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## METHODS OF TRAINING IN THE WORKPLACE

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## METHODS OF TRAINING IN THE WORKPLACE

“IN THIS BUSINESS, YOU ARE WHAT YOU KNOW!

Keeping your skills and abilities up-to-date in today's on-demand environment is a critical component to your success. IBM now makes it easy for you to enjoy the technical training you need to maintain that edge!” IBM email, August 2005

Virtually all modern organizations accept that a well-trained workforce is a critical success factor. American organizations spend more than \$62 billion per year on formal training of their employees. It is impossible to estimate the full costs of the additional informal training that occurs. Ability to use information and communication technologies (ICTs) is among the most important skills that many employees need. Yet there is more speculation than well-grounded, factual knowledge about the kinds of training regarding work-related computing to which most employees are exposed. This report utilizes a recent, empirical survey of American workers to provide information about this issue.

Training for work-related computing comes in a variety of forms, ranging from formal, scheduled classroom instruction to spur-of-the-moment sessions with a co-worker to self-based trial and error efforts. Both organizations and individual workers make choices regarding the selection of training methods. In this report we explicate the modes of training being utilized by employees. We also analyze the linkages between these various training modes and the organizational, technical and individual characteristics associated with each employee. The main issues addressed are the factors which influence the types of training methods used within organizations and the factors which influence choice of training by individual workers.

This report utilizes the results of a survey of 1200 individuals in twelve metropolitan statistical areas (MSAs) in the United States.<sup>1</sup> The survey was conducted by telephone during the period April to July, 2004. It is a part of the larger Project POINT (People, Organizations, and Information Technology) conducted by researchers at the Center for Research on

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<sup>1</sup> The twelve MSAs selected were chosen to represent the more sophisticated areas of the U.S. as regards technology use (number of households with computers) and internet infrastructure (access to broadband). They are: Portland, ME, Boston, MA, Middlesex-Somerset-Hunterdon, NJ, Washington, DC-MD-VA, Raleigh-Durham-Chapel Hill, NC, Austin-San Marcos, TX, Des Moines, IA, Fort Collins-Loveland, CO, Minneapolis-St. Paul, MN, Olympia, WA, San Francisco, CA, and Orange County, CA. Within each MSA, a total of 100 respondents were interviewed (using random digit dialing techniques). The overall response rate for the survey was 42%, with MSAs varying from a low of 32% (Middlesex-Somerset-Hunterdon, NJ), to a high of 51% (Portland, ME).

Information Technology and Organizations (CRITO) located at the University of California, Irvine. Project POINT focuses on how ICTs, especially the Internet, are transforming people's lives in the home and workplace. The goal of Project POINT is to empirically explore and understand the linkages between information and communication technologies and behavioral changes in individuals and groups.

The sample is more representative of white-collar workers, that is, workers engaged in non-manual labor and includes only those who use (desktop or laptop) computers for work-related purposes at least 5 hours per week and work for at least thirty hours per week. Nearly two-thirds (64%) of the sample are engaged in occupations generally classified as managerial or professional (See Table 1). Only 5% are engaged in occupations classified as production workers. Fifty-eight percent of the respondents are between 35-55 years of age. A full 38% of the respondents have a college degree and 30% have a graduate degree, while only 8% have no more than a high school education.

**Table 1: Characteristics of the Sample**

(N=1202)	%
<i>Gender</i>	
Male	48
Female	52
<i>Age</i>	
18-24 years	4
25-35	19
35-44	30
45-54	28
55 and over	19
<i>Educational level</i>	
High school or less	8
Trade/vocational school	2
Some college	22
College graduate	38
Graduate degree	30
<i>Occupation classification [SOC]</i>	
Management, professional & related	64
Service occupations	4
Sales & office occupations	20
Natural resources, construction and maintenance	3
Production, transportation & material moving	2
Not classified	9

## Types of Training

Training can be characterized on a number of dimensions. Two important dimensions are the degree to which there is interaction with others during training (which we term personal versus interpersonal), and the degree of formality of the training. If we create a taxonomy of training modes based on these two dimensions, we can identify the four modes of training which are shown in Table 2.

**Table 2. Classification of Training Methods In Organizations**

		<u>Degree of Formality</u>	
		<b>Informal</b>	<b>Formal</b>
<u>Degree of Interaction</u>	<b>Personal</b>	Self-training	E-Learning
	<b>Interpersonal</b>	Peer	Instructor-led

We expect that both the degree of interaction and the degree of formality of workplace training will be affected differently by characteristics of the organization, the worker’s socio-technical environment, and the individual characteristics of the worker.

We expect that both individuals and organizations have preferences for particular types of training modalities. However, we also expect that many organizations and individuals use several training methods rather than relying on a single method. In the survey, the respondents were asked to indicate whether, during the past three years, they had: 1) attended instructor-led classes or workshops for work-related computing; 2) engaged in any training sessions for computing with a supervisor or co-worker; 3) done any computing training using online computer or software training programs; and/or 4) learned to use computers and software for work through self-training with user manuals, instruction sheets, or “trial and error.” Table 3 displays the percent of respondents engaging in each of the four types of training modes:

**Table 3. Percent Participating in Training Method In Past Three Years**

<u>(N=1202)</u>	<u>% having</u>
Attended instructor-led classes or workshops	55
Training sessions for computing by a supervisor or co-workers	58
Used online computer or software training programs	34
Self-trained using manuals and “trial and error”.	83

More than four-fifths of the respondents have engaged in self-training in the use of work-related computing by using manuals, or ‘trial and error,’ while only one-third of the respondents have used any type of e-learning during the past three years. Relatively equal percentages of respondents – more than half of all workers -- have been trained in an instructor-led class or workshop or have been trained by a supervisor or co-worker. It is perhaps surprising that the less formal methods of training (self-training via trial and error or peer training) have been utilized by more employees than the formal methods (instructor-led classes or e-learning), since these latter modes receive the bulk of attention in discussions of training.

In Table 4, the respondents are classified in terms of all the possible combinations of the four types of training that they might have experienced during the past three years. Since 83% of the respondents reported using manuals and trial and error as training methods, we have attempted to create some useful distinctions among categories. Thus we report the percent of respondents who used only this method but ignore self-training for establishing the percentage of workers with the combinations of instructor-led, co-worker/supervisor-based, and online training reported. The most frequent training method continues to be self-training with 21% of the respondents reporting this as the only mode of training received during the past 3 years.

**Table 4. Frequency of Multiple Training Methods In Past Three Years**

(N=1202)	% utilizing
Report no training in past 3 years	5
Self-training using manuals and “trial and error” only	21
Instructor-led classes only	16
Co-worker/supervisor-led classes only	10
On-line computer or software training programs	6
Both instructor-led and co-worker/supervisor led classes	15
Both instructor-led classes and online programs	10
Both co-worker/supervisor-led training and online programs	3
Instructor-led, co-worker/supervisor-led classes and online programs	14

However, forty-one percent of the employees engage in more than one training method. Also very noteworthy is the low 6% of the respondents who rely solely on online computer or software training programs. This is at odds with the reports that many organizations are currently attempting to transition rapidly to extensive reliance on such e-training. For nearly all contemporary workers, online computer or software training programs appear to be augmented with other types of training. Also significant is the fact that only 5% of the employees report no

training on work-related computer use during the past three years. This is more consistent with the widespread emphasis on the importance of enhancing the computer-based skills of the workforce.

Using the taxonomy in Table 2, about one-third of the respondents relied solely on formal methods (32%) of training in the past 3 years, another one-third (31%) utilized only informal methods, and another one-third employed both formal and informal methods. “Interpersonal” training with an instructor, co-worker, or supervisor is the training mode for 41% of the respondents, while 27% engage primarily in solitary (“personal”) modes, and another 27% engage in both interpersonal and personal modes of training.

Empirically, for purposes of further analysis, we identify four major training methods in use by our sample:

1. Interpersonal instruction method either within a classroom with instructor or in the work unit with supervisor-co-worker (41%),
2. Interpersonal instruction supplemented with e-learning/software training modules (27%),
3. Self-training methods, with reliance on trial and error or training manuals (27%)
4. No training (5%).

