

KEEPING UP: WEB DESIGN SKILL AND THE REINVENTED WORKER

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Abstract

The flexible reinvented worker figures prominently in accounts of information-age work (Touraine 1971; Bell 1976; Zuboff 1988; Block 1990; Aronowitz and DiFazio 1994; Castells 1996; Rifkin 1996; Sennett 1998). These accounts argue that new media workers, in particular, need to be flexible, to often readjust to new technology and to reskill constantly. While these arguments normally emphasize the role of changing work conditions, in this paper, I investigate the formation of skill in the new media industry. Specifically, I ask how employers in the late 1990s framed a particular new media skill, web design, and how this skill-set dealt with upgrades and changes. Using classified job advertisements, trade publications, informant interviews, and fieldwork, I document the articulation of web design skill and its boundaries. My findings highlight how skill definition, rather than work conditions, affects new media work. I show that the web design skill-set: 1. emerged as a fluid, rather than narrow and technically defined, set of competencies; 2. thrived in a tension between art (design) and code (development); 3. utilized web technology itself to create professional institutions; and 4. required constant skill maintenance and upgrading, what I, echoing an informant, call 'keeping up'. I conclude by suggesting that the definition of what constitutes a skill is essential to one of the greatest challenges of new media work: the phenomenon of re-skilling.

Keywords

skill, work, re-skilling, web design, internet, World Wide Web

The flexible reinvented worker figures prominently in accounts of information age work (Touraine 1971; Bell 1976; Block 1990; Aronowitz and DiFazio 1994; Castells 1996; Rifkin 1996; Sennett 1998). Information technology, these accounts stress, demands that workers constantly update their skills to accommodate new technological advances. Information technology and its accompanying work structures propagate a system in which workers 'must be ready to update their skills as quickly as new technologies are introduced' (Webster 1995: 158). New media workers, in particular, exemplify this kind of flexibility, facing job insecurity in contract-based service work, variable work schedules, and constant readjustment to the new, digital technology.

If it is clear that the network society requires ‘reprogrammable labor’ (Castells 1996), then how and with what skills this labour is being reprogrammed remains to be shown. In this paper, I focus on the skills of new media workers, who because technology is their medium and product, are particularly subject to the pressure to ‘keep up’ with the latest technology, constantly reinventing and upgrading their skills. Using classified job advertisements, trade publications, informal fieldwork, and informant interviews, I examine the invention and reinvention of one information technology skill, website design, in the mid-1990s.

Focusing on skills, rather than on the conditions in which work takes place or even on the worker, enhances our understanding of new media work. First, studying skill brings us closer to the work that people actually do, rather than the conditions in which they work. It is a better place from which to answer questions about how information technology transforms the tasks of new media workers. Second, the articulation of skills underlies key structures of the workplace, most notably pay, promotion, and hierarchy. How a skill is defined has real consequences on work content and structure (Philips and Taylor 1980). Third, skill is what educational institutions and training programmes ostensibly teach and what students strive to get. Fourth, and often forgotten, skill is at the core of our identity. In many instances, skill is what we perceive as giving us worth not only within the marketplace, but within our lives as well (Sennett 1998). Anxiety provoked by outdated or inadequate skills often reflects uncertainty about our place in the world.

As an information technology skill, web design is a particularly appropriate object of study. First, it is unmistakably an information technology skill, intimately and exclusively linked to the World Wide Web (www), a subset of the Internet. Second, since technological turmoil characterizes the web in the years on which I focus, web design speaks directly to debates about reinvented, flexible workers. Thirdly, web design skill is in high demand so while it may not represent all information technology skills, it is far from esoteric.

STATE OF KNOWLEDGE: IT SKILLS AND THE REINVENTED WORKER

Since the unveiling of the first commercial microprocessor in 1971, information technology has permeated the US workplace, creating an unprecedented demand for information technology skills. The US Department of Labor estimates that from 1996 to 2006, the nation will create 18, 574, 000 additional jobs. As Table 1 illustrates, the three fastest growing occupations are all in the information

Table 1 Projected employment growth in Information Technology occupations, 1996–2006.

Occupation	1996	2006	Per cent Change
Total, all occupations	132, 353, 000	150, 927, 000	+14%
Database administrators, computer support specialists, and all other computer scientists	212, 000	461, 000	+118%
Computer engineers	216, 000	451, 000	+109%
Systems analysts	506, 000	1, 025, 000	+103%
Computer programmers	568, 000	697, 000	+23%

Source: Monthly Labor Review, Bureau of Labor Statistics, US Department of Labor.²

technology sector: database administrators and computer support specialists, computer engineers, and systems analysts.¹

Sociologists document information technology’s transformation of the workplace in numerous theoretical and empirical works. The theoretical work often focuses on questions about post-industrialism, mainly what this kind of economic structure’s reliance on technology means for workers’ skills. The empirical work covers a range of academic fields. Some studies pursue Braverman’s (1974) analysis of capitalist production, asking whether information technology would deskill workers as Braverman concluded manufacturing technology had done previously. By the 1980s, other studies examined the arrival of information technology in a variety of settings: insurance companies (Applebaum 1984), automobile manufacturing plants (Shaiken 1985), and clerical departments of banks (Zuboff 1988).

Studies of workers’ skills from the 1980s and 1990s are striking in their consensus that the introduction of technology, in this case information technology, creates an environment in which workers must constantly upgrade their skills. For example, in her influential study of automation in banks, Zuboff (1988) writes:

While it is true that computer-based automation continues to displace the human body and its know-how (a process that has come to be known as de-skilling), the informing power of technology simultaneously creates pressure for a profound *reskilling*.

