

# The curriculum as a hypertext

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## SUMMARY

**In this paper the interdisciplinary nature of electronic publishing is addressed by raising two issues relating to the content and structure of an electronic publishing course. The first is whether it is possible to agree upon a generic curriculum, based on a set of headings or topics, which may be treated quite differently by those in different disciplines (e.g. typographers, computer scientists). The second related issue is whether it is appropriate to set down a single structure which puts topics under specific headings, given the interdisciplinary nature of the subject.**

A course on the theory of electronic publishing given to typography students is used as an example of the type of material that might be covered and how it may be structured. A HyperCard has been developed alongside part of this course. The way in which this subject fits in with the course in Typography & Graphic Communication as a whole is briefly described.

It is proposed that hypertext systems go some way towards providing students with alternative structures for organizing their knowledge of electronic publishing. This platform could therefore be used as the basis for a core curriculum from which various material is developed and structures created.

KEY WORDS Hypertext Electronic publishing Curriculum Document preparation Information retrieval

## 1 INTRODUCTION

### 1.1 What is electronic publishing?

One of the difficulties in teaching, or learning about, electronic publishing seems to be identifying the scope of the subject. It is probably wrong to attempt to define electronic publishing unless it is done in a very general way. Brailsford and Beach [1] adopt a general view, regarding electronic publishing as the use of computer science and electronics to present information.

The literature on electronic publishing does not appear to provide a framework for studying the subject. But, it is probably fair to say that any relatively new and expanding area lacks this global treatment. Topics may have been defined, but they cannot always be slotted neatly into an existing structure. If we attempt to do so, we may leave out whole areas of study. For example in using traditional publishing as a model for electronic publishing, we may fail to encompass innovation, or to address issues and products that only emerge with new technology (e.g. access to information, data protection, expert systems).

## 1.2 Approaches: users versus functions

It is likely that all those who choose to study electronic publishing interact with these systems in some way. However, it is simplistic to group all users together. Although we can specify types of people, e.g. computer scientists, typographers, editors, publishers, and more generally scientists versus humanists, much of the current technology breaks down these specializations. A desktop publisher may be an author, editor, copy editor, designer, production controller, picture researcher, keyboard operator, indexer, printer and binder. In practice, these roles are not made explicit and some may even be disregarded.

A more useful approach may be to identify uses of electronic publishing systems and to examine these. I have followed this approach by distinguishing two major functions: document preparation and information retrieval. More specifically, part of the curriculum is assigned to tools for input, writing, design and composition. Although types of users can be mapped onto these specific functions, this restricts the generality and flexibility of the curriculum. Within this framework, a typographer can learn about various stages in the publishing chain, about the hardware and software components of document preparation systems, whilst a computer scientist may appreciate aspects of design through evaluating design tools.

## 2 CURRICULUM DEVELOPMENT

### 2.1 Specialization

This approach supports the view that students from different disciplines will benefit from a broad outlook on the subject which cuts across any boundaries imposed by specific roles. It is difficult to argue against this general philosophy, but there is also a need for specialists. Those who design and build systems require a different type of knowledge from those who use and evaluate the system, although there is bound to be some overlap.

There are a number of alternative routes to specialization:

- a tailor-made curriculum for each discipline or specialization
- a broad-based curriculum (similar to the sum of the individual curricula) from which components are selected according to students' needs
- a generic curriculum with a set of core headings which are interpreted and elaborated upon according to the orientation of the particular discipline

The first alternative fails to exploit the interdisciplinary nature of the subject. Topics are likely to be examined only from the viewpoints held within the individual disciplines. The second approach may have similar weaknesses, but this will depend on how the individual curricula are combined. The more that generalities across the curricula are emphasized, the closer this alternative comes to being a generic curriculum.

### 2.2 Generic form

Although the generic curriculum appears the most parsimonious solution, it may require the most work to set up, as various disciplines must agree upon a set of headings. The difficulty of this task is likely to vary depending on the level of headings we wish to use, in other words the amount of detail that is specified in the course curriculum. However, the degree

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of difficulty in agreeing upon headings does not necessarily increase with greater detail. For instance, we may agree that the course should include such topics as word processing, graphics scanning and page makeup applications, but there could be debate as to which heading(s) they fall under.

