

Chapter 21: Skills Online

“ [O]ver the next ten years we will see shifts from in-residence learning to online learning. It will go beyond picking up some skills; it will actually involve education and knowledge, not just information.”

Gerhard Casper in ‘I Have At Least Nine Jobs’, by Henry Muller and Gerhard Casper, *Fortune*, October 16, 2000.

Prologue

Gerhard Casper made the above statement when he was coming to the end of his tenure as President of Stanford, the university most associated with the rise of Silicon Valley. Casper and his successor, John Hennessy, are both quoted in the article, recognizing the promise of online learning as well as its current and future limitations. They both emphasize the potential of being able to deliver knowledge online, so that distance and location diminish in importance. However, for the range of skills and knowledge that a university imparts, the human element of interaction is likely to be around for a long time to come.

In Chapter 1, we discussed the terms “information economy” and “knowledge economy”. Though the two concepts are closely related, knowledge is, roughly, deeper and more substantial than information. The latter term, in particular, captures the idea that knowledge-based skills matter more and more in the modern economy, as routine manual tasks become increasingly susceptible to automation. Therefore, acquiring these skills, as in a university, or through other forms of education and training is increasingly important. Furthermore, being able to make one’s skills available to those who value them the most is also more critical. For individuals, this means finding the right “job”, whether that means a lifetime career, or a two-week project. For firms, it means finding individuals or teams with the right sets of skills. As one might expect, where there is value to be created, someone will try to create and capture it. Intermediaries that match individuals and firms have become increasingly important, and they, too, have moved online.

This chapter, therefore, is about how the Internet is affecting the matching of supply and demand for skills and knowledge, the delivery of services based on knowledge and, as a specific case of the latter, the transfer and acquisition of knowledge through education and training.

21.1 Introduction

This chapter examines how various kinds of skills and knowledge are traded online. The range of possibilities considered is very broad, ranging from matching the suppliers of particular skills or skill sets with those who are willing to pay for them, i.e., matching workers with jobs in firms, to the online delivery of services based on skills and knowledge, to the transfer and acquisition of the skills themselves, i.e., education and training.

We begin in Section 21.2 with online job searches. We discuss how online searching for jobs lowers costs and increases efficiency, by allowing information about workers and jobs to be transmitted and analyzed more effectively. This section also considers how certain kinds of information may potentially create inefficiencies, by exacerbating lemons problems, or other situations may involve greater inequality as a result of improved information. As we discussed in Chapters 7 and 8, intermediaries can arise to deal with inefficiencies such as lemons problems. In job markets, intermediaries have always existed, acting as screening mechanisms, carriers of reputation, and so on. Online intermediaries fulfill these roles in new ways, as discussed in Section 21.3. The innovations that these new intermediaries provide are based on the ability to search for information, restructure and analyze it, and communicate it at lower cost using information technology. Intermediaries can also create new value bundles by bringing together information from disparate sources.

In Section 21.4, we consider a wide range of examples where knowledge services are discovered and delivered online. These include software programming projects, limited healthcare services, financial services, and travel-related services, as well as general information. In many of these cases, the dividing line between “information” and “knowledge services” is fuzzy. Typically, many consumer-oriented web sites provide large quantities of free information, and knowledge services take the form of advice or expertise that is often, though not always charged for. One of the stories of the Internet and the Web, of course, is the relentless reduction of once-valued knowledge services to free information.

Finally, Section 21.5 examines a special kind of knowledge service, namely online education and training, or “e-learning”. As with other knowledge services, the content can mostly be digitized (one cannot do physical and chemical experiments – though more and more they can be simulated virtually), which supports a shift online. Low cost digitally mediated communication promotes interaction, which is a crucial aspect of learning. One key difference between education and training and other forms of knowledge services is the transfer of lasting skills, rather than just the output of those skills. This requires testing of the skill transfer, and in some cases this is well suited for digitization as well. E-learning is likely to grow, because it provides greater flexibility and reach in delivery, at the same time that technological improvements are reducing its disadvantages relative to traditional classroom methods. Online methods are especially valuable for corporate training and for other situations where the traditional bundle of educational services provided by universities is too costly as a package, or involves substantial switching costs.

21.2 Job Searches

Firms and workers are buyers and sellers, transacting in a way similar, in abstract, to buyers and sellers of collectibles on eBay. What are the differences? An obvious one is the nature of the contract: no firm ever “owns” a worker as they would a physical asset. However, a firm may contract for the delivery of certain services by a worker, for a short period or a long one, just as it might rent or lease physical assets such as machinery or equipment. Another difference also flows from the ongoing involvement of human beings on both sides of the transaction. The piece of equipment does not derive any value from how it is used after being rented, while a worker derives positive or negative utility while carrying out a job. Putting aside these differences, however, successfully matching a worker and a firm (or a job within a firm) involves creating value for both sides in the transaction, and a better match creates more value. Just as eBay, Amazon and similar sites reduce search costs for buyers and sellers of heterogeneous goods, the Internet also offers the possibility of more efficient matching of workers and jobs, by lowering search costs.

Traditional direct ways of initiating job matches include advertising by firms and queries by job seekers. In the latter category, there is no formal intermediary, though job-seeker queries may be triggered by word-of-mouth information. Job advertising has long relied on intermediaries, namely newspapers, to reach job-seekers but the role of newspapers has been merely been the passive one of providing a channel for broadcasting the information. We shall consider more active intermediaries in the next section, focusing here on the basic delivery of information about jobs and job seekers.

Corporate websites allow firms to advertise jobs directly, bypassing intermediaries completely. Smaller firms may simply list jobs and job descriptions, while larger firms also offer searchable databases and online résumé forms. In both cases, job seekers can submit their own résumés electronically. Online job postings allow more information about the jobs to be displayed than is possible in paper-based advertisements, and they can be adjusted or updated more easily and frequently. Online résumé forms also allow the firm to screen or filter job applicants at lower cost, since criteria related to education and experience can be used for automatic sorting. Lower costs of processing and communicating rich information are, of course, key features of the Internet.

According to economists Peter Kuhn and Mikal Skuterud¹, 15 percent of unemployed job seekers and 7 percent of employed persons used the Internet to look for a job in December 1998. These figures may seem relatively low, but they are likely to have risen substantially since then, a statement we will substantiate in the next section. In fact, half of those with Internet access at home used the Internet for job search. The percentage of the employed who used the Internet was substantially higher than previous estimates of job search by the employed (using traditional methods), which were closer to

¹ Their article titled, “Job search methods: Internet versus traditional”, was in the *Monthly Labor Review*, October 2000, accessible at <http://stats.bls.gov/opub/mlr/2000/10/contents.htm>.

4 or 5 percent, suggesting that the Internet, by reducing the costs of search, has increased job search by employed persons.

Other data that highlight the growing importance of the Internet in searching for jobs compare Internet use with traditional methods. Internet use for job hunting in December 1998 was comparable to, or higher than traditional methods such as contacting friends or relatives, checking union or professional registers, and contacting private employment agencies. Not surprisingly, many traditional methods continued to be used, with the Internet providing an additional, complementary channel for search. Note that some of the categorization of traditional methods does not exclude use of the Internet as the channel for making contact or searching for information (see Illustration Box).

