The Internet and Learning Organizations:

Developing Strategies for Improving the Rate of Innovation

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Abstact:

Today as we move progressively into what has become known as the knowledge economy, where the near exponential increase in knowledge has caused product/service lifecycles to collapse, firms will need to innovate faster than ever before if they hope to compete, prosper and survive.

In this economy, where knowledge has replaced the traditional tools of production, land and capital, firms must learn faster than ever before and they must create and employ superior knowledge. Unlike land and capital, knowledge is a unique resource that can be created from nothing. However, in order to create knowledge, it must be shared. The learning organization has been proposed as a way of increasing a firm's ability to learn through a sharing of its knowledge capital. In this chapter we will examine one of the factors that enables more effective organizational learning, information technology, and in particular Internet based information technology. We will report on the findings of a survey of CIOs concerning the role of Internet technology as a catalyst for creating learning organizations.

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Introduction

Change it has been said is the only constant, and business leaders understand full well the implications of this oxymoron. Jack Welch, CEO of General Electric Company, unarguably one of the most successful companies in the world, expressed the concerns of most business leaders today when he stated, "When the rate of change outside the firm is greater than the rate of change inside, the end is in sight."

Changes brought about by advances in technology, especially information technology, intense global competition, and rising customer expectations have dramatically altered the way business is conducted today. The rapid rate of change that we have experienced this century, especially during the last twenty-five years since the introduction of the microprocessor, means that businesses have to innovate faster than ever before if they hope to compete, prosper and survive. The rapid rate of change also means that firms can no longer depend on a long product/service lifecycle to plan their strategies and recoup their investments. Today, many products are designed and tested on the computer thereby eliminating the long lead-time associated with building mockups and testing prototypes.

As the traditional lifecycle of fours stages (i.e., initiation, growth, maturity, and decline) collapses, firms are faced with the dilemma of trying to bring new products to market faster than before, but without the benefit of the cash flows that have typically been generated during long maturity and decline stages. As we move rapidly into what has become known as the knowledge economy, where intellectual capital replaces the

traditional tools of production (i.e., land and capital), learning or more specifically, organizational learning is viewed by many as a solution to this dilemma. Evidence of this can be seen when we look at the behavior of the financial markets.

The financial markets have indicated that they are willing to provide financing to those firms that they believe have the intellectual capital capable of generating continuous innovations and attractive future cash flows. For example, look at Microsoft. During most of this past year, the market value for Microsoft has been consistently above $350 billion. During this same period, their net assets were less than $15 billion. This means that for 1999, Microsoft's intangible assets (i.e., patents, copyrights, and overall know-how) were approximately twenty times their net assets. In 1996, the ratio of market value to net assets were less than 10 to 1. In essence, the financial markets believe that Microsoft possesses the intellectual capital necessary to successfully compete in this new economy. The same is true for a number of companies that have recognized the critical importance of their human and knowledge capital.

Recognizing the importance of these intangible assets, Ray Stata, CEO of Analog Devices, expressed the challenge that all firms face today when he noted, "The rate at which individuals and organizations learn may be the only source of sustainable competitive advantage" [Stata 1988]. However, no matter how good individual learning makes us feel it is basically irrelevant because most learning today takes place in groups. For organizations to learn, knowledge must be efficiently and effectively communicated.

While there are many factors that contribute to knowledge transfer and hence organizational learning including, strategy, management, culture and technology, surprisingly, technology is one factor about which there has been little written

[Balasubramanian, 1999]. In this chapter, we will explore the relationship between organizational learning and information technology such as web browsers, search engines, Internet phone, e-business, GroupWare, data mining, chat rooms, multimedia, Internet video conferencing, virtual learning, microworlds, etc. We will do this by reporting on the results of a survey sent to 1,000 CIO's across the United States. The firms surveyed, included a mix of both large (i.e., > 500 employees) and medium sized (i.e., between 20 and 400 employees) firms in both the manufacturing and service sectors. The survey shown in Table 1 was distributed both by mail and by the Internet, and was designed to address several questions including: (1) Do learning organizations use the Internet more than non-learning organizations? and (2) Do learning organizations use the Internet differently than non-learning organization?

In order to address these questions we first had to identify those firms that were learning organizations. Then we had to develop a comprehensive list of Internet tools. Finally, we had to assess the extent to which these tools facilitated organizational learning. The results, we believe can provide managers with insights as to how Internet strategies can help their firms become learning organizations.

Learning Organization

In order to determine whether a firm is a learning organization we first had to find a well-grounded definition. There are many definitions of learning organizations, yet one of the most often quoted is one attributed to Peter Senge, a principle architect of learning organizations. Senge [1990] described learning organizations as:

"… places were people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where

collective aspirations are set free, and where people are continually learning how to learn together."

Critics contend, however, that such definitions are too idyllic and do not provide concrete ideas that can be easily implemented. Senge [1990] also gave us a more prescriptive definition in his classic article, "The Leaders New Work: Building Learning Organizations." In this article, he identified what have commonly been referred to as the five disciplines that leaders, and hence organizations must practice if they hope to become learning organizations (i.e., ***shared vision, mental models***, ***personal mastery***, ***team learning, and systems thinking***). While some may argue that there really is no well grounded definition of what a learning organization is [Garvin, 1993], many have embraced Senge's five disciplines and have used them to develop valid inventories for assessing whether a firm is a learning organization.

Table 2 illustrates **The Reality Checklist: Characteristics of a Learning Organization,** which resulted from a study of 350 firms participating in a learning organization study conducted by IBM Corporation. IBM's list of 30 behaviors, are organized according to four major categories, ***leadership, structure and processes, culture, and managing people as assets***. Upon close inspection it can be seen that these behaviors correspond to Senge's five disciplines. For example, the behavior, *Senior executives visibly reinforce values by talking about them frequently and behaving in ways that are consistent with the company's stated values*, really deals with ***shared vision***. Likewise, the behavior, *Responsibility for business decision-making is as often as possible, delegated to the person who actually does the work*, is one that facilitates and depends on ***personal mastery***.

Another instrument similar to IBM's Reality Checklist is the **Learning Organization Inventory** (LOI) developed by Advanced Business Development Services [Cole, 1996]. The LOI consists of five categories that are cross-referenced with Senge's five disciplines. Table 3 shows the fifty behaviors that comprise the LOI, grouped according to categories such as ***leadership, culture and professional environment, competence and innovation, professional development and recognition, and work processes and systems***.

Table 4 shows yet another set of behaviors that constitute an inventory called the **Learning Company Questionnaire** developed by Transform Development Consultants, Ltd. [Boydell, Pedler, and Burgoyne, 1996]. As can be seen, this inventory identifies eleven behaviors of a learning company, as well as ways to measure each.

It should be clear from an analysis of the various instruments, that Senge's five disciplines are central to each. As such, we have elected to use Senge's model and in particular, IBM's Reality Checklist, in order