I have used the analogy of the structure of a document to describe the basis of the curriculum. I am suggesting that to formulate a generic curriculum, we must attempt to separate the core outline from its interpretation or implementation (in a similar manner to SGML). But we need to decide the level at which we will set the core curriculum, the point at which individual interpretation begins.

### **2.3 Structure**

In developing a curriculum, it is necessary to define topics which can then be put into more general categories. Alternatively, general categories or headings are established and topics listed under these headings. Whether a top-down or bottom-up approach is used, this categorization, though useful in creating a structure, often obscures similarities between items that have been placed in separate categories. This result is inevitable if we classify topics using only one dimension, such as function.

However, a single structure is insufficient when dealing with an interdisciplinary subject. Each discipline may choose not only to put their own interpretation on the material they incorporate under a heading, but also choose to organize the material in a different way, e.g. classify according to the type of processing, rather than function.

The same principle can also be applied within one specialization, e.g. typography. A better understanding of electronic publishing is likely to come from a multidimensional approach which draws on different types of similarities between topics and offers alternative ways of structuring knowledge. Wilmott [2] suggests that SGML-based markup can capture structural relationships between items. This form of markup may be useful in developing documents for hypertext systems, which make these relationships explicit through building links.

## **3 ELECTRONIC PUBLISHING CURRICULUM AT READING**

### **3.1 Context**

The course in electronic publishing at Reading University can be used as an example to illustrate the above issues. This course is part of a degree in Typography & Graphic Communication. Students of typography come from quite a wide range of backgrounds. Although students of design, it is not a requirement that all students have studied art. The course deals with the communication of messages which can require logical thought, creative talent, organizational skills, etc. and draws upon various disciplines, such as history of art, linguistics, psychology, computer science.

As with other subject areas of the course, electronic publishing is taught through theory and practice. Practical work takes the form of projects which explore design problems using specific software tools. Some of these projects are real jobs, where a client provides the brief.

This paper deals only with the theory of electronic publishing. Although the practical work is closely related to some parts of the theory, there is a discrete set of lectures on the subject. A HyperCard system has been developed to support the lectures.

### 3.2 General approach

A broad interpretation of the term electronic publishing is taken such that digital typography is seen as synonymous with electronic publishing; desktop publishing is regarded as a subset of electronic publishing.

The subject is divided into two main areas: document preparation and information retrieval (Figures 1 and 2). But these two functions should not be seen as entirely discrete. There are general similarities between the two areas. For example, both systems have input, display, storage and processing components. Furthermore, we can also classify the source of information in information retrieval (multimedia products or databases) as structured documents and consider the preparation of these documents. These examples illustrate the need for a flexible classificatory structure which can incorporate cross-references or links between items which have been separated.

Nevertheless, some initial categorization is necessary, at the very least for convenience, but also to signal the orientation of the course, i.e. what is considered important. The distinction I have made focuses our attention either on the production of information (document preparation) or the receipt (information retrieval). One reason for this approach is that the design issues and their treatment may not be the same in both cases, although we would be advised to look for similarities.

### 3.3 Aims

The broad aims of the course are to:

- promote efficient use of computers as design tools
- analyse design aspects of electronic publishing systems
- examine current and past systems within the context of various industries, such as the publishing industry, the computer industry and the entertainment industry

To devise the material and structure of the course, these aims must be interpreted with regard to the more general interests, existing knowledge, and level of understanding of typography students. Some of these factors are:

- generally little technical knowledge, nor interest in technical detail
- some knowledge of publishing procedures
- an appreciation of design issues through other course work
- limited use of desktop publishing and associated tools

