

A SURVEY OF FACTORS INFLUENCING THE ENGAGEMENT OF INFORMATION TECHNOLOGY PROFESSIONALS IN INFORMAL LEARNING ACTIVITIES

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A survey collected data on the factors influencing the engagement of 143 information technology (IT) professionals in informal learning activities. Analysis of the data found that this group of professionals relies mostly on searching the Internet to learn informally in the workplace. When they are unable to address their learning need via this activity, IT professionals turn to more interactive activities, such as talking and sharing resources with others. Six environmental factors were found to inhibit IT professionals from engaging in informal learning activities: lack of time, lack of proximity to colleagues' work areas, unsupportive organizational culture, inaccessibility of others, lack of equipment and technology, and lack of meeting/work space. In addition, nine personal characteristics were found to enhance the motivation of this group of professionals to engage in informal learning: (a) initiative; (b) self-efficacy; (c) love of learning; (d) interest in the profession; (e) integrity; (f) outgoing personality; (g) teamwork ethic; (h) curiosity; and (i) open-mindedness. These findings have implications for theory, research, and the facilitation of informal workplace learning (IWL) among IT professionals.

The scope and intensity of professional work has increased dramatically in recent years. Today's professionals face far greater pressures, more complex and ambiguous problems, and greater uncertainty than ever before (Primm, 2005). A group of professionals for whom these changes especially apply are information technology (IT) professionals.

IT professionals are responsible for designing, implementing, and maintaining computer systems that gather, manage, and analyze information used by organizations ("Professional Information Technology Classification Matrix," 2004). These responsibilities have become increasingly critical to the effective operations of organizations and are far more complex and ill-defined than ever before. A generally accepted belief is that such job intensification concurrently increases the need to acquire new job knowledge and skills, yet decreases the amount of time available for learning (Powell & Snellman, 2004). Because of job intensification, it is highly likely that IT professionals rely heavily on informal learning as a means of developing the knowledge and skills they need to perform their jobs.

Informal learning refers to activities initiated by people in work settings that result in the development of their professional knowledge and skills (Cofer, 2000; Lohman, 2000). Unlike formal learning, which refers to organized instructional activities that take place in educational or training institutions and often lead to some form of official recognition (e.g., a degree, certification, or credit), informal learning can be either planned or unplanned and structured or unstructured (Merriam, Caffarella, & Baumgartner, 2007). Examples of informal learning include talking and sharing resources with others, searching the Internet, and experimenting with new techniques or tools. Reports indicate that informal learning now takes precedence over formal learning as the dominant way in which employees acquire new knowledge and skills (Ellinger & Cseh, 2007).

The importance of informal learning in cultivating professional expertise focuses greater

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attention on the interplay between informal learning activities, the environment where they occur, and characteristics of those engaged in them (Billett, 2001; Ellstrom, 2001). Recent studies have made important progress in developing greater understanding of the types of work-based activities associated with informal learning as well as personal and contextual factors that tend to promote or inhibit participation in informal learning (Boud & Middleton, 2003; Ellinger, 2005; Ellinger & Cseh, 2007; Ellstrom, 2001; Kwakman, 2003; Lohman, 2000). However, few studies have investigated the ways in which certain characteristics of workers and their work environments influence participation in specific informal learning activities. This is a critical area of investigation in the IT profession because of the growing reliance on informal learning as a means of developing the knowledge and skills required to handle increasingly complex and ambiguous problems effectively in their work.

Enhanced understanding gained from this study can be used to reconsider the design of the work environments of IT professionals to make them more conducive to learning informally as well as to rethink the design of professional development programs so that they further develop the ability of IT professionals to solve problems and learn independently.

FACTORS INFLUENCING ENGAGEMENT IN INFORMAL LEARNING IN THE WORKPLACE

Informal learning in the workplace involves both structured and unstructured on-the-job activities that result in the development of new capabilities required for effective work practice (Billett, 2002). Informal learning in the workplace, which is the focus of this study, is an aspect of workplace learning that specifically involves those learning activities that are initiated by employees in the workplace and result in the development of their professional knowledge and skills (Cofer, 2000; Lohman, 2005). This form of learning is predominantly experiential, involving a dialectical process of action and reflection (Marsick, Volpe, & Watkins, 1999).