(Zuboff 1988: 57, original emphasis)

Block (1990) in his study of the manufacturing sector notes that the more companies exploit the 'flexibility of new technologies, the stronger the drive to broaden workers' skills will be' (Block 1990: 103). Information technology skills, these studies maintain, require flexible, broad skills that can constantly be updated.

The flexibility of information technology clearly has serious repercussions on skill. The previous model in which a person learned one skill and used it until retirement is obsolete in environments that depend on information technology. Rather, the current norm is that a person learns a skill, such as how to use one version of software, just in time for the new version of the software to be installed (Manis 1991). The protagonist in Sennett's work laments that complex skills are no longer additive, but that they require completely different and new premises (Sennett 1998). The US Department of Labor aptly describes the pressure of re-skilling, stating that 'rapid technological advances' require 'a highly skilled American workforce that can quickly adapt to a changing workplace' (Herman 1998).

Given a context in which information technology, particularly related to the Internet, changes so often, the emergence of a skill-set stable enough to call itself web design is an impressive feat. Employers were able to delineate the skill-set to the point that they could advertise for positions and write job descriptions, and new media workers were able to present themselves as skilled. As my findings illustrate, however, no sooner did the skill-set emerge than did the demand for its upgrading begin.

METHODOLOGY AND THE WORLD WIDE WEB

To investigate the emergence of the web design skill-set, I combined several data sources, the primary one being classified job advertisements in the *San Francisco Chronicle*. Examining classified advertisements' articulation of skill allowed me to capture demand for the skill from the new media industry, as well as from the publishing, software, graphic design/fine arts, and marketing industries. Short of conducting a comprehensive survey of all US employers, this data provided the best way to see how employers articulated web design skill to the public, especially to potential employees. For one Sunday every month, from October 1994 to December 1997, I collected every web-related job advertisement, creating a sample of 25, 305 job positions. Recognizing that classified advertisements can give only one view of employers' definition of skill, I supplemented this data with a thorough review of graphic design and computer trade publications, as well as two years of informal fieldwork and fifteen formal informant interviews.

I approached my research with a technical definition and a theoretical definition of website design, more commonly called web design. Web design is the technical process of making websites. A popular reference book on web design identifies three concrete aspects of web design: 'HTML authoring, graphics production and media development' (Niederest 1999: xiv). The first component, hypertext markup language (HTML), is the code that structures how text and images will appear on a web page. Graphics production is the software-driven process of manipulating digital images for the web. Media development is a polyglot of visual and technical components of a website, such as video or chat.

In addition to a series of technical, concrete steps, web design also refers to a theoretical approach to making websites, one that emphasizes user interface. Professionals trained in human computer interaction (HCI), visual arts, and graphic design emphasize the importance of user experience, communication, and cognitive psychology in the web design process. Davis and Merritt define interface for a website as:

a crafted communication environment that houses the site's content and the navigation devices the user needs to get to the content.

(Davis and Merritt 1998: 10)

Rather than focusing on the practical mastery of technologies, this characterization of web design emphasizes the communicative element of the medium.

I used both the technical and theoretical definitions of web design to operationalize web design in my research. For example, to address the fact that the phrase 'web design' did not come into vogue until 1997 (three years after Netscape appeared), I included advertisements that used words such as World Wide Web, online, or specific web software and languages to describe the process of website creation.

FINDINGS

In the mid-1990s, a skill-set defined as web design did indeed emerge. My findings concentrate on four particular features of web design skills, focusing on how these skills constantly reinvented themselves to incorporate technological change. In this section I discuss how the web design skill-set: 1. emerged as fluid set without narrow, technically-defined boundaries; 2. existed in a tension between art and code; 3. utilized the technology itself to create new professional groups; and 4. required constant skill maintenance and upgrading, what I, echoing the words of an informant, call 'keeping up'.

Flexible skills with fluid titles

Defining a skill broadly with vague terminology facilitates constant skill upgrading. Contrary to what one might expect of a technology-based skill, web design skill, especially in the early years, encompassed a remarkably broad range of competencies. Often, accounts of skill imply that technology simply creates skills, that the invention of typewriters simply created the typewriting skill. The creation of the web, however, did not simply create web skills. Rather, the web created a remarkably broad skill-set with a wide range of competencies. High levels of literacy, attention to detail, HTML, interface design principles, web servers, UNIX, graphic file manipulation, programming languages, and databases all comprise web design. In fact, the terminology used to describe web design skills is so vague that only 5 per cent of the classified ads in my sample explicitly mentioned ‘web design’.

Though the Internet flourished in the San Francisco Bay Area during the mid-1990s, web positions comprised a small percentage of the positions advertised in the *San Francisco Chronicle*. As Table 2 illustrates, from November 1994 to December 1997, no more than 2.6 per cent of the total advertisements in the computer and programming sections of the *Chronicle*’s classifieds mentioned the web or the Internet explicitly. During that same time period, the percentage of graphic design advertisements that mentioned the Internet or the web grew steadily as well.³

When advertisements explicitly asked for web, online, or Internet skills, they

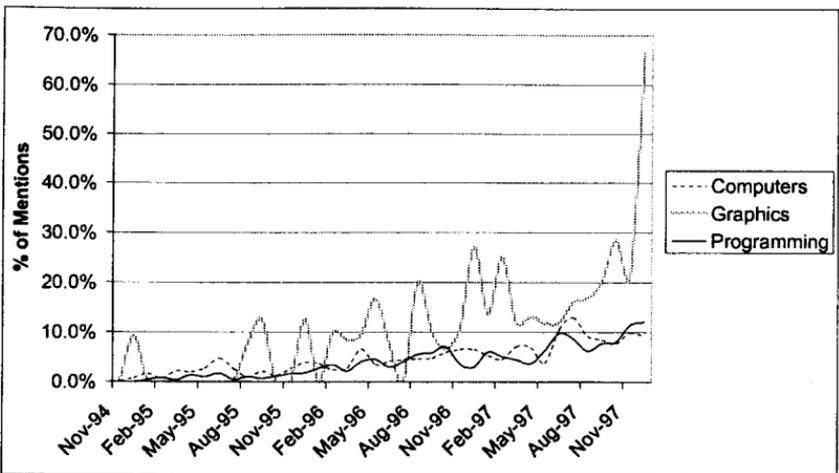


Table 2 Per cent of *San Francisco Chronicle* classified advertisements mentioning ‘Internet’ or ‘Web’.