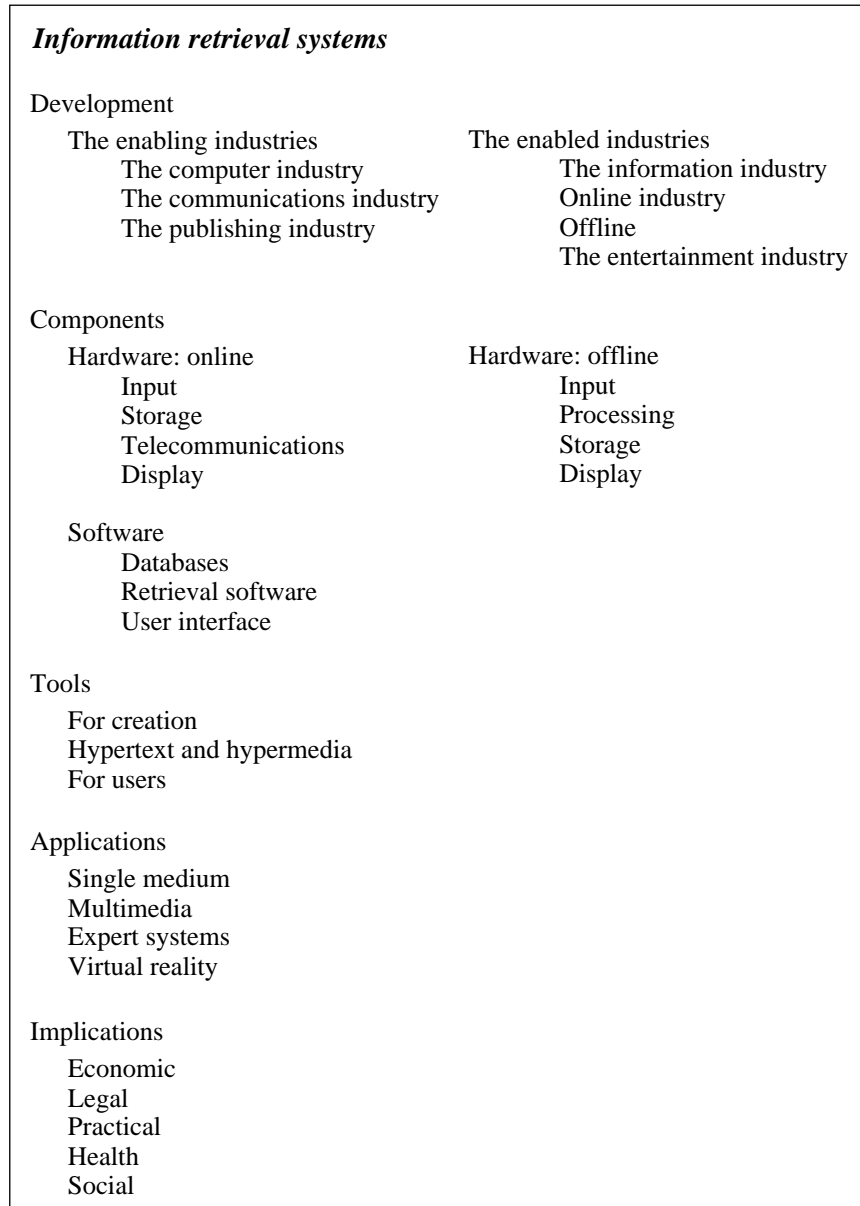
### 3.4 Treatment of material

I have developed a simple analytic treatment which can be applied to the main areas of electronic publishing. Essentially, we deal with the recent historical context (development), the common configuration of the systems (components), the software that has been developed for specific uses (tools) and the outcome of using these tools (applications and implications).

In treating the subject in this way, I have necessarily imposed my own interpretation on the material. This could be construed as a tailor-made curriculum, which cannot be developed into a generic or core curriculum. But, the material spans more than one discipline,

