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Educational Publishing and the World Wide Web

Ann Marion, Elizabeth H. Hacking

Abstract:

Publishers have long had an important role in education, producing books and other learning materials. Today, the publisher's role is changing fast with the platform evolution from stand-alone to networked computers. Print and the Web are compared, demonstrating that they will remain complementary. The publishers' traditional Value Chain is linear and one-way; it is operative in a stable, predictable environment, and accommodates mass production. This traditional Value Chain is evolving into a new Value Circle, which is iterative, with shorter product cycles, interaction between customers, authors and publishers to develop products and services, and "mass customization". Today, custom publishing efforts are already well underway. However, critical solutions are required for handling rights, royalties, and intellectual property protection; publishers are developing the Digital Object Identifier, new licensing standards, and experimenting with copy protection technologies. Key opportunities in emerging technology are discussed, including Metadata and query enhancement; work flow analysis and new tools that capture pedagogy; and contact management systems to capture and support customers. The emergence of repositories of software such as the Educational Object Economy are critiqued, with recommendations made for facilitation of electronic commerce. We review some basic business considerations. Our perspective is based on college publishing, the focus of the E/W Consortium on Authoring Tools, but all segments of publishing face similar concerns.

Keywords: education, publishing, textbook, college, licensing, copyright, faculty authors, faculty development, custom publishing, Digital Object Identifier (DOI), community, technology adoption, learning platform, networked computer, learning architecture, authoring tool, community of practice, Educational Object Economy (EOE), Value Chain, component architecture, interoperability, metadata, work flow, pedagogy, and contact management system.

Demonstrations:

Quicktime movies showing excerpts from *Chemisty:Interactive* are available at: <http://www-jime.open.ac.uk/98/2/beaker.html> and <http://www-jime.open.ac.uk/98/2/molecules.html>

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1. Introduction

Publishers have long had an important role in education, producing the books and other learning materials that have been the primary means of conveying knowledge from experts to students. Today, the publisher's role is changing with the rise of digital technology and the Internet. This paper discusses issues publishers face as we adapt to our changing educational function and create products for the digital environment. We also review some basic business considerations. Our perspective is based on college publishing, the focus of the East/West Consortium on Authoring Tools (Spohrer, Sumner and Buckingham Shum, 1998, this issue), but all segments of publishing face similar concerns.

College publishing is unique from other kinds of publishing in that the authors of college course materials and textbooks are faculty who not only understand their subject area, but have insight into how it is learned by students, and how it is taught by faculty. These faculty authors know that both subjects and pedagogy are constantly evolving. Other faculty who adopt their course materials will need to be able to modify the materials. Students who purchase the textbooks will have to find them useful to their studies. The college publisher has played a strong role as developer of course material. In addition to shaping a text to be useful to a broad spectrum of the targeted market, the college publisher develops a wide array of supporting materials (print and software) to enhance the usability of the core text. For example, introductory accounting texts are accompanied by as many as 100 supplemental materials for both teacher and student, specific to that text.

New Business Models are under development which have arisen out of new opportunities in the on-line environment. The emergence of repositories of software such as the Educational Object Economy are critiqued, with recommendations made for facilitation of electronic commerce.

2. Print Versus the Web: Advantages and Drawbacks

In recent years, technological innovations have given educational publishers a chance to use a variety of nonprint media, including audiotapes, videotapes, and CD-ROM. Now we are experimenting with a new technology: the Web. As we consider how the Web will affect our business and how we can best use it to meet the changing needs of our customers, we must examine it from two perspectives – as an educational tool for authors, instructors, and students, and as a source of profitable business. Accordingly, we are evaluating its role as a complement to and a substitute for print, researching how it will influence the learning process, and examining what forms of Web use professors and students are likely to welcome into teaching and learning environments, wherever they take place. More generally, we are considering all network systems, networkable media, and how they can be integrated into off-line media.

One consequence the new technology has already produced is an awareness of the limits traditional print has imposed on educational publishers. There are several. First, printed materials require long development periods, but once published they are static and quickly outdated. Second, in attempting to be all things to all teachers and reach the broadest possible audience, authors and editors may create large, unwieldy texts, from which professors must excerpt what they need. At the K-12 level, the challenge is to prepare materials for nationwide consumption while accommodating different localities, who may use different frameworks for teaching reading or math or whose preferences for coverage may differ starkly on such topics as evolution and sex education.

A third limitation of print is that it can only present information in a two-dimensional format. Some students learn better through auditory, kinesthetic, or other means. Because the Web offers such a rich variety of visual and auditory displays, it can accommodate students who have "other ways of knowing," (Gardner, 1993). A related issue is that print alone is not well suited to helping students move back and forth between concrete and abstract thinking, (Bruner, 1974). By presenting a broader array of learning options, websites and other media can potentially improve students' grasp of concepts and their interrelationships. [1] Houghton Mifflin's new *Chemistry Fourth Edition* by Zumdahl (1997), for instance, includes a CD-ROM that reinforces understanding of chemistry concepts by allowing students to see the relationships between the macroscopic (real-world) event and its atomic-level underpinnings (Figure 1) and to link both of these to the types of problems they are asked to solve in chemistry courses in Chemistry: Interactive Plus (1997). Furthermore, for $10, students get six months of access to an entertaining site devoted to chemistry education, *The Chemistry Place* [2] , Peregrine Publishers, developed with the authors (Figure 2). A second Houghton Mifflin site is *The Chemistry Resource Center for Instructors of Chemistry* [3] which offers extensive on-line resources, including a *Molecule of the Month* feature (Figure 3) which can be viewed and manipulated in three-dimensions using Chime (1997).

1 *Houghton Mifflin Company. Boston, Mass. USA. <http://www.hmco.com>*

2 *The Chemistry Place. Peregrine Publishers, Inc. (PPI) Wakefield, Mass. USA. <http://www.chemplace.com>*

3 *Chemistry Resource Center for Instructors of Chemistry. Dix, James (ed) Houghton Mifflin Company, Boston, Mass. USA. <http://www.hmco.com/hmco/college/chemistry/resourcesite/resource.htm>*

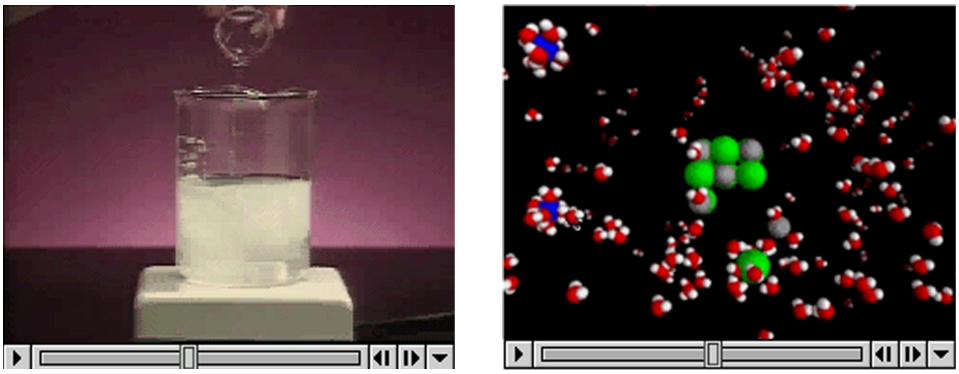

Figure 1: *Side by side illustrations of a macroscopic (real-world) event and atomic-level underpinnings linked to types of problems students are asked to solve in chemistry courses (Chemistry: Interactive Plus 1997). (The Web version of this article provides video clips from this material)*

> *Exploration: Precipitation Reactions: "An example of a precipitation reaction is the formation of insoluble silver chloride when solutions of silver nitrate and sodium chloride are mixed."*

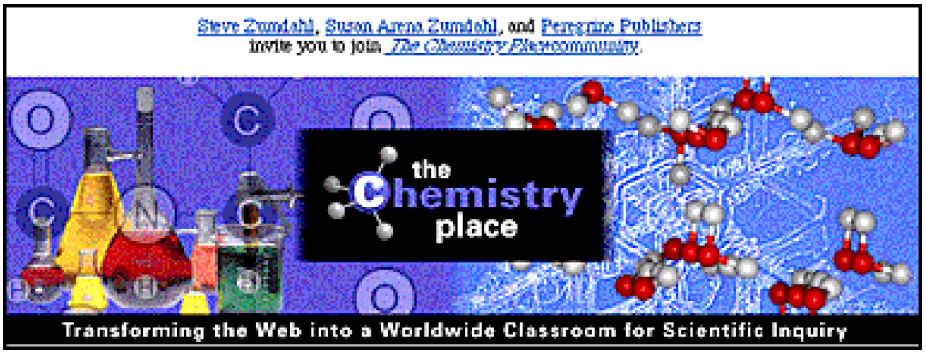

Figure 2: *The Chemistry Place*

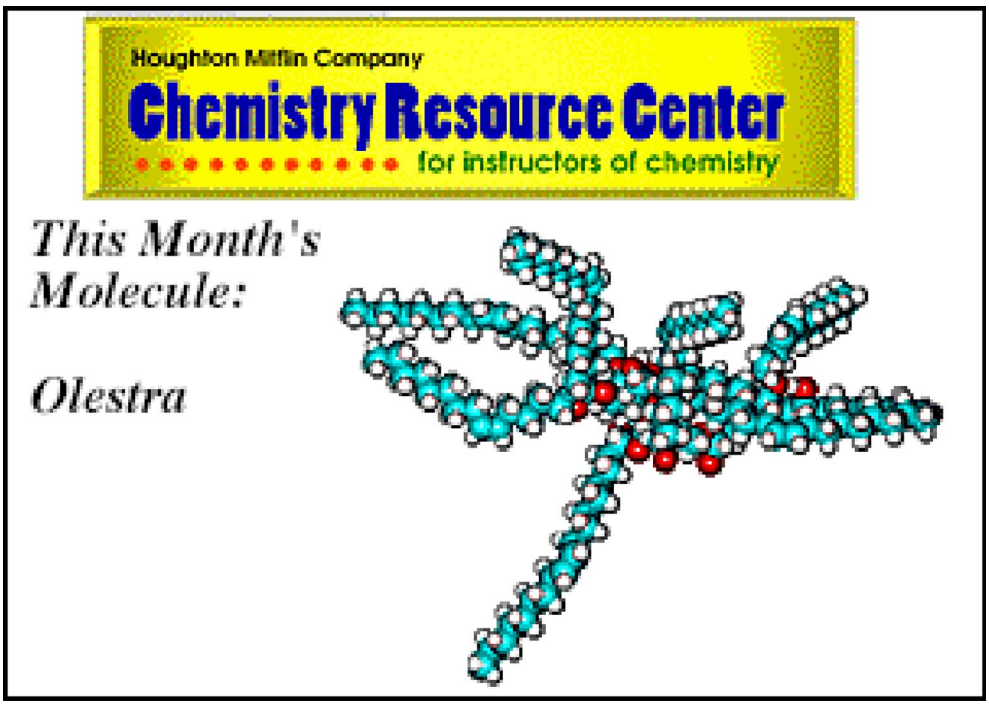

Figure 3: *Molecule of the Month: Olestra (Dix 1997)*

A fourth limitation is the lack of interactivity. For many years, publishers have tried to mitigate some of the other limitations of print by using it in tandem with broadcast television or videotapes, but these combinations lack real interactive capability. The Web is uniquely able to remedy this shortcoming by allowing links to additional sites and encouraging electronic communications with faculty and other learners for discussion and clarification. In Houghton Mifflin Interactive's *Online* [4], for example, users can ask questions of expert birders, participate in various forums, practice bird identification with "*Skill Builders*" and "*ID Challenge*" features, keep up with sightings of rare birds, and link to dozens of other sites, as the user's desires dictate.