In the remainder of this report we will look at the associations of these four patterns of training with selected organizational, sociotechnical, and individual characteristics.

## **Organizational Context**

The organizational context includes such factors of the organization as its size (measured by number of employees), commitment to employees’ skill development, ICT sophistication (in particular, the degree the organization is paperless and the degree it is leading edge in its use of ICTs), and the degree to which the organization is dependent on computing. We expect that features of the organization might affect the methods of training adopted by our respondents.

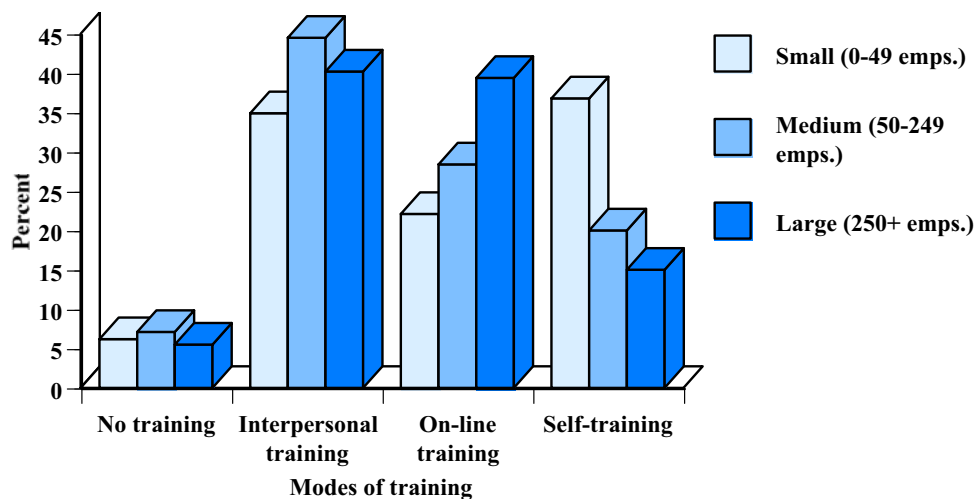
*Size of organization:* The size of an organization is an important feature because in some respects it is indicative of a number of factors. Such issues as complexity as well as availability of resources are coupled closely with the size of an organization. Organization size is associated with modes of training and particularly the use of on-line training modules (Table 5 and Figure 1). A significantly larger proportion of employees in large organizations have used on-line computer training in the past three years than in either small or medium-sized organizations. Additionally, a significantly higher proportion of respondents in small organizations rely on self-help only, in comparison to the proportion in large organizations.

**Table 5. Organization Size with Modes of Training**

	<u>Size of Organization</u>			<u>Total</u> (n=989)
	<u>Small</u> (0-49 emps.) (n=321)	<u>Medium</u> (50-249 emps.) (n=155)	<u>Large</u> (250+ emps.) (n=513)	
No training in past 3 years (%)	6.2	7.1	5.5	6.0
Instructor/Co-worker/Supervisor based training (%)	34.9	44.5	40.2	39.1
On-line computer training also used (%)	22.1	28.4	39.4	32.1
Self-training only (manuals, trial and error) (%)	36.8	20.0	15.0	22.9

$\chi^2(p)=.000$

**Figure 1. Association of Size of Organization with Modes of Training**





*Skill development:* Since formal methods of training tend to be a higher investment than informal methods, we expect that those organizations that are high on fostering skill development among their employees will likely have more instructor-led courses and e-learning opportunities. Indeed we do find a significant difference (Table 6 and Figure 2). In those organizations reported to emphasize skill development, there is a higher proportion of employees participating in organized training sessions either within a classroom setting or with co-workers or supervisors. In addition there is a higher proportion (35%) who also have used online computer or software training modules. Where organizations are reported as low on fostering employee development of skills, a significantly higher proportion of the respondents report engaging in only self-training, that is, using manuals and trial and error. Employees in organizations promoting skill development are only about one-half as likely to have no training or to rely only on self-training as those in organizations that do not encourage skill development.

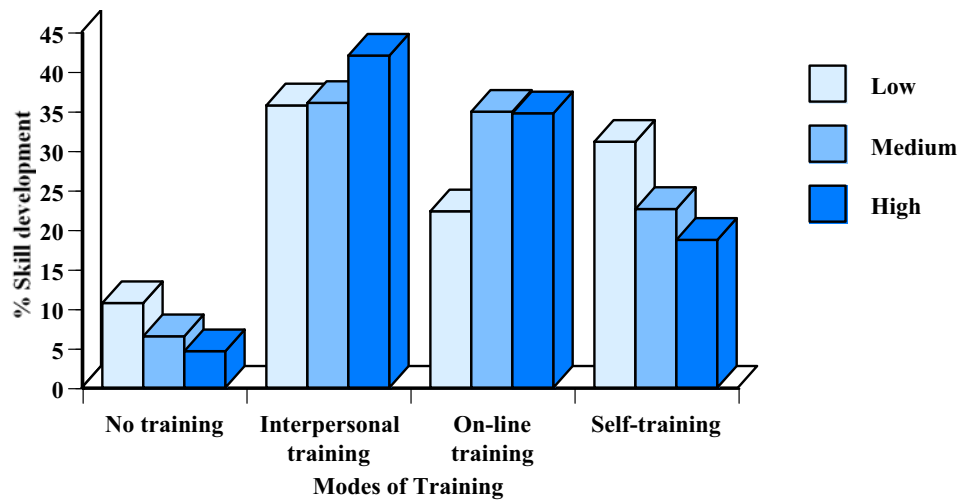
**Table 6. Organization Encourages Skill Development with Modes of Training**

	<b>Degree Organization Encourages Skill Development<sup>a</sup></b>			<b>Total (n=1186)</b>
	<b>Low (n=103)</b>	<b>Medium (n=186)</b>	<b>High (n=897)</b>	
No training in past 3 years (%)	10.7	6.5	4.6	5.4
Instructor/Co-worker/Supervisor based training (%)	35.9	36.0	42.0	40.6
On-line computer training also used (%)	22.3	34.9	34.7	33.6
Self-training only (manuals, trial and error) (%)	31.1	22.6	18.7	20.4

X<sup>2</sup>(p)=.002

<sup>a</sup>People working here are encouraged to develop their skills.

**Figure 2. Association of Organization Encourages Skill Development with Modes of Training**



*Paperless organizations:* With the advent of cheaper and more powerful computer equipment coupled with increased emphasis on networking within organizations, many organizations are moving towards the digitization of all documents and becoming a ‘paperless organization.’ Organizations vary on the extent to which they have achieved this goal. We expect that in more paperless organizations, the greater use of on-line training materials also would occur. In Table 7/Figure 3 is the relationship between training method and the degree to which an organization has been able to achieve a paperless environment. In organizations which score low on this measure, only 28% of the workers have accessed on-line computing training, while in high paperless environments a full 40% have used this type of training in the past three years. It appears that the drive towards a paperless environment encompasses not only the operational materials of an organization, but also spills over into a greater incidence of e-learning as well.