Source: Author’s analysis

Table 3 First mention of ‘World Wide Web’ in *San Francisco Chronicle* classified advertisements.

Section	Date	Job Title	Description
Programming	1/8/1995	–	mosaic, world wide web, HTML
Computer	2/12/1995	–	Internet, unix system . . . world wide web
Publishing	2/12/1995	Online project managers	world wide web, HTML, and mosaic projects
Graphic design	9/10/1995	Graphic designers	world wide web pages etc.

Source: Author’s analysis

articulated the skill in very ambiguous terms, particularly in the technology’s early years. The first mention of the web in the various sections of the *San Francisco Chronicle* captured in table 3, demonstrates this imprecision.

The description in ‘Programming’ clearly seeks someone with software proficiency. Mosaic refers to the first Internet browser software (which eventually metamorphosed into Netscape Navigator Version 1.0). HTML is listed as a language, though no particular version is specified. The programming section’s advertisements usually requested very specific skills, such as COBOL II or Oracle 8. When companies sought someone with web familiarity, on the other hand, ‘world wide web’ apparently sufficed.

These first four advertisements illustrate the diversity of skills in the web design set. Under the ‘Computers’ heading, the combination of Internet and Unix implies a demand for a fairly technical knowledge about servers and operating systems. On the other hand, the ‘Online project manager’ position, though it mentions the web, calls for general project management experience much more than any specific web expertise. Similarly, the job listed under ‘Graphic design’ seeks individuals with graphic design experience, who may know something – though it is not clear what – about the web.

Employers often asked for web design skills without naming the skill-set explicitly, particularly since the phrase, web design, was not common until 1997. In fact, only 48 per cent of the 1, 200 advertisements for web design skills

mentioned the Web explicitly at all. Instead, classified advertisements sought an Internet designer, an online specialist, or a programmer. In *Occupational Outlook Quarterly*, the US Department of Labor commented that, 'There is no typical Internet staff', and 'job titles can be confusing because duties vary by employer' (Steinberg 1997: 2).

The sheer range of job titles listed in the classified advertisements for web workers also illustrates just how much territory the skill-set covered. On a single Sunday, 11 August 1996, the following positions were listed, all of which could fit under the umbrella of web design:

Associate art director-web site, Computer programmer, Graphic designer, Internet network engineer, Internet testers, Managing Editor/Online, Programmer analyst, QA partner, Tech support rep, Technical coordinator, Web developer (two), Webmaster (four), Web system administrator

(Source: Author's analysis, *San Francisco Chronicle*, 11 August 1996)

Technical support representative, web system administrator and Internet network engineer are positions that require knowledge of computer hardware. The associate art director and graphic designer positions require visual interface experience. The remaining positions – managing editor, programmer, and webmaster – are ambiguous, not only to the lay readers but to the web-savvy reader of the time as well.

The once standard, if now sometimes mocked, job title, webmaster, also illustrates the fluidity of the boundaries of web design skills. This catchall title encompasses any web-related task that the employer, or the employee for that matter, decided it should. In September 1997's *Software Futures*, Matt Cutler, President of The Webmasters Guild, offers the following definition of a webmaster:

Generally, we view webmasters as the group of people including, but certainly not limited to, business strategists, marketers, programmers, writers, salespeople, librarians, graphic designers and software developers responsible for the ultimate success of a particular Web site.

(Software Futures 1997)

The journalist who wrote the article wryly commented that 'Understandably for something new, it's still a bit vague'. The International Webmasters Association (IWA), actually divides the webmaster position into six subspecialties: entrepreneur/site manager, systems administrator, programmer, writer/editor, instructor, and designer. These definitions of web design hold only the web in common. While the breadth of the definition is no doubt intends to include as many web workers as possible in a fledgling association, it also underscores how

little job titles say about skill. It also demonstrates both how web design integrated previous skills into its definition and how the titles themselves say very little about the technology.

When *PC Week* dubbed the webmaster position, ‘the glamour IT job of the nineties’, it also used words like ‘juggler’, ‘flexible’, or ‘mediator’ to describe it (Shein 1996). Classified advertisements in the *San Francisco Chronicle* that asked for webmasters cast an equally wide net. One advertisement sought ‘proven site management skills, photoshop, html, cgi (perl) and Javascript programming’ (9 March 1997). Another looked for ‘html, java, unix, cgi, perl, netscape’ (12 January 1997). A third searched for someone who would ‘administer www site and write about on-line-related matters’ (10 March 1996). While the webmaster title was popular early in the web’s history, by the end of 1997, its popularity declined.

The rise and the fall of the webmaster title echo the larger world of web design skills. The job titles and descriptions in the classifieds demonstrate quite aptly the flexibility of the web design skill-set. Though the web industry acknowledged that web skills existed, initially little, if any, consensus existed on what would constitute these skills. This lack of consensus undoubtedly left room for new technologies, and therefore, new competencies to enter the skill-set easily.