<i>Document preparation systems</i>	
Development	
<ul style="list-style-type: none"> <li>The computer industry               <ul style="list-style-type: none"> <li>Text editors</li> <li>Text formatters</li> <li>Word processors</li> <li>WP codes for typesetting</li> <li>Page makeup</li> <li>Desktop publishing</li> <li>Design issues</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>The publishing industry               <ul style="list-style-type: none"> <li>Generations in typesetting</li> <li>WP codes for typesetting</li> <li>Current systems</li> </ul> </li> </ul>
Components	
<ul style="list-style-type: none"> <li>Hardware               <ul style="list-style-type: none"> <li>Input methods</li> <li>Displays</li> <li>Storage</li> <li>Processing units</li> <li>Output devices</li> </ul> </li> <li>Markup systems               <ul style="list-style-type: none"> <li>Forms of markup</li> <li>Generalized markup</li> <li>Procedural markup</li> <li>Coding systems</li> <li>Style sheets</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Software               <ul style="list-style-type: none"> <li>Operating systems</li> <li>Font technology                   <ul style="list-style-type: none"> <li>commercial developments</li> <li>system 7</li> </ul> </li> <li>Programs</li> <li>File management</li> </ul> </li> </ul>
Tools	
<ul style="list-style-type: none"> <li>For writing               <ul style="list-style-type: none"> <li>Outlining</li> <li>Thesaurus</li> <li>Glossaries</li> <li>Spelling checks</li> <li>Punctuation checks</li> <li>Grammar checks</li> <li>Style checks</li> <li>General-purpose packages</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>For input               <ul style="list-style-type: none"> <li>Optical character recognition                   <ul style="list-style-type: none"> <li>OCR/ICR systems</li> </ul> </li> <li>Speech recognition</li> <li>Graphics scanning</li> <li>Graphics packages</li> </ul> </li> <li>For design and composition               <ul style="list-style-type: none"> <li>Page makeup applications</li> <li>Hyphenation and justification</li> <li>Table of contents</li> <li>Indexing</li> </ul> </li> </ul>
Classification	
<ul style="list-style-type: none"> <li>Function</li> <li>Process</li> <li>Instructions</li> <li>Display</li> <li>Interface</li> </ul>	

Figure 1. Part 1 of the course outline



*Figure 2. Part 2 of the course outline*

suggesting that at least some headings may be translatable into material for a course within a different discipline.

### 3.5 Course outline

An outline of the two parts of the course is given in [Figures 1](#) and [2](#). More detail is given for the first part on document preparation systems as this has been developed into the HyperCard system described below. The final part of the document preparation section is a simple classification which identifies five dimensions of the systems which emerge from the analysis.

## 4 SUPPORT MATERIAL

The development of the HyperCard was motivated by what I perceived to be missing from the literature of the subject: a framework for the study of electronic publishing. A hypertext environment seems to provide an ideal platform for tackling the issues of a core curriculum with flexibility in the choice and structure of material under specific headings.

### 4.1 Content

The HyperCard is based on the above outline of document preparation systems, with tutorials corresponding to each of the third level of headings (e.g. the computer industry, publishing industry, hardware, software). Each tutorial is broken down into smaller more manageable sections ([Figure 3](#)) which contain from one to nine screens or cards; most are not more than three cards. Each section is relatively short, the idea being to avoid extended periods of continuous reading from the screen. Sentences are also kept short and lists used where possible.

The tool is intended to be an accessible reference source, and generally contains key points. The level of detail may be compared to an encyclopaedia, with the entries arranged according to their content, rather than alphabetically.

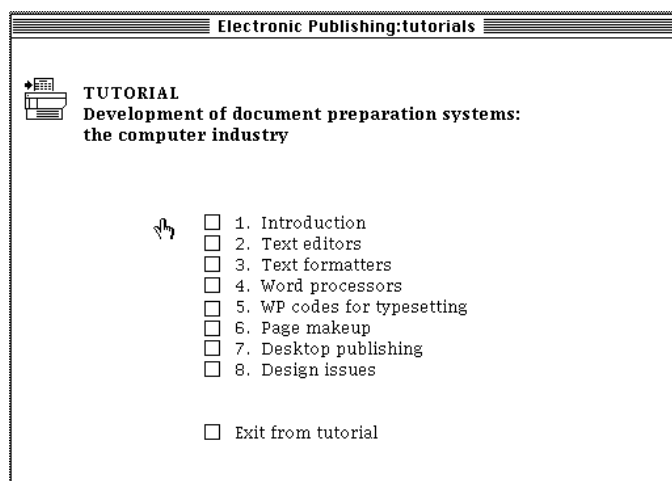


Figure 3. A HyperCard 'contents page' containing eight sections

## 4.2 Features

The HyperCard has a modular structure, made up of nine stacks. An ‘introduction’ provides an overview of the general area, but the main tutorial material is held in the stack ‘tutorials’ which has links to all the other stacks.