In their model of informal workplace learning (IWL), Cseh, Watkins, and Marsick (1999) assert

that this dialectical process is triggered by challenging work situations and involves a series of eight steps that closely resemble the steps of the problem-solving process. These steps are (a) framing the context; (b) responding to triggers to a potential learning experience; (c) interpreting the experience; (d) examining alternative solutions; (e) choosing learning strategies; (f) producing alternative solutions; (g) assessing intended and unintended consequences; and (h) evaluating lessons learned. This informal learning model provides a useful blueprint of the cognitive activities involved in the informal learning process. However, it does not specify behavioral activities that are associated with navigating through the eight cognitive steps, nor does it speak to characteristics of work environments or of workers that influence engagement in those activities.

Several conceptual models have been constructed recently in an attempt to identify such activities and characteristics. These models have been based predominantly on theory and research studies of workplace learning, motivation, and job demand and stress. For example, in their work-related learning model, Doornbos, Bolhuis, and Simons (2004) describe workplace learning as work-based activities related to handling novel, ambiguous work problems. The model identifies six work environment characteristics (autonomy, work pressure, support, task variation, interaction partner variety, and collegial availability) and four worker characteristics (social integration with managers, social integration with colleagues, experience of competence, and recognition of value of learning at work) as paramount to promoting work-related learning.

Similarly, van Woerkom, Nijhof, and Nieuwenhuis (2002) constructed a model of factors influencing critical reflective behavior at work. Critical reflective behavior was defined as a “set of connected, individual activities, aimed at analysing, optimising or innovating work practices on individual, team, or organisational levels.” (van Woerkom et al., 2002, p. 376). The model posits that eight work activities are associated with critical reflective behavior: reflection on oneself in relation to the job, learning from mistakes, vision

sharing, challenging group think, asking for feedback, experimentation, sharing knowledge, and awareness of employability. Factors influencing participation in these work activities include 10 job characteristics (workload, alternation, autonomy, task obscurity, information, participation, cooperation, communication, coaching, and organizational climate for learning) and 3 worker characteristics (motivation, self-efficacy, and variety of experience).

Empirical studies have been conducted to examine some aspects of these models. For example, Kwakman (2003) investigated factors affecting engagement in informal learning activities in a survey of 542 secondary teachers in the Netherlands. Survey findings revealed that four personal characteristics (professional attitudes, appraisals of feasibility of learning activities, appraisals of the meaningfulness of learning activities, and loss of personal accomplishment), two task factors (work pressure and job variety) and two work environment factors (collegial support and intentional learning support) influenced participation in informal learning activities, with the personal characteristics appearing to influence participation more substantially than either the task or work environment factors.

Similarly, van Woerkom et al. (2002) conducted a survey of 742 educators to examine the influence of job and individual characteristics on critical reflective working behavior. Of the thirteen individual and job characteristics studied, the respondents reported one to be most potent in relation to promoting critical reflective behavior: self efficacy.

Empirical studies such as these have helped to develop greater understanding of factors influencing participation in the informal learning process. However, few studies have examined the degree to which specific characteristics of workers and work environments influence participation in certain types of informal learning activities. One exception is a series of studies that examined the informal learning experiences of public school teachers and human resource development (HRD) professionals (Lohman, 2000, 2005). These studies found that teachers rely to a greater extent

than HRD professionals on interactive learning activities. Two environmental factors proved frequently to inhibit both professional groups from engaging in informal learning activities: a lack of time and a lack of proximity to colleagues' work areas. Three additional environmental factors were found to inhibit HRD professionals: an unsupportive organizational culture, the inaccessibility of others, and the unwillingness of others to participate in informal learning activities. A lack of funds was another environmental inhibitor found for teachers. Seven personal characteristics were found to enhance the motivation of both professional groups to engage in informal learning: initiative, self-efficacy, love of learning, interest in the profession, commitment to professional development, a nurturing personality, and an outgoing personality.

The aforementioned empirical studies of informal learning have provided greater insight into the informal learning activities used by professional groups such as educators and HRD personnel to learn informally, as well as the characteristics of work environments and workers that influence engagement in those activities. It is highly likely that IT professionals also rely on informal learning as a means of handling the increasingly complex and ambiguous nature of their work. Consequently, more must be known about the degree to which the insights from previous studies can inform our understanding of the informal learning activities IT professionals use to develop their knowledge and skills and the factors that influence their engagement in those activities.