Illustration Box **Traditional Methods of Job Search**

Data on job search and methods used comes from the monthly Current Population Survey conducted by the Bureau of Labor Statistics. The survey uses nine categories of type of search:

- 1) Contacted employer directly
- 2) Contacted public employment agency
- 3) Contacted private employment agency
- 4) Contacted friends or relatives
- 5) Contacted school employment center
- 6) Sent résumés/filled applications
- 7) Checked union/professional registers
- 8) Placed or answered ads
- 9) Used other active search methods

Of these, contacting the employer directly was the most common, used by about 65 percent of job seekers, with sending out résumés and filling applications coming in next at about 47 percent. No other method exceeded 16 percent. Not only does the above categorization overlap with Internet use (contacting the employer directly may be via the Internet, rather than a separate approach), but there are overlaps in the categories themselves, so that sending a résumé may be part of direct contact with an employer. A useful distinction is between direct (method 1) and intermediary-based (methods 2 through 5, 7 and 8) approaches. The Internet changes the role of traditional intermediaries, but will typically not lead to complete disintermediation (recall Chapter 8).

Source: Kuhn and Skuterud, "Job search methods: Internet versus traditional", *Monthly Labor Review*, October 2000.

If, as the research summarized above suggests, the Internet has added an important, lower cost method of matching workers with jobs, what are the effects of this addition? Economic theory predicts that if search is less costly, the quality of job matches will improve, and therefore productivity will rise. Furthermore, reducing the friction of

searching for jobs and workers will reduce unemployment. Finally, lower search costs will increase mobility between jobs, and tend to reduce the average length of time spent in a job. Unfortunately, it is difficult if not impossible to test these propositions as yet, since many other factors are at work simultaneously, and the data on Internet job searches is still sparse.

The potentially rosy picture of the impact of online job searching is balanced by some possible negative consequences. David Autor, in his survey of online labor markets², identifies three possible problems: lemons problems (recall Chapter 7.5), losses to some workers as a result of better matching, and greater inequality due to geographic integration of labor markets. Note that while we earlier emphasized efficiency, the focus here shifts mainly to inequality. We briefly consider each of these three problems.

Lemons Autor makes the useful distinction between “low bandwidth” and “high bandwidth” information. The first category consists of data such as education, credentials and experience, which are objective and relatively easy to verify. The second category includes factors such as “quality”, motivation and “suitability”, which are difficult to assess except through interviews and other direct contact and observation. The Internet makes low bandwidth data much cheaper to transmit, and increases applications by job seekers who may be low quality or a poor fit for the job in question. The average quality of the initial applicant pool therefore falls, increasing costs for high quality job seekers in establishing their value to employers. As in the case of used cars, the simple prediction of market failure is not borne out, because alternative institutions arise, in particular various intermediaries. These are considered in the next section.

Match Quality The problem of some workers being worse off with better matching would obviously occur if the information that firms have about workers is improved, so workers are paid amounts more closely tied to their productivity. However, if lower search costs simply make better matches possible, this can influence firms’ technology choices in ways that hurt some workers. In the example constructed by Autor, there are high-skill and low-skill workers. If search is costly, the firm uses a general-purpose technology where both types of workers are moderately productive (Table 21.1a). If search is cheaper, firms can match better, and use a technology that takes better advantage of the high-skill workers, but makes the low-skill workers worse off (Table 21.1b). Total output is higher in the second case, but only high-skill workers benefit, getting their marginal product if firms are competitive in their hiring and make zero economic profit in either case (see Chapter 4.2).

²See David H. Autor, “Wiring the Labor Market”, *Journal of Economic Perspectives*, Winter 2001, pp. 25-40. Autor also discusses the work of Kuhn and Skuterud in more detail, and provides additional references.

Table 21.1a

<i>Worker Type</i>	High	Low
<i>Technology</i>		
General use	5	4

Table 21.1b

<i>Worker Type</i>	High	Low
<i>Technology</i>		
High-skill specific	8	0
Low-skill specific	0	3

Note: The numbers in the cells are outputs resulting from technology and worker-type combinations.

Geographic Linkages One of the most basic effects of the Internet is the “death of distance”. In the context of job search, if labor markets that were previously separate become more integrated, some kinds of workers may find that they are competing in a larger pool, while demand is not proportionately increased, and that their wages consequently go down. This effect will largely depend on moving costs being low enough, or location-independent delivery of services (see Section 21.4). In any case, as Autor points out, inequality may worsen or improve, depending on the geographic distribution of supply and demand for particular skills.

21.3 Intermediaries

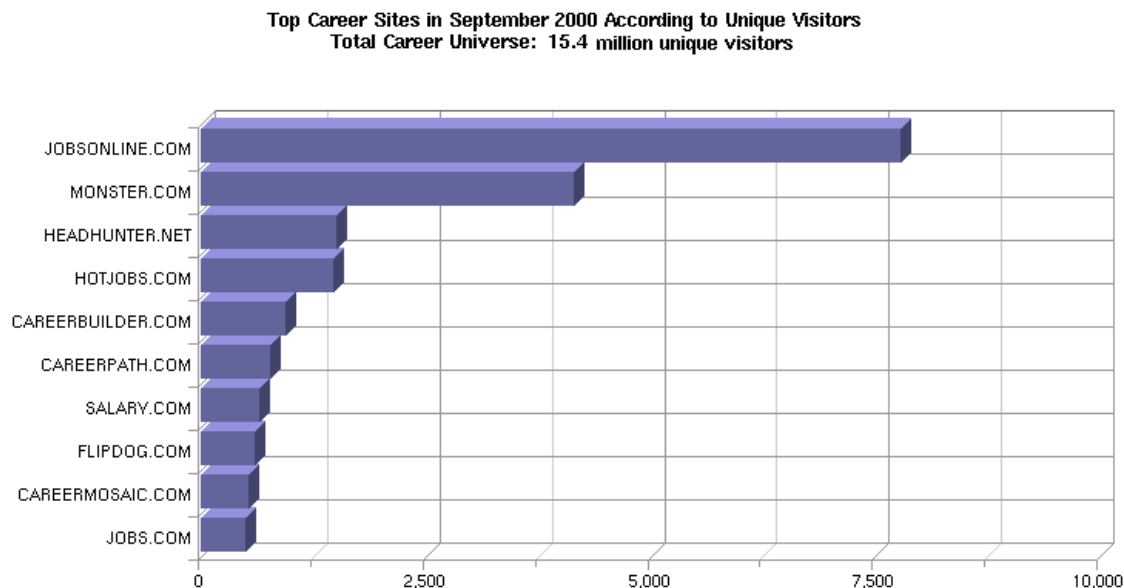
We discussed the general roles of intermediaries in Chapter 8, and considered ongoing changes in those roles in Chapter 11. Of the eight intermediary functions considered earlier, the ones most relevant for the job market are (suitably modified):

- Smoothing the market
- Providing expert actions or information
- Being long-term players with reputations
- Economizing on search costs
- Matching buyers and sellers

Most online job sites bundle together the last four of these roles. We will consider the smoothing function later, and focus first on this typical bundle. The top online job or “career” sites as measured in September 2000 by Jupiter Media Metrix are shown in Figure 21.1. While Monster.com held a consistent lead through mid-2000, by July it had been slightly overtaken by Jobsonline.com, and this lead quickly widened, as shown in the figure.³

Figure 21.1: Leading Job Sites

³ More recent reports, referred to on Jobsonline.com’s own site (March 2001), suggest Monster.com is back in the lead.



source: media metrix

The main active roles that job sites play are a combination of providing expertise and information, lowering search costs, and enabling matching of firms and job seekers. For example, Jobsonline.com offers information on and pre-registration for career fairs; research on companies; tips on interviewing, application cover letters and résumés; a set of tools for assessing relocation issues (see Box); salary comparisons; and access to online training courses.

