDIA AND MULTIMEDIA

Topic No: 41

Hypertext, Hypermedia, Multimedia

In this lesson, more attention is paid to the special features of the computer that give it the potential to offer something different from (and in some cases better than) traditional teaching and learning materials. These features include hypertext, hypermedia and multimedia.

9.1 Hypertext

Hypertext refers to links among textual items, often indicated on a computer or website by key words set in underlined blue type, that, when highlighted by a pointer device (e.g. mouse, trackball, finger on a touch-sensitive screen) and selected or clicked, take the reader to the referent. These links are usually defined in terms of their activity and are referred to as hotlinks or hyperlinks or, increasingly commonly, simply links. The referent of the hyperlink might be a separate screen or so-called 'page' that obscures or replaces the first page, or simply a small box of text that appears to float above the initial page. For example, in a language-learning program, one might click on a hypertext link to go to one of several choices in a branching story and arrive at that link on another page, or simply click on a word to get a floating box offering its dictionary definition. Hypertext is often used to link text to materials traditionally contained in footnotes and annotations but may also include much more.

Bolter (1991) explains the significance of hypertext: 'Electronic text is the first text in which the elements of meaning, of structure, and of visual display are fundamentally unstable' (p. 31). By this he means that electronic texts are subject to rearrangement and reordering by the user beyond the traditional linear organization of books. This has countless implications to the creation of language-learning materials where the sequence of learning is so often strictly predetermined, based on research as to the order of complexity of lexical items and structures.

J.D. Bolter on footnotes:

In a printed book, it would be intolerably pedantic to write footnotes to footnotes. But in the computer, writing in layers is quite natural, and reading in layers is effortless. All the individual paragraphs may be of equal importance in the whole text, which then becomes a network of interconnected writings. The network is designed by the author to be explored by the reader in precisely this peripatetic fashion.

Bolter (1991: 15)

The development of hypertext has been associated most closely with a constructivist model of learning and aspects of schema theory. But while the behaviourist model might use hypertext's special features only to link text with explanations, tests and answers, the constructivist model might consider the same features and use them to encourage learners to evaluate the structure and the sequence of their own learning. This latter approach is more likely to accommodate collaboration and negotiation of meaning as it involves a greater degree of decision-making.

9.2 Hypermedia

Hypermedia refers to similar links to those used in hypertext, but instead of simply linking text to text, hypermedia involves linking various media, such as sound, images, animation and/or video. For example, a word or picture might have a link to a sound file giving its pronunciation. A video of a language-learning opportunity, such as a shopping excursion, might be linked to an animation that shows the same exchanges simplified, omitting the distracting elements around the interactions between the shopper and the sales clerk. Or, an animation might focus on a related aspect, such as a review of the value of different denominations of money.

The projects mentioned in the ALLP (see Section 2.3.3) would be classified as hypermedia systems, although their creators (see Murray, 1995) classify them as Intelligent Computer-Assisted Language Learning (ICALL). ICALL differs from CALL in that it offers often dubiously labelled 'intelligent' feedback features that customize responses to learner input through subroutines similar to the already mentioned Eliza program (see Section 2.3.5).

J.D. Bolter on dismissing so-called 'intelligent' aspects of the computer:

Computer-assisted instruction . . . is nothing more than a hypertext in which the author has restricted the ways in which the student/reader can proceed. In typical Computer-Assisted instruction, the program poses a question and awaits an answer from the student. If the student gives the correct answer, the program may present another question. If the student's answer is wrong, the program may explain the student's error. If the student makes the same error repeatedly, the program may present a review of the point that the student has failed to grasp. In most cases, these questions and explanations are texts that the teacher/programmer has composed and stored in advance. However, good programming can make these simple programs seem uncannily clever in replying to the student.

Bolter (1991: 30)

Differences in positions on computer intelligence are only a matter of semantics. While we do not expect a computer to think and converse intelligently, it can have some features that appear to simulate intelligence.