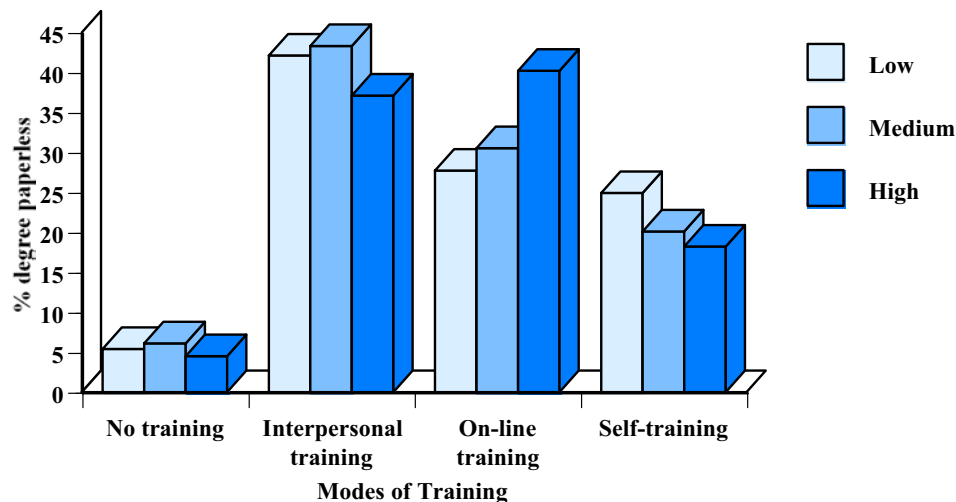
**Table 7. “Paperless Organization” with Modes of Training.**

	<b>Degree Organization is Paperless<sup>a</sup></b>			<b>Total (n=1188)</b>
	<b>Low (n=354)</b>	<b>Medium (n=344)</b>	<b>High (n=490)</b>	
No training in past 3 years (%)	5.4	6.1	4.5	5.2
Instructor/Co-worker/Supervisor based training (%)	42.1	43.3	37.1	40.4
On-line computer training also used (%)	27.7	30.5	40.2	33.7
Self-training only (manuals, trial and error) (%)	24.9	20.1	18.2	20.7

X<sup>2</sup>(p)=.004

<sup>a</sup>In my company, all forms, reports and information are handled electronically rather than on paper.

**Figure 3. Association of “Paperless Organization” with Modes of Training**



*Leading edge organizations:* Another measure of technological sophistication is the degree to which an organization attempts to be on the ‘leading edge’ in computer hardware and software. Intuitively, we would expect that the more an organization attempts to be leading edge the more likely that part of its collection of training methods will be online computer training and software modules. Figure 4 displays the relationship between this indicator of technological sophistication and method of training (see also Table 8). The association between these two measures is interesting. There is little difference in the participation level of workers in instructor/co-worker/supervisor-based training sessions based on the degree to which the organization tries to be leading edge. Nonetheless, there is a steady progression in the greater use of on-line computer training and software from organizations that are low on an emphasis on the use of leading edge technology to those that are high (24% versus 39%). Conversely, self-training is substantially lower as the organization is more leading edge in its applications of ICTs.

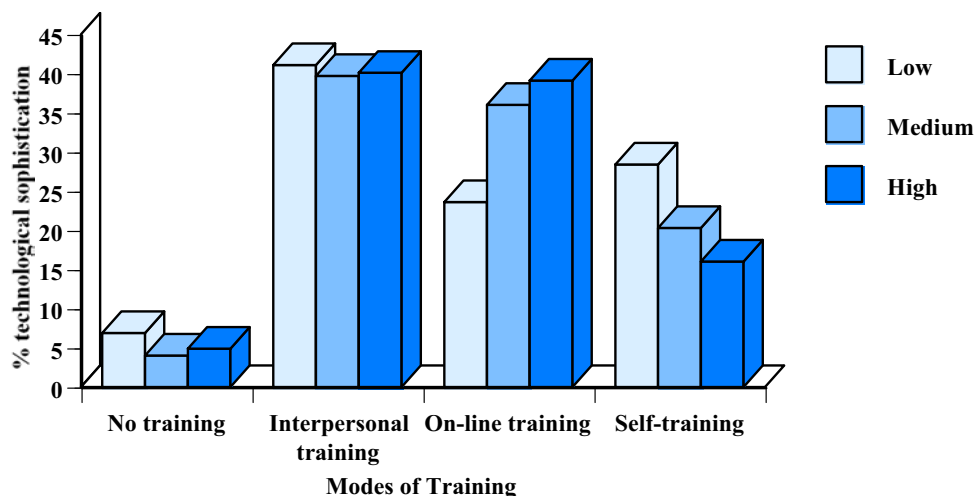
**Table 8. Degree Organization is Leading Edge in Computing with Modes of Training.**

	<b>Degree Organization is Leading Edge<sup>a</sup></b>			
	<b>Low (n=348)</b>	<b>Medium (n=325)</b>	<b>High (n=514)</b>	<b>Total (n=1187)</b>
No training in past 3 years (%)	6.9	4.0	4.9	5.2
Instructor/Co-worker/Supervisor based training (%)	41.1	39.7	40.1	40.3
On-line computer training also used (%)	23.6	36.0	39.1	33.7
Self-training only (manuals, trial and error) (%)	28.4	20.3	16.0	20.8

X<sup>2</sup>(p)=.000

<sup>a</sup>My company always attempts to be on the leading edge in computer hardware and software.

**Figure 4. Association of Degree Organization is Leading Edge in Computing with Modes of Training**



*Dependency on computing:* Organizations can be characterized in terms of the degree to which the organization is dependent on computing for doing business. Whether a organization is more or less dependent on computing to complete its business is not statistically associated with the type of training modalities provided to its employees (Table 9 and Figure 5). However, there are visible, if slight, tendencies for greater computing dependency to be related to a higher incidence of on-line training and lower levels of interpersonal training.

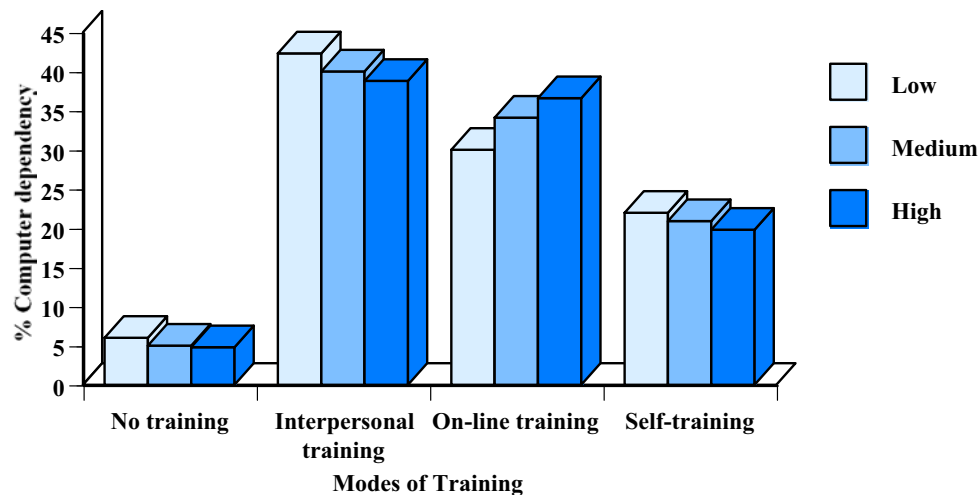
**Table 9. Degree Organization is Dependent on Computing with Modes of Training.**

	<b>Degree Organization Dependent on Computing<sup>a</sup></b>			
	<b>Low (n=463)</b>	<b>Medium (n=220)</b>	<b>High (n=505)</b>	<b>Total (n=1188)</b>
No training in past 3 years (%)	6.0	5.0	4.8	5.3
Instructor/Co-worker/Supervisor based training (%)	42.3	40.0	38.8	40.4
On-line computer training also used (%)	30.0	34.1	36.6	33.6
Self-training only (manuals, trial and error) (%)	21.6	20.9	19.8	20.7

$\chi^2(p)=.530$

<sup>a</sup>When the computers are down, my company cannot do its business at all.

**Figure 5. Association of Organization's Computing Dependency with Modes of Training**



*Reliability of computing hardware environment:* It might be predicted that if an organization’s computing environment is not very reliable, the focus will be on stabilizing basic computing operations rather than on training of any kind. This would result in a reliance on self-training or very low overall levels of training. Our data do not reveal a systematic, statistically significant pattern between reliability and modes of training. However, there are some notable differences in the data. As expected, no training is almost twice as likely for employees in low reliability environments, as is on-line training. Interpersonal training tends to be more common on these low reliability settings (Table 10 and Figure 6).