For employers and recruiters, job sites offer lower cost ways of advertising. According to David Autor, a job advertisement in the *Sunday New York Times*, with a circulation of 1.7 million cost \$4500 in the year 2000. Monster.com, with 3.8 million unique visitors in May 2000, charged only \$137 for a 30-day advertisement. A year later, a standard job posting on Monster.com cost \$295, more than double the earlier amount, but still a small fraction of the print medium. As of May 2001, upstart Jobsonline.com offered free job postings to employers and recruiters, relying on advertising for revenue. Presumably Monster.com offers some additional services for employers compared to Jobsonline.com, including résumé prescreening, searchable résumé databases, better service, or similar features. Monster.com also boasts of partnerships with America Online, Fortune 500 corporations, and leading websites. For job seekers, it offers features very similar to those described for Jobsonline.com.

Illustration Box

Power Tools For Relocation

Jobsonline.com connects to a site that offers access to databases, interactive calculators and more. It says, "Use these interactive tools and calculators to save time, save money, and help you make more informed decisions when relocating." It offers the following resources, with links to information and calculating tools:

Resource	Description
Salary Calculator	Find out how much you would need to make in your new city to keep your current lifestyle.
Moving Calculator	Use the moving calculator to help you budget for your upcoming move.
Free School Reports	Obtain in-depth reports on over 12,000 public schools districts and local child care
Free City Reports	Get your side-by-side reports with comparisons of up-to-date information on demographics, cost of living, helpful local contacts and more.
Relocation Crime Lab	Use our Crime Lab to compare crime statistics in over 6,000 cities.
Relocation Wizard	Create a custom timeline to help you cope with all the details of relocating.
Find a Home	Search for your new home from an extensive database of over 1.3 million homes.
Insurance Professor	Challenge your knowledge of Insurance with our Professor's Quiz on Auto, and homeowners insurance and get quotes on all types of insurance.
Community Calculator	Compare and contrast over 29,000 neighborhoods to find the community with the lifestyle that most appeals to you.
Getting the Best Mortgage	Gain access to all of our useful calculators, articles and links that help you select and get the best mortgage.
Apartments	Searching for an apartment? Use this resource.

Source: http://www.homefair.com/homefair/newstool.html?test=true&NETSCAPE_LIVEWIRE.src=jobsonline.

In providing information, expertise and matching, job sites also seek to build reputations. Monster.com may also be able to charge employers for job postings when competitors are free because its reputation is stronger. For example, it has a reputation for being the "leading" job site on the Internet, and benefits from being run by a division of a larger, public company, TMP Worldwide Inc. This company was created in January of 1999 through the merger of The Monster Board and Online Career Center, founded in 1994 and 1993 respectively. Jobsonline.com began in July 1999, and remains a private company and "pure" Internet play.

Online job sites also offer opportunities for matching buyers and sellers of skills in ways that would be too costly in the offline world. For example, Monster Talent Market (talentmarket.monster.com) – is an online, auction-style marketplace that connects “free agents”, or workers with skills to offer, with companies that need those skills on a contract basis. Launched by Monster.com in July 1999, the service provides for real-time searches of detailed free agent profiles. The Monster Talent Market features a diverse pool of contract talent, including management consultants, project accountants, graphic designers, and IT programmers. Companies can utilize the service to fill contract assignments quickly, by placing bids on prospective talent. To make the initial match, searches can be defined according to profession, location, availability, whether talent is required on-site or off-site, and any relevant keywords. Suppliers of talent pay \$99 for listing for 60 days.

Websites such as FreeAgent.com, Guru.com and SkillsVillage.com offer services similar to the Monster Talent Market. Much as is the case with eBay (which has chiefly served this role for “used” goods), structured markets are created in cases where previously communications and transactions costs might have led to inferior matches, or to no matches at all. There is also the possibility of suppliers of complementary skills finding each other online, in order to create project teams that can then be matched to buyers. In these cases, there are obviously still very severe limitations on “high bandwidth” data, and potential lemons problems, as discussed in the previous section. To avoid these problems, online intermediaries will have to evolve toward being more like traditional temporary help agencies and service contracting firms, maintaining “inventories” of workers for hire, who have been pre-screened offline in traditional ways. The nature of the information transfer and verification required means that much of this market smoothing role will be performed in traditional ways, with only the final information sharing and matching being moved online.

Even in the case of traditional temp agencies or recruiters, the Internet offers significant new ways of aggregating and exchanging information. Examples that various online job sites offer include⁴:

- email notices to job seekers about jobs that might meet their requirements
- blocking of viewing of online résumés by current employers
- email newsletters with career-management advice
- tracking of “hits” for job listings by corporations and commission-based recruiters
- specialized listings by industry, region and even subject
- aggregation and posting of job listings from corporate websites

Ultimately, features such as these will extend the reach of online job searching and matching, but, as in the case of other online markets, the penetration rates are still low. Forrester Research, for example, surveyed job seekers who were also Internet users, and estimated that only 4% of jobs were found online. It projects that global “e-cruiting”

⁴ See “E-cruiting is working out”, Andrea Adelson, *San Jose Mercury News*, September 6, 2000, p 3C.

revenue will grow from \$600 million in 1999 to \$2.3 billion in 2003, but that would still be only 1% of the total recruiting market.

21.4 Knowledge Services

In addition to changing how firms and workers find each other, the Internet also affects how some kinds of services are delivered. Work that does not involve geographic proximity can potentially be performed over the Internet and World Wide Web. The best example of this category of services is information technology itself. Software development and troubleshooting can often be performed from remote locations. Of course this phenomenon can be viewed as part of a more general, longer-run trend that has been driven by falling telecommunications costs. For example, call centers, where personnel are concentrated for answering customer queries of all kinds, can now be cost-effective in serving global clientele. A US firm may situate a call center in Ireland or even India to lower its labor costs, with the costs of international voice transmissions no longer being a barrier.

The Internet and the Web expand the scope of such processes, since they allow much richer information to be exchanged at long distances, at even lower cost. Any information that can be digitized can be transmitted back and forth with relative ease. Thus programmers in India can collaborate with counterparts in the US to develop and test software, without either group having to travel to the other's location. These kinds of full collaboration over the Internet are still in their infancy, but are likely to grow rapidly as technology advances to allow more and richer exchanges of information and remote access to information technology resources. In many cases, the bulk of a job may still be performed without using the Internet, while instructions, inputs and results are exchanged at long-distance.

Autor (2001) discusses another example of relocation of work through digitization. Bank check processing is a low-skill, labor-intensive job, but one that must be done rapidly to satisfy federal regulations in the US. This latter requirement earlier meant that processing had to be done at locations nearby to banks. Now, however, digital imaging allows paper checks to be electronically transmitted to a smaller number of facilities, reaping economies of scale, and allowing banks to take advantage of locations with lower labor costs. This kind of phenomenon is an example of the forces that we discussed in Chapter 11, where we discussed the changing nature of firms.