The purpose of this study was to survey IT professionals to examine factors influencing their engagement in informal learning activities. Accordingly, three areas were investigated: (a) what types of activities IT professionals use to learn informally in the workplace; (b) what characteristics of work environments inhibit the engagement of IT professionals in informal learning activities in the workplace; and (c) what personal characteristics enhance the motivation of IT professionals to engage in informal learning activities in the workplace.

METHOD

This section describes the procedures for subject selection, instrument construction, and data collection and analysis.

SUBJECT SELECTION

The US membership list of the Computer Society of the Institute of Electrical and Electronics Engineers (IEEE) was used to select participants for the current study. IEEE is the world's largest professional association of IT professionals. The mission of the Computer Society of IEEE is to advance the theory, practice, and application of computer and information processing technology. At the time of the study, there were approximately 55,000 IT professionals in the USA with active membership in the Computer Society of IEEE. Six hundred members of the Computer Society were randomly selected from IEEE's database to participate in this study. Two mailings of the survey were administered, producing a total of 143 completed surveys for a response rate of 24.1 percent.

As shown in Table 1, the majority of the IT respondents were fairly seasoned workers with 52.7% ($n = 75$) possessing more than 20 years of work experience; 26.1% ($n = 37$) had between 11 and 20 years of experience, and 21.2% ($n = 30$) had 10 years or less work experience. While the majority of the respondents had a substantial amount of work experience, 50.3% ($n = 72$) had worked for their current employer for only 5 years or less, 18.9% ($n = 27$) had worked for their current employer for 6 to 10 years, 20.3% ($n = 29$) for between 11 to 20 years, and 10.5% ($n = 15$) for more than 20 years. IT respondents were overwhelmingly male (89.5%), with a mean age of 46.8 ($SD = 12.17$). With respect to the educational level achieved, 9.8% ($n = 14$) had high school diplomas, 29.6% ($n = 42$) had bachelor degrees, 43% ($n = 61$) had masters degrees, and 17.6% ($n = 25$) had doctoral degrees.

INSTRUMENTATION

The current study used the same informal learning survey that was used in a recent survey of teachers and HRD professionals (Lohman, 2005). The survey instrument contained 19 items grouped within 4 main sections. The first section

Table 1. Demographic Characteristics of Survey Respondents

		n	%
Total Years of Work Experience	6 - 10	14	9.9
	11 - 15	18	12.7
	16 - 20	19	13.4
	> 20	75	52.7
	Total	142	100.0
Years Worked for Current Employer	0 - 5	72	50.3
	6 - 10	27	18.9
	11 - 15	18	12.6
	16 - 20	11	7.7
	> 20	15	10.5
Total	143	100.0	
Gender	Male	128	89.5
	Female	15	10.5
	Total	143	100.0
Educational Level	High school	14	9.8
	Bachelor	42	29.6
	Master	61	43.0
	Doctorate	25	17.6
	Total	142	100.0
Age		n	M(SD)
		143	46.8(12.17)

asked respondents to rate the frequency with which they use eight informal learning activities: talking with others, collaborating with others, observing others, sharing materials and resources with others, searching the Internet, scanning professional magazines and journals, trial and error, and reflecting on your actions. The second section asked respondents to rate the frequency with which five aspects of work environments (time, proximity to colleague's work areas, access to computer technology, monetary rewards, and recognition) inhibit their engagement in the eight previously identified informal learning activities. The third section asked respondents to rate the extent that four personal characteristics (initiative, self-efficacy, love of learning, and interest in professional field/subject area) enhance their motivation to engage in the eight informal learning activities. Likert scales, ranging from 1 to 5, were used for all closed-ended items in the first three sections. An open-ended item was provided at the end of each section for respondents to provide additional information concerning informal learning activities, environmental inhibitors to informal learning, and personal characteristics enhancing their motivation to engage in informal learning. The fourth section of the survey contained demographic questions regarding the respondent's age, gender, educational level, total years of work experience, and years worked for their current employer.

The validity and reliability of the survey instrument have been established in a previous informal learning study of two professional groups (Lohman, 2005). To ensure the instrument's suitability for IT professionals, it was administered to 12 IT professionals enrolled in a graduate information systems course at a mid-Atlantic university. Seven participants were male and five were female. Their mean age was 28.3 years ($SD = 8.54$). Participants provided written and oral feedback on the clarity and structure of survey items and the degree to which the items comprehensively reflected their informal learning experiences. All participants indicated that the survey was comprehensive, and they had no suggestions for improving the survey's clarity or structure.