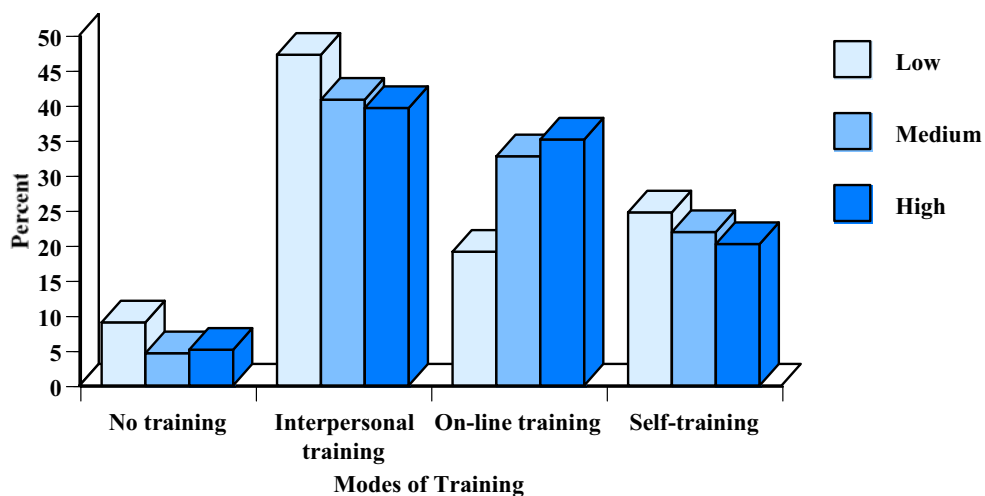
**Table 10. Reliability of Organization’s Computing Environment with Modes of Training.**

	<u>Degree Organization’s Hardware Environment Is Reliable<sup>a</sup></u>			<b>Total (n=1191)</b>
	<b>Low (n=89)</b>	<b>Medium (n=196)</b>	<b>High (n=906)</b>	
No training in past 3 years (%)	9.0	4.6	5.1	5.3
Instructor/Co-worker/Supervisor based training (%)	47.2	40.8	39.6	40.4
On-line computer training also used (%)	19.1	32.7	35.1	33.5
Self-help only (manuals, trial and error) (%)	24.7	21.9	20.2	20.8

X<sup>2</sup>(p)=.092

<sup>a</sup>I can count on the computer systems I use to be “up” and available when I need them.

**Figure 6. Association of Hardware Reliability with Modes of Training**



*Stability of computing software environment:* Types of training methods used might be associated with the frequency with which the organization’s software environment changes, particularly those instances in which the organization is substantially upgrading or implementing enterprise-level applications. Many studies have indicated that effectiveness of use in these circumstances requires intervention in the form of training. We would expect that such organizations might need to focus more on organization-controlled computer software instruction (i.e., instructor-led or on-line training) and to discourage employees’ individualized, self-help methods in order to provide to its employees with the organization’s ‘vision’ of how to use the new systems and to increase the consistency with which employees adapt to the new software environment. As predicted, we see a significantly lower proportion of respondents relying on self-help in those organizations with more changes in software (Table 11 and Figure 7). There is also an increase in on-line computing training as the level of changes in software increases.

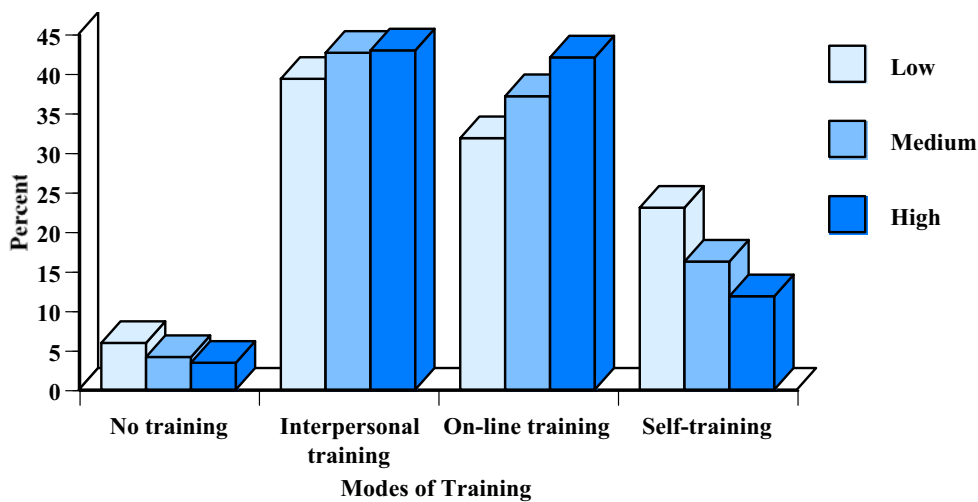
**Table 11. Instability of Organization’s Computing Software Environment with Modes of Training.**

	<b>Degree of Instability of Organization’s Software<sup>a</sup></b>			
	<b>Low (n=868)</b>	<b>Medium (n=197)</b>	<b>High (n=119)</b>	<b>Total (n=1184)</b>
No training in past 3 years	5.9	4.1	3.4	5.3
Instructor/Co-worker/Supervisor based training	39.3	42.6	42.9	40.2
On-line computer training also used	31.8	37.1	42.0	33.7
Self-help only (manuals, trial and error)	23.0	16.2	11.8	20.8

X<sup>2</sup>(p)=.000

<sup>a</sup>In my company, there are too many changes in the software I use.

**Figure 7. Association of Software Instability with Modes of Training**



## Personal Characteristics

This section explores whether the employee’s personal characteristics such as age, gender, and educational level are associated with methods of computer training. It also includes individual characteristics which pertain more directly to work, such as the number of years on the job, the type of work performed, the degree to which work can be classified as knowledge work, and the degree to which the individual’s work is characterized by time pressures and task routine.

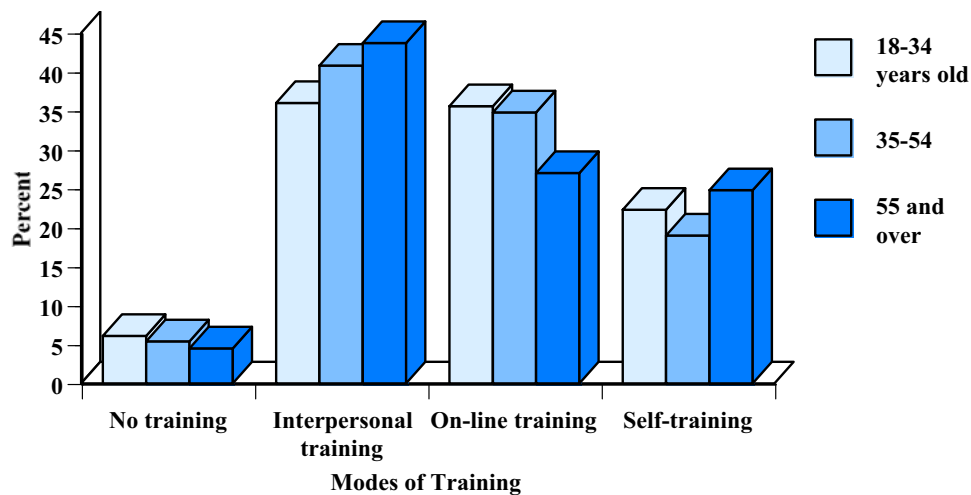
*Age:* Our initial expectation is that there will be an association between age and type of training because younger workers are likely to be more comfortable with both online training and also self-training. While the overall pattern is not statistically significant, the trend appears to go in the hypothesized direction, with 36% of 18-34 year olds having used on-line computing training in the past three years in comparison with 27% of those 55 and over (Table 12 and Figure 8). Similarly, older workers have a higher incidence of interpersonal training modes.