Returning to the arena of software development, one area where cooperative long-distance work has been well established has been the open source software movement, in which informal teams of developers have used the Internet to collaborate across the globe. Again, while much of the actual programming would be done offline, the ability to communicate questions, solutions, results and so on is critical to making such efforts work. User forums, bulletin boards and news groups have allowed users to ask and answer questions of each other in an open forum, even before the advent of the World Wide Web. While one programmer may be an initiator or become a *de facto* project

leader (as in the case of Linus Torvalds and Linux), the inputs of many, many individuals from different locations are critical to the overall success of the software development.

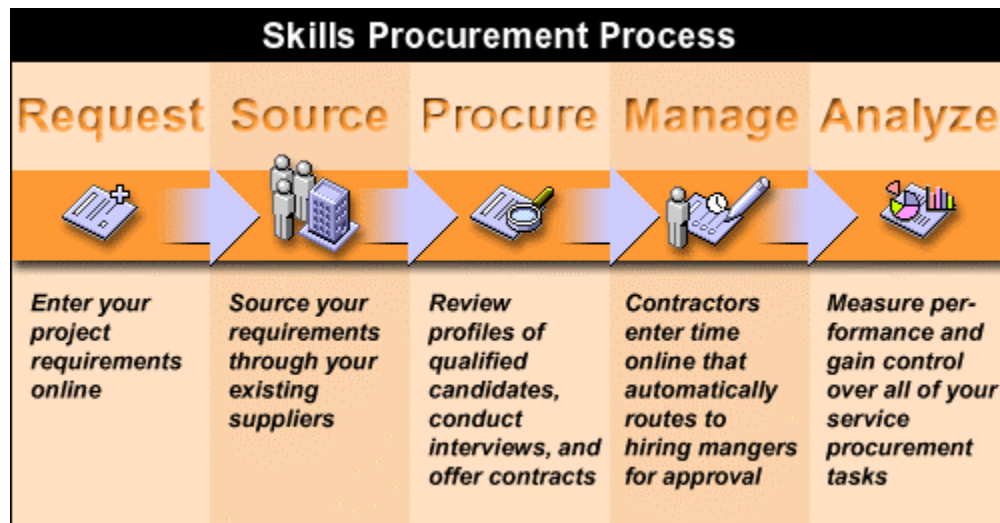
In open source software development, the rewards (at least in the short term) are non-monetary. Programmers will contribute for self-satisfaction, or to earn the praise and recognition of their peers. However, this means that the process can be subject to considerable variability and uncertainty. For example, when a group member posts a question to a forum, the response time can be lengthy, because there is no financial incentive for anyone to provide a fast and thorough answer. Furthermore, data produced by forums can be difficult to aggregate and analyze.

In response to the above difficulties, companies such as HotDispatch have blended some of the features of the open source collaborative model with standard intermediary roles, to offer what HotDispatch calls Community Knowledge Marketplaces (CKMs). Members of the IT “community”, including IT/IS professionals, systems integrators, and software vendors, can use such marketplaces to buy and sell knowledge services such as questions & answers, project outsourcing, and software exchange. In contrast to open source communities, a CKM is a commerce-driven business forum, and incorporates the features of online talent marketplaces, but with delivery mechanisms as well as matching. Members can exchange a comprehensive range of technical services, not just questions and answers. Entire projects can be outsourced and code can be bought and sold. As one might expect, monetary incentives act as a catalyst, and the result is fast responses with initial answers in just a few hours. The CKM also acts as an aggregation point for different technologies and applications, whereas user groups or open source communities are typically more narrowly focused.

HotDispatch's global community has over 50,000 experts. While individuals may register free, corporate customers pay an annual subscription fee, as well as a 10-15% transaction fee for all completed transactions in the marketplace. The transaction fee is reduced to 5% for projects valued at \$50,000 or more. In addition to providing access, corporate accounts also feature budget management tools that enable monitoring and control of a corporate team's activity and spending.

Firms like HotDispatch match suppliers of software and related technical skills with demanders who are firms (or teams within firms). In these cases, a “job” as a longer-term contract that will involve a bundle of tasks to be fully specified later (what economists call an incomplete contract) is replaced by a “job” as a specific project or even just a single query (see Figure 21.2). The Internet facilitates this unbundling of jobs because it reduces the fixed costs of finding and contracting with a supplier of services. Other examples of knowledge services involve services that are provided to consumers rather than firms, or hybrid situations. We briefly examine healthcare, financial services, and travel-related services from the perspective of delivering knowledge services online. Note that we could also consider these industries as subsets of delivering digital products and services online, as we have done in Chapter 19. We have already considered financial services in some detail in Chapter 20, and will offer a complementary perspective in this chapter.

Figure 21.2: Skills Procurement at SkillsVillage.com



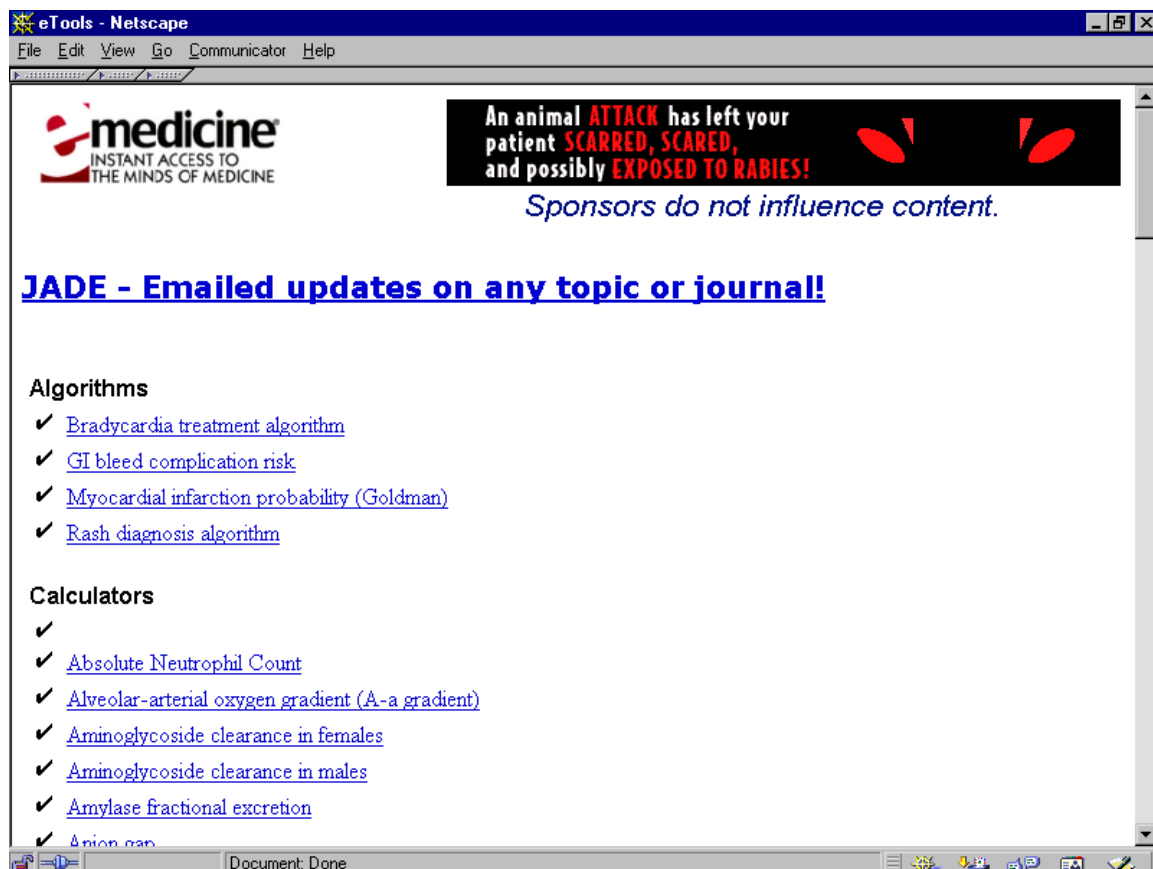
Source: <http://www.skillsvillage.com/zbeta/content/solutions.html>