9.3 Multimedia

Multimedia is a term that has essentially subsumed hypermedia, but the original difference was that where hypermedia might only make use of two types of media (e.g. text sound or text photographs) multimedia tends to feature several media types including text, images, sound, video and/or animations. However, Thompson et al. (1992) offer a slightly different definition of hypermedia contrasting it to multimedia and suggest that the former has a pedagogical perspective while the latter is simply a mode of presentation. This definition also accords with the structure of many of the multimedia programs on the market, most of which tend to dictate a set path of instruction.

A.D. Thompson et al. on terminology:

Many educators are confusing hypermedia with multimedia and ignoring the differences between the two. Whereas multimedia refers to the use of a variety of media, hypermedia can be defined from the two words that make up the term. Hyper means non-linear or random and media refers to information represented in many formats. Educational technology futurist Dede (1987) defined hypermedia as a framework for non-linear representation of symbols. He considered hypermedia an external associational memory where the technology provides assistance in organizing and accessing information.

Thompson et al. (1992: 57)

A type of program more likely to match Thompson et al.'s (1992) interpretation of hypermedia would be a software reference tool such as Microsoft's discontinued encyclopedia Encarta. In this, as in traditional paper encyclopedia's, one is not expected to read through the materials in a linear fashion but rather jump from topic to topic as need or interest dictates. Also, within each of Encarta's topics and definitions, one may well choose to follow separate hyperlinks that lead to distinct areas of inquiry just as one would follow a paper encyclopedia's linked subjects, often indicated through words set in small capitals or bold.

The difference, or advantage, of hypermedia is the possibility for easy access to various links within a program; selected referents are only a keystroke away. The word possibility has to be emphasized here; the design of interfaces differs from program to program affecting their ease of use. Similarly, multimedia links are selected and based on the perceptions of the program designer and may not mirror the needs of the learner. A multimedia program, by Thompson et al.'s (1992) definition, would be a program that uses several media, but only along a fixed linear path. For example, a children's storybook in which learners must start at the first page and continue reading to the end may only use extra media to provide incidental sound and visual effects to enhance the text. In a multimedia version, one might read the story of Peter and the Wolf and have opportunities to follow links and learn more about wolves or hear the Sergei Prokofiev musical interpretation.

However, these small (and now dated) distinctions are largely lost in the current literature on multimedia so, for the purposes of this book, the term multimedia is used to encompass the non-linear organization of text in hypertext and the non-linear and multiple information formats referred to in hypermedia.

N. Williams suggests that multimedia and the computer need no longer be differentiated:

'Both the hardware and the software of these technologies are converging, such that there is little point in trying to discriminate between them. Every-thing on the 1997 computer can be called 'multimedia'. Williams (1998: 153)

In the following discussion, many of the references to the theoretical basis and application of hypertext and hypermedia apply equally well to this definition of multimedia.

Module -24

ANTECEDENTS OF MULTIMEDIA

Topic No: 42

Science fiction and CALL, Affordances and Misaffordances, Interface

9.4 Antecedents of Multimedia

We have already discussed some examples of multimedia CALL programs from past decades, but in understanding multimedia, it is also useful to examine the earlier ideas that led to its formation. This historical perspective might not seem practical to modern CALL researchers, but an understanding of the ideas that went into creating modern computer applications might suggest new directions for research and development.

The idea of multimedia learning resources is not new. Some wistfully trace multimedia back to hypertext aspirations of Mr Casaubon in George Eliot's 1871 novel Middlemarch; his life's work is creating a textual set of grand connections among all knowledge. In 1945, Vannever Bush published an article titled As we may think in which he outlined plans for a desk-sized Memex (MEMory EXtension) System which would access and organize large amounts of information (Bush, 1945). Bush had built a mechanical computer at MIT and had been Director of Scientific Research for the American War Office during the Second World War, so he was already familiar with British and American efforts in constructing the first modern computers, the already mentioned Colossus and ENIAC machines. In the article, Bush notes that, after witnessing worldwide conflict, he was eager to turn the intellectual resources applied to warfare to more humanitarian and educational pursuits.