Art versus code

The web design skill-set emerged in the tension between art and code. This tension contributed to the instability of the skill and allowed different professions to insert new skills into the set at will. As web technology multiplied and its capacity increased, the tasks needed to create a website diversified and specialized.⁴ The division between abstract design skills and precise technical skills grew more pronounced. The graphic design community accentuated this division between art and code in website creation through their trade publications. These experts argued that though HTML code and database programming skills were useful, a theoretical understanding of how to communicate information to the user – what they defined as design – was the most important component of the web design skill-set. The progression of the technology and the mobilization of the design community resulted in the bifurcation of art and code in the web design skill-set.

Design is a word with a history in the worlds of both programming and visual art, touching on fields as diverse as architecture, decorating, ergonomics, aeronautics, and of course, information technology.⁵ One research study of web design practice identified at least three distinct types of design: information,

graphic, and navigation (Newman and Landay 2000). The ubiquity of the word and its claim to a variety of traditions makes it an effective object of struggle in the battle between art and design.

Unsurprisingly, 'design' appeared very early in the classified advertisements for web skill. The first advertisement for web skills that included the word, design, ran on 9 July 1995, nine months after the release of the Internet browser, Netscape Navigator. Under the Computer heading, it asked for a 'multimedia graphic designer' who knew HTML and was 'internet-savvy'. Though the computer advertisements mentioned website design fairly early in the web's existence, the meaning of design differed substantively from its use in contemporary website design. An advertisement for 'Internet design' in the Programming section during the early years of the web, likely refers to networking computers for Internet access, not to web design. Only when advertisements coupled design with the web, did the website design skill-set emerge.

Though the invention of a new technology does not dictate which people will be associated with the technological skills, it often does trigger a battle for territory. Professions or competing fractions thereof, will attempt to claim the skills as their own (Abbott 1988; Gieryn 1999). The jurisdiction battle for web design is an understated example of this struggle.⁶ The user interface designers in the computer programming tradition and the desktop-savvy, print-based graphic designers were the two professions best poised to claim that their skills were akin to website design skills.

Computer science's user interface design community easily made the link between its skills and web design skills apparent to itself and to the public. Though the occasional article in the trade publications discussed the difference between interface design for software and for the web, for the most part, computer scientists portrayed web design as a natural extension of user interface design.⁷ Furthermore, this community had the computer skills necessary to understand and to work with web technology immediately. Especially in the early years when website design was portrayed as a technical exercise, the extension of the computer science skills into the web medium went unchallenged. It is in the graphic design industry that the struggle to claim web design as art rather than code was a more urgent, and certainly more visible, endeavour.

The graphic design profession was slow to adapt to the web. Trade publications such as *Communication Arts* and *Print* hint at the contentious debates about web design that basically asked whether it was art or code. In these publications, the graphic design community initially denigrated web design as inferior to genuine visual design.⁸ Belittling other practitioners of a skill as amateurs is one way of

bolstering one's own professional legitimacy. Starting in 1996, the graphic design community embarked on a similar project by emphasizing the difference between art and code.

The trade publications of the graphic design industry often characterized web design as a form of design limited intrinsically by technology, an instance of code dominating art. For instance, one designer in *Communication Arts*, a renowned design publication, writes:

[Designing for the World Wide Web is] also a huge step backwards in terms of design tools and limitations. It's a clumsy environment to work in, and severely limited in graphic control
(Richmond 1995: 167)

Another graphic designer describes the trade-off between good design and the constraints of web technology:

Every visual preference ever expressed in a design – a picture here, a splash of color there, this typeface, that simple bit of white space – can cost dearly in terms of time taken to 'download'.
(Wyper and Greco 1997)

Even the computer magazine, *MacWeek*, points out the limitations of programming, '[HTML] is a limited language that doesn't give designers free reign in their attempts at creative Web construction'. (Streeter 1997: 21). The overall implication is that web design is not about true design, but is, at its best, a communication medium restricted by the technological characteristics of the web.

The technology required to make websites was another obstacle in the graphic design community's reluctant embrace of the Web. Graphic designers repeatedly asked, in trade publications, my fieldwork, e-mail discussions, and conferences, 'Will we have to learn code?' (McMillan 1997: 131). This question speaks directly to the main preoccupation of workers in information-technology-related fields: do I need to learn new skills to remain viable. Conflicting answers greeted this salient question. One web design expert, Charlie Morris, writing for *Internet.com*, claimed that, 'if you want to design Web pages, you need to know your HTML backwards and forwards.'⁹ While my fieldwork suggests that the expectation of how much coding and technical proficiency that a designer have varied greatly across firms and industries, the preoccupation about when design was design and when it was technical expertise remained. In other words, if graphic designers did not know code, they feared that they would be hard-pressed to call themselves web designers.

Despite its reservations about web design, again and again, the graphic design community argued that its artistic skills were pertinent and even essential to the world of web design. In order to convince themselves and the public of this truth, it followed a well-worn path. Abbot argues that in order for occupations and professions to survive they must be able to argue that they possess an abstract knowledge – in this case art – which can in turn be linked with specific skills (Abbott 1988). In order to accomplish this feat, professions emphasize theoretical, abstract knowledge over practical know-how. Reporting from the 1997 American Center for Design Conference, a designer/journalist writes in response to the code question:

To thrive, [designers] will have to reinvent themselves, expanding their skills and their vocabulary to encompass information design, interaction design, navigational mapping and the creation of community. And these are skills that are not addressed by HTML.

(McMillan 1997: 135)

The author downplays the importance of technical skill and highlights the skills abstract nature.

The graphic design community's attempt to claim website design skills as abstract art rather than as technical code illustrates the strength of the pressure to update a skill-set and one way in which a threatened group can respond. The graphic design community had to decide not only what constituted the nature of its skill, but also what were the implications of integrating new competencies into its skill-set. Embracing the necessity to code would allow non-graphic designers to exercise their claim over web design and possibly weaken the graphic design community's claim to web design, but also perhaps to the expertise of design itself. The tension of web design's existence between art and code opened the door to competing claims of what knowledge should be part of the skill-set and who holds this knowledge.