DATA COLLECTION AND ANALYSIS

Mailing packets containing a cover letter, the questionnaire, and a postage-paid return envelope were prepared. Participant code numbers were assigned to the 600 IT professionals selected to participate in the study and placed on the lower right corner of the questionnaire's back page to maintain participant confidentiality and enable the researchers to track respondents and non-respondents. Two mailings were used to collect the data. The first mailing was distributed the third week of February 2005. Non-respondents were mailed a second packet six weeks later.

Descriptive statistics (frequency counts, means, and standard deviations) and correlation analyses were used to analyze the responses to the closed-ended items. Responses to the three open-ended items were recorded and tabulated. If more than 10 percent of the respondents ($n \geq 15$) provided the same response to an open-ended item, it was considered to be a noteworthy additional finding.

RESULTS

Three research questions concerning the informal learning experiences of IT professionals were examined. A detailed report of the findings is presented in this section.

INFORMAL LEARNING ACTIVITIES

As shown in Table 2, the mean scores for the frequency with which IT professionals use each of the eight informal learning activities ranged from a high of 4.3 ($SD = .84$) for searching the Internet to a low of 3.2 for observing others ($SD = 1.03$). The second and third most frequently used activities were talking with others ($M = 4.0$, $SD = .82$) and sharing materials and resources ($M = 3.8$, $SD = .83$).

The analysis of the textual responses to the open-ended item in this section of the survey yielded one additional informal learning activity. Twenty-three IT professionals (16.7%) indicated that they read books of various forms, including technical manuals, textbooks, e-books, white

Table 2. Mean Scores of the Frequency with Which Respondents Engage in Eight Informal Learning Activities

Informal Learning Activities	n	M	SD
Search the Internet	139	4.3	0.84
Talk with Others	140	4.0	0.82
Share Materials and Resources with Others	140	3.8	0.83
Collaborate with Others	140	3.7	0.89
Reflect on Your Actions	139	3.7	0.92
Trial and Error	140	3.6	0.92
Scan Professional Magazines and Journals	140	3.5	0.99
Observe Others	139	3.2	1.03

NOTE. Rating scale: 1 = Never use learning activity, 5 = Always use learning activity. Rank: 1 = Most frequently used learning activity of the 8 activities studied, 8 = Least frequently used learning activity of the 8 activities studied.

papers, and conference papers, when they have a need to learn something new at work.

ENVIRONMENTAL FACTORS INHIBITING INFORMAL LEARNING

As shown in Table 3, two environmental factors were found to inhibit IT professionals from engaging in informal learning: a lack of time and a lack of proximity to colleagues' work areas. The degree to which each of these factors inhibited informal learning depended on the type of learning activity in which the professionals wished to engage. Mean scores on the degree to which a lack of time inhibits IT professionals from learning informally ranged from a high of 3.2 ($SD = 2.80$) when collaborating with others to a low of 2.2 ($SD = 1.01$) when searching the Internet. Mean scores on the degree to which a lack of proximity to colleagues' work areas inhibits IT professionals from engaging in informal learning ranged from a high of 2.9 ($SD = 1.37$) when observing others to 1.3 ($SD = 0.76$) when searching the Internet.

The mean scores for the remaining three environmental factors—computer technology, monetary rewards, and recognition—for all learning activities were below 2.5, indicating that these factors were not perceived by the respondents to be important inhibitors to engagement in informal learning activities.

A correlation analysis examined the relationship of mean scores on the eight informal

learning activities and the five environmental factors studied, as shown in Table 4. A significantly high negative correlation was found between engagement in informal learning activities and a lack of time ($r = -.78$). Moderate negative correlations were found between engagement in informal learning activities and lack of proximity to colleagues' work areas ($r = -.44$) and lack of monetary rewards ($r = -.43$). These three negative correlations indicate that as the perceived strength of each environmental factor increases in inhibiting engagement in an informal learning activity, the frequency with which that learning activity is used decreases. The analysis also revealed a moderate positive correlation of .35 between engagement in informal learning activities and lack of access to computer technology, indicating that when IT professionals experience greater difficulties in accessing computer technology, they increase the frequency with which they engage in the informal learning activities studied. A low negative correlation ($r = -.15$) was found between engagement in informal learning activities and lack of recognition.

The analysis of the textual responses to the open-ended question in this section of the survey found that four additional environmental factors frequently inhibit engagement in the eight informal learning activities studied. Specifically, an unsupportive organizational culture was reported by 52 (36.4%) respondents, the inaccessibility of others was cited by 41 (28.7%) respondents, a lack of meeting/workspace was reported by 20 (14%) respondents, and a lack of equipment and technology was cited by 15 (10.5%) respondents.