Although Bush's Memex was never built, the article describing it directly influenced Douglas Engelbart whose Stanford Research Institute laboratory developed many of the tools which would eventually make multimedia possible; the mouse pointing device, a windows interface, word processing and electronic mail were all developed there in the 1950s and 1960s. In the 1960s, Ted Nelson coined the terms hypertext and hypermedia although the concepts had already been established and were in general use by those with access to computers. Around the same time, a research scientist working in the area of computers, Alan Kay, introduced the idea of the graphical user interface (GUI) made up of icons to represent chains of textual commands, and, in 1968, the concept of a portable computer, which he called the Dynabook (Cotton and Oliver, 1993). The Dynabook looked very much like a modern laptop but was wildly impossible to turn into a reality given the technology of the time. This points to the importance of dreaming of the ideal when considering directions for the future.

9.5 Science fiction and CALL

Science fiction has long been a rich ground for speculation about the use of computers and, in many ways, serves to offer idealized visions of learning without concern for the constraints of technology that lag behind imagination. Many concepts that first appeared in science fiction have inspired developments in computing.

One of the techniques of science fiction is to analyze concepts for the irreducible meanings and then to synthesize new and sometimes surprising combinations of ideas out of that basic material.

Gunn (1995: 26)

Author William Gibson created the metaphor cyberspace in his 1984 science fiction novel Neuromancer. Cyberspace retains its original (and poetic) definition as 'a consensual hallucination' and 'a graphic representation of data (i.e. hypertext, hypermedia and multimedia)' (Gibson, 1984: 51). The basic idea is that when interactions take place online, such as within a simulated environment, they are taking place within cyberspace.

The sense of cyberspace as a meeting place has been developed in other novels by Gibson (1986, 1988) and Neal Stephenson (1995, 2000). In their virtual venues, simulated worlds are created and machines given avatars or online personalities that might be based on human forms, fanciful animals or even machines. In the novel Snowcrash, based on ideas of the fall of a modern Tower of Babel, a vast information/library data-base is given the appearance of a rumpled, friendly but almost infinitely knowledgeable librarian (Stephenson, 2000). Humans in the novel project themselves, or artistic interpretations of themselves, and interact as they would in the real world.

The use of human-like avatars was not far-fetched; the technology, although sometimes clumsy to manipulate with a keyboard or mouse, is already in place and widely used in gaming situations and social networking spaces such as Second Life (http://www.secondlife.com). The applications to CALL have not been widely exploited, partly because of the cognitive overhead of teaching second-language students how to use a service like Second Life outweighs any perceived benefits. However, for those already familiar with and active in Second Life, it might be an interesting platform for second-language instruction.

Conceptual ideas, along with electronic networks featuring services such as the WWW and physical collections of data on CD-ROMs and DVDs, have fostered the growth of multimedia as new learning resources, particularly for language learning. The principal qualities of multimedia that have made it useful are the types of information (text, images, sound, animation, video) that can be stored and, more importantly, the useful ways that multimedia can be used to search information, electronically developing Dr Johnson's second quality of knowledge after actually knowing a thing itself: knowing where to find it (Boswell, 1791). The contrary argument is that

the extensiveness of data available on media such as the WWW has made searching more, not less, difficult.

Virtual worlds and avatars

Virtual words can provide platforms for educational interaction

Affordances and Misaffordances

Affordances are the visual clues that an object gives to its use as well as what it is capable of doing in terms of both intended and unintended functions. A chair is for sitting on and the size of the seat suggests that it might be comfortable for that purpose, but the chair can also be stood upon or used as a weapon; these are other affordances. Affordances can be both obvious and learned. But an object can have both affordances and misaffordances. A misaffordance is something which distracts from an object's intended use. A misaffordance for a chair would be design features that disguised its purpose or interfered with its central purpose of being comfortably sat upon.