**Table 12. Age with Modes of Training.**

	Age Groups			Total (n=1150)
	18-34 (n=264)	35-54 (n=664)	55 and over (n=222)	
No training in past 3 years (%)	6.1	5.4	4.5	5.4
Instructor/Co-worker/Supervisor based training (%)	36.0	40.8	43.7	40.3
On-line computer training also used (%)	35.6	34.8	27.0	33.5
Self-training only (manuals, trial and error) (%)	22.3	19.0	24.8	20.9

$X^2(p)=.177$

**Figure 8. Association of Age with Modes of Training**



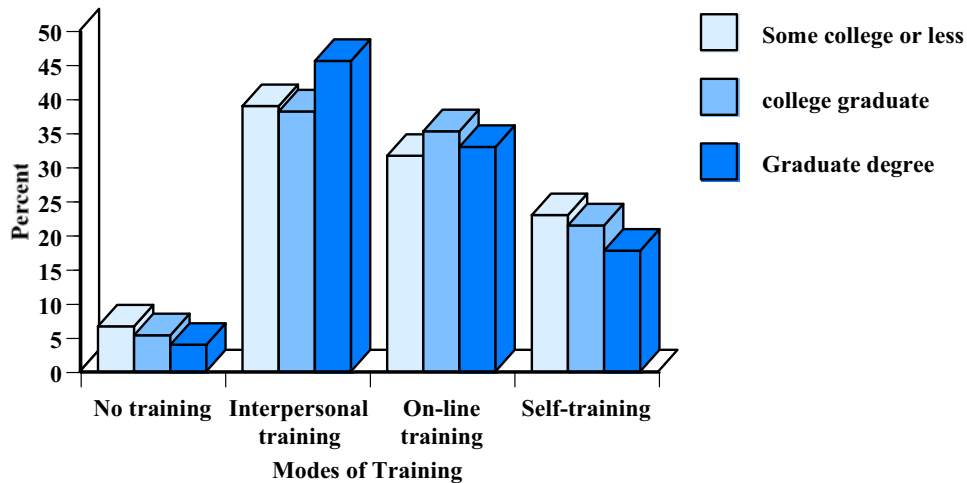
*Education:* Level of education is not statistically associated with modes of training (Table 13 and Figure 9). Perhaps this is because choice of training modalities is more associated with job type and computing skills (as will be reported below) than with educational level, per se. One aspect of Table 13 which is worth noting, although the explanation is elusive (in the absence of other control variables), is that a higher proportion of those with graduate degrees obtain their training through interpersonal approaches rather than through self-training methods, whereas one might have predicted that the most educated would be most inclined to engage in self-training.

**Table 13. Education with Modes of Training.**

	<u>Level of Education</u>			<u>Total</u> (n=1185)
	<u>Some college or less</u> (n=380)	<u>College graduate</u> (n=449)	<u>Graduate degree</u> (n=356)	
No training in past 3 years (%)	6.6	5.3	3.9	5.3
Instructor/Co-worker/Supervisor based training (%)	38.9	38.1	45.5	40.6
On-line computer training also used (%)	31.6	35.2	32.9	33.3
Self-training only (manuals, trial and error) (%)	22.9	21.4	17.7	20.8

$\chi^2(p)=.182$

**Figure 9. Association of Education Level with Modes of Training**





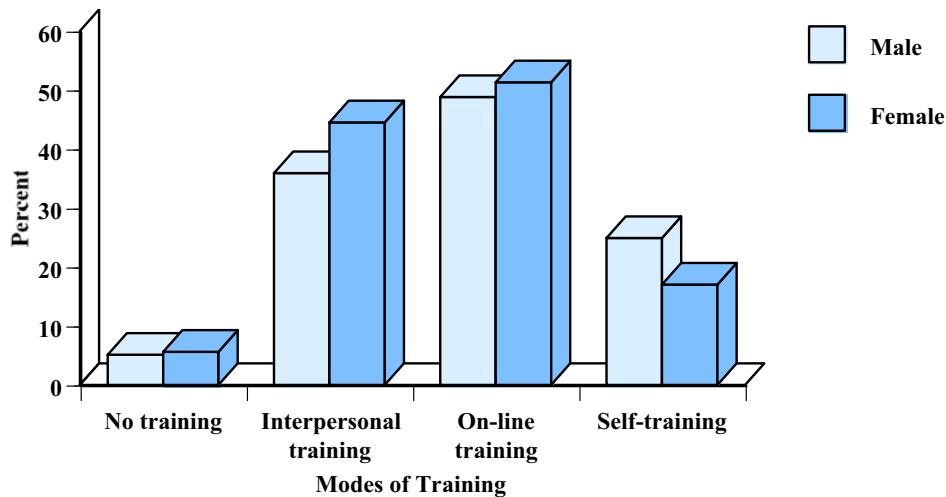
*Gender:* The association of gender with modes of training is interesting, with a significantly higher proportion of females than males engaged in interpersonal training (45% versus 36%) and substantially more males than females engaging in self-training methods (25% versus 17%) (Table 14 and Figure 10). While characterizing gender differences is dangerous ground these days, it might be that men are more inclined to engage in trial and error methods while women, in general, opt for engagement and assistance with other people. Partial explanation for these significant differences might be also be based on gender differences in the distribution of job categories. However, it is notable and intriguing that women and men utilize on-line training in roughly equal proportions.

**Table 14. Gender with Modes of Training.**

	<b>Male (n=571)</b>	<b>Gender Female (n=623)</b>	<b>Total (n=1194)</b>
No training in past 3 years (%)	5.1	5.6	5.4
Instructor/Co-worker/Supervisor based training (%)	35.9	44.5	40.4
On-line computer training also used (%)	34.2	32.9	33.5
Self-training only (manuals, trial and error) (%)	24.9	17.0	20.8

$X^2(p)=.002$

**Figure 10. Association of Gender with Modes of Training**



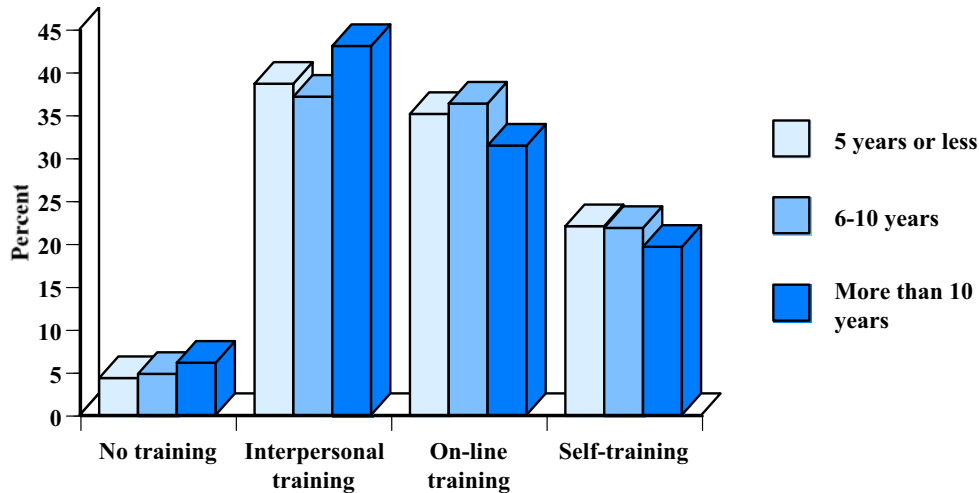
*Work Experience:* We expect years of experience in a particular job to be associated with mode of training. In particular, we might expect that the proportion of respondents reporting no training or self-help only training over the past three years would be associated with a higher number of years spent working in the current job. In fact, the number of years of experience in the current job is not statistically associated with the distribution of modes of training (Table 15 and Figure 11). However, those with the highest level of experience on their current jobs are slightly more likely to utilize interpersonal training or to have no training at all and slightly less likely to engage in on-line training.