PERSONAL CHARACTERISTICS ENHANCING MOTIVATION TO ENGAGE IN INFORMAL LEARNING

As shown in Table 5, mean scores on the extent to which each of the four personal characteristics enhances motivation to engage in each of the eight informal learning activities were all above 3.0,

Table 3. Degree to Which Five Environmental Factors Inhibit Engagement in Informal Learning Activities

Informal Learning Activities	Time				Proximity to Colleagues' Work Areas				Computer Technology			Monetary Rewards			Recognition		
	n	M	SD	Rank	n	M	SD	Rank	n	M	SD	n	M	SD	n	M	SD
Search the Internet	137	2.2	1.01	8	138	1.3	0.76	8	137	2.1	1.52	139	1.3	0.63	137	1.2	0.58
Talk with Others	140	2.8	0.99	5	140	2.5	1.26	3	138	1.5	0.86	140	1.4	0.70	138	1.5	0.94
Share Materials and Resources	140	2.7	1.00	7	139	2.5	1.19	3	138	1.8	1.08	140	1.6	0.90	138	1.7	1.07
Collaborate with Others	140	3.2	2.80	1	140	2.6	1.28	2	138	1.8	1.11	140	1.5	0.82	138	1.7	0.96
Reflect on Your Actions	138	2.8	1.10	5	137	1.5	0.78	7	135	1.4	0.79	139	1.4	0.74	137	1.4	0.82
Trial and Error	137	3.1	1.08	2	137	1.9	1.05	5	135	2.2	1.29	138	1.6	0.95	136	1.5	0.84
Scan Professional Magazines and Journals	138	3.1	1.08	2	138	1.6	0.90	6	137	1.7	1.05	139	1.6	0.98	137	1.3	0.77
Observe Others	138	3.0	1.04	4	139	2.9	1.37	1	136	1.5	0.88	139	1.4	0.79	137	1.4	0.82

NOTE. Rating scale: 1= Never inhibits engagement in learning activity, 5= Always inhibits engagement activity. Rank: 1= Environmental factor inhibits engagement in this learning activity the most of 8 learning activities studied, 8= Environmental factor inhibits engagement in this learning activity the least of the 8 activities studied.

indicating that IT professionals perceived that their initiative, self-efficacy, love of learning, and interest in their profession play important roles in motivating them to participate in all informal learning activities studied. A ranking of these mean scores showed that the four personal characteristics were most useful (as interpreted by a ranking of #1 or #2) in enhancing the motivation of IT professionals to search the Internet, talking with others, sharing materials and resources, collaborating, experimenting, and scanning professional magazines and journals when they have a need to learn on the job.

A correlation analysis, shown in Table 6, examined the relationship of mean scores on the eight informal learning activities and four personal characteristics studied. The analysis showed a significantly high positive correlation between engagement in informal learning activities and initiative ($r = .71$). Moderate positive correlations were also found between engagement in informal learning activities and love of learning ($r = .48$) and interest in profession ($r = .43$). These three positive correlations demonstrate that as the respondents' perception of the extent to which each personal characteristic enhances their ability to engage in

an informal learning activity becomes more favorable, the frequency with which they engage in that activity increases. A low positive correlation of .18 was found between engagement in informal learning activities and self-efficacy.

The analysis of the textual responses to the open-ended question in this section revealed that five additional personal characteristics enhance motivation to engage in the informal learning activities studied. Integrity, expressed as taking pride in one's work, the desire to do one's work

Table 4. Correlations between Frequency of Engagement in Informal Learning Activities and Five Environmental Factors

	1	2	3	4	5	6
1. Informal Learning Activities	--	-.78*	-.44	.35	-.43	-.15
2. Lack Time		--	.44	-.19	.62	.45
3. Lack Proximity to Colleagues' Work Areas			--	-.32	.14	.68
4. Lack Computer Technology				--	.26	-.04
5. Lack Monetary Rewards					--	.50
6. Lack Recognition						--

* $p < .05$

Table 5. Extent to Which Four Personal Characteristics Enhance Motivation to Engage in Informal Learning Activities