A main feature of this tool is the ease with which levels of information can be incorporated into the document and unfolded if desired (Figure 4). The top level is the text contained in the tutorials. Additional material is available in the form of:

- definitions of words which may be new to students, or which have a specific meaning
- references to articles or books which expand on a topic
- examples of items
- explanations or further information on topics
- illustrations of items

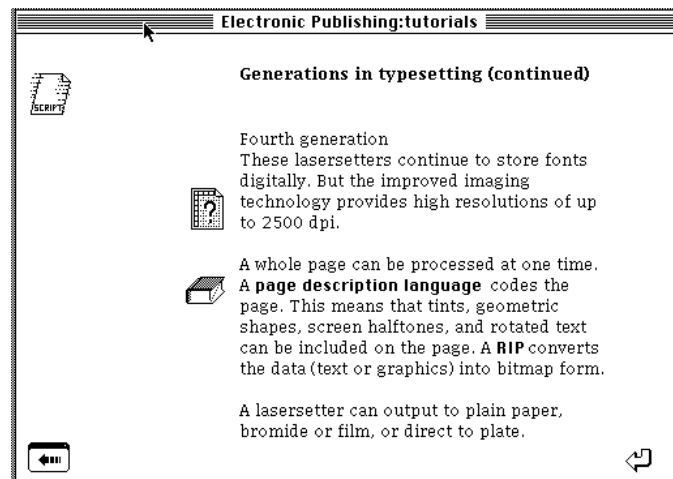


Figure 4. Additional information on laser imaging technology is made available through the query button. The book button reveals a reference on PostScript. Definitions of ‘page description language’ and ‘RIP’ are provided through clicking on the words in the text

I have also created a stack of ‘departmental facilities’ to provide students with familiar examples of some of the systems which are discussed.

This medium is ideal for encouraging students to pursue similarities between apparently discrete topics, and consequently to appreciate alternative ways of organizing information. On a general level, some of the connections between the two categories of document preparation and information retrieval systems have already been noted. More specific similarities between separate topics have been indicated in the hypertext. One example is the method of recognition using template matching which is applied in both speech recognition and optical character recognition.

To signal these relationships, links have been incorporated into the document, modifying the structure. They are implemented through pop-up buttons which give the section or topic



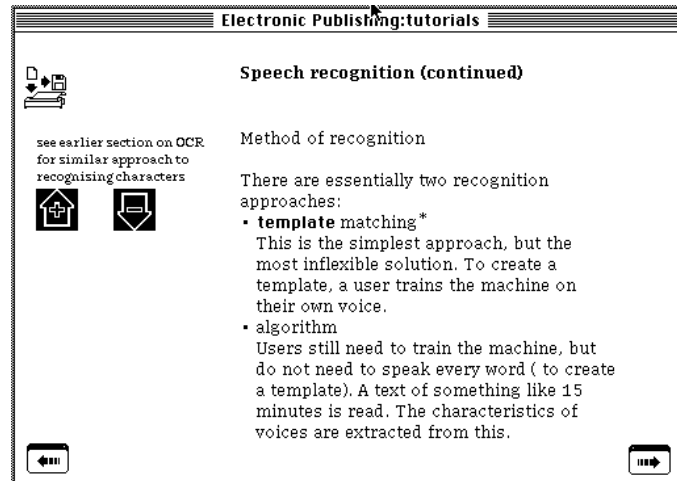


Figure 5. A card showing the method used to link different sections

name (Figure 5). The classification tutorial in particular encourages students to look at the material in different ways.

### 4.3 Problems

There are well-documented problems in navigating through documents of this nature, such as disorientation and cognitive overhead [3]. But, in a sense, I am trying to exploit these properties. I would like students to maintain several trails at once.

However, despite my aim to provide flexibility in structure, the HyperCard still imposes a primary organizational structure and it may be difficult to extract information that has no relation to the original structure imposed by the author [4]. Nevertheless, some links have been made between tutorials which cut across the primary categorization and users are able to move between different sections as easily as moving within sections.

## 5 CONCLUSION

Through reorganizing my course material over the last five years I have come to the conclusion that there is no one definitive structure for the study of electronic publishing. However, there is a conflict between the multidimensional nature of the subject and the need to provide structure. The major feature of hypertext, non-linearity, helps to resolve this conflict by providing a means of defining a core curriculum, at some level, and enabling various structures to emerge from this base of information.

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