Print has some disadvantages, but that does not mean its death knell has been sounded. Print also has some powerful advantages. First among them is that compared to today's computers, books are utterly "user-friendly"; we may sometimes be tempted to fling a book across the room, but never because we can't figure out how it works. Using computers and navigating the Web, on the other hand, can be an inefficient, anxiety-ridden experiences. Another issue is expense.

4 *Peterson OnLine. Houghton Mifflin Interactive, Somerville, Mass. USA. <http://www.petersononline.com>*

Although the price of technology continues to descend as power increases, current low-end computers cost ten to fifteen times as much as textbooks.

Books are more convenient than computers. They are easier to carry around and "set up" than laptops. And they are reliable – we needn't fear that someday we'll open our book to find that the pages are blank, or worse yet, that the book has devolved back into a pile of moist wood chips because a power line somewhere got struck by lightning.

Finally, books are presently more reliable archives than the Web. The Web is dynamic, susceptible to continual change, and at present we don't know what the life of digital archives will be. The static nature of print, which can be a liability, can also be a virtue. Once you have a book, you have it for a long time.

3. The On-line Learning Community

Print, then, is unlikely to be completely replaced by digital media anytime soon. And as with print, so it will be with many other aspects of academia. Schools and colleges will not lightly surrender valued elements of traditional, book-based education.

One of the most important of these elements is the university environment itself. When students buy a book, they purchase more than just the text and illustrations – they buy instructional materials designed to be used in a supportive university environment, staffed with faculty who interpret them for students. The pedagogical requirements of learning materials has been generously described elsewhere (see Laurillard, 1993). What is critical for future development is a better process for simultaneous design, development, and customization of integrated pedagogical materials in multiple media. We anticipate that this will be a continuous, long process, which will close the loop between students, faculty, faculty authors, and publishers. We emphasize here that we must ground such new processes at the very source of pedagogical concern, the community of faculty.

Students, faculty, faculty-student relationships, long-term alliances among groups of students, instructional materials, and supporting facets of the academic community constitute a whole that is greater than its parts: the learning community. A central focus of the learning community is the educational community of practice through which instructors attempt to determine the best way to educate their students. Communities of practice have always existed among educators. For centuries such communities have discussed how to apply the thinking of the day to their respective fields, how to balance theory and example, what level of discovery learning is best, and how to explore intellectual and cultural heritage with students. These communities share their teaching experiences through workshops and convene around pedagogical strategies

and techniques, and, most germane to publishers' current situation, around tools.

For educational publishers to integrate these tools into their businesses, we need to provide new kinds of products and services that address changing university budgets, increasingly diverse student requirements, and a host of other issues. To do so, we need to be able to draw on the creativity and expertise of educators and authors to create the digital equivalents of learning communities. A community that uses new, digital tools is emerging from existing educational practice communities, and in efforts to improve digital tools the involvement of these experienced teachers is crucial. Already, Houghton Mifflin and other publishers are supporting communities of practice with email , online discussions, and listserves, such as Chem Resource. Organizations which support on-line discussion groups for educators are numerous, including ACW [5]; CCCC [6]; CAUSE [7]; NWCA [8], Syllabus [9]. Indeed, the Internet itself was originally developed and supported by the US federal government as a means for researchers to more readily share their research findings. Clearly, the role publishers already play with faculty, authors, and students on campuses can be extended to ensure that a strong community develops on-line.

Two concepts are especially useful in that they provide a framework for understanding this transition and what it means to educational publishing – the value chain and the educational object economy.

4. The Traditional Value Chain

"Value chain" is a term for the circuit a product takes from the point of its inception until it reaches the customer (Hill and Jones, 1998). At each stage, value is added to the product. The

5 *The Alliance for Computers and Writing (ACW). Bateson, T. (Gallaudet University), and Kemp, F. (co-directors), Department of English, Texas Tech University, Lubbock, TX. USA. <http://english.ttu.edu/acw>*

6 *48th Conference on College Composition & Communication, Phoenix, AR, USA. March 12-15. Sponsored by National Council of Teachers of English (NCTE).*

7 *CAUSE: the association for managing and using information resources in higher education. University of Colorado, Boulder, Co. USA. <http://cause-www.colorado.edu/cause.html*

8 *National Writing Centers Association (NWCA).: Colgate University, Hamilton, NY. <http://www2.colgate.edu/diw/NWCA.html>*

9 *About Syllabus Press. SyllabusWeb, Syllabus Press: San Jose, Ca. USA. <http://www.syllabus.com/about.html>*

value chain is not a "business" model used to track how price increases accrue to the customer; rather, it describes the process through which products and services gain value for the customer. The value chain might include editors who help authors share and refine their ideas to better meet customers' needs; salespeople who interpret customer requirements and explain to customers how they can adapt the product to meet them; a distribution system that makes it easy for customers to get what they need when they need it; and service and support of the product after sale.

To give a simple example, the value chain for milk begins with the farmer who raises the cows that produce the milk. It is picked up from the farmer by a trucker, who transports it to a central processing plant. There the milk is pasteurized, homogenized, processed and graded into different fat contents, and bottled. It is then shipped from the processor to a wholesaler, or perhaps directly to a retail store, where it is displayed and purchased by the consumer. In this example, the actual product, the milk itself, is produced in the early stages of the chain, but a barrel of milk on a farm is of no use to most consumers. Participants in later stages of the value chain add value to the product by ensuring that the milk is healthy, and by packaging and transporting it for the consumer's convenience. At each stage, the product gains in value. In the sense that we use the term here, "value" is often correlated with monetary value, but it is not necessarily synonymous with it. Adding vitamin D to milk, for instance, may have a negligible effect on cost but still adds value because it's something consumers appreciate.

Comparing the value chain for a traditional print textbook with the value chain associated with digital products is a good way to grasp both the nature and the magnitude of the changes we anticipate in educational publishing. The value chain for a traditional textbook can be divided into five stages (see Figure 4): creation of the concept, development and production, manufacturing, marketing and sales, and distribution. In the creation stage, the publisher and/or author conceives of the project and writes, or aggregates, the materials, such as the manuscript, original source documents, photos, illustrations, and maps. Then the publisher develops the manuscript editorially, helping authors shape their ideas into coherent, pedagogically grounded presentations that respond to customers' needs as determined through market research and academic reviews. During production, the manuscript is readied for printing. In the manufacturing stage, the product is produced in the appropriate quantities. The marketing stage involves advertising and selling to encourage faculty to adopt the book. The distribution process entails storing the books in warehouses, shipping, and finally selling the book in campus bookstores.

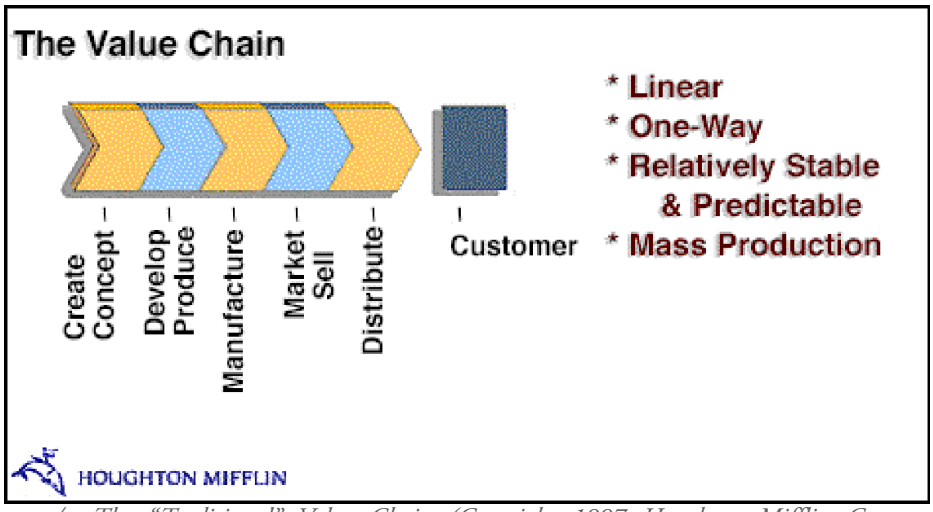

Figure 4: *The "Traditional" Value Chain (Copyright 1997 Houghton Mifflin Company)*

This traditional process has several defining characteristics. First, it is linear – a textbook project begins at a certain point and proceeds systematically through a series of steps. Second, it is a one-way process; eventual customers have little **direct** influence on the process. Third, the process works well in a relatively stable and predictable market environment, and last, the process lends itself to mass production.

5. The Emerging Digital Value Circle

The value "circle" of the digital world differs strikingly from the traditional value "chain", and to those accustomed to the traditional process, it seems far more complex. Some elements of the value chain will contribute in new ways to the digital value circle, some will join the process for the first time, and others will disappear from it. Participants in the value circle (see Figure 5) interact more frequently, and these interactions drive customization of products and services. The consequence is an increasingly intimate integration of customer needs with publishers' products and services.

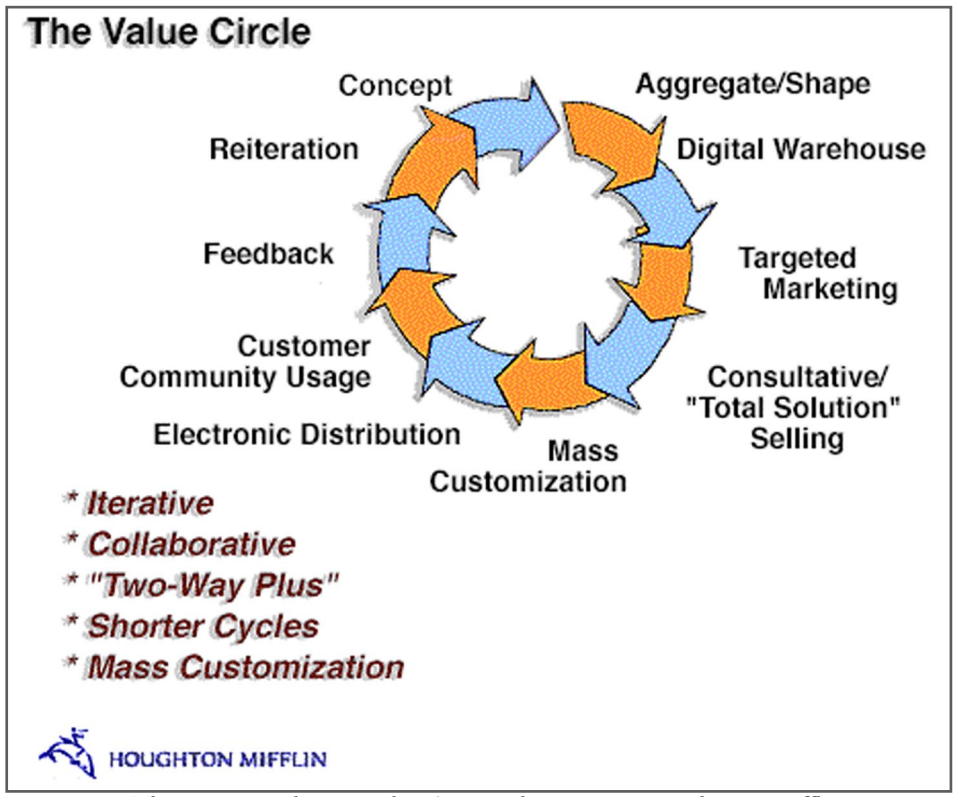

Figure 5: *The New Value Circle (Copyright 1997 Houghton Mifflin Company)*

Like the traditional Value Chain, the *digital Value Circle* begins with conceptualization, but analogous steps in the two processes are pursued in different ways. Once a publisher and/or author conceives of a new product or service, we again proceed through a period of aggregation. In the future, however, this may entail recombining aggregations produced by others; indeed, it already does to some extent. Consider, for instance, an article on the relative merits of the "whole language" and phonics approaches to teaching reading, written by an advocate of the whole language approach and published in a scholarly journal. A college publisher might "bundle" this article with others from different sources and by different authors with diverse perspectives, and add this "package" of original materials to the college publisher's own general overview of the topic. Subsequently, the material will evolve, perhaps in different directions, as it is disseminated and re-aggregated again and again.