Informal Learning Activities	Personal Characteristics															
	Initiative				Self-Efficacy				Love of Learning				Interest in Profession			
	n	M	SD	Rank	n	M	SD	Rank	n	M	SD	Rank	n	M	SD	Rank
Search the Internet	138	3.8	1.31	1	137	3.1	1.52	7	139	4.4	0.98	1	138	4.1	1.06	2
Talk with Others	138	3.8	1.08	1	137	3.5	1.27	1	139	4.2	1.06	4	138	3.9	1.06	5
Share Materials and Resources with Others	138	3.5	1.16	6	137	3.3	1.28	3	139	3.9	1.08	6	138	4.0	1.00	3
Collaborate with Others	138	3.8	1.00	1	137	3.5	1.20	1	139	4.1	1.03	5	138	4.0	1.07	3
Reflect on Your Actions	138	3.6	1.26	5	138	3.2	1.44	5	140	3.9	1.23	6	137	3.8	1.22	7
Trial and Error	137	3.8	1.09	1	137	3.3	1.40	3	139	4.3	0.95	2	137	3.9	1.12	5
Scan Professional Magazines and Journals	138	3.5	1.25	6	137	3.2	1.41	5	140	4.3	0.97	2	139	4.2	0.99	1
Observe Others	137	3.3	1.16	8	136	3.1	1.30	7	138	3.9	1.10	6	138	3.7	1.14	8

NOTE. Rating scale: 1 = Does not enhance my motivation to engage in the learning activity, 5 = Enhances my motivation to engage in the learning activity to a great extent. Rank: 1 = Personal characteristic enhances motivation to engage in this informal learning activity the most of 8 learning activities studied, 8 = Personal characteristic enhances motivation to engage in this informal learning activity the least of 8 learning activities studied.

well, and continually improving one's skills/performance, was reported by 36 (25.2%) IT professionals. Teamwork ethic, expressed as respecting and empathizing with others, mentoring others, and being a team player, was cited by 35 (24.5%) respondents. An outgoing personality, described as enjoying social situations and a friendly disposition, was cited by 28 (19.6%) respondents. Open-mindedness, described as the ability to seek out, listen to, and value other's input, was reported by 16 (11.2%) respondents. Finally, curiosity, expressed as being intrigued by technical and professional challenges and questions, was cited by 15 (10.5%) respondents.

DISCUSSION

A survey was conducted to describe the factors that influence the engagement of IT professionals in informal learning in the workplace. Analysis of the data found that IT professionals rely heavily on searching the Internet to learn informally in the workplace. When they are unable to address their learning need with this activity, IT professionals turn to more interactive activities, such as talking and sharing resources with others. This group of professionals reported that six environmental factors inhibit them from engaging

in informal learning activities: lack of time, lack of proximity to colleagues' work areas, unsupportive organizational culture, inaccessibility of others, lack of equipment and technology, and lack of meeting/work space. Of the five environmental factors included in a correlation analysis, three (lack of time, lack of proximity to colleagues' work areas, and lack of monetary rewards) were negatively correlated, and one (lack of access to computer technology) was positively correlated with engagement in informal learning activities. In addition, IT professionals indicated that nine personal characteristics enhance their motivation to engage in informal learning: initiative, self-efficacy, love of learning, interest in the profession, integrity, outgoing personality, teamwork ethic, curiosity, and open-mindedness.

Table 6. Correlations between Frequency of Engagement in Informal Learning Activities and Four Personal Characteristics

	1	2	3	4	5
1. Informal Learning Activities	--	.71*	.18	.48	.43
2. Initiative		--	.55	.62	.30
3. Self-Efficacy			--	.02	.06
4. Love of Learning				--	.65
5. Interest in Profession					--

* $p < .05$

Of the four personal characteristics included in a correlation analysis, three (initiative, love of learning, and interest in profession) were positively correlated with engagement in informal learning activities.

This study has two limitations. First, IT professionals were selected from a membership list of a professional association in their field. It is possible that individuals with such an affiliation may have a greater commitment to their professional development than the general professional population. As such, the findings of this study seem most appropriate for those professionals committed to improving their professional practice. A second limitation was the survey response rate (24.1 percent). A concern that the response rate may have limited the generalizability of the study's findings was investigated by comparing IT respondents to the target population on known characteristics. The comparison showed that the respondents were highly similar to the target population and, as a result, increased the confidence that the study's findings may be generalized to the population of interest (Dooley & Lindner, 2003). Given these limitations, the findings of this study have important implications for theory, practice, and research of informal learning in the field of IT.