**Table 15. Work Experience with Modes of Training.**

	<u>Number of Years Working in Current Job</u>			<u>Total (n=1191)</u>
	<u>5 Years or less (n=350)</u>	<u>6-10 years (n=248)</u>	<u>Over 10 years (n=593)</u>	
No training in past 3 years (%)	4.3	4.8	6.1	5.3
Instructor/Co-worker/Supervisor based training (%)	38.6	37.1	43.0	40.5
On-line computer training also used (%)	35.1	36.3	31.4	33.5
Self-training only (manuals, trial and error) (%)	22.0	21.8	19.6	20.7

$\chi^2(p)=.440$

**Figure 11. Association of Work Experience with Modes of Training**



### Characteristics of the Job.

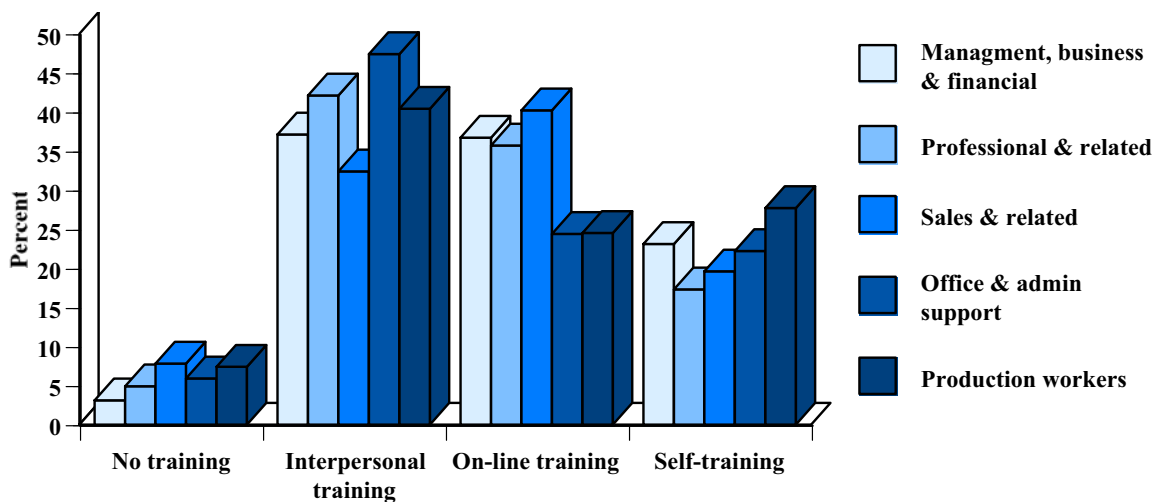
*Type of Job:* In general, there is a significant distribution of modes of training in relation to the general type of job held by the employee. One important pattern in Figure 12 and Table 16 is that online computer training is a method more likely to be used by those in management, professional and (especially) sales-related jobs, in comparison to those in office and administrative support jobs and in production jobs. Where computer training is made available, it is more likely to be provided by another person for those in administrative support jobs. It is also noteworthy that a reliance on self-training is most likely to be found among those in production jobs. It is notable that, of all job types, managerial and professional employees are least likely to have had no training in the past three years.

**Table 16. Type of Job with Modes of Training.**

	<u>Type of Job</u>					Total (n=1093)
	Mgmt., business & financial (n=294)	Profes- sional & related (n=468)	Sales & related (n=102)	Office & admin. support (n=135)	Produc- tion workers (n=94)	
No training in past 3 years (%)	3.1	4.9	7.8	5.9	7.4	5.0
Instructor/Co-worker/Supervisor based training (%)	37.1	42.1	32.4	47.4	40.4	40.3
On-line computer training also used (%)	36.7	35.7	40.2	24.4	24.5	34.0
Self-training only (manuals, trial and error) (%)	23.1	17.3	19.6	22.2	27.7	20.6

$X^2(p)=.022$

**Figure 12. Association of Type of Job with Modes of Training**



*Knowledge Work Level:* Knowledge work entails the extent to which the employee relies extensively on information in work, has substantial discretion in the choice of information sources, and engages in more frequent interpretation of information. A priori, it is difficult to predict whether there will be a particular association between the pattern of training modalities and the degree to which an individual is engaged in knowledge work. However, in Table 17 and Figure 13 there are some notable and statistically significant differences with respect to the mode of training and extent to which the employee’s job centers on knowledge work. Those respondents low on knowledge work are distinguishable from those respondents medium to high in terms of their lower incidence of using on-line training. Curiously, the use of manuals and ‘trial and error’ for self training appears to be bi-modal with both those low and those high on knowledge work significantly more likely to have used these training methods. Conversely, online training is most common among those with middle levels of knowledge work, rather than those highest or lowest on this measure.

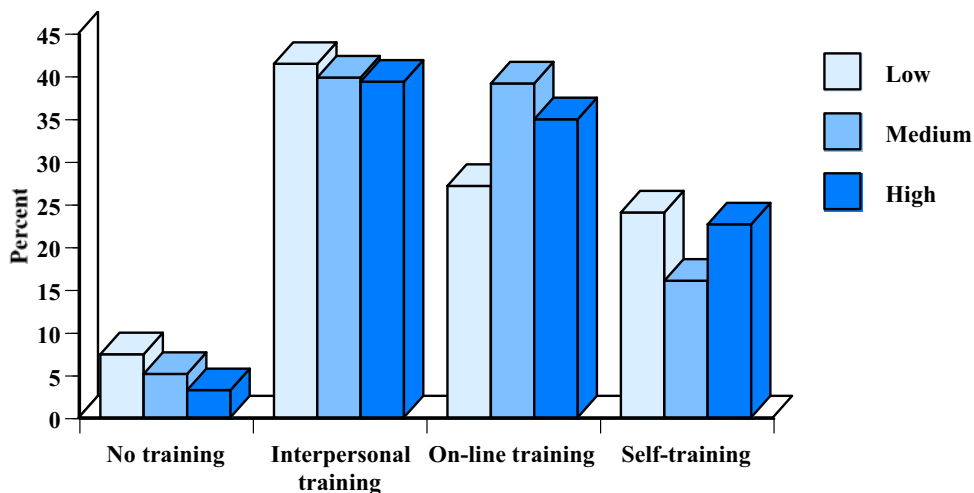
**Table 17. Extent of Knowledge Work with Modes of Training.**

	<u>Extent of Knowledge Work<sup>a</sup></u>			<b>Total</b>
	<b>Low</b>	<b>Medium</b>	<b>High</b>	
No training in past 3 years (%)	7.4	5.1	3.2	5.4
Instructor/Co-worker/Supervisor based training (%)	41.4	39.8	39.3	40.2
On-line computer training also used (%)	27.1	39.1	34.9	33.6
Self training only (manuals, trial and error) (%)	24.0	16.0	22.6	20.8

$X^2(p)=.001$

<sup>a</sup>The knowledge work scale consists of the combination of scores on the following three items: 1) In my major work tasks, I rely extensively on information; 2) In my major work tasks, I have a high level of choice in what information sources I use; and 3) In my major work tasks, much of my time involves interpreting information or data.

**Figure 13. Association of Knowledge Work Level with Modes of Training**



*Time Pressure:* One variable element of a job is the extent to which the employee experiences time pressures in the completion of work. We might predict that those who feel a great deal of time pressure in their job engage in less training or might not utilize the more inflexibly-scheduled, formal methods of training and might rely on more informal methods of peer training or self training. This expectation however is not borne out. There are no systematic differences in the distribution, and those with low time pressures and those with high time pressures seem especially similar regarding the types of training methods utilized (Table 18 and Figure 14).

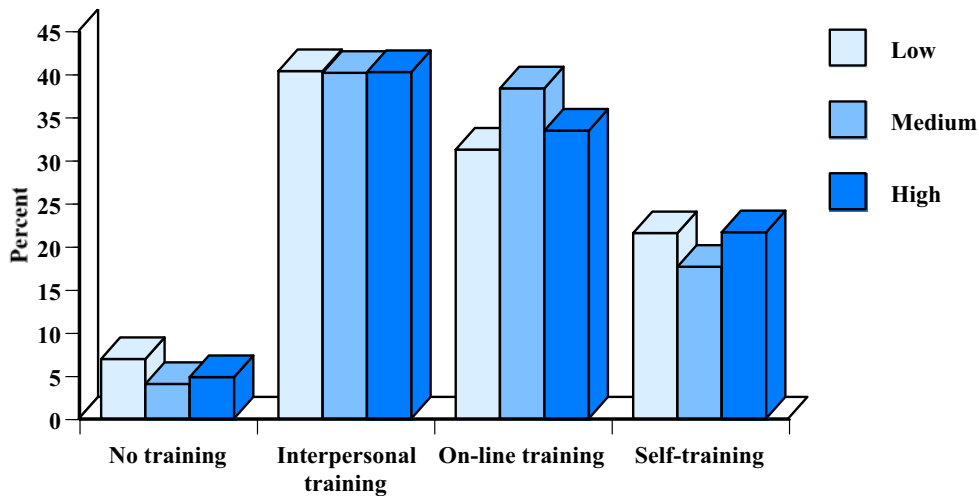
**Table 18. Job Time Pressure with Modes of Training.**

	<u>Degree of Time Pressure<sup>a</sup></u>			<b>Total (n=1191)</b>
	<b>Low (n=404)</b>	<b>Medium (n=227)</b>	<b>High (n=560)</b>	
No training in past 3 years (%)	6.9	4.0	4.8	5.4
Instructor/Co-worker/Supervisor based training (%)	40.3	40.1	40.2	40.2
On-line computer training also used (%)	31.2	38.3	33.4	33.6
Self training only (manuals, trial and error) (%)	21.5	17.6	21.6	20.8

$\chi^2(p)=.361$

<sup>a</sup>I never seem to have enough time to get my job done.