New professional institutions

Sociologists argue that professional institutions provide structure and stability to skill. Abbott, for example, refers to the 'organizational paraphernalia of a profession – school, association, attempted regulation' (Abbot 1988: 29). From this perspective, skills are not obvious creations of technology, but rather the result of contested struggles over the boundaries of expertise (Collins 1979; Abbot 1988). The fact that the skill of childbirth assistance lies in the domain of the midwife or the obstetrician is the outcome of the territorial struggles of professional associations to license and to control the skill. Professions, most

famously medicine and law, use credentials and membership organizations as tools to define and claim technologies and skills.

For some information technology skill-sets, professional institutions did matter. For example, the network administration skill-set requires very precise knowledge about particular versions of software and how it will work with particular servers. In order to meet their customers' demands for these skills to accompany products, software companies, sometimes in alliance with training institutions, created a credential system. Employers would ask prospective computer network employees for certification in Microsoft NT, for example, a guarantee that the person they hire will possess the skill that they need.

However, web design, unlike computer networking, had an ambivalent and largely ineffectual relationship with membership organizations and credentials, the main institutions of professions. Though a few organizations, such as the HTML Writers Guild and the Association for Internet Professionals emerged in the mid-1990s, their membership numbers were low and more important, employers did not take them seriously. Not one of the thousands of advertisements I reviewed asked for an employee with any formal web design education. None of the trade publications advising about careers in web design suggested that people enroll in formal programmes. The CEO of a web design shop summarized the prevailing attitude towards the professional associations, saying, 'Most of these places you can send in fifty bucks and you can become a member'.

While the web design workers did not use established professional institutions to set skill boundaries and to safeguard their expertise, new professional institutions did exist for the web design skill set, namely in the form of key websites and online discussion groups. While these online spaces were more transitory and informal than previous professional institutions, these new professional institutions did serve some of the same functions as their traditional counterparts. Key websites and e-mail-based mailing lists served as the primary form of information about web design for many years. In these arenas, practitioners could distribute technical information about web design, as well as debate and legitimate web design skill.

Knowing the theories of experts, the technology of the exemplary sites, and the firms that produced them formed an important rite of passage for people to legitimize their web design skills. Instead of attending classes or obtaining degrees, web design practitioners gained and expressed the legitimacy of their skill-set in part through familiarity with particular websites (the products of web design) and with theories of web design experts, such as Jakob Nielsen. *Nielsen, has been hailed as one of 'The Web's Ten Most Influential People', and 'among the Web's most recognized human-interface experts'.* Part of the web design skill-set in the early

years was the ability to recognize Nielsen's name, but also to invoke elements from his website or his periodic online column in discussions of web design. Similarly, since the web community considered the Amazon.com website as the standard to follow at one point, understanding how to replicate any technical component of Amazon.com's web design was an important proof of expertise. Familiarity with the work and practices of high profile web design firms, such as Organic Online and StudioArchetype were also an important badge of web design expertise.

Online groups of individuals, whether one-to-many e-mail lists or e-mail-based discussion groups, also served the same roles that professional institutions have in other situations. These forums provided opportunities for web design practitioners to exchange information about design, technical standards, technological breakthroughs, available jobs, and the web in general. One example of such an online forum is Monkey Junkies, a listserv that was run by Webmonkey, *Wired's* site for web designers and developers.¹⁰ When asked how they would suggest that one acquire web design skills, three informants, each at a different company, suggested: first, an online tutorial at Webmonkey; and second, joining the Monkey Junkies e-mail list. These informants clearly believed that the best way to learn web design skills was to learn on one's own with the support of online resources. While Monkey Junkies is one example of such an online space, hundreds, if not thousands, of these electronically-based professional communication groups exist, providing opportunities to learn and update web design skills.

The ready availability of web design knowledge and the teach-yourself nature of the skill explain to a great degree why these new professional institutions were more visible and credible than previous forms. Traditionally, credentials and professional associations restrict access to learning their professional skills. In some cases, a profession's survival depends on its ability to maintain exclusive control of its skills. However, in the case of web design, professional institutions freely disseminated web design knowledge, rather than hoarding it.

Information about website design, how to code HTML, optimizing graphics, layouts of an individual page, was readily available according to my research. The key print publications in computers and design ran how-to articles, promoting a do-it-yourself approach. Evidence from a large-scale survey reinforces the impression that the web design skill-set was accessible. The October 1997 GVI data lists the most common ways that web authors learn HTML: 83 per cent from online resources, 62 per cent from books, 35 per cent from friends, 25 per cent from local gurus, 22 per cent from tutorials/classes, and 17 per cent from other sources.

My informants also emphasized the low barriers to acquiring web design skills. A producer at a large website praised the professional community that surrounded web design:

The interesting thing about HTML is that like the Web it started out as do-it-yourself. There are strong virtual communities out there that believe in that concept. People are willing to help each other out. They help to increase each other's skill level.

Another producer at a web design boutique emphasized the self-taught nature of the skill:

There's a lot of resources online. And there's a lot of books. And I think probably the most common way of learning, maybe not learning the basics, but learning new things is probably by looking at the sources of pages . . . They see something that is cool and they want to know how to do it. It's right there, you just have to view source and then you can see exactly how it was done.¹¹

A producer at another web design firm highlighted the just-in-time nature of skill development. When asked how people learn web design, he told me:

On an ad hoc basis. They learn it—they start messing around with it on their own and then they start doing projects. They find out ways to do things, they're working with other people who teach them, I think it varies, oral tradition sort of thing. Certainly, there are books and things out, but I didn't learn that way and I don't think anybody here learned that way.