IMPLICATIONS FOR THEORY OF INFORMAL LEARNING AMONG IT PROFESSIONALS

The current study's findings corroborate earlier studies regarding the reliance of professionals on the eight informal learning activities studied (Lohman, 2000, 2005). The present study's findings deviate from these earlier studies in that IT professionals were found to favor an independent activity, searching the Internet, most when they learn informally. Their preference for searching the Internet differs from the preferences of two other professional groups, HRD professionals and public school teachers, who were found to favor more interactive face-to-face activities when they have a need to learn something new on the job.

The study's findings concerning environmental inhibitors may help to explain the learning preferences of IT professionals. A lack of time and lack of proximity to colleagues' work areas were found to inhibit IT professionals from engaging in the informal learning activities studied. Because IT professionals possess a high level of expertise in computer technology and typically have easy access to computer equipment, it is highly plausible that when they have a need to learn at work but are pressed for time, they naturally reach out to the Internet as a fast and efficient way of gathering information. When they are unable to access the Internet, as the negative correlation between lack of access to computer technology and engagement in informal learning activities demonstrates, IT professionals then tend to reach out to others in their workplace for assistance.

The degree to which IT professionals are able to obtain help from others in their organizations, however, varied based on the accessibility and support of colleagues in the work environment. This finding is consistent with the workplace learning models of Doornbos et al. (2004) and van Woerkom et al. (2002) and the findings from Kwakman's (2003) empirical study in which collegial availability and support as well as organizational climate for learning were identified as factors influencing participation in IWL activities. In the current study, IT professionals indicated that while they might like to use interactive activities more frequently, their organizational cultures and colleagues were often not supportive of such collegial interaction and sharing.

The current study corroborates aspects of the workplace learning models of Doornbos et al. (2004) and van Woerkom et al. (2002) in identifying four personal characteristics, initiative, self-efficacy, love of learning, and interest in one's profession, that enhance motivation to engage in all eight IWL activities studied. The present study also revealed five additional personal characteristics that enhance such motivation for IT professionals: integrity, outgoing personality, teamwork ethic, curiosity, and open-mindedness.

IMPLICATIONS FOR FACILITATING INFORMAL LEARNING AMONG IT PROFESSIONALS

This study's findings give rise to three important implications for facilitating informal learning among IT professionals. First, greater amounts of unencumbered time need to be built into an IT professional's work day. Simply increasing unencumbered time may not be sufficient to foster informal learning in the workplace, however. Control over free time is also a critical element in informal learning (Hargreaves, 1992). As a consequence, increased amounts of unencumbered time with discretion over how that time is used would provide greater opportunities for engagement in informal learning.

A second recommendation for promoting informal learning among IT professionals is further development of online information sharing and collaboration tools. Because this group of professionals relies heavily on Internet-based technical resources, continued enhancements to these two types of online tools should help facilitate information gathering and analysis activities and thereby decrease the strength of two environmental inhibitors to informal learning that were found in this study, lack of time and lack of proximity to others.

A third recommendation for promoting informal learning among IT professionals is to create virtual communities via organizational intranets. In the current study, IT professionals indicated that the inaccessibility of others was an environmental inhibitor to informal learning. Because this inhibitor includes both the absence of others who possess necessary expertise and the unwillingness of others to help, participation in virtual communities should be voluntary and meaningful incentives for participation should be provided. Virtual communities would improve access to learning resources and enhance the perceived support of the organizational culture for informal learning, thereby helping IT professionals communicate with others and gather information when the need to do so arises (Tobin, 1998).

IMPLICATIONS FOR RESEARCH OF INFORMAL LEARNING

A first important area for future research is to develop a greater understanding of the informal learning activity most preferred by IT professionals, searching the Internet. In contrast to previous studies of other professional groups, who were found to prefer more face-to-face interactive learning activities (Lohman, 2000, 2005), the current study found that IT professionals rely on the Internet to access a wide range of technical resources. Further understanding of the types of resources that IT professionals use, why they select them, and how they locate them would inform our understanding of the ways in which the Internet serves as a conduit for informal learning among this group of professionals.

Second, the degree to which the findings of this study apply to other professions needs to be examined. An appropriate next step would be to replicate this study with other professional groups who, similar to IT professionals, are experiencing high levels of job intensification.

A third area for future research is the design of an instrument to assess an employee's inclination to engage in informal learning as measured by the nine personal characteristics that were found to enhance motivation to engage in informal learning. This assessment could be used for performance coaching purposes to cultivate IT professionals who are able to continuously learn and grow even when environmental resources are constrained.