Healthcare At one level, it seems unlikely that healthcare services could be delivered online. Healthcare involves close personal contact, and in that sense is not amenable to digitization! Nevertheless, healthcare also involves the provision of knowledge services, since the doctor or nurse uses her or his expertise to solve patients' health problems. The question is what components of healthcare can be effectively unbundled and delivered as online knowledge services. Information that improves preventive care (nutrition and fitness) by individuals is the mainstay of health information sites aimed at consumers. For example, drkoop.com, one of the highest profile health sites (because of the association of the former US Surgeon General, as well as its financial troubles) can be characterized as a combination of a health magazine (including questionnaires and tables, dubbed "calculators"), layperson's medical encyclopedia, and health news channel – in other words, a basic health portal. The consumer portions of most other health sites, such as WebMD, HealthCite and Healthology, are similar in scope. All these web sites stress the active involvement of physicians in developing the content that they make available (HealthCite uses its doctors to compile existing information), but there is a strong distinction from actually providing medical advice or services – in fact, every such site includes a clear disclaimer to this effect.

One consumer-oriented site, thedailyapple.com, goes somewhat beyond the others, in also offering users the ability to construct and track their own health profiles on the web securely, in an integrated manner. In this respect it is somewhat similar to the approach of personal finance web sites such as quicken.com. Thedailyapple.com also offers access to lab test results online. One can view such services as partly replacing physical delivery of information, and partly complementing the usual services of medical professionals. One area where such developments may be particularly valuable is in

managing chronic diseases such as diabetes.⁵ In such cases, patients inevitably must play an active role in treatment, well beyond just taking prescribed medications. The rich exchange of online information can lead to significant improvements in the effectiveness of healthcare.

Figure 21.3: Medical Calculation Tools



Another site, eMedicine.com, is aimed primarily at physicians, offering them access to a library of professional peer-reviewed articles, as well as a long list of tools (calculators, scoring rules, decision rules, algorithms and tables – see Figure 21.3) for a variety of conditions and situations. This is the closest one gets in the healthcare domain to online delivery of knowledge services to professionals, analogous to the online knowledge flows that are so common in the case of software developers. Like the other healthcare sites, eMedicine.com does not charge for its services, though it may pay its suppliers (e.g., the doctors who write the articles posted). The nature of the professional

⁵ See, in particular, the article at <http://www.thedailyapple.com/public/corp/pressArticle.jhtml?articleRepositoryID=%2Ftarget%2Fcs%2Fnews%2Fcs%2Fpress33.html>.

community, and the role of economic factors, is different from knowledge services such as software development.

At one level, economic factors are clearly important in healthcare – doctors are well rewarded for the sacrifices they make to obtain their qualifications. At another level, however, patients' wellbeing is still the ideal, with economic considerations meant to be overridden by need. Therefore it is unlikely that one will ever see an online market for healthcare services of the kind created by HotDispatch for software development. This issue is illustrated by the travails of the site, myhealthscore.com, which offers information on the costs of various medical procedures (as set by health insurance companies) as well as quality ratings of medical practitioners. The American Medical Association frowns on this site, not only because the site uses a list of codes and descriptions that the AMA has copyrighted, but because it makes more salient the payments doctors receive, something the AMA argues can come in the way of choosing the best medical care.

Despite the importance of noneconomic considerations, the ability of the Internet to allow lower-cost communications will ultimately increase the medium's role in the provision of healthcare. Email communications with patients, in particular, provide a useful alternative or addition to the use of the telephone, and appear to be growing. Privacy concerns are being alleviated as the levels of security and encryption on the Internet continue to improve. Perhaps where the Internet will have the greatest impact is not on the delivery of services, but on the ancillary activities of record-keeping, insurance reimbursement and access to knowledge databases.

Finance Financial services boil down to two broad categories: (1) information and advice on managing income, payments, and the allocation of assets; and (2) execution of financial transactions. As we have discussed in Chapter 20 and earlier chapters, the Internet has extended automation of the second category to allow individuals to perform many transactions without specific human assistance, using software that replaces previously manual tasks. This has contributed to the unbundling of the above two components of financial services. Furthermore, the Internet has made large quantities of financial information available to individuals, potentially reducing the value of financial advice. Financial advice in this situation must be based less on better information, and more on superior expertise and ability to analyze information. In other words, the Internet pushes financial services, as provided by people rather than software, in the direction of becoming more purely knowledge services.

Traditional financial services firms such as Merrill Lynch, Morgan Stanley and Salomon Smith Barney resist moving such knowledge services online, since they have a substantial investment in branch offices, and personnel to staff them (over 10,000 financial consultants and account executives each). Each has dipped its toes in the water in terms of offering online financial information and trading, but higher-value services are offered through branch offices and personal contact, with the emphasis on building relationships with clients. Corporations and wealthy individuals are the main targets for these services. The Web provides a convenient complement for access to account

information (e.g. mycfo.com), but not for creating any kind of marketplace for knowledge services in financial management.

Companies such as Instinet, which has been discussed in Chapter 12 as a financial trading platform or ECN, are attempting to offer financial research services online, creating what Instinet calls a “Research Marketplace”, where research and analysis can be purchased from Instinet or various third-party providers. Research services will typically be embodied in the form of documents, so that the line between “knowledge services” and “content” is blurred. The clients of Instinet are smaller financial services firms, and possibly even the larger, consumer-oriented firms, though those firms will typically prefer to generate their own research in-house.

Figure 21.4: Financial Knowledge Services Marketplace



A site that provides something very close to a marketplace for financial knowledge services is BizWiz, a business-to-business online network, that allows members to find each other, request services or proposals to provide services, and exchange information in general. For example, it includes LawForLess.com, which offers information and advice on financial law. Potential buyers can submit questions and receive quotes for relevant services, which may be delivered online. Alternatively, a

search engine allows one to do key word searches among members (see Figure 21.4), so that searching corporate financial services under the category “consulting” for the key words “money laundering” produces half a dozen results, such as Proximal Consulting, a “global money laundering mitigation firm providing a complete range of services to combat money laundering including due diligence, training and investigations”. One can then proceed to send an email describing one’s need, requesting specific services, requesting a bid or proposal, or setting up an online meeting using BizWiz’s MeetNow software. Even if these kinds of financial services are unlikely to be delivered online, the matching and communications role of the Internet is well exploited in this case. Note that this business services marketplace can also be considered as being analogous to the B2B product marketplaces discussed in Chapter 12.

Illustration Box Managing Business Travel

Managingtravel.com’s listed benefits include:

- Know if you are about to go over budget before it's too late
- Compare the planned expenditure with the actual cost after each trip
- Access the lowest fares available for any trip
- Save time when making reservations
- Give your travelers more control over their travel plans
- Ensure all activity is within the company's travel policy
- Set the right policy and change it dynamically if necessary
- Make it easier for the traveler to complete expenses
- Slash the cost of processing expense claims
- Speed up the authorization process
- Identify the main suppliers within your travel and expense chain
- Have the facts you require to optimise suppliers and negotiate better deals
- Reclaim overseas Value Added Tax
- Work more effectively with your travel agent
- Tailor the system to suit your particular needs

Source: <http://www.managingtravel.com/ubenefits.htm>.