By all accounts, knowledge about web design circulated easily among individuals who knew about the key outlets for this kind of information. These informal networks consisting of colleagues, instructional books, or professional groups online, became important markers of expertise, more so than formalized education as one informant implied:

I almost find degrees weird. It's bizarre to go to a class to learn HTML, when you could learn by book on your own. If someone came to me and said I want to learn HTML, should I pay \$300 for a class. I'd say no. Do an online tutorial like Webmonkey, get involved with some not-for profit or other unpaid Web work to get experience.

While formal certificate programmes for web design and membership associations for practitioners did emerge, traditional professional institutions did not play a large role in shaping the web design skill-set. The impotence of professional institutions, in one sense, cleared the way for the speed of technological change to prompt the constant turnover of web design skills. While in other contexts, professional institutions have been able to monitor the flow of new competencies

into a skill-set's domain, the institutions associated with web design did not seem able to, or even interested in, regulating and freezing the web design skill-set. Instead, new media workers themselves, largely by using the web to participate in online forums and consult the works of experts, created their own informal professional institutions through which they could legitimate their skills and ensure that they kept their skills fresh.

Keeping up

On 23 November 1998, a participant in a web-related, e-mail-based discussion group posted the following message:

I have been on the job hunt for some time now looking for that perfect web design position. The problem is; I think that I have designed some pretty good sites but I use GoLive with some basic HTML and DHTML. I am by no way a guru in C++, CGI, Java etc. Do jobs exist that don't require you to have 3 million pages of java in your head? If so where is it? It would be nice to know every program that they ask for but who has the time to fully master debabelizer, Photoshop, Aftereffects, Flash, Fireworks, CGI, Cascading style sheets . . . have 5 or more years experience designing and coding [sic] for the web . . . win coolsite of the day award . . . plus bring home the bacon AND fry it up in the pan?¹²

These sentiments speak directly to the fourth, and, perhaps, the most provocative theme in the emergence of web design skills: the ability to 'keep up'.

Studies of information technology skills usually treat the arrival of a new technology as a one-time event, such as the introduction of robots into the assembly line. A striking feature of web design skills is their continual adjustment to the introduction of the new technologies. Rather than reacting to a single major technological breakthrough, web design skills accommodate a multitude of small technologies, such as those mentioned earlier by the listserv participant.

Keeping abreast of new web technologies and changes to existing web technologies is such a challenge and a necessity that it overrides the other components of the web design skill-set. *Web Site Design in a Nutshell* begins with the following statement:

Most web authors agree that the biggest challenge (and headache!) in web design is dealing with the variety of browsers and platforms, each with its own support and implementation of HTML and scripting elements.

(Niederest 1999: 3)

When asked what was the single most important skill his web design company sought in prospective hires, the president and founder replied 'the ability to keep

up with all the fuss and bother', such as versions of HTML and browsers, as well as newly emerging technologies.

The ability to keep up roughly translates to a college education according to my informants who hire web design workers. When I asked about the educational backgrounds of his employees, the president of one web design firm thought for a minute and said in a surprised tone that all his design employees had at least bachelor's degrees, though in varied fields, such as English, Film, and Fine Arts. When asked the same question, another firm's CEO told me:

You tend to look for people who are college educated or highly motivated. It is not easy to do this (web design), it requires a certain amount of conceptual thinking ability because all the networks and all the images we talking about are just bits and bytes off disks, so you have to have . . . a head around the way things are connected. I think people need good conceptual abilities to be able to do this.

Education or motivation, ideally both, is the foundation for the ability to keep up with web design skills. As Table 4 shows, a study of webmasters' education conducted just after the web's creation confirms that 84 per cent of the survey participants had at least a college degree.

Whether web design skills are presented as conceptual or as straightforward technical competence, the fact remains that they need to be continually updated and reformatted to meet the requirements of the technology.

As the onus of refreshing one's skills with the latest information is on the worker, the newly emerging professional institutions are the main vehicle for this new kind of continuing education. People with web skills view the online forums in which they participate as the main source of information about their skills. In these forums, people ask questions about how to troubleshoot their HTML code or whether anyone knows which version of Explorer best handles JavaScript. It is precisely through access to information about the minutiae of web design that people are able to build and continually update their web design skills.

Table 4 1995 Webmaster study.

Education level	Percent of webmasters
Graduate school degree	30%
Some graduate school education	25%
College degree	29%

Source: Collaborative Marketing, Inc.

While a college education may be a prerequisite for this ability to keep up, the actual maintenance and refreshment of knowledge is carried out almost entirely on the web worker's initiative. Keeping up with the latest information for new media workers is distinct from the ethics-related continuing education requirements demanded of, and often resented by, certified public accountants or lawyers. First, the pressure to keep up with the changing technology of the web is often articulated as an attractive quality of the job. Especially in the heady first years of the web, being a web designer meant working at the cutting edge of technology and art. Web design workers engaged in what was seen as "cool work" (Neff *et al.* 2001).

The excitement provoked by constant upgrading ensures that the web design jobs possessed what Bauman describes as some of the ideal qualities of the modern job: 'varied, exciting . . . giving occasion to ever-new sensations' (Bauman 1998: 33).

Second, no official sanction exists for not keeping abreast of web skills' development. The unofficial sanction, in a context in which keeping up is the most prized component of the skill-set, is that unrefreshed skills become worth-less and are, in fact, no longer regarded as skills at all. Keeping up is nearly impossible given the speed with which websites are created, pulled down, and redone, yet it is precisely by remaining current with this kind of information that permits practitioners to claim that they possess the web design skill-set. Not keeping up with the latest technology definitely means that one is not a good web designer, but it also means that one may not be a web designer at all.