Misaffordances are common in software programs where, for example, flashing words or pictures distract from the purpose of reading.

Interface

Interface has already been mentioned in terms of Graphical User Interface (GUI). In pedagogical terms, an interface is the aspects of a computer that allow the user to have sensory interaction with a program. The screen can present an interface in many different ways, most of them controlled by a mouse cursor or by keyboard commands. On screen, one can use a mouse and keyboard – or even a finger with touch screens – for commands to press buttons, turn dials, move sliders and drag images and text from one place to another. Drop down menus, such as on the Microsoft Windows interface, are a widely used interface tool.

Interfaces, like computers, are largely pan-cultural phenomena, similar the world over because of the need for standardization and the reluctance of software and hardware manufacturers to localize products for small audiences. However, some interfaces in countries such as China are often navigated with graphics tablets on which the user can draw word characters. A few strokes often prompts one or more predicted choices (e.g. Chinese words with a sense of liquid might be prompted by the three-drop radical representing water) based on a combination of lexical context and what the program has learned from the most frequent choices of the learners.

Module -25

THE PRINTED BOOKS AND CALL

Topic No: 43

The printed book and CALL, The Print and Computer Revolutions, Applications to General Learning, Database and Search Engine, Applications of Multimedia to Language Learning

9.6 The printed book and CALL

Like modern multimedia, the printed book changed the nature of information through the ways in which ideas could be shared, recorded and explored. The increased access to information made possible by the book shifted the focus of education from an apprenticeship model of learning towards classroom-based instruction. Books also increased opportunities for autonomous self-directed learning in ways that have been dramatically extended by search engines and online encyclopedias on the WWW; people who never would have bothered to pick up an encyclopedia to check a fact, now routinely Google dozens of bits of information every day.

The Print and Computer Revolutions

Johannes Gutenberg's (1400 – 68) invention (or popularization, considering early Chinese and Korean innovations) of the moveable type printing press led to a proliferation of books that changed the world by changing the ways in which education could take place. In words that could equally well apply to the WWW today, information became more portable, cheaper and generally more accessible. Postman (1993) writes, 'Forty years after Gutenberg converted an old winepress into a printing machine with moveable type, there were presses in 110 cities in six countries. Fifty years after the press was invented, more than eight million books had been printed, almost all of them filled with information that had previously been unavailable to the average person' (p. 61).

Several authors (McLuhan 1962 – focusing on television; Birkerts, 1995; Hanson-Smith, n.d.) have linked current innovations in electronic publishing, and multimedia learning materials development occurred as the printed book changed the nature of information and knowledge established by the illuminated manuscript.

Some are critical of such comparisons, such as Johnson (1991) who mocks those who imagine, 'grandiose schemes of software/hardware interrelationships that resemble the cosmic attractions of the Middle Ages: layers of hierarchically related strata of reality teeming with agents of all kinds' (p. 272). However, since Johnson wrote the above, the WWW has begun to 'teem' with agents such as automated 'bots' which search and compare different kinds of information, such as the price of goods and services and 'spiders' which look throughout the entire web, documenting web pages for the use of search engines.

An increasingly important role of schools is to encourage learner autonomy to enable learning beyond the classroom. In other words, a principal role of schools is to provide learners with not just a body of knowledge, but the tools to modify and expand that knowledge beyond their formal classroom education. A concern of teachers has always been to push learners along a continuum of knowledge from novice to expert through transmitting critical thinking skills and strategies for learning as well as exploring ways in which learners may educate themselves. CALL helps in this process by increasing the resources available to learners out-side the classroom, the search tools for finding that information and the presentation of that information in multiple media.