After aggregation, the material is developed for the appropriate medium, such as CD-ROM or

a website. If it is in digital form, it is stored in a "digital warehouse." Marketing efforts are aimed at specific target buyers; the goal is to meet their needs comprehensively. Distribution to buyers may be via electronic means, as traditional paper products, or both. Note that the use of digital technology affects the process through which a product is produced. It doesn't necessarily dictate that the final product will be entirely electronic, although many probably will be. A value-circle process could also result in a product printed on paper. Customers using the products can be in continual contact with the publishers through electronic means or publishers' representatives to provide feedback to editors, authors and webmasters. Because digital products can be revised in part more readily than paper products – to revise a chapter in a textbook, the entire book must be reprinted – it is much easier, in theory, for digital products to continually evolve to better meet buyers' needs.

The defining characteristics of this process differ significantly from those of the traditional process. First, the Value Circle is iterative, not linear; steps may be repeated as publishers collaborate with customers to meet their total needs. This collaboration may not be limited to just the publisher and a single customer; value may be added through the interaction of a *community* of customers organized and "managed" by the publisher ("two-way plus"). Cycles are shorter, measured not in years but perhaps eventually in periods as short as weeks or even days. Finally, rather than trying to satisfy the broadest possible spectrum of buyers with one product, this process permits mass customization, perhaps through offering an array of "treatments" of various topics, from which buyers can choose to assemble precisely the teaching materials they want.

6. The Educational Object Economy

University researchers, government agencies, and some technology companies are fostering the idea of an *educational object economy* (EOE). Jamie Dinkelacker, a Netscape communications scientist, has articulated a view of how this new digital environment could be used and organized. He envisions Web-based marketplaces that will foster transactions of digital "objects," such as templates, tools, plug-ins, components, lessons, simulations, MPEGs, and other software items. The "*object economy*" based on these marketplaces would consist of a broad range of providers spanning the private and public economic sectors. Objects could be bought, sold, shared, or distributed via secure servers by anyone from anywhere. Publishers would make money through licensing arrangements and perhaps tallies of end users, Dinkelacker (1997) suggests.

This view of the object economy posits a new wave of software interoperability. Large proprietary software programs would give way to interoperable programs, and all applications, browsers, and databases could be viewed and used inside each other (IBM 1997). Software

would be designed such that components could be sold separately and linked with those from different vendors, one of the goals of on-line software exchanges such as the Educational Object Economy.

This is of particular interest to us (the authors), as this goal seems to reflect the goals of developing a "Value Circle". The Value Circle depends on components which can be re-aggregated and customized. It also depends on a community of partners who assume different roles in re-agregation and customization.

Of particular interest are marketplaces dealing in "*knowledge objects*" – software tailored for education, expertise transfer, performance support, personal development, and coaching. In the object economy, faculty and publishers would use multiple tools and content from numerous sources to create customized courses. What's more, products selected could then be digitally modified by professors, students, other authors, and even other publishers. As Dinkelacker (1997) notes, this arrangement would "create new economic vistas with astonishing opportunities for enterprises and enterprising individuals."

In a business climate of continuous changes, the strategic vision of the educational object economy proposed by the East-West Consortium is unique in that it assumes that the structure of the environment will be fundamentally chaotic. Jim Spohrer (Principal Investigator, East-West Consortium, and Senior Researcher, Apple Computer) and John Lilly (Senior Researcher, Apple Computer), together with the East/West Authoring Tools group, are creating a site to address this disorganization.

Spohrer and Lilly claim that discussions, explorations, simulations, and stories are the most appropriate learning environments for the Web, and the distributed, community-oriented nature of these environments suggests that equally distributed community-oriented development paradigms might be the most economical. Their goal is to build a system which will not only allow us to produce most economically the next generation of learning environments for the Web, but will help us develop modes of production that actually welcome and even encourage platform shifts, because they (1) reduce the barrier to create new objects, (2) exponentially raise the number of different objects being produced, and (3) include community characteristics which encourage experimentation and allow members to effectively leverage work done by other members (see Spohrer, *et al.* 1998, and the EOE site [10] for further discussions of these aims).

The Educational Object Economy is an ideal. The first few broad strokes have coalesced around the idea of a java code repository for the community of java developers. To reach the target goal which Spohrer and Lilly describe, new, as yet un-built mechanisms for commerce must be

10 *Educational Object Economy, The EOE Foundation <http://www.eoe.org>*

invented and implemented. We describe some of these in this article as "The Value Circle" which is also a projection into the future, requiring invention.

Many aspects of electronic commerce, such as those described by Stefik (1997), are not operative yet. One example is the critical labeling of on-line goods. Houghton Mifflin, with the University of Massachusetts, has conducted a survey of the labeling of EOE objects using *IMS MetaData* [11] (see Rinat Haimovitz and Beverly Woolfe 1998). In addition to incomplete and missing labels, there is a need for new categories, and new mechanisms for search and retrieval. Labeling is challenging also because of the diversity of objects, and the diverse backgrounds of people who post objects. Some of the objects were written by professors for use in their own classes, others were submitted by java developers. At the present time there are few references to syllabuses, or lesson plans demonstrating how an applet might be used in presenting a complete course.

Spohrer and Lilly also claim that the biggest single critical success factor in making the EOE economy go is building a strong community around it, with implicit and explicit roles, just as in any real world community. Those connections and interpersonal roles should address some of the deficiencies that will arise from a pure technology solution. "Going critical" will require a community of partners who assume business roles, such as in a "Value Circle" These participants need coordination and systems to support on-going coordination. This has not yet happened, although some technology companies such as the members of CAUSE have assumed leadership roles in promoting cross industry discussions surrounding standards.

The existence of "trusted systems" which Stefik (1997) describes seems decades from practicality for publishers. Security measures which are commercially available today are prohibitively expensive for the protection of individual titles. Some of these are described in Section 8 of this article. To be effective in use, what are now unique and disparate security measures need to be integrated into one unified system which is embedded into the process of taking on-line courses. New licensing or financial arrangements which would allow publishers to amortize such investments across their entire product line are required.

We anticipate that publishers will first use the EOE in the process of developing college courses, to review software for potential inclusion in a course. It would be advantageous to be able to sort objects by their licenses, to see if they were available for commercial use. It would be likely that publishers would require changes to the software, or customized application of the software, so having a mechanism for communicating with the object's originator would be useful. Also

11 *Instructional Management Systems Project (IMS). website, a National Learning Infrastructure (NLII) Project, directed by Educom. California State University Center for Distributed Learning, www.cdl.edu, Sonoma State University, Rohert Park, Ca, USA. <http://www.imsproject.org>*

useful would be to know what other third parties might be interested in doing the customization work. Newly customized objects would probably have to be made available for sale to schools and students who bought the course in which they were included, hence mechanisms for purchasing their use in the course must be possible.

We do not anticipate that faculty will directly access the EOE until additional layers are built. This may be a role for publishers.

7. The Transition from Print to Digital Media

This is a challenging time for publishers as we try to understand the nature and pace of the digital transformation and how we should change in order to respond with agility. These internal changes are not simply a matter of reconfiguring the old processes and information systems. Rather, they entail a substantial move from the language and culture of print to the language and culture of computers. The transition has already begun.

Critics of the publishing establishment sometimes propose that the future presents a stark choice between print and technology. We believe, in contrast, that print will be around for a long time, but that how it is used in college publishing will unquestionably be changed. The college publishers' product, formerly a textbook, is now what has been termed a "continuous solution" available in a variety of packages. Different instructors can adopt the same course, yet choose the presentation that suits them best: paper textbooks, which will increasingly be custom printed; fully on-line courses; or some combination of print, multimedia, and self-paced interactive modules. Realizing that the future is already upon us, one problem publishers face is knowing the optimal speed for introducing new products and delivery systems. It is difficult at best to gauge how fast new technology will be adopted, how training will proceed, when new platforms and networks will become available, and when reliable procedures for secure transactions and rights tracking will be available. During a period of transition, many futures are possible. Essentially betting the company on any assumption about how the digital world will evolve is a bad idea. Many companies that tried brave initiatives at the wrong moment are now out of business. To understand what is happening and to be prepared to adapt, developers and publishers need to experiment. So do our customers, who must learn to "consume" in a new way.

The working solution is to give customers choice over how products are packaged. Some college publishers have already begun work in this realm, using the Web as a tool to customize instructional materials to meet the needs of different professors.

How will these changes in process and product affect publishers? Comprehensively, we may be

sure. The sequence in producing educational materials will no longer move in a simple straight line from author to publisher to institution to end user. Because the process is cyclical, the product will undergo continuous improvement. Publishers will have to learn new ways to involve customers in product development. Like software developers, we may send "prototype" products into the marketplace to begin learning about customer reactions. Users will offer feedback on their experiences, perhaps through customer service representatives, who will communicate directly with product managers to modify the next version of the product. Rather than merely acting as advisors or reviewers as they do now, customers will be the decision-makers, choosing to use some material "as is," adapting others to their needs, and creating from a variety of constituents the array of materials that best meets their unique requirements.

The authors' role will change from writing and revising their texts in a linear process once every three or four years, to continuous involvement when substantive changes are required. Given that authors of college texts usually are full-time professors with research and teaching responsibilities, this more on-going authoring process of a textbook may be onerous to some. Creating content for a web environment that demands more frequent up-dating and creation of new pages and new linkages is a very different experience and process for authors and editors alike. Publishers will seek authors who, in addition to being experts in their fields and inspiring teachers, understand how to incorporate new technologies to enrich the teaching and learning experiences.

Job roles in publishing companies are changing as we move to this new environment, often growing broader and less clearly defined. Some traditional roles will disappear and other, new ones will arise. Editors will continue to focus on building a close and trusting relationship with authors, but their jobs increasingly will move closer to those of webmasters, in terms of more rapid creation and development of content. Marketing positions are quietly evolving with new technology tools available to conduct market research and create communities of interested constituencies – editors, sales representatives, authors, customers. Sales representative positions are also changing; laptops enable them to transfer their knowledge of customers into databases that are the foundations for segmentation, targeted marketing, and customized materials and services.