Travel Travel websites such as Travelocity and Expedia offer a mix of content, services and tokens of exchange. The tokens of exchange are reservations and tickets that are issued as a result of booking online, which itself is a digital process or service. These websites provide an enormous amount of content, pertaining to all aspects of travel.

Since prospective travelers have to do much of the search and evaluation themselves, the level of knowledge services provided is limited. This is in contrast to traditional travel agents, whose main value has been precisely in using their expertise to provide search and evaluation services. Travel agents often act as aggregators of the experiences of their past clients, which become part of their knowledge base. In the online case, previous customers can post reviews, and again prospective travelers have to perform the search and evaluation functions themselves, though simple summary measures are typically provided (one to five checks, stars or similar rating systems).

To the extent that travel websites provide more than just information, they also provide knowledge services. For example, Travelocity has a page called “Travelocity’s Been There!”, which offers vacation stories and suggestions from its own employees, from “Hawaii on a budget” to “Mystical mysterious Stonehenge” to “Swimming with the sea life”. However, such examples are limited, and the impact of the Internet can be seen in terms of unbundling the range of travel services, and reducing the scope and transfer of knowledge services. Even in the case of business travel, the knowledge services component of online travel services is relatively small. The emphasis is instead on providing online management of travel claims and expenses. For example, managingtravel.com offers a range of such services, presented as a complement to those provided by a traditional travel agent, rather than a substitute (see Illustration Box above).

General Information The boundary line between content and knowledge services is fuzzy at the lower end of the spectrum. In some sense, all search engines and search services offer knowledge services based on the content that has been put on the Web. In the case of firms such as Ask Jeeves (www.ask.com), the nature of the querying is through questions rather than key words, and databases of answers are built up specifically to answer queries. However, the value of such content does not appear to be high enough for firms to charge for it explicitly – instead advertisers pay for access to these users’ eyeballs.

Ask Jeeves also offers the opportunity for users to answer each others’ questions, but the quality of the responses illustrates the problem with such an approach for serious knowledge service delivery: it is difficult if not impossible to judge the quality of many responses, or to know if they are accurate. What is absent are trust and reputation. These problems are not insurmountable under some circumstances. For example, open source software communities involve the building of reputations within the community. Frequent interaction and some degree of specialized knowledge are essential for such developments.

If knowledge is available in substantial enough form, and provided by reputable sources, it becomes a product or service that can be charged for. Consulting firms of all kinds can be considered to be providers of knowledge services. Most of their work involves traditional modes of interaction, which cannot easily be shifted online. On the other hand, research and analysis firms such as Forrester, Gartner, IDC and Jupiter Media Metrix can provide the results of their research and analysis in the form of online

documents, online audio briefings and conferences, and even access to software tools for decision-making. These firms provide what might be characterized as “business intelligence”, and this is a form of knowledge service that commands a relatively high price, since it can have an impact on business customers’ bottom lines. The frequency and degree of standardization of the knowledge provided determine whether or not it is produced in response to a specific request, and whether or not it is delivered online. The Illustration Box below shows how one firm uses the Internet and Web to extend its knowledge services.

Illustration Box Online Knowledge Services

Giga Information Group is a smaller research and analysis firm, specializing in technology businesses. The following is taken from their web site:

Giga Advisory Members receive:

- Unlimited phone and e-mail inquiry to all of Giga's Analysts
- Full access to ExperNet, our exclusive network of independent IT practitioners
- 24-hour access to research via a personal Virtual Office on GigaWeb
- The latest technology news from our third party content partners
- Unlimited access to audio-teleconferences
- Preferred status and discounts at Giga Events, including Giga World IT Forum
- Giga's commitment to a high ethical standard of objectivity in our research
- Superior Inquiry Response
- Access to all Knowledge Salons

Knowledge Salons

The heart of GigaWeb 3.0, Knowledge Salons are dynamic, continuously updated online forums where research, analysis and points of view are shared and debated via the Web. Each Salon centers on an issue, is initiated by a catalyst (a client inquiry, industry event or discussion among Giga analysts), and continues until the issue recedes and a new one takes its place. Giga clients join Salons to gain quick access to the value-added information they contain. Salons are hosted by Giga's senior analysts, who are responsible for continuously revisiting and advancing the issues to keep the content and discussion fresh and interesting. Giga analysts also proactively keep Salon participants up-to-date by pushing the latest ideas and developments to them periodically via e-mail.

Forums, Comments on Content, and Surveys GigaWeb 3.0 encourages users to interact directly not only with Giga, but also with each other by sharing feedback about interests and challenges and contributing ideas that may drive Giga's research direction. Including the entire client community in Giga's unique collaborative research process makes Giga's research team highly responsive to client needs.

Source: <http://www.gigaweb.com/Marketing/home.asp?intGContextID=18&strMode=advisory>

A final example of knowledge services involves bundling with offline content. CD-ROM and DVD-ROM encyclopedias, such as Microsoft's Encarta, have almost completely displaced traditional print encyclopedias because of their substantially lower cost of production and distribution. However, even these digital encyclopedias provide only a small fraction of the information that is potentially available on the Internet. Hyperlinks in these encyclopedias therefore provide on-demand knowledge services, without any marginal cost. Articles to which these hyperlinks connect have been prescreened for accuracy, so the service provided is different from that of basic search engines.

21.5 Education and Training

As is the case with other aspects of the Internet's economic effects, there is a range of ways in which education and training can have online components. These include:

- Email, user groups, chat rooms and class websites for traditionally taught classes
- Websites for textbooks
- Online testing for traditionally taught classes
- Videotaped lectures delivered online
- Assignments made available online, and completed assignments delivered via the Internet
- Instructional materials made available online

In the extreme case, there is no live instructor to mediate the learning: the student relies entirely on pre-prepared materials, and perhaps on interactions with other students.

What makes education and training different from knowledge services of the kinds we have discussed in the last section? Perhaps one key difference is that formal education and training involve testing and certification. Whereas knowledge provided by a research firm, a consultant, or a software developer may be valuable, the main goal in such cases is improved decisions, better products, faster development, and so on. There may well be knowledge transfer to the buyer of the services, but it is not the main goal, and so it is unlikely to be systematic.

In some cases, the knowledge service may be provided in such a way as to prevent any transfer of knowledge that is of lasting value – otherwise the seller will shrink its market with each sale. For example, a financial services firm may provide analysis and recommendations for portfolio allocation without revealing the model it uses for analysis. In other cases, the service is not in a form that provides the knowledge required to reproduce the service. The software developer may write a program in JavaScript that is completely open to scrutiny, but the buyer of the service will not be able to program in that language by studying that program. In education and training, on

the other hand, the objective is precisely to transfer a skill to another person⁶, and the success of this process must be determined by some form of testing. Furthermore, certification signals such success to future buyers of the transferred skills.