CONCLUSION

The reinvention of skill for new media workers appears to be an endless process. My analysis demonstrates how from the moment of its emergence in the mid-1990s, web design skill immediately engaged in the process of reinvention. This discovery suggests that new media workers may very well be working with a construction of skill that differs significantly from earlier conceptions of skill. My first finding suggests one way that re-skilling actually happens. Defining a skill-set broadly and with vague terms is one strategy to ensure that the skill can be reborn repeatedly. Neither employers nor employees can ever place tasks outside the boundaries of the skill-set because those boundaries bend to accommodate novelty. As the data show, almost any web-related task belonged to the web design skill-set. New competencies, whether based on the introduction of new technologies or the demands of a newly organized work structure, are always part of

the existing skill-set. In the early years of the web when web technology was volatile, this method of reinventing web design proved effective.

Secondly, as the web developed, web design skills began to specialize along the split between art and code, allowing the substance of the skill-set to be endlessly debated and negotiated. Whilst the computer science industry was able to extend its territory to encompass web design, the graphic design industry struggled to claim the skills within the scope of its expertise. Re-skilling lay at the foundation of this struggle: how much re-skilling on the part of graphic designers was necessary and how easily it could be achieved? The specialization of the skill-set itself, though not the focus of this paper, does prompt further research questions. The division between art and code, the 'pretty' and 'practical', may overlie previously existing social cleavages represented by the female-dominated graphic design field and the male-dominated programming field.

Thirdly, my findings highlight the irrelevance of traditional membership institutions and credentials for web design and the increasing salience of new vehicles of professionalization. Participating in social networks and seeking the advice of experts, the rituals in which web design practitioners participate, are, of course, not new practices. However, the ease with which any person could enter into these electronically-based networks, the primacy of these institutions in legitimating skill, and the relative impotence of traditional membership-based professional organizations, may very well point to an emerging pattern of skill formation. These new institutions lend themselves well to skill upgrading as they can respond quickly to innovations and reach a broad audience that moves often between jobs and companies.

The final finding of my research, the integration of 'keeping up' into the web design skill-set, seems to confirm the theories that fear a future of constant re-skilling. The information technology on which the skills are based is infinitely flexible, and the web's technological improvements are so essential to market competitiveness that keeping up becomes the integral component of the skill. For the web design skill-set, keeping up usually translates into having a college education and being young, both of which presumably allow the easy and constant upgrading of skills. However, in the isolated case of web design, it is not clear whether workers experience constant skill upgrading as an oppressive aspect of their work. Employers may apply pressure on their employees to 'keep up', but employees, particularly in an era in which they will work for several companies in different capacities during a single lifetime, self-monitor to keep their skills current. Whilst the listserv participant I quoted earlier clearly found 'keeping up' overwhelming, no doubt many individuals enter the web design field for precisely the challenge of a vibrant, fast-paced job.

Other explanations for the instability of web design skill are possible. I may have honed in on the early years of the skill when all professions experience the lack of coherence that I have ascribed to the web design skill-set. It is also possible that all white-collar jobs share some of the characteristics I discuss in my findings. Though we must wait for time to provide more facts, I suspect that web design will remain a unique skill-set for a while, for two reasons: first, web design exists firmly in the tension between art and code. As currently conceptualized, the skill-set blends skills with two distinct histories: programming and visual design. This tension may be merely a stage in the skill's development, but it is more likely that it is a fundamental characteristic of the skill. Secondly, web technologies need to stabilize before a coherent skill-set can form around them. Given the rapid pace of technological development and lack of standards in this industry, it seems unlikely that this stability will occur in the short-term.

My findings portray a skill characterized by ambiguity, tensions between art and code, new professional institutions, and the pressure of keeping current. The sociological literature has been quick to document the effect of an information economy on the worker, suggesting that the constant demand for upgrading skills is creating reprogrammable labour. My case study of web design skill highlights that a new form of labour – reprogrammable labour – is being reprogrammed with a new kind of skill and, as this research demonstrates, we are only beginning to understand what this skill might look like.

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NOTES

- 1 The US Department of Labor's Directory of Occupational Titles includes both 'Internet Developer' and 'Web Developer', under the mainstream computer-related occupations.

- 2 Monthly Labor Review, Online. Available: <http://stats.bls.gov/opub/ted/1998/Oct/wk4/art03.htm>
- 3 Percentages cited here are low estimates of the actual number of advertisements that sought web design skills. I included only those advertisements that explicitly mentioned the words, 'online', 'Internet', or 'Web'. See Methodological Appendix.
- 4 In the early years of the web, one person could possess all of the skills needed to create a viable commercial website. As time passed, the requirements of such a website grew increasingly complex. At the end of 1998, *Internet World* bemoaned the plight of web designers with an article titled, 'Pondering the lone designer's future: increasingly complex technology and demanding clients mean more challenges for one-man shops' (Marlatt 1998).
- 5 For a more extensive discussion see Donald A. Norman (1988), *The Design of Everyday Things*, New York: Doubleday/Currency and JoAnn T. Hackos and Janice C. Redish (1998), *User and Task Analysis for Interface Design*, John Wiley and Sons, Inc. New York.
- 6 This struggle is understated because it has not taken on the strident intensity of previous struggles, such as that between doctors and midwives, or between psychiatrists and psychologists.
- 7 See Jakob Nielsen's 'Difference Between Web Design and GUI Design', Alertbox, online. Available: www.useit.com/alertbox/9705a.html. Also see Alan R. Dennis, 'Lessons from Three Years of Web Development' in *Communications of the ACM*, 41(7) July 1998: pp. 112–3.
- 8 In her analysis of trade publications, Marvin (1988) demonstrates how professionally trained engineers attempted to establish the legitimacy of their own skills by labelling the people who had informally learned those skills as amateurs and hobbyists. Another excellent discussion of this technique of creating professionalism by emphasizing the difference between amateurs and professionals is Pamela Inglesby's 'Button-pressers versus picture-makers: the social reconstruction of amateur photography in the late 19th century', *Visual Sociology Review*, 5(1), Summer.
- 9 Charlie Morris, A Look at the Web Development World Ahead. Web Developer's Virtual Library. Online, Available: <http://www.stars.com/Internet/History/LookAhead/> (Jan 10 2000).
- 10 Hotwired (www.hotwired.com) launched on the web in October 1994, a month before the release of Netscape's original browser, and it is generally considered one of the first web institutions. Online. Available: <http://hotwired.lycos.com/home/digital/>
- 11 Web browsers can reveal the HTML source code underlying websites.
- 12 GoLive is software that partially automates web creation and maintenance. DHTML is a version of HTML language, Aftershock is 2-D animation software. Flash is a plug-in piece of software that allows websites to display moving images. Fireworks is an all-in-one web graphics tool. CGI (Common Gateway Interface) are scripts that facilitate communication between applications on a web server. CSS refers to Cascading Style Sheets, a design standard implemented in HTML 4.0. DeBabelizer is a graphics software that allows for efficient manipulation and compression of images.
- 13 The following *Internet World* issues were not included: Jan/Feb 1993, Feb 1995 and Jan 1996, Feb 1996.