While these job transitions create angst, many employees find the new environment invigorating and want to learn new skills so they won't be left behind. Training takes place in both formal sessions and informal mentoring, often by younger employees who now enter the job market with knowledge of and facility with a variety of technologies, as well as a keener sensibility about the uses and vagaries of the web environment.

An important issue for publishers is to develop new business models that take into account these

changes in relationships among creators, developers, and end users. After-sales service, not a significant part of the traditional process, will be very important in the new system. Houghton Mifflin has already begun to develop such new services, offering the *Faculty Development Program* [12] . In response to changing university budgets and the increasing diversity of student requirements, publishers will need to bundle new kinds of products and services, and be well situated to do so. How these issues may manifest themselves in practical terms will be evident from additional discussions and some specific examples later in this paper.

The value that college publishers have traditionally added in transforming professors' ideas, course structure, and syllabus from raw manuscript to finished textbooks with multiple accompanying supplemental materials is akin to Laurillard's contrast between information and knowledge. Publishers work closely with authors to select, analyze, interpret, integrate, articulate, test in applications, and evaluate (Laurillard 1993). A publisher's added value is even greater in the Value Circle, particularly in the aggregations of bundled third party enhancements; digital warehousing and data mining; and in organizing and facilitating communities of users.

Revolutionary changes will also take place in the economic aspects of publishing. Publishers and their new value-circle partners in technology and other areas of expertise are inventing and evaluating new theoretical bases for developing on-line business, articulated by Hagel and Armstrong (1997) and Utterback (1996). A perspective that has attracted a great deal of attention from government authorities is the educational object economy.

7.1 Complementary Media: Print Supported by the Web

7.1.1 Web-based Custom Publishing

As the digital environment evolves, college publishers have been searching for ways to capitalize on the Web's current potential while maintaining their core business of producing textbooks. An avenue several companies have pursued is to display an array of materials on the Web. Professors review the selections and choose those they would like to use in their classes; they can also include text they have written themselves. The publisher then prints and binds the selections into customized volumes and sells them essentially as they would a traditional textbook.

One such effort was undertaken by the College Division of McGraw-Hill [13] , in conjunction with Kodak and R. R. Donnelly, which began to offer custom publishing through its Primis unit in 1989. The database consisted of content written specifically for the database, material from the public domain, material owned by McGraw-Hill, and content licensed from other sources,

12 *Faculty Development Programs. Houghton Mifflin Company: Boston, Mass. USA. <http://www.facultytraining.com>*

such as cases from the Harvard Business School. Customers selected what they wanted from the database, and it was printed on demand by high-speed Kodak printers.

The *Primis* effort was both ground-breaking and expensive. Moving material originally prepared for books into another, very different medium was troublesome. Securing permission to publish material on-line was extremely difficult, and sometimes impossible. Another difficulty was that *Primis* sales representatives had to spend a great deal of time walking faculty through the ordering process. Converting traditional books into the proper format proved to be expensive, as was meeting the demand for free sample copies. However, these problems have apparently been overcome. According to *The McGraw-Hill Companies Annual Report for 1996* (see McGraw-Hill, 1996), there has been "double-digit revenue growth" from Primis and "increasing demand for customized course materials and multimedia products in [the] college market."

Houghton Mifflin's College Division is working on a number of Web initiatives. Since February 1996, *Bibliobase: Custom Coursepacks for U.S. History* (Figure 6) has been available on the College website [14]. History instructors can search Houghton's database of 600 primary source documents and place an on-line order for custom-printed books, which are printed on demand and shipped within two weeks. Bibliobase avoided the permissions issue by only using public domain materials.

7.1.2 Supporting Print on the Web

During this time of transition, most college publishers make money primarily from paper products and digital ancillaries bundled as part of the overall price. Because professors' access to and interest in computers varies so much, publishers must offer course materials that can be used without them. At the same time, our offerings of digital elements – CD-ROMs for students, websites with resource materials, tests on floppy disks for professors to print out – help make our textbooks competitive in the marketplace. We do not charge separately for most of these expensive electronic ancillaries; they are considered part of the overall textbook program.

13 *Primis Custom Publishing McGraw-Hill Higher Education, Burr Ridge, IL. USA. <http://www.mhhe.com/primis>*

14 *Bibliobase. Houghton Mifflin, Boston, Mass. USA.<http://www.beacon.com/bibliobase>*

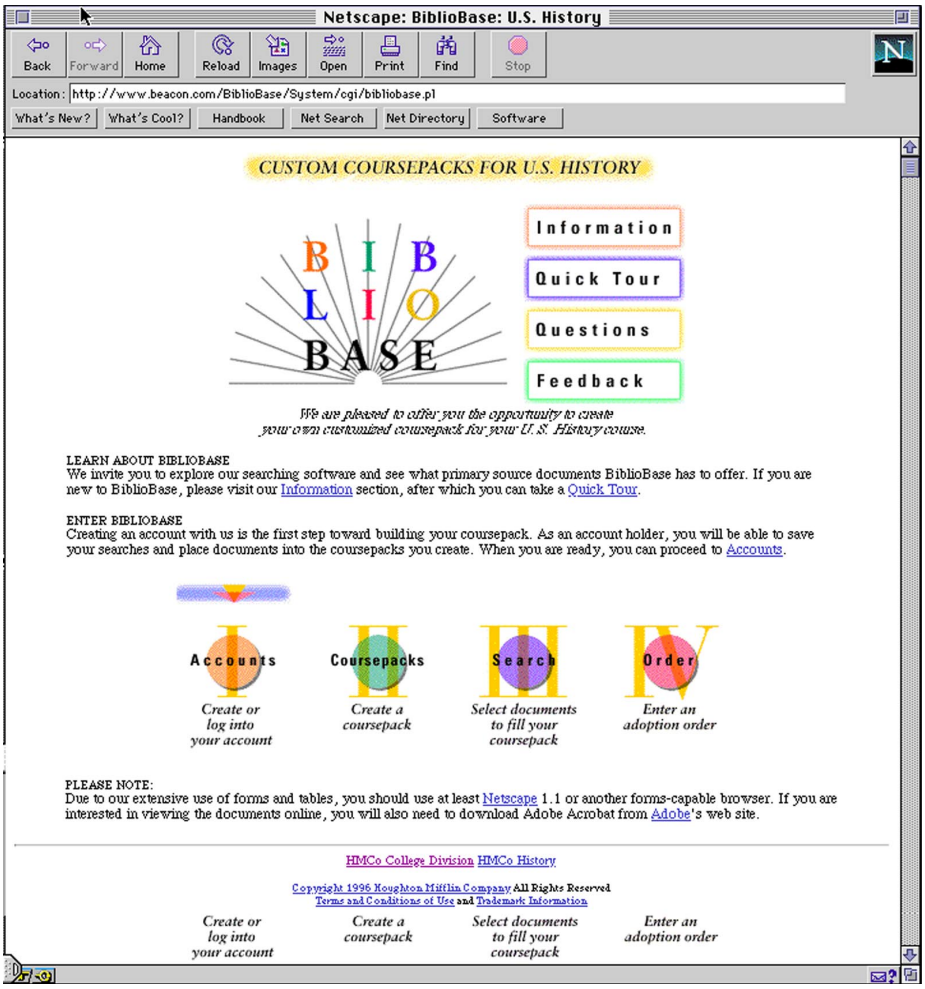

Figure 6: *Bibliobase (Copyright 1997 Houghton Mifflin Company)*

Similarly, most college publishers do not yet charge for content on their websites, but we are experimenting with models for selling Web products. One early experiment was the *PoliticsNow Classroom* (Figure 7), the product of a groundbreaking collaboration between Houghton Mifflin and PoliticsNow, a partnership of ABC News, the Washington Post, and the National Journal.

Figure 7: *PoliticsNow (Copyright 1997 Houghton Mifflin Company).*

PoliticsNow (1997) sponsored a website offering material to complement our political science textbook, at a cost of $15 per semester. It offered a rich collection of political reporting, documents, and information, keyed to the standard organization of the American Government course and integrated with extensive Internet resources. This first edition of PoliticsNow Classroom followed the chapter format of four Houghton Mifflin texts. The project was short-lived, however; although the site got as many as 1.5 million hits a day during the height of the 1996 campaign, the news organizations concluded that they were putting too much money into PoliticsNow and getting little in return, so they gave it up and devoted their resources to their individual online sites. It's an excellent example of a first-rate product that didn't fly because the pieces needed to make it economically worthwhile were not yet in place.

Other Houghton Mifflin sites are marketing and sales oriented, with the goal of contributing to the community of instructors by supplying additional resources that could be used in their classes.

At present, digital resources are being used to support paper. In the future, paper textbooks might be a means of augmenting courses on-line. In fact, many publishers foresee a shift in their business model, from selling hard goods and giving away service to selling service aggregated around electronic goods. Publishers in the vanguard will face many issues. One of the most complex and technologically demanding of these issues concerns copyright and royalty payments.

8. The Copyright Issue

As shown in the Bibliobase example, rights issues can be avoided by using only sources in the public domain, but doing so severely limits what a publisher can publish. Virtually all college texts use materials owned by others, such as excerpts, photos, illustrations, maps, and diagrams. Managing these complicated rights issues is a crucial part of a publisher's work. Parties who are not well acquainted with the educational publishing industry often don't realize how integral this issue is to producing published materials. A separate permission agreement is worked out for each item owned by someone else, and the agreements vary case by case. In some instances, permission is given free of charge but limited to a single edition, or even more complicated, to a single edition, in paper form only, for a certain market (such as colleges in the United States). When the usage changes, a new agreement must be drawn up. Other items require payment to the parties holding the rights (which might include the creator, a university, a funding agency, or another publisher). Ideally from the standpoint of simplicity, a lump sum payment settles the issue, but generally royalty payments are involved, with rates varying over time and with the creator's and publisher's expenses.

Although the conventions regarding permissions are complicated and ponderous, they have evolved over time and work adequately for printed materials. When we attempt to apply conventions developed for print to electronic media that are only roughly analogous to print, the situation becomes very complicated.

8.1 Rights Issues on Campus and the Problem of Copying

The Association of American Publishers (AAP)[15], to which all major publishers belong, is addressing rights issues, both print and electronic. Perhaps the most widespread rights issue on campuses concerns illegal copying and software piracy. Copying was a problem long before the advent of digital technology; encouraged by the advent of high-speed copying, copy centers for years have sometimes copied and resold copyrighted materials without permission, and some have been prosecuted for it.

The digitization of copyrighted materials leaves publishers even more vulnerable to copyright

violations. Digital technology makes it much easier to use other people's materials, but it simultaneously makes it easier for people to publish their own material, which they then want to protect.

The complex rights issues that are a fundamental aspect of all intellectual property must be as comprehensively addressed for electronic versions as they are for print. This will entail the use of legal agreements in tandem with several technologies more sophisticated and complex than anything we have today. Mark Stefik (1997) has an extensive discussion of a theoretical environment for electronic commerce of intellectual property, which is based on many real systems we see in operation today. However, the system is not yet a system; the individual pieces of software solutions offered by different vendors are not yet integrated and the pricing of independent solutions is prohibitive. The technology solutions alone are insufficient and must be combined with new licenses, and new standards for business transactions.