What are the advantages of online education and training? Some of these advantages may be directly the benefits of digitization. Others may result from lower communication costs that in turn are driven by digitization. We next discuss these different possibilities, which illustrate the properties of digital products and communication discussed in earlier chapters. From the perspective of those who are obtaining education, online delivery offers some freedom from geographic constraints, the ability to receive and study content at any time and pace, and greater possibilities for cost-effective customization. These features are present to some extent with older alternatives to classroom learning: radio, TV, and mail (correspondence courses) have offered the first two benefits. Customization, however, is a consequence of digitization of educational content, whether text, audio or video. As we have discussed in Chapter 9, any information in digital form can be modified relatively easily.

Digital information can also be delivered in physical forms. In particular, CD-ROMs provide a way of making educational content available wherever the learner chooses. Testing, which is an essential part of education and training, can be built into digital learning programs. For example, presentation of concepts can be followed by questions that must be answered correctly to move on to the next concepts. This represents a limited form of “interactivity”, since the learner’s answers affect the sequence and pace of presentation of ideas, but still much more than is possible with radio and TV as distance learning delivery tools. Furthermore, in the case of software-mediated learning, instruction is entirely automated, and its quality is limited by the quality of the software. While many people (including Gerhard Casper) see great potential in the future, there are limits to what software can currently offer, and human interactions still have a vital role to play.

Most online learning offerings, therefore, use email and chat rooms to enable communication between the instructor and the students, and among the students themselves. The main conceptual material that would traditionally be delivered through lectures in a classroom is now offered in recorded digital form (text, graphics, audio and video) but discussions and assignments take place in “real time”. The instructor’s role is shifted from delivering knowledge in classroom lectures to managing the overall learning process, with students taking a more active role. Many would argue that learning is thereby made more effective.

Modifiability of digital content also means that customization can include the delivery of knowledge in more varied sizes of units. To some extent this just extends what has occurred in traditional classroom education, as it has moved away from an aggregated model of delivery, with smaller courses such as weekend courses being offered. In the realm of school and university education, where most students are still

⁶ This is essentially the point made by Gerhard Casper in the quote at the beginning of this chapter.

full-time, the need for this adjustment is less. Furthermore, the requirements of reaching a minimum level of competency before certification can be given also places restrictions on the extent of disaggregation or unbundling: for example, very little foreign language learning can be accomplished in an afternoon. On the other hand, smaller chunks of material may well be suitable for corporate training situations. Since online learning can involve substantially lower fixed costs of delivery (versus using separate physical facilities and a human instructor), disaggregation is particularly suitable in this realm (see Illustration Box).

Illustration Box **E-Learning on the Plant Floor**

Assemblers of workstations and servers at Sun Microsystems' plant in Newark, California now receive electronic alerts about changes in assembly methods, rather than having an engineer come to the plant floor to explain it to a technician, who would then instruct the affected workers. Alerts may include text, graphics and videos as appropriate. They can be automatically recorded in a database.

The infrastructure that delivers alerts to workers at their stations also is used to provide more general online training. During downtimes on assembly lines, workers can choose from a range of modules, from simple 30 minute sessions to courses that are made up of 10 four-hour sessions (about as much as a term-long university course). Topics include how to avoid scratching computer cabinets and how to avoid electrostatic discharges that can ruin an expensive hard drive inside the computer, and so can directly affect job performance and the bottom line.

Workers who take the online courses can be tested before and after a module or segment. Wrong answers can automatically trigger a repeat presentation of the material in question, and this can be done without the embarrassment that revealing ignorance or mistakes in a classroom situation can cause.

On-demand assembly-line e-learning is just one part of a general shift toward online corporate training, in which companies like Cisco have moved 90% of their training online, though the overall figure for corporate America is more like 10%. The forecast is that the average will reach 50% in a few years, because of the need for continued training of workers at all levels, and the convenience, flexibility and low-cost of online training.

Source: "E-Learning Has Arrived on the Plant Floor", by Gene Bylinsky, *Fortune*, June 26, 2000

Ultimately, the development of online education and training will be driven by economic considerations. The demand for e-learning is driven by factors such as more rapid obsolescence of skills, higher opportunity costs of time that make traditional full-time education costlier, the need to deliver training as quickly as possible ("just-in-time"), and globalization that affects the training needs of multinational corporations with scattered workforces as well as the education needs of developing countries. On the supply side, of course, we have the falling costs of information processing, storage and

communication associated with the Internet, World Wide Web, and parallel, complementary technological developments. One of the main potential impacts of online learning is through economies of scale in delivery. While developing educational and training materials for digital delivery may involve higher fixed costs than traditional methods, the potential market for these materials is much greater, since the costs of reproduction and transmission can be almost negligible (as long as the general Internet infrastructure is in place).

Traditional education content and service providers are adjusting to the new situation, in varying ways. While all schools and universities in developed countries have incorporated features such as class web pages, email and user groups into the mix alongside traditional classroom instruction, others – at least several dozen universities in the United States – have more aggressively pushed forward with purer online offerings. In some cases, the attempt is to reach a target market already well suited for this switch. For example, the University of Phoenix, already attempting to serve working individuals or non-traditional students using geographically distributed rented facilities and contract instructors, has moved toward virtual classrooms with alacrity. As many as a third of US colleges offer some online courses, including heavyweights such as the University of California, Stanford, Harvard and New York University. In such cases, the goal is often to reach students who would otherwise not enroll in these universities, and who are not enrolled for degree courses. Thus the strategic approach for the big brick-and-mortar educational “brands” is quite different than in the case of upstarts such as the University of Phoenix.

Traditional brand-name universities can only go so far with online offerings, without hurting their reputations or cannibalizing their high-paying full-time student customer base. However, some universities have leveraged their brand names, pools of expertise, and other assets in ways that avoid this cannibalization. For example, online education provider Unext.com has created a virtual “university”, Cardean, in partnership with an impressive consortium of academic institutions: Columbia, Stanford, Carnegie-Mellon, Chicago, and the London School of Economics. Cardean actually focuses on business courses, and offers various modules, suites of courses, and so on, sold cafeteria style. Cardean illustrates disintermediation possibilities as well, so that well-known academics such as Carl Shapiro and Hal Varian are able to co-brand their own offerings with the online organization (see Illustration Box below).

Business schools represent one point of overlap between academics and industry. Engineering and other professional schools have similar connections outside universities. It is not surprising that these are the areas where the boundaries between education and corporate training are the fuzziest, and where new collaborations between brick-and-mortar universities and online education and training providers are emerging. Cardean is probably the most prominent example. In other cases, universities may simply hire expertise from outside, and preserve their interface with their “customers” – unlike the

Illustration Box

Executive E-business E-Learning

Here is an abbreviated description of just one of the course suites offered by Cardean (with helpful hyperlinks in the original web page to other courses):

Learn strategies for effective decision-making in the information economy.

Course Type: Quantum suite
Timeframe: Series of four courses, two hours each
Completion Date: Within two weeks
Prerequisites: None
Suite Price: US \$380

How are the courses in this suite relevant?

Information technology has created a revolution in the information, communications, and entertainment industries. However, because information technology also is permeating other industries, the economic forces surrounding information technology may seem entirely new. "Information Rules - Business Strategy for the Information Economy," a Quantum suite of four courses, examines the dynamic decisions that arise in information-based industries. It offers professionals ideas about how to succeed in this new environment, based on the best-selling book, *Information Rules*, by Carl Shapiro and Hal R. Varian.

Who should take these courses?

They are for mid- to upper-level managers who want to understand how to better take advantage of business opportunities in the information economy.

What is covered in these courses?