**Figure 14. Association of Degree of Job Time Pressure with Modes of Training**



*Job Non-Routineness:* Another job characteristic that might affect mode of training is the level of routine on the job. We capture this aspect of work in the dynamic direction, by measuring the extent to which the job forces the employee to learn new things continuously (that is, “non-routineness”). Whether such continuous challenge is a virtue is, of course, in the eye of the beholder. It is possible that where the job does force constant learning, the employee would also be forced to engage in more extensive training and, perhaps, in modes that can be controlled to be more responsive to the newest changes. Indeed we do find an increase in the proportion of employees engaging in training and using on-line training as the job demands more learning and adaptation and conversely a drop in self-training methods in these circumstances (Table 19 and Figure 15).

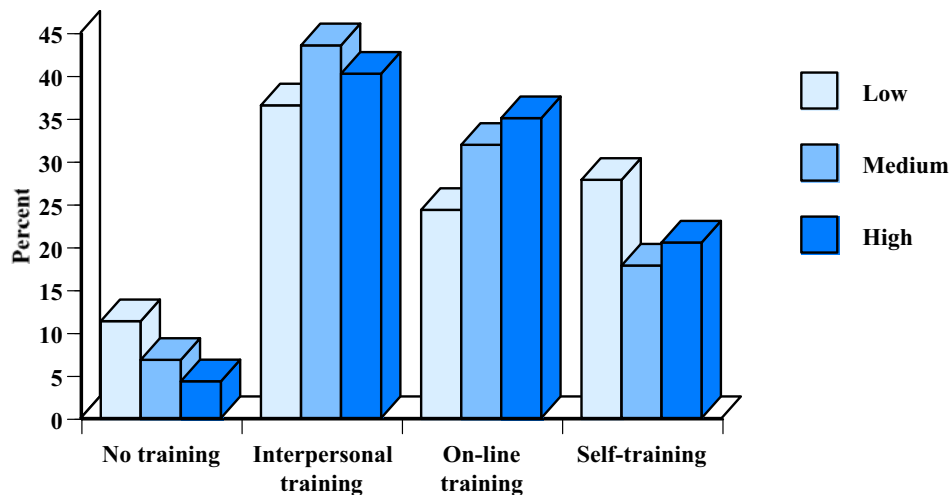
**Table 19. Non-Routineness on the Job with Modes of Training.**

	<b>Degree of Non-Routineness on Job<sup>a</sup></b>			
	<b>Low (n=115)</b>	<b>Medium (n=191)</b>	<b>High (n=888)</b>	<b>Total (n=1194)</b>
No training in past 3 years (%)	11.3	6.8	4.3	5.4
Instructor/Co-worker/Supervisor based training (%)	36.5	43.5	40.2	40.4
On-line computer training also used (%)	24.3	31.9	35.0	33.5
Self training only (manuals, trial and error) (%)	27.8	17.8	20.5	20.8

X<sup>2</sup>(p)=.005

<sup>a</sup>My job forces me to learn new things continuously.

**Figure 15. Association of Degree of Job Non-Routineness with Modes of Training**



## Technology-in-Use Factors

Technology in-use factors include such characteristics as connectivity, and the location of computer services (centralized vs. decentralized) at the organizational level and frequency of computer use per day as well as computer skill at the individual level.

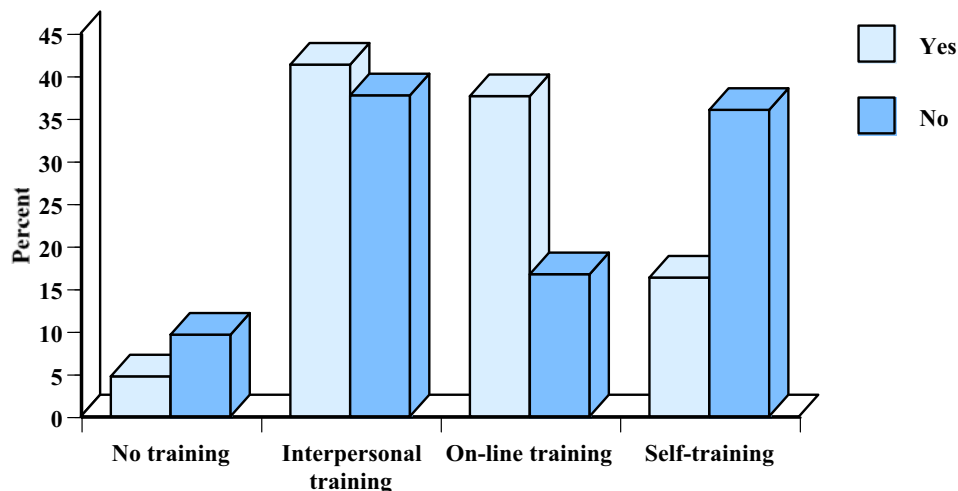
*Connection to Internet in the workplace:* An Internet connection in the office is critical to the success of on-line computer training and software since most of the packages require such access. We find that a significantly higher proportion of respondents report having used on-line computer training where Internet access is available in the office than where it is not (36% vs. 18%) (Table 20 and Figure 16).

**Table 20. Internet Access with Modes of Training.**

	<u>Internet Connection In Office</u>		
	<u>Yes</u> (n=1045)	<u>No</u> (n=60)	<u>Total</u> (n=1105)
No training in past 3 years (%)	5.2	10.0	5.4
Instructor/Co-worker/Supervisor based training (%)	41.1	41.7	41.1
On-line computer training also used (%)	35.8	18.3	34.8
Self-help only (manuals, trial and error) (%)	18.0	30.0	18.6

$X^2(p)=.008$

**Figure 16. Association of Connection to Internet in Workplace with Modes of Training**



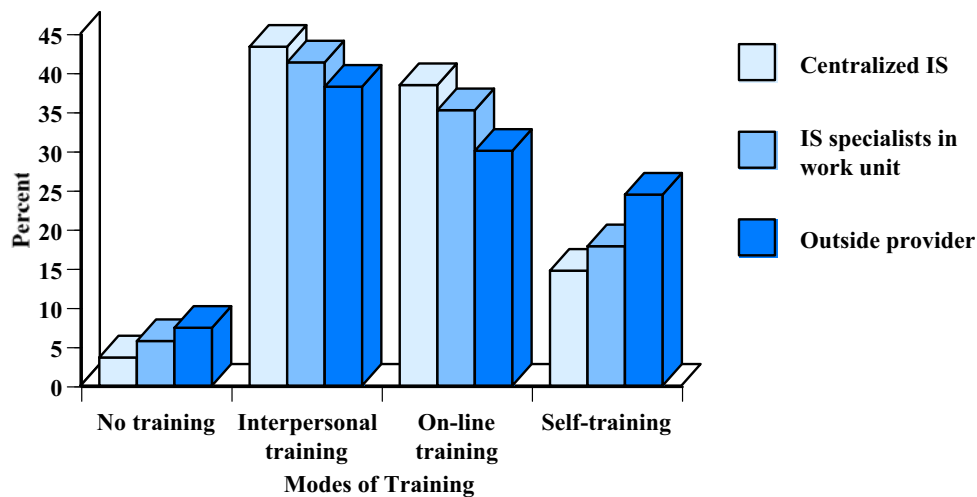
*Provision of computing services:* How computing services are organized in a organization can have major effects on the modes of training provided to employees. For the workers studied here the highest proportions of workers having had instructor-based training over the past three years are in the more centralized service provider environments, with slightly less workers in the more decentralized departmental service provision situations and even less so when computer services have been outsourced (Table 21 and Figure 17). In contrast, a significantly higher proportion of the workers who are engaged in self-help training methods or have had no training at all in the past three years are in organizations where computing services are provided by a third-party.