Working with consultants, publishers, vendors, and international standards bodies, the AAP has proposed the use of a *Digital Object Identifier* [16]. A DOI is simply a number immovably embedded in a digital object such as a document or photo. The DOI is not affected by changes in the copyright owner or by moving a document to a different Internet site. The number is stored in an automated DOI Agency directory that can be accessed by those who wish to use the object; the directory refers users to the copyright owner, with whom arrangements can be made. In a typical case where someone is using his or her own web browser to locate materials on the Web, clicking on a reference will automatically forward that person to the right distributor of the document. Special software must be built by publishers to handle the additional DOI functions for their catalogs and custom publishing efforts.

In the fall of 1997, Houghton Mifflin and other publishers began participating in a DOI Prototype project designed to test system performance and understand design issues. The project was also to serve as an exemplar, illustrating the ability of the DOI to serve as an international system supporting many kinds of digital products and as a product marketing tool. This first phase of the DOI project is a test of its use with electronic commerce; in later stages the project will address rights and permissions issues.

Businesses have developed various technological solutions to back up copyright control with a wide range of mechanisms designed to support secure transmission of materials to the proper recipient. They have also designed less secure techniques that permit sampling of products by

15 *The American Association of Publishers. (AAP). Washington, D.C. USA. <http://www.publishers.org>*

16 *Digital Object Identifier (DOI). International DOI Foundation Washington, DC, USA. and Geneva, Switzerland. <http://www.doi.org>*

potential customers and encourage the potential customer to pay. To protect copyrighted images, digital "watermarking" software has been developed. *Digimarc® watermark "reader"* is available for free and is bundled in approximately 90% of all image editing software such as *Adobe Photoshop®* 4.0 [17]. The digital watermark is invisible to the naked eye. It hides in the naturally occurring variations throughout an image. Watermarks can be embedded or read using the Filters or Image menu in the image editing software by Adobe (1996). An image vendor or author registers for a unique watermarking identifier. A demonstration at Digimarc's site [18] shows how you click on the image to find out about the image creator. MarcSpider crawls the Web looking for your watermarked images and reports use of your images. This report gives you a thumbnail picture of your found images, other image file data, and a hyperlink to their locations. Xerox [19] and IBM [20] have announced products of this type and are working on new solutions in this area. Publishers need to collaborate with sophisticated technologists such as these companies employ to ensure that we address legal issues and matters pertaining to usage in the classroom.

Photo archives, such as Eastman House, are experimenting with multiple forms of encryption and other techniques. An alternative deterrent from *SoftLock Services®* [21] notices when it is downloaded to an authorized paying customer's local hard drive and opened through the use of an assigned password. Whenever the customer copies the photo to a new hard drive, authorization must be reconfirmed by contacting the vendor for a new password. Photo vendors need to disseminate pre-sale samples broadly, yet build in a means to encourage interested customers to identify themselves, and pay for their use of digital assets. SoftLock is easily incorporated into other vendors software, such as an Adobe Acrobat plug-in. More elaborate is IBM's *Databolts®*[22] product, which gives buyers access to reams of data from a variety of Databolt-enabled sites. And computer software manufacturers are tackling more sophisticated electronic commerce models, which should help us to establish royalty rates in an electronic environment, to tag complex data structures formed by combining photos, videos, and text from different sources,

17 *Adobe Ventures Portfolio Digimarc Corporation. Adobe Systems Incorporated. San Jose, Calif. USA. <http://www.adobe.com/aboutadobe/adobeventures/Digimarc.html>*

18 *About Digital Watermarks. Digimarc Corporation. Portland, Oregon, USA. <http://www.digimarc.com/about_wm.html>*

19 *Xerox Docushare. Xerox Corporation. Palo Alto, Ca., USA. <http://www.xerox.com/products/docushare>*

20 *IBM Digital Library. IBM. San Jose, Ca. <http://www.software.ibm.com/is/dig-lib/index.html>*

21 *SoftLock at a Glance. SoftLock Services,Inc. Rochester, NY USA. <http://www.softlock.com/glance.html>*

22 *IBM Datalope/Cryptolope. IBM. San Jose, Ca.<http://www.software.ibm.com>*

and also to tag each item within such combination. A great variety of techniques that perform different functions have been or will be developed; it will be up to publishers to use these in whatever combination best meets our requirements.

The Association of American Publishers (see note 15) tracks numerous issues related to copyright concerns besides illegal copying. One of them is inconsistent licensing and pricing. An excellent reference on intellectual property licenses is maintained at Yale University [23], with discussion groups around many pivotal issues. College librarians find that vendors providing site licenses for copyrighted material use dramatically different pricing schemes to renew licenses [24]. "Unlike paper materials, digital information generally is not purchased by the library; rather it is licensed by the library from information providers. A license usually takes the form of a written contract or agreement between the library and the owner of the rights to distribute digital information. (Liblicense 1998)" Formulas vary from charging a flat fee plus an additional cost per user to assigning universities to fixed price tiers based on their book budget and student population. Often, the rigid, complicated agreements offered by vendors simply can't be applied to the system that actually exists at the college [25]. Publishers must give campus libraries the flexibility to make maximal use of products they have paid for, but publishers need some measure of usage if we are to be properly compensated and pass along payments to our rights holders. Unfortunately, accurately estimating true usage as a basis for fees is very difficult. Librarians and lawyers are currently working to identify the best approach in this matter.

9. Obstacles to Adoption

In the college environment, the copyright question is an obstacle of concern mainly to publishers constructing digital materials. Additional impediments stem from other aspects of the campus situation. Obstacles of this sort are addressed at length in Bondaryk (1998, this issue) and by other authors such as the seminal discussion by Everett Rogers (1997) and the later marketing schema derived by Moore (1991). Here we offer only a very brief overview of this crucial topic.

23 *Liblicense: Licensing Digital Information, A Resource for Librarians. Yale University Library, New Haven, Conn. USA..<http://www.library.yale.edu/~llicense/index.shtml>*

24 *Liblicense Introduction Yale University Library, New Haven, Conn.USA. <www.library.yale.edu/~llicense/intro.shtml>*

25 *Definitions of Words and Phrases Commonly Found in Licensing Agreements. Yale University Library, New Haven, Conn.USA. <http://www.library.yale.edu/~llicense/index.shtml>*

At some colleges, the hardware for digital education simply doesn't exist. Not all departments have access to computer labs, and not all students have access to computers outside of computer labs. Some faculty don't own computers, and some have never touched one. And not all professors welcome the advent of digital materials into the classroom. They are uneasy with technology and resist the changes it brings to the education process.

Where they do exist, computers may have old operating systems, have too little RAM, or be incompatible with new versions of applications. Professors who have up-to-date computers at their college may have older computers at home. Support, both administrative and technical, is another issue. The college technical support staff may be inadequately trained or spread too thin. Kenneth Green, the director of the *Campus Computing Survey*, has concluded that "it is not surprising that this year's survey respondents identify the closely linked issues of instructional integration and user support as the key technology challenges confronting their institutions. 24.9 % of community college respondents to the 1996 survey identify 'assisting faculty integrate technology into instruction' as the single most important information technology issue at their institution over the next year. Almost another 23.1% of community colleges chose 'providing adequate user support' as the top campus IT issue." (See Cross and Milliron (1997) and Green (1996) for further discussion of these findings). Few programs exist to reward faculty for using educational technology. Intracampus networking, like networking outside of campuses, is improving, but slowly, due to both the cost and the ever-changing nature of hardware platforms.

The consequence of these circumstances is that many students, professors, and colleges are simply not ready to rely on digital technology. The same *Survey* found that technology has been infused into a relatively small percentage of classes. Even the most popular application – preparing hand-outs – has not yet reached 40% of all community college courses (Cross and Milliron,1997). Other faculty, sometimes in the same institution, are in the technological avant-garde and able and eager to try something new. Reaching these early adopters without slackening efforts to sell traditional materials can be a challenge to those responsible for marketing to the campus community as a whole (Bower and Christensen, 1995).

10. Emerging Technology

10.1 Publishers and Technologists Must Work Together

Many publishers, and their customers, are unimpressed by the current technology designed for higher education – it resists customization and it lacks "community," deep cultural roots, and responsiveness. On-line resources are still marred by technical difficulties and crashes, which can lead to loss of work. Although some already view the Internet as a replacement to print (e.g.,

Drucker, 1993), most students and instructors do not consider it a reliable, comprehensive alternative medium for learning a subject.

Publishers recognize that we need to design next-generation textbooks and course materials that provide a full spectrum of class activities in an on-line setting (see Laurillard, 1993). We still need to better understand how on-line tools can be used in practice to meet faculty needs in activities ranging from posting the course syllabus to conducting class discussions. Cross-functional, cross-divisional task forces are investigating ways to use computers in education, but on campus we don't yet see much use of newer technologies designed to support on-line communities such as described by Judith Donath (1997) or O'Day, *et al.* (1996). Exemplary models have also been constructed by faculty at M.I.T., with student involvement (see Cassell, forthcoming, or the project web page [26], and Davenport [27] for examples). A large scale commercial implementation is under development by Electric Communities [28]. Recent surveys have found, however, that reliability and simplicity are the most essential characteristics for practical classroom use.

From both a technical and a business point of view, it does not make sense for publishers to build the sophisticated technologies required to support a new learning environment. Publishers must work with technology companies to create products that meet the needs of the new environment. The challenge is to bridge the gap between the two worlds. The priorities and requirements of technologists and publishing personnel are so dissimilar that efforts to develop new products often fall apart at the initial stages. Funding agencies could nurture small steps in the risky and often costly process of building new products.

In the next few sections of the paper we consider a few areas where publisher-technologist collaboration might yield fruitful results.

10.2 Web Search

Many people have been frustrated by the difficulty of finding what they want on the Web. To integrate Web searches into core curriculum classwork, it is critical that publishers address this limitation. We should offer students material that is useful, related to the curriculum, written at

26 *MIT media lab project page. . Justine Cassell's class projects page. Massachusetts Institute of Technology, Cambridge, Mass. USA. <http://gn.www.media.mit.edu/groups/gn>*

27 *Evolving Documentary. Davenport, Glorianna.(ed). Massachusetts Institute of Technology, Cambridge, Mass. USA. <http://ic.www.media.mit.edu*

28 *Electric Communities Electric Communities. Cupertino. Ca. USA <http://www.communities.com>*

the right level, accessible through use of keywords, and appropriately filtered so that the searcher isn't overwhelmed with marginally relevant information. At Houghton Mifflin we are watching with interest the work going on at such sites as *Alta Vista's advanced search pages* [29]. Their approach of using more than one set of key words and trying different algorithms for searching is a solid step toward a solution.

Defining useful keywords is a critical piece of work which requires involvement of content developers and librarians. Important steps have been taken by technology industry consortia proposing initial standards such as *"Metadata"* from *Instructional Management Systems Project* (see note 11) a National Learning Infrastructure Project, directed by Educom.

10.3 Work Flow Analysis and Tools

In business as well as education, work processes are being investigated and reinvented. An important focus of these investigations is work flow description, the sequence of procedures people actually follow as they perform a certain task. In education, assessment of work flow reveals how people 'work at learning' the subjects they are being taught. Work flow analysis is already a hot subject in the software industry and the subject of professional conferences (e.g. the Conference on Computer Supported Collaborative Work). Reengineering work flow in the classroom to support the learning process will become an important focus for the publishing industry.