The suite looks at how the information economy changes business decision-making, introducing students to the concepts of lock-in, network effects, differential pricing, and complements

Course: Lock-in Visit the web site of a major airline to learn how it uses the site to entrench and leverage its customer bases. Participate in an interactive scenario that requires use of lock-in strategies to build and retain the customer base of a hypothetical online brokerage firm. Look at the switching costs involved in purchasing a new brand of computer. Watch three videos in which Professors Shapiro and Varian discuss the negative effects of lock-in and how technology vendors are using lock-in strategies.

Course: Network Effects See how two electronics companies used network effects to introduce new technologies into the marketplace. Take an interactive quiz that tests knowledge of how businesses can use network effects to their advantage. Explain how a leading software provider used network effects to improve sales of a particular product. Watch four videos in which Professors Shapiro and Varian discuss the positive aspects of network effects and explain demand- and supply-side economies of scale.

Course: Pricing Strategies View animation that describes the importance of appropriate pricing strategies. See how leading online retailers use personalized pricing by visiting their web sites. Visit the web sites of a major airline and a leading software developer to identify when strategic pricing decisions are being made. Watch two videos in which Professors Shapiro and Varian provide examples of successful personalized pricing and how to use differential pricing.

Course: Complements Understand the critical dependence high tech industries often have on decisions made by producers of complementary products. View animation to determine how complementary products may increase the demand for a current product offering. Explain how the merger of two media giants involved the principle of complements. Watch three videos in which Professors Shapiro and Varian discuss how industries use complements and how to produce complements.

Professionals considering these courses may also be interested in:

- Lock-in Strategies for the Information Economy Suite
- Network Effects in the Information Economy Suite
- Pricing Decisions for the Information Economy
- Managing Complements in the Information Economy Suite

Source:http://www.cardean.edu/cgi-bin/cardean1/view/catalog_quantum_suite.jsp?

case of Unext.com and Cardean. The online education and training industry has, in fact, three main components: providers of content, learning services firms (essentially building courses), and “delivery solutions” companies (essentially providing software for online

delivery). Universities can outsource some of these components, and not others, if they choose.

The potential issue for universities is that the new providers of online education can cut them out of substantial portions of the value chain. Universities with the best known brands will be able to leverage them, as in the example of Cardean. However, when individual professors make deals with online providers, the universities where they are based may not get a cut, even though the professors benefit from their university association. The question is probably one of relative reputational value. In the case of the many faculty members at Columbia Business School who are listed as Cardean development faculty, Columbia's reputation is probably more important. In the case of Shapiro and Varian, the success of their book has made them more valuable than the institution (University of California at Berkeley) where they teach. The general point is that online education opens up new market segments, and those with the strongest reputations (individuals or institutions) may capture a greater share of any economic rents associated with their intellectual property.

Another possible source of economic rents is technology, but it seems unlikely that there are any crucial technological advantages that any subset of companies has. In fact, the entire online learning industry, encompassing all three segments (content developers, learning services firms, and delivery solution providers) is quite crowded, with anywhere from 300 to 3000 firms⁷, depending on how one defines the industry and firm membership in it. While some of these firms may become quite large, none of them appears to have any technological advantage as a basis for growth.

The potential market itself is large, with education estimated at 9% of GNP, or about \$800 billion, for the United States. In the US, the corporate training market is about \$60-70 billion, and, as noted above, the online component of this is expected to grow rapidly. Online learning is currently about a \$1.5 billion business, and one that has proved one of the likeliest e-commerce to actually make money. This is not surprising, since the product or service can be digitized, free online content is not a close substitute, and brick-and-mortar alternatives are costly with limited availability.

Scale is important for success, and ultimately those who can offer the most desirable instructional content will be winners. Scale matters because the fixed costs of production are high, even though the costs of delivery are lower. Producing an hour of sophisticated digital content can cost as much as \$200,000. In the Cardean example, students are being charged \$380, or about \$50 per hour for the shorter "Quantum course suite", while the longer "Mastery courses" (similar to term-length university courses) cost \$500, or about \$15 per hour. Using the above figures, and neglecting other fixed costs, which would be substantial, Cardean would need about 4,000 to 14,000 students per course to break even. It is likely that the production costs for the courses described

⁷ These and other estimates are based on IDC and Gartner Group data reported in "Online Learning", *Fortune*, May 15, 2000, and data from "E-Learning Has arrived on the Plant Floor", *Fortune*, June 26, 2000.

are lower, which would reduce the number of students needed to break even. Furthermore, there are probably economies of scope in producing related courses, such as those listed at the end of the Illustration Box. On the other hand, there are still fixed costs of administration and marketing that must be borne, despite the absence of physical facilities. A useful reference point is the student at a private US university, who may pay \$20,000 in tuition for approximately 1,000 hours of instruction in a year, which works out to \$20 per hour.

The e-learning option, at least in the example considered here, does not look cheap, but the online student avoids substantial fixed costs beyond the tuition that would be incurred by the student attending university full-time. On the other hand, the latter class of student gets a package that includes social interaction and other aspects of the “college experience”. Online learning unbundles these components, offering only the learning part of it. For those who do not want or cannot afford the whole bundle, it provides an attractive alternative. Before the Internet and related IT innovations, alternatives were deficient in certain key features of traditional education – interaction and richness of content in particular. The Internet moves “distance learning” much closer in quality to what is available in the classroom.

21.6 Conclusion

While much of the focus in media treatments of e-commerce has been on efforts such as retailing physical products and grand plans for B2B exchanges, some of the most profound changes are taking place in areas where information and knowledge are crucial to transactions. Job markets, as well as markets for all kinds of knowledge services are being transformed by the ability to digitize all kinds of content and transmit it at low cost. The theme of this chapter has been skills, which are embodied in people, and which are a fundamental input in any economy. Especially in developed countries, routine skills are becoming less important, and “higher-level” knowledge that enables one to deal with novelty and unique situations is becoming more valuable. Even in routine jobs, skills must be updated more frequently, and a greater variety of skills must be mastered. Markets for matching skills, delivering them, and improving them are therefore increasingly important. The Internet and information technology can make these markets work more efficiently, and in new ways.

Summary

- Online job sites lower search costs and potentially increase efficiency in job markets by improving the quality of matching between workers and jobs.
- Improved information may worsen inequality in some cases, and it may also exacerbate lemons problems, leading to lower efficiency.
- Online job market intermediaries play roles as carriers of reputation, as well as bundling a range of information-related services. Their ability to aggregate and communicate various kinds of job-related information at low cost expands their value as intermediaries beyond what pure brick-and-mortar firms can achieve.

- The Internet makes it possible to deliver knowledge services online, not just information. Software development projects are a major example of such delivery, but healthcare, financial services, travel-related services, and business intelligence are all examples where varying combinations of raw information and knowledge services (expertise used to answer questions or solve problems) are provided online.
- Online learning is particularly well suited for the corporate training market, where flexibility and convenience are important factors.
- Existing academic institutions can leverage their knowledge and brand assets, combining with technology-oriented firms to deliver online education and training.
- Online components will become part of all education and training to varying degrees, depending on the market segment being served.
- Economies of scale and scope will favor those who provide the most valued, unique educational content in terms of capturing the greatest value from reaching more students.

Questions

1. In what ways is searching for a job online better than traditional methods? In what ways is it worse?
2. How do online intermediaries in the job market compare with other kinds of online intermediaries, for example, in consumer product markets?
3. What are the advantages of online education and training over traditional classroom methods? What are the disadvantages? How do the relative costs compare?