S.A. Weyer outlines the organization of the traditional book:

A book may be written in a linear, page-oriented order that may be alphabetical, chronological, geographical or pedagogical in its organization. Pieces of information are related to each other by their physical proximity in a paragraph, on a page or on neighboring pages. A subject index provides access to parts of the book in some other order. A good teacher, a set of questions or the authors can help provide connections and cross references to seemingly distinct sections and ideas; footnotes (and parenthetical remarks) refer to details of minor interest, named references to figures and chapters lead to other pages, and bibliographic citations point to other books or articles. Weyer (1982: 88)

Weyer (1982) points out that the organizing devices of a book make it a useful tool for a reader whose needs match its organization. But Weyer also outlines the problems that occur when there is a mismatch between the learner's mental model of a body of a text and its organization and organizing devices.

S.A. Weyer on mismatches between learner needs and the organization of a text:

What happens, however, when your vocabulary, organization or perception of a subject domain does not match the ones provided? In deciding to read footnotes as soon as they are referenced,

you may suffer minor inconvenience by losing your place in the main narrative. You may have more difficulty in trying to find a word in a dictionary if you have misspelled it, know only to look for a synonym for it or know only how it sounds. How do you locate work 'related' to your own: by reading through everything about man–machine interfaces (for example), asking a colleague or attempting to specify a set of keywords or commonly used free-text terms for retrieval from some information system? Weyer (1982: 88)

Weyer (1982) answers his own questions about mismatches in the organization of a text explaining that learner's needs are largely solved by the use of hypertext references. To take Weyer's (1982) example of looking for a synonym, in some computer programs, a thesaurus link is explicitly indicated for the learner, such as the already mentioned hyper-text underlined blue mark-up hyperlinks that might connect a word to not just its dictionary definition, but also synonyms and antonyms. But, in other cases, such as a misspelling, the hypertext function is buried within a program. If, for example, a learner misspells phone as *fone, a computerized word-processing software program's spelling checker, such as that in Microsoft Word, underscores the word in red jagged line and offers possible correct spellings such as fine, foe, phone, fond, fore and font. Five of these words (fine, foe, fond, fore and font) have been pre-selected based on the likelihood of the learner making a typing mistake and, looking through a traditional paper dictionary, one might indeed find the latter three variations.

However, for phone, the learner would never find the correct spelling in the f section of the dictionary. In other cases, such integrated hypertext systems are also used for checking grammar, for example suggesting an additional s to complete subject–verb agreement or to change a clause from the passive to the active tense.

There are many other more advanced applications to which hypertext and multimedia are applicable. Several are noted in the following section.

9.7 Applications to General Learning

The above examples point out a few of the remedial aspects of hyper-text in reading and writing. Hypertext, hypermedia and multimedia also overcome other limitations of the book by making use of the computer's ability to search through vast databases of text and images and form new and unexpected links in the material. In an approach perhaps modelled on earlier cognitive approaches to learning, this is similar to the way that a learner fills out mental schema adding successive thoughts and ideas.

From the point of view of the learner, there are three main advantages to hypertext:

1. A hypertext footnote can be traced backwards and forwards to the referent or reference respectively.

2. A hypertext section can be referenced in several places within the text reducing the need for paraphrasing ideas that are used repetitively and ensuring consistency of information.

3. A hypertext reference can be visible at the same time as the text to which it refers; in a book one might need to turn to an appendix or even another book.

Conklin (1987) lists other beneficial features, but these mostly pertain to authors of hypertext, for example: ease of creating new references and the ability to structure information and customize documents. He also includes collaboration as a beneficial function of hypertext authoring. Traditionally, authoring was considered the domain of the professional/ commercial materials developer or the teacher acting as a materials developer. However, most of these functions can also be useful for learners if they are given the opportunity to create multimedia materials as part of their exploration of a knowledge base. An already mentioned application of this is the ALLP project, Dans le quartier Saint Gervais (In the Neighbourhood of Saint Gervais), that allows learners to make their own documentaries and multimedia documents from the source materials.