An area in which work flow analysis has been applied is the teaching of writing (see notes 5, 6, 7, 8, as well as Carbone [30], Epiphany [31] for examples). Some writing instructors have long championed focusing on the process of writing, rather than outcomes alone (see Scardamalia, Bereiter, Steinbach, 1984). One successful process-oriented approach involves peer review, coaching students to review the writing of other students (Wittkopf, 1998). At Carnegie-Mellon, Neuwirth, Kaufer, Chandhok, and Morris (1990), all proponents of peer review, created classroom procedures for using this approach and subsequently developed a software tool to capture the essence of these procedures. This tool, now a Houghton Mifflin product known as *CommonSpace* (see Figures 8 and 9), provides a digital collaborative writing

29 *About AltaVista.digital.com. Digital Equipment Company, Palo Alto, Ca. USA. <http://www.altavista.digital.com/av/content/about.htm>*

30 *Internet Resources for English Teachers Carbone, Nick (Ed), English Department, University of Massachusetts, Amherst, Mass. USA. <http://www.umass.edu/english/resource.html>*

31 *Epiphany Project: Strategies & Structures for Pedagogical Change in the Age of the Electronic Text. Annenberg/CPB Projects (sponsors). George Mason University, Fairfax, Va. USA. <http://mason.gmu.edu/~epiphany>*

environment developed to facilitate the use of peer review in teaching writing composition (see Neuwirth et al., 1992 and Cavalier, et al., 1991). CommonSpace can be seen, then, as a set of educational processes made concrete; it's a good example of a commercial product that originally arose from an educational community of practice. A history of the project is described by computer scientist turned developer Rob Chandhok (1997). Descriptions of its integration into writing instruction are described by Vila, Hector, and Long (1997) and by Nancy Tucker (1996). Many other campuses also have initiatives underway to examine work flow in the classroom and to formalize it.

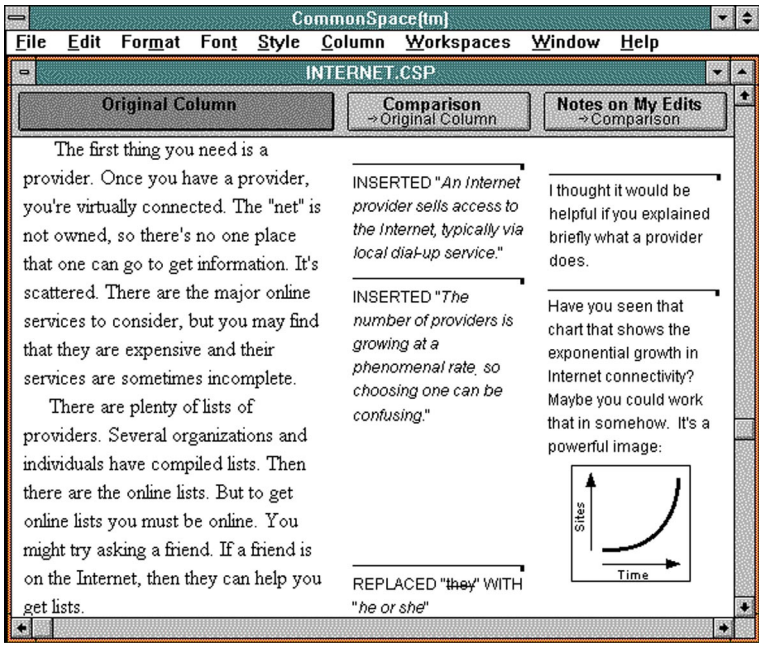

Figure 8: *CommonSpace's Comparison Feature* [32] *(Copyright 1997 Houghton Mifflin Company)*

Author-editor teams already take the results of work flow studies into account as they produce print textbooks and ancillaries, and we can expect more efforts of this sort in the digital world. In the future, every textbook may be accompanied by software that walks students and teachers through a typical series of steps in the process used to learn the subject.

Significantly, CommonSpace emerged from the existing educational community at Carnegie-Mellon. Such communities are the ideal wellspring for tool development. One of the course-

32 *CommonSpace's Comparison Feature. Sixth Floor Media. Houghton Mifflin Company. Boston. MA USA <http://www.sixthfloor.com/CSCompare.html>*

management tools mentioned below, *WebCT*, was developed by a professor of computer science for use in his own classes and later generalized.

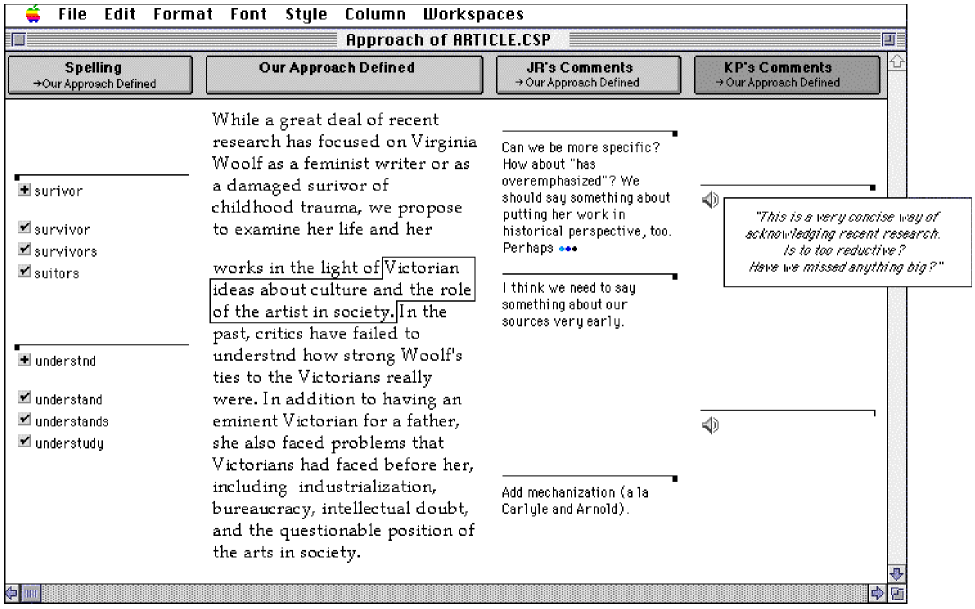

Figure 9: *CommonSpace's Annotation Feature* [33] *(Copyright 1997 Houghton Mifflin Company)*

10.4 Developing and Managing Courses

Writing, editing, and printing a comprehensive text and ancillaries for a core course text often takes two to three years. It is a group effort involving authors, editors, designers, reviewers, student field-testers, permissions experts, photo researchers, and a host of others. On-line, the threshold to authoring courses must be lower, and one means of lowering it is user-friendly authoring tools. Among the simplest now available is Norton's new web page creation tool and hosting service, *On Course*. This service offers professors a set of forms for generating a course website containing a syllabus and content. On Course provides the following types of web pages: a course page, which covers course policies and related matters; a syllabus page; an updates-and-handouts page; and "On Reserve," a method for instructors to enter links to favorite sites and resources with the instructor's own annotations. The service is free to any adopter of a Norton textbook [34].

33 *CommonSpace's Annotation Feature. Sixth Floor Media. Houghton Mifflin Company. Boston. MA USA <http://www.sixthfloor.com/CSAnnotatePage.html>*

34 *On Course. W.W.Norton & Co.,Inc. N.Y. USA. <http://www.wwnorton.com/college/oncourse.htm>*

WebCT [35], meaning *"Web Course Tools"*, takes a different approach. *On Course* provides page templates to fill in, *WebCT* provides web page editors, assessment, and tracking tools. According to the author, Murray Goldberg (1997), *WebCT* provides three services:

1. an "editing" interface allowing the design of course pages and content

2. a set of educational student tools that can be incorporated into a course. Examples include communication tools, collaboration tools, self evaluation, homepage creation, a course calendar, content annotation, searchable content and glossary, indexing, and others.

3. a set of administrative tools designed to assist in the process of conducting and improving an on-line course. This includes student progress tracking, content access tracking, on-line quizzing with automatic grading, a grading database with distribution abilities, account management, and more.

Goldberg claims that *WebCT* is finding use equally in small scale, medium scale, and campus-wide environments even though it has only started selling licenses in the latter part of 1997. WebCT is something that an individual faculty or small department could choose, it does not require a campus wide decision. The company has also made alliances with technology providers, publishers, and Internet Service Providers (ISP's). The ISP's are hosting the software, so that the faculty or campus does not need to purchase and support WebCT.

Another comprehensive competitor is *Lotus LearningSpace* [36], which provides the infrastructure for creating and distributing collaborative, instructor-facilitated learning. Lotus is also exploring leasing arrangements through ISP's. *LearningSpace* provides for the following areas, among others: schedule (a syllabus tied to exercises and projects); a media center (documents, multimedia, the Web, links, applications); a course room (for collaboration in teams, instructor grading); profiles (of the instructor, plus student home pages); and assessment. Since IBM owns Lotus, presumably *LearningSpace* will benefit from integration into IBM'S *Open Blueprint* , promoted by IBM (1997), to addresses flexibility in administration of client-server computing services by the university instructional technology staff. It also provides a business model that allows the university to purchase just the technical capabilities it requires. For instance, a school could purchase database capabilities but not email, if they already have an email system. The IBM/Lotus solution requires coordination at the institutional level; it is not easily adapted by an individual faculty member. Plans are in the works to integrate LearningSpace with other important realms of university administration. Regardless of their level of comprehensiveness

35 *Web Course Tools <http://homebrew.cs.ubc.ca/webct>*

36 *Lotus LearningSpace, Lotus Corporation. Cambridge, Mass. USA. <http://www.lotus.com/learningspace>*

and technical details, all authoring tools should offer technical support. Unsupported products are unlikely to be used by faculty.

11. Enabling Customer Relationships

The digital revolution affects more than the nature of the products we sell for use in the classroom. It has also changed how companies communicate, both internally and with their customers and suppliers. As publishers' work more pervasively reflects the characteristics of the Value Circle and the object economy, the range of contacts publishers must sustain grows exponentially. The computer software industry had the same experience with their volume of contacts growing to overwhelming proportions. As the software industry matured, it developed computerized systems to manage communications, which came to be known as contact management systems. For instance, the *Remedy* [37] product was originally devised for internal help desk support at Sun Microsystems. A large number of Value Added Resellers [38] have built even more complete systems on top of Remedy, with integrated suites of corporate information systems (CIS) applications, focused on automating sales and marketing, quality assurance, and customer support functions.

Publishers find that they, too, need such systems, and the systems must support multiple roles. The business fundamental of taking and fulfilling orders is "customer order management". "Customer information systems" can be built from a database of customers, and used to improve sales and marketing to different kinds of customers through "database marketing" and "targeted marketing" techniques. "Contact Management" is a productivity tool which uses a customer database to track individual customers' histories, including pre-visits and phone calls, sales transactions, the state of order fulfillment, and after sales support such as training or tech support. Important parts of these systems are "client-server" networks, which enable employees with desktop personal computers to download data from a centralized corporate mainframe computer.