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METHODOLOGICAL APPENDIX**A. Classified advertisements**

For this study, I read through 25, 305 individual job listings from October 1994 to December 1997 in the Sunday section of the *San Francisco Chronicle*. I created a sample of the classified section using the second Sunday of the month.

For each Sunday, I looked for web-related advertisements in the following sections:

- Computers/Computer science
- Graphics/Graphic design
- Internet
- IS/IT (Information Systems/Information Technology)
- Multimedia
- Programming
- Publishing
- Web/World Wide Web (www)

I defined web-related very narrowly as any advertisement that mentioned in the title or the description a specific set of words (listed below). By using narrow criteria, I believe that I underestimated the demand for web skills, particularly within the computer/programming and graphic design industries. For example, C++ programming positions advertised in this time period were most likely, but not definitely for web-related positions. Similarly, in graphic design, firms that I knew did a lot of online work advertised for someone familiar with Photoshop. Again, the probability was high that the position was web-related, but not certain. Rather than run the risk of including advertisements that were not web-related, I consciously erred on the side of undercounting, rather than include uncertain data. I considered advertisements web-related if they included in the job title or the description the following words:

- Internet
- Web/World Wide Web
- Online
- Web software (e.g., Mosaic, Netscape)
- Web languages and code (e.g., HTML, Java, Perl)

When advertisements directed the reader to other headings, I followed the lead

to headings outside my initial targets and documented the advertisements. In this way, I also covered the following sections, though not in as consistent a manner:

- Art
- Communication
- Editing
- Marketing
- Production

For each web-related advertisement, I noted the title and the relevant part of the description. I counted each job listing as one available position unless the advertisement specifically stated otherwise.

Using advertisements in the print edition of the newspaper created some methodological challenges, which I discuss at length in another article (Kotamraju 1999). Briefly, as the web expanded, an increasing number of positions were advertised solely through online venues, particularly web-related positions. This information is archived inconsistently online and is not a reliable source. Therefore, though the print advertisements may underestimate the actual demand for web skills, I believe it accurately reflects trends in demand.

B. Industry publications

I focused on the industry publications for the computer/web industry, and the graphic design industry. I systematically examined the following publications:

- *Internet World* (September 1992 to December 1997)¹³: Now a magazine 'for and about the Internet user community', this publication was formerly *Meckler's Research and Education Newsletter*, which served an academic and scientific community interested in the Internet and online resources.
- *Wired Magazine* (print edition, Spring 1993 to December 1997): publication known for their cutting edge technology information and artistic style.
- *World Wide Web Journal* (1995 to 1997): online publication of the World Wide Web Consortium (W3C), an industry consortium responsible for promoting common protocols on the Web.

I also relied heavily on numerous web-related articles from the following print publications: *AIGA* (American Institute of Graphic Arts) *Journal of Graphic Arts*, *Communication Arts* and *Print*.

Using Lexis/Nexis, I also searched for articles related to web design skills in popular magazines and newspapers.

C. Websites & Listservs

I browsed through the archives of several public discussion groups including: Monkey Junkies, San Francisco webgrrls, and various W3C discussion lists.

I also consulted more than twenty-five websites, including those of professional organizations in the web, computer, and graphic design industry. A few examples of online publications and design-related sites that I used as resources: Hotwired, Internet.com, Webdeveloper.com, webpagesthatsuck.com, www.useit.com, <http://www.stars.com/>, <http://www.alistapart.com/>.

D. Informant Interviews

In addition to informal conversations with Web professionals, I conducted formal interviews with the following informants:

- Associate producers at HotWired, who report directly to web designers.
- Producers at Hotwired, who liaise with web designers.
- The founder and president of a 5-year-old website design firm with approximately ten permanent employees and fifty contractors.
- Project managers/producers responsible for hiring web designers at two small website design firms.
- The founder/CEO of a multimedia design firm that transitioned from graphic design to CD-ROM design to web design.

E. Informal Fieldwork

Through my freelance work and with the help of acquaintances in the Internet industry, I had the opportunity to observe the practice of web design in several companies. These experiences familiarized me with the vocabulary and technology of the web in a way that I doubt I could have learned elsewhere. The following were my main sites:

- When.com, a company producing a web-based calendar software (now owned by AOL).
- Productopia.com, an online buying guide.
- Atomic Vision, a web design company.
- Mouseworks/VisibleEmbryo.com, a multimedia design firm (CD-Roms and websites).