**Table 21. Computing Service Provision with Modes of Training.**

	<u>Provision of computing Services</u>			Total (n=1010 )
	Centralized information systems department (n=563)	Information systems specialists in work unit (n=230)	Outside provider (n=217)	
No training in past 3 years (%)	3.6	5.7	7.4	4.9
Instructor/Co-worker/Supervisor based training (%)	43.3	41.3	38.2	41.8
On-line computer training also used (%)	38.4	35.2	30.0	35.8
Self-help only (manuals, trial and error) (%)	14.7	17.8	24.4	17.5

$X^2(p)=.008$

**Figure 17. Association of How Computing Services are Provided with Modes of Training**





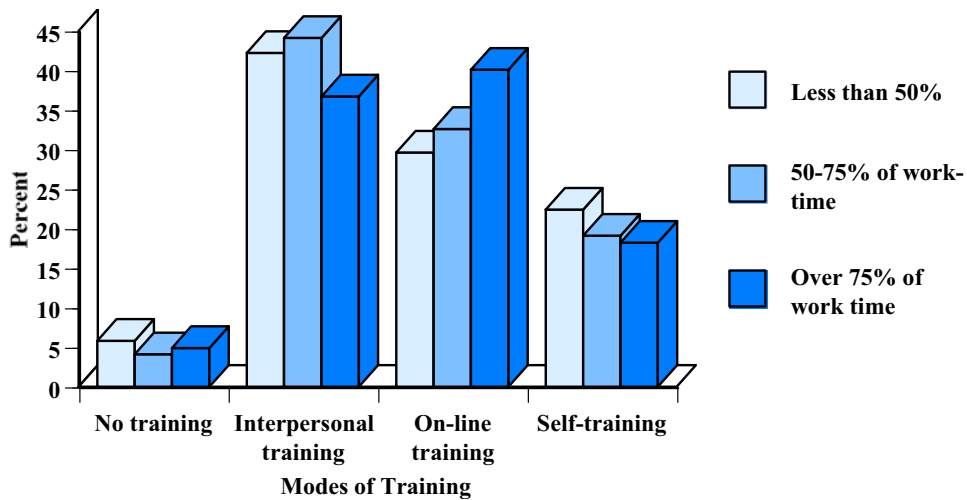
*Centrality of computer use:* The more central computing is to the worker’s job, the more likely online training will be used. There is once again a striking progression in the proportion of the respondents who utilize online training methods as we move from low use to high use of computing during working hours (Table 22 and Figure 18). In contrast, self help training actually declines as the level of computer-related work increases.

**Table 22. Centrality of Computing with Modes of Training.**

	<u>Percent Use Computer For Work</u>			<b>Total (n=1149)</b>
	<b>Less than half of work time (n=398)</b>	<b>50%-75% of work time (n=340)</b>	<b>Over 75% of work time (n=411)</b>	
No training in past 3 years (%)	5.8	4.1	4.9	5.0
Instructor/Co-worker/Supervisor based training (%)	42.2	44.1	36.7	40.8
On-line computer training also used (%)	29.6	32.6	40.1	34.3
Self-help only (manuals, trial and error) (%)	22.4	19.1	18.2	19.9

$\chi^2(p)=.051$

**Figure 18. Centrality of Computer Use in Job with Modes of Training**



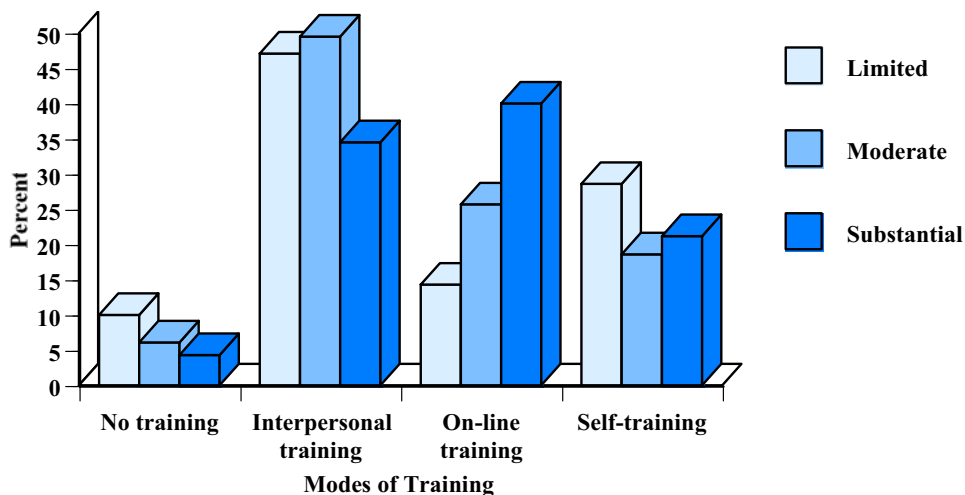
*Computer skill level:* Do workers who are more computer-skilled utilize different training methods than those who are less skilled? We would expect that those who are highly skilled in using computers may be able to “self-train” at a higher rate than those who have limited skills. In addition, instructor-based training either by a computer trainer or a co-worker/supervisor may be more important for those who are less skilled. The differences by skill level are dramatic with on-line computer training significantly associated with higher skill level (Table 23 and Figure 19). On-line training or software appears at this time to be geared more towards those with substantial computer skills or is more embraced by the skillful users and less suitable for those with limited skills or to some extent those with moderate computer skills. While those with substantial computer skills also obtain instructor-based training, they are clearly more likely to also include online training. It is interesting to note that a significantly higher proportion of those with limited computer skills also have engaged in self-help only in comparison to those with substantial computer skills.

**Table 23. Computer Skill Level with Modes of Training.**

	<b>Computer Skill Level</b>			<b>Total (n=1191)</b>
	<b>Limited computer skills (n=70)</b>	<b>Moderate computer skills (n=408)</b>	<b>Substantial computer skills (n=713)</b>	
No training in past 3 years (%)	10.0	6.1	4.3	5.3
Instructor/Co-worker/Supervisor based training (%)	47.1	49.5	34.5	40.4
On-line computer training also used (%)	14.3	25.7	40.0	33.6
Self-help only (manuals, trial and error) (%)	28.6	18.6	21.2	20.7

$X^2(p)=.000$

**Figure 19. Association of Computer Skill Level with Modes of Training**



## **Summary and Conclusions**

The primary determinants of type of training methods available to respondents are more related to characteristics of the organization than to individual characteristics of the worker. Organizational context does make a difference in the type of training methods provided to employees. Larger organizations tend to provide more formal modes of training than smaller organizations where employees are more likely to engage in self-training. We also find that those organizations which emphasize skill development provide more varied training opportunities than those organizations which do not. In addition, those organizations which are focused on being leading-edge are significantly more likely to offer on-line training than the more conventional-thinking organizations. On-line training is also more likely in organizations where there is a higher degree of instability in the software environment.

Individual characteristics such as age, educational level, number of years working in the current position are not associated with different modes of training. While gender is shown to be associated, once we control for type of job, it is no longer statistically significant, except for the professional & related category. In the main, then, individual characteristics are not a good predictor of type of training method selected.

The stronger relationship with organizational characteristics rather than worker characteristics makes sense in that it is the organization which chooses the methods to be used in training its employees. While the individual worker may be able to decide whether or not to participate in the training, the actual choice of method is not available. We are not able to test this proposition directly since the current survey does not collect information about all the training methods available to the employee, but rather only the training methods in which the employee has participated in the past three years. Nevertheless, we do find associations which point towards training method choices aligned with organization strategy or characteristics. Further research is needed to determine how successful these training methods are in creating value for the organization and specifically whether the design of training methods should take into account more directly individual worker characteristics..