The digital Value Circle depends on the successful deployment of networked communications systems. When you recall that the Value Circle incorporates feedback from customers and other constituencies into the actual product and services, it is clear that customer experience must directly support the product development process. Similarly to the software manufacturing business, applications for sharing customer data across product support and development are becoming increasingly important to the publishing business,

37 *Remedy Products OverView. Remedy Corporation, SunnyVale, Ca USA. <http://www.remedy.com/products/prodover.htm>*

38 *Remedy List of Value Added Resellers (VAR). Remedy Corporation, SunnyVale, Ca USA. <http://www.remedy.com/partner_locator/var_listing.shtml>*

However, it is not only Sales and Marketing nor after-sales Technical Support that will benefit from infrastructure process improvements. These infrastructure systems are inherently capable of supporting a new integration of the entire spectrum of customer-product development processes. This way the faculty and students using a publisher's learning environment can communicate directly about their experience, and authors and webmasters can respond with improved designs for products and services. We hope to see better processes for evolving learning environments in the future (see Fischer and Scharff, 1998, this issue, for a discussion of evolution and EOEs).

Further, in the future such systems can directly support the core relationship between student and faculty, and among students in a learning peer group. We already see the beginning of this trend with some on-line distance learning systems such as we described above, but the systems are still very brittle. Further basic research and development is needed before we can effectively support students and faculty in their mutual need to annotate and communicate about issues of substance related to a body of work. There are many thorny technical and practical problems which remain to be overcome. Hopefully, these new capabilities will promote aspects of 'ideal' student-faculty relationships which have become too costly to support at most universities. Two examples of working systems in place today illustrate the capacities of customer software, both at Houghton Mifflin: the contact management system of Sixth Floor Media; and the field sales force automation system in the College Division.

11.1 Customer Information and Contact Management

Sixth Floor Media, a small department at Houghton Mifflin, currently conducts its contact management (technical support, bug tracking, and telesales) with commercial, off-the-shelf software packages such as Goldmine [39] (Figure 10).

The prices and capabilities of off-the-shelf systems vary dramatically and nearly all are biased toward the feature set used in the industry and functional area from which they originated. Sixth Floor's functions are well integrated, but as we seek to upgrade our packages, we are not finding solutions tailored to the specific needs of publishers. Goldmine allows Sixth Floor to maintain it's own customer information. Sixth Floor requires keeping histories of individual customers' experiences because the department sells software applications such as CommonSpace. Sixth Floor has a support system of technicians who answer the phone and send out usage advice and software patches. The technicians cannot do their job effectively without sharing databases that record customer activity. Such databases allow technical support, software developers, and salespeople to follow the progress of problems and see that they are resolved. The combined team work of tech support and sales is also heavily engaged at the front end, in pre-sales consulting and product sampling.

[39] *GoldMine Software Corporation <http://www.goldminesw.com>*

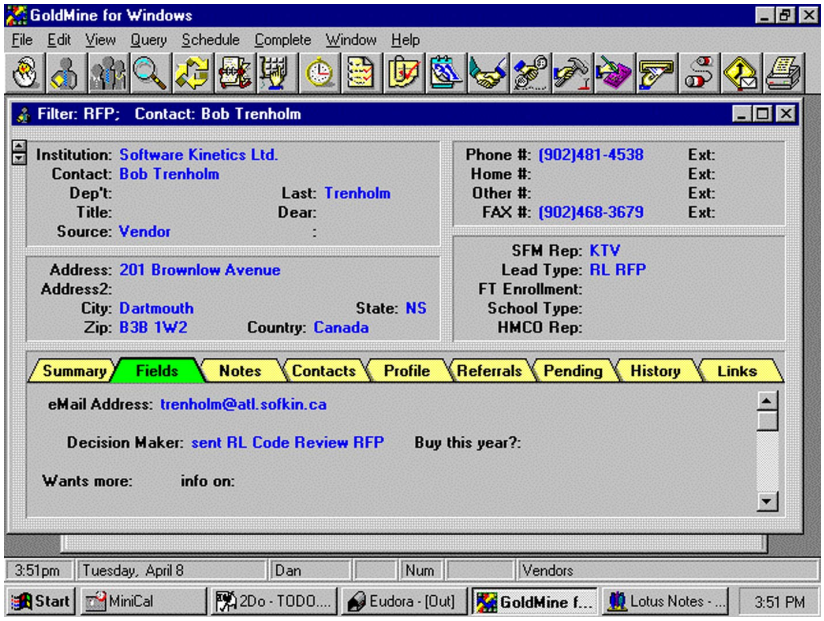

Figure 10: *GoldMine, Sixth Floor Media's contact management system*

11.2 Sales Force Automation

All sales staff in Houghton Mifflin's College Division are connected through *Lotus Notes* (see note 36), a client-server technology system designed for group work. *Notes* provides email and permanent access to databases of key information, such as detailed marketing information on all products in all disciplines. There are also specialized applications such as manuscript reporting and custom publishing projects. But the main driver is targeting of sales opportunities. As the sales representatives generate large quantities of customer information in the process of sampling, this information can be used for other purposes. Targeting is a step on the path toward more analytical use of customer information in marketing, i.e., database marketing.

The College Division's field sales representatives use *Lotus Notes* to copy parts of the catalog onto their ThinkPads; they can also create records of new customers, update customer information and upload it daily to the Divisional server. The Houghton Mifflin Corporate database resides in products from two other technology vendors, Sun Microsystems [40] and Sybase [41]. Corporate, College Division, and College sales representatives' data will be synchronized through client-server "subscribing". The divisional Sybase database will "subscribe" to corporate data that is of

40 *Sun Microsystems. Sun Microsystems. Mountain View, Ca, USA.*

41 *About Sybase, Inc. Sybase, Inc. Emeryville, CA, USA. <http://www.sybase.com/inc>*

interest to the College Division; the divisional Sybase database will also contain data that is division-specific and not shared with corporate; and the divisional Sybase database will exchange data with the Lotus Notes databases that the salesreps get their information from. Data flow in such systems needs to be carefully managed, flowing largely in one direction. Entering changes "upstream" requires moving through a system of permissions, sign-offs, and data cleansing.

A further advantage of a sales force automation system is facilitating communication with customers. Virtually all faculty have access to email on campus, and many also have Lotus Notes. The College Division sales representatives can send and receive email with faculty who are the focus of their efforts when selling course materials. Projects enabling customers to directly access Corporate or Divisional databases, such as the product catalog, are also currently underway.

12. Business Considerations

12.1 Market Readiness and Key Drivers of Change

The development of an "early adopter" market into a mainstream market is a road littered with expensive failures, well described by Everett Rogers (1997), Geoffrey Moore (1991), and Laura Fillmore(1997). Nevertheless, many market forces indicate that learning environments are changing. Among numerous other influences, for example, colleges face public pressure to decrease the cost of education and allow everyone who chooses to attend to do so. The technological sophistication of both instructors and students is also increasing. Together, market forces are creating increased market fragmentation and a demand for more individualized materials. Figure 11 depicts these major forces of change:

In this business climate, publishers are considering new business relationships that could be financially sound and produce practical products. One development we have noted is the rise of Internet Service Provider (ISP) businesses. ISPs are hosting many campuses who are not ready to host their own 24-hour campus servers and offering augmented service to campuses that do. Some ISPs plan to rent applications, such as Lotus's new collaboration environments, and compete with each other by seeking other interesting on-line services to rent to subscribers. ISPs may be poised to become the bookstores and coffee shops of tomorrow.

Figure 11: *Key Market Drivers Copyright 1997 Houghton Mifflin Company)*

The publishing business is evolving from a product business to a hybrid product-service business, as publishers offer a higher level of customization of product as well as consultation on how to use the product. Publishers, who are unaccustomed to the role of service provider, can take their cues from other industries. Yahoo [42] and other search engines, for example, now give their users the option to personalize their opening screen by choosing which types of information will be sent to them – creating, in effect, a custom publishing system. *Pointcast* [43] is a news network offering a similar service; users choose from seven "channels" to personalize information that appears on their computer screens in lieu of screen savers. Publishers could offer a similar service to students in a particular course. Supported by strong query enhancement, the service would deliver needed content and sufficient interpretation of content to students on a pay-per-use basis.

Some companies are seeking to service their customers by creating profiles of their customers' interests. *Amazon.com* [44], an on-line bookseller, is one example. Customers provide information on their reading interests; amazon.com then keeps them informed of new books that may interest them. Amazon.com is also creating communities by inviting customers to post their own reviews of books, which can then guide other readers in their choices. In the future, "real-time" products and services customized on the fly will combine competitors' products and services with customers' additions.

Houghton Mifflin will continue to consider such possibilities as it reviews new approaches to serving customers. Successful adaptation of any of these tools for the college market will require close collaboration between computer manufacturers and publishers.

42 *Yahoo! Yahoo! Inc. <http://www.yahoo.com>*

43 *Pointcast. Sunnyvale, CA. <http://www.pointcast.com>*

44 *Amazon.com. Amazon.com Inc. NY., USA. <http://www.amazon.com>*

12.2 Business Models, ROI and R&D

Thriving businesses try to establish a predictable return on investment (ROI), a calculation based on the amount of money invested, the profit returned, and the length of time required to realize the return. ROI predictions are one measure that governs the allocation of resources to new product development. Publishing companies, particularly the majority that are publicly held, must maintain the current revenue and profit streams produced by their traditional print businesses to fund experiments with the next generation of technology products and services (see Boer, 1994). This new technology does not provide comparable returns because the customer base is still in the unprofitable early adopter stage.

In the "next-generation" environment, current business measures don't suffice as detailed by Profozich (1998). The traditional print business has clear notions of sales fulfillment and inventory management, which can be used to monitor and improve efficiency. New digital products, especially those for the Web, require a new, as-yet- undefined profitable business model that includes new measures for improving efficiency and reporting back to management and staff in meaningful ways. This significant problem is addressed by many business authors including: Meyer and Utterback (1993), Industrial Research Institute, Inc.[45] , and Boar (1997). The book *Netgain* by Hagel and Armstrong (1997) discusses how business models based on dynamic feedback loops that assess customer activity in new ways can provide tremendous fuel for new business ventures. A dynamic feedback loop is a concept roughly analogous to the value circle explained earlier. The loop is used, not simply to assess a product's course from production through final sale, but to understand how businesses function in complex, ever-changing situations such as those characteristic of the object economy. The concept is used in considering such questions as what internal mechanics drive such organizations and how do you keep them running when the product, the customers, and the other players change so often. The authors argue that having measurable elements is critical to inventing new businesses.

A growing body of research, exemplified by Geoffrey Moore (1991), underscores the difficulty established companies face in making the leap to next-generation technologies – their core customer base, the main source of current revenues and profits, usually only articulates a need for incremental change. To monitor next-generation adopters not currently in the core customer base, some publishers have created *"skunkworks"* research and development groups (Bower and Christensen 1995). These groups work with early adopters to create new business models and processes that can later be migrated to the core business. *Sixth Floor Media* is one such group at Houghton Mifflin.

45 *Networking, Best Practices in R&D Innovation Leadership Conference. Industrial Research Institute, Inc. Washington, DC. USA. <www.iriinc.org>*

13. Conclusion

Houghton Mifflin Company has been providing high-quality educational materials for over 150 years. Our role as a publisher has not changed in that we continue to shape authors' ideas to provide learning solutions. But in the digital world, our business is changing in exciting ways that enable us to better meet the individual needs of both teachers and students. Enabled by technology, the delivery vehicle for educational resources has broadened from a few components of print on paper to hundreds of components of multiple media, and the development time frame has collapsed from years to months, and with the Internet, to weeks and days. Our marketplace has broadened beyond institutional bricks and mortar to wherever learning takes place. In addition, the linear "creator to customer" Value Chain applicable to the traditional, strictly print-based publishing process has given way to an iterative "Value Circle" that incorporates two-way interactions between publisher and customers, as well as an increasingly intimate and dynamic integration of products, services, and individual customers' needs.

While much has been written about pedagogic issues related to the use of interactive media in teaching, most colleges and professors are still not much beyond the *"early adopter"* stage. Professors are grappling with how to integrate the enormous resources on the web into their curriculum, and transform this information into knowledge (Laurillard 1993). Along with professors, publishers are experimenting with a variety of platforms for delivering content, attempting to provide for the breadth of teaching and learning styles of professors and students respectively.

To produce functional educational material, publishers must work closely with technologists during development and then test and re-test the new products with early adopters to ensure that they are reliable and simple to use, both in classrooms and with distance learners. As in the software industry, publishers will need to develop close, long-term relationships with customers, offering ongoing, sometimes intensive customer service and support.

For publishers and authors to realize the full potential of digital media, a number of obstacles – technological and administrative, social and financial – must be overcome. Chief among them are the fundamental issues of rights and intellectual property protection. The resolution of this critical issue will result from close collaboration among all public and private sector constituents.

Publishers who shift from producing static books to managing dynamic resources, and who embrace their changing role in the Value Circle – from gatekeepers to organizers of communities, and to service providers of diverse learning resources – will flourish. We look forward to working with all constituencies to bring to fruition the opportunities presented by the Web and the emerging educational object economy.

References

Adobe (1997) *Adobe Systems Introduces Adobe Photoshop 4.0, New Version of Industry-Leading Image-Editing Tool*. Adobe Systems Incorporated. San Jose, Calif. USA (September 9) <http://www.adobe.com/aboutadobe/publicrelations/HTML/9609/960909.ps4ann.html>

Boar, B.H. (1997) *Strategic Thinking for Information Technology: How to Build the IT Organization for the Information Age*. John Wiley & Sons, Inc. N.Y. USA.pp. 61-116

Boer, P.F. (1994), *Linking R&D To Growth and Shareholder Value*. Research-Technology Management, USA.May/June

Bondaryk, L.G. (1998, this issue). *Publishing New Media in Higher Education: Overcoming the Adoption Hurdle*. Journal of Interactive Media in Education, 98 (3). <http://www.jime.open.ac.uk/98/3>

Bower and Christensen (1995) *Disruptive Technologies: Catching the Wave*. Harvard Business Review. Cambridge, MA. USA.

Bruner, J.S. (1974) *Toward a Theory of Instruction*. Harvard University Press. Cambridge, MA. USA.

Cassell (forthcoming) *Storytelling as a Nexus for Change in the Relationship between Gender and Technology*. In Cassell, J. & Jenkins, H. (Eds), From Barbie to Mortal Kombat: Gender and Computer Games. Cambridge, MA: MIT Press.

Cavalier, T., Chandhok, R., Morris, J., Kaufer, D., and Neuwirth, C. M. (1991) *A Visual Design for Collaborative Work: Columns for Commenting and Annotation*. In Proceedings Of The Twenty-Fourth Hawaii International Conference on System Sciences (HICSS-24) Nunamaker, Jr., J. F. (Ed). IEEE Press, USA. pp. 729-738

Chandhok, R. (1997) *A Brief History of CommonSpace*. Within Technology, Inc., Waynesburg PA, USA. <http://www.within.com/projects/commonspace.shtml>

Chemisty: Interactive Plus (1997) *Chemistry: Interactive Plus, Version 2.0*. Houghton Mifflin Company, Boston, Mass. USA

Chime (1997) *Chemscape ChimeTM (VERSION 1.0)*. MDL Information Systems, Inc. (Molecular Design) San Leandro, Ca.USA. <http://mdli.com>

Cross, C. and Milliron, M. (Eds.) (1997) *Survey Shows a Growing Emphasis on Instruction and User Support*. Signals, Newsletter of the Information Technology Initiative of the League for Innovation in Community College, Kirkwood Community College. Cedar Rapids, IA USA. January.

Dinkelacker, J. (1996). *Soapbox: Knowledge Object Economy*. Netscape Communications. Mountain View, Ca. USA. <http://people.netscape.com/jamie/index.html>

Dix, J.A. (1997) *Molecule of the Month:Olestra*. Chemistry Department, State University of New York, Binghamton, NY. USA. (November).
<http://www.hmco.com/hmco/college/chemistry/resourcesite/molecule/molecule.htm>

Donath, J.S. (1996) *Inhabiting the Virtual City: The Design of Social Environments for Electronic Communities*. PhD. Massachusetts Institute of Technology: Cambridge, Ma. USA

Drucker, P.F. (1993) *Post Capitalist Society*. Harper Business, NY, USA.

Fillmore, L. (1997) *Slave of a New Machine: Exploring the For-Free/For-Pay Conundrum*. Internet Dreams, Stefik M. (Ed), MIT Press, Cambridge, MA, USA pp 207-218

Fischer, G and Scharff, E. (1998, this issue). *Learning Technologies in Support of Self-Directed Learning*. Journal of Interactive Media in Education, 98 (4).
<http://www.jime.open.ac.uk/98/4>

Gardner, H. (1993) *Frames of Mind : The Theory of Multiple Intelligences/Tenth Anniversary Edition.* Basic Books (Harper Collins Publishers), NY. USA.

Green, K. (1996) *Campus Computing Survey*. Campus Computing Encino, Ca. USA.

Goldberg, M.W. (1998) *WebCT (Web Course Tools)*. University of British Columbia, Belcarra, British Columbia, Canada. <http://homebrew.cs.ubc.ca/webct/>

Hagel III, J. & Armstrong, A.G. (1997) *Netgain, Expanding Markets through Virtual Communities*. Harvard Business School Press, Boston, Mass. USA.

Haimovitz, R., and Woolfe, B. (1998) *Report on IMS Meta Data Usage in the Educational Object Economy*. University of Massachusetts, Amherst, MA, USA

Hill, C.W.L., and Jones, G.R. (1998) *Strategic Management Theory, An Integrated Approach*. (4th edition); Houghton Mifflin Company, Boston, USA. (pp. 118-121).

IBM (1997) *IBM Network Computing Framework and the Open Blueprint Structure*. IBM Corporation. San Jose, Ca. USA.
<http://www.software.ibm.com/openblue/papers/obncfr2a.htm>

Laurillard, D. (1993) *Rethinking University Teaching: A Framework for the Effective Use of Educational Technology.* Routledge, New York, USA, p.123

Liblicense (1998) *Liblicense Licensing Resources*. Yale University Library, New Haven, Conn.USA. <http://web.library.yale.edu/~llicense/liclinks.shtml>

McGraw-Hill (1996) *McGraw-Hill Annual Report*. McGraw-Hill Companies, NY. USA.<http://www.mcgraw-hill.com/corporate/news_info/annual_report/ar1996/index.html>

Meyer, M.H. and Utterback, J.M (1993) *The Product Family and the Dynamics of Core Capability*. Sloan Management Review (Spring) Cambridge, Mass. USA.

Moore, G. A. (1991) *Crossing the Chasm*. HarperBusiness, N.Y. USA. pp.17-59.

Neuwirth, C. M., Chandhok, R., Kaufer, D. S., Erion, P., Morris, J. and Miller, D. (1992). *Flexible Diff-ing In A Collaborative Writing System*, In Proceedings of the Fourth Conference on Computer-Supported Cooperative Work (CSCW '92), Association for Computing Machinery. Baltimore, MD USA. pp. 147-154.

Neuwirth, C. M., Kaufer, D. S., Chandhok, R., and Morris, J. H. (1990). *Issues in the Design of Computer Support for Co-Authoring and Commenting*. In Proceedings of the Third Conference on Computer-Supported Cooperative Work, (CSCW'90) Association for Computing Machinery. Baltimore, MD USA. pp.183-195

O'Day, V.L., Bobrow, D.G., and Shirley, M. (1996). *The Social-Technical Design Circle*. Computer Supported Cooperative Work (CSCW 96) ACM. (Sponsored by SIGCHI & SIGOIS) November 16-20 Boston, Mass. The Association for Computing Machinery, NY.

PoliticsNow (1997) PoliticsNow Classroom. Houghton Mifflin and PoliticsNow, a partnership of ABC News, Washington Post and National Journal supplements four Houghton Mifflin texts referenced throughout the site: Janda, K., Berry, J.M., Goldman, J. (1997). *The Challenge of Democracy*, (5th ed). Houghton Mifflin, Boston, Mass. USA. Wilson,James Q. (1997).*American*

Government: BriefVersion, (4th ed). Houghton Mifflin, Boston,Mass. USA. Gitelson, A.R., Dudley, R., and Dubnick, M. J. (1996). *American Government* (4th ed) Houghton Mifflin, Boston, Mass. USA. Lasser, W. (1996). *American Politics: Institutions and Interconnections*. Houghton Mifflin, Boston, Mass. USA.

Profozich, D. (1998) *Managing Change with Business Process Simulation*. Prentice Hall PTR. Upper Saddle River, N.J. USA.pp.38-102

Rogers, E.M. (1997) *Diffusion of Innovations*, 4th Edition. Free Press

Scardamalia, M., Bereiter, C. and Steinbach, R. (1984) *Teachability of the Reflective Processes in Written Composition*. Cognitive Science, (8), 173-190.

Spohrer, J., Sumner, T. and Buckingham Shum, S. (1998, this issue). *Educational Authoring Tools and the Educational Object Economy*: Introduction to this Special Issue from the East/West Group. Journal of Interactive Media in Education, 98 (10). <http://www-jime.open.ac.uk/98/10>

Stefik, M. (1997). *Letting Loose the Light: Igniting Commerce in Electronic Publication*. Internet Dreams: Archetypes, Myths, and Metaphors, The MIT Press, Cambridge, MA, USA. pp.218 253

Tucker, N. (1996) *The CommonSpace Review.* Kairos, A Journal For Teachers of Writing in Webbed Environments. Doherty, M. (Ed.) sponsored by Alliance for Computers and Writing, Department of English, Texas Tech University, Lubbock, TX. USA.Issue 1.3 <http://english.ttu.edu/kairos>

Utterback, J.M (1994), *Mastering the Dynamics of Innovation*. Harvard Business School Press, Boston, Mass USA. pp.79-144, 176-187.

Vila, H., and Long, P. (1997) *Resources on Using Enabling Constraints and CommonSpace to Enhance Skills and Create Voice.* (A presentation abstract); William Paterson College from the 1997 Computers and Writing Conference held at Kapi'olani Community College, USA.

Wittkopf, W. (1998) *Collaborative Writing Technology Bibliograph*. University of Minnesota, USA.

Zumdahl, S.S. (1997) *Chemistry 4th Edition*. Houghton Mifflin Company, Boston, USA.