A fourth area for future research is the creation of a diagnostic instrument for auditing an organization's work environment to determine the degree to which it supports informal learning. Based on this study's findings, the diagnosis should assess the degree to which an organization's culture, design, policies and procedures, and people support engagement in informal learning.

Unquestionably, the findings from this study showed that IT professionals participate in a variety of informal learning activities when the need to learn something new arises. Their selection of specific learning activities is strongly

influenced by various environmental and personal characteristics. As jobs in the field of IT continue to intensify in scope and complexity, the ability to decrease environmental inhibitors to informal learning as well as enhance personal characteristics that promote informal learning becomes critical to cultivating workplaces where working and learning are integral and natural parts of the workday.

REFERENCES

- Billett, S. (2001). Learning through work: Workplace affordances and individual engagement. *Journal of Workplace Learning*, 13(5), 209-214.
- Billett, S. (2002). Toward a workplace pedagogy: Guidance, participation, and engagement. *Adult Education Quarterly*, 53(1), 27-43.
- Boud, D., & Middleton, H. (2003). Learning from others at work: Communities of practice and informal learning. *Journal of Workplace Learning*, 15(5), 194-202.
- Cofer, D. A. (2000). *Informal workplace learning* (Practical Application Brief No. 10). Columbus, OH: Center on Education and Training for Employment.
- Cseh, M., Watkins, K. E., & Marsick, V. J. (1999). *Re-conceptualizing Marsick and Watkins' model of informal and incidental learning in the workplace*. Paper presented at the Academy of Human Resource Development Conference, Washington, DC.
- Dooley, L. M., & Lindner, J. R. (2003). The handling of nonresponse error. *Human Resource Development Quarterly*, 14(1), 99-110.
- Doornbos, A. J., Bolhuis, S., & Simons, P. R. (2004). Modeling work-related learning on the basis of intentionality and developmental relatedness: A noneducational perspective. *Human Resource Development Review*, 3(3), 250-274.
- Ellinger, A. (2005). Contextual factors influencing informal learning in a workplace setting: The case of "reinventing itself company." *Human Resource Development Quarterly*, 16(3), 389-415.
- Ellinger, A., & Cseh, M. (2007). Contextual factors influencing the facilitation of others' learning through everyday work experiences. *Journal of Workplace Learning*, 19(7), 435-452.
- Ellstrom, P. (2001). Integrating learning and work: Problems and prospects. *Human Resource Development Quarterly*, 12(4), 421-435.
- Hargreaves, A. (1992). Time and teachers' work: An analysis of the intensification thesis. *Teachers College Record*, 94(1), 87-108.
- Kwakman, K. (2003). Factors affecting teachers' participation in professional learning activities. *Teaching and Teacher Education*, 19(2), 149-170.
- Lohman, M. C. (2000). Environmental inhibitors to informal learning in the workplace: A case study of public school teachers. *Adult Education Quarterly*, 50(2), 83-101.
- Lohman, M. C. (2005). A survey of factors influencing the engagement of two professional groups in informal workplace learning activities. *Human Resource Development Quarterly*, 16(4), 501-527.
- Marsick, V. J., Volpe, M., & Watkins, K. (1999). Theory and practice of informal learning in the knowledge era. In V. J. Marsick & M. Volpe (Eds.), *Informal learning on the job* (Vol. 3, pp. 80-95). San Francisco: Berrett-Koehler.
- Merriam, S. B., Caffarella, R. S., & Baumgartner, L. M. (2007). *Learning in adulthood* (3rd ed.). San Francisco: Jossey-Bass.
- Powell, W. W., & Snellman, K. (2004). The knowledge economy. *Annual Review of Sociology*, 30, 199-220.
- Primm, D. (2005). What workplace stress research is telling technical communications. *Technical Communication*, 52(4), 449-455.
- Professional Information Technology Classification Matrix. (2004). Retrieved July 27, 2006, from www.admin.mtu.edu/hro/forms/ITMATRIX10-01-04.pdf
- Tobin, D. R. (1998). *The knowledge-enabled organization: Moving from "training" to "learning" to meet business goals*. New York: AMACOM.
- van Woerkom, M., Nijhof, W. J., & Nieuwenhuis, L. F. M. (2002). Critical reflective working behaviour: A survey research. *Journal of European Industrial Training*, 26(8), 375-383.

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