Database and Search Engine

A database is a corpus of information that is accessible for selection and reorganization by predetermined criteria, as simple as alphanumeric ordering or by more complicated searches, such as by semantic field. The information can be in the form of text, numbers, images, sounds or any other media. From the point of view of the user, the World Wide Web (WWW) is essentially a single database which one investigates with a search engine such as www.google.com. Search engines used to rely on organizing principles and efforts of teams of librarians, but with the exponential growth of the WWW search engines are now generally automated with computer programs that look for the highest incidence of one's search words or, in the case of www.google.com, for the number of other websites linked to websites featuring the search words.

9.8 Applications of Multimedia to Language Learning

Most of the above points that favour hypertext and hypermedia also favour multimedia. Key writings on hypertext were mainly published in the 1970s and 1980s. After this period, the focus and terminology shifts to multimedia even though much of the content and many of the issues

remain the same. The advantages to general learning are much the same for language learning. But there are also additional advantages more central to language learning. For example, Montali and Lewandowski (1996) review studies conducted with first-language secondary-school students favouring multimedia as a way of improving reading skills among average and less-skilled readers. They suggest that readers who enjoy reading tend to read more and are more motivated to read and that a computer can be useful in promoting interest.

J. Montali and L. Lewandowski discuss poor readers and the benefits of bimodal reading as a type of computer-based learning:

According to Paris and Winograd (1991), poor readers may harbor such anxiety about their abilities and expected failure that many will intentionally and effortfully avoid reading. Bimodal reading instruction may increase a child's motivation by providing a more successful reading experience for youngsters with disabilities. Moreover, (Montali and Lewandowski, 1996) demonstrated that poor readers not only feel more successful with bimodal presentation, but are more successful in terms of comprehending content. This type of reading program delivered via computer may offer one solution to some of the problems educators encounter with students who display reading difficulties.

Montali and Lewandowski (1996: 278)

Other advantages of hypertext and multimedia are in the promotion of autonomous language learning (see Benson, 2010, Benson and Lor, 1998, Benson and Voller, 1997). Learners who can take advantage of multimedia links to explore explanations and peripheral information can somewhat lower the teacher- centred ness of the classroom (i.e. learner dependence on the teacher as the sole source or arbitrator of information). A well-formed multimedia database of materials can also assist those young and second-language learners who lack dictionary and library search skills.

Examples of multimedia which distract the learner from the task are too common: inappropriate and unnecessary interruptions, such as flashing screens and senseless noises are what Hoogeveen would label incongruent. Hoogeveen (1995) suggests that learners' responses to multimedia interact in a complex way giving learners the feeling of experiencing information instead of simply acquiring it and improve:

1. learning (retention, understanding, knowledge acquisition), but also
2. the user-friendliness of user interfaces and thus man–machine interaction
3. the entertainment value of systems (i.e. more fun)

4. the impact of messages (e.g. during business presentations or com-mercials) (p. 351)

Many of these advantages can be seen as following constructivist models of instruction but, as will be seen in Chapter 7 in a discussion of models of learning, there are more complex dimensions to their place within both behaviourist and constructivist models of instruction in the classroom.

M. Hoogeveen suggests that quality multimedia, featuring a high degree of interactivity, congruence (the degree to which different information types are used redundantly to express the same ideas) and visual references lead to:

1. A high level of stimulation of the senses, at least with regard to the auditory and visual perception systems

2. A high level of involvement, attention, concentration

3. Emotional arousal, e.g., fun; the word arousal is used in the psychophysiological sense of emotional, internal arousal, related to arousal of the nervous system

4. Strong recognition effects, using mental reference models.

Hoogeveen (1995: 350)

What Hoogeveen says has not changed, simply because his points deal with basic psychological constructs. However, Hampel (2009) is among those who looks at the challenges of dealing with learning language online and suggests that beyond the affordances of the software program, teachers need specific skill sets in order to educate learners appropriately.

Source Reference:

1. **Teaching and Researching Computer-Assisted Language Learning,** 2nd edition by Ken Beatty Philip , First published in Great Britain in 2003, Second edition published 2010 © Pearson Education Limited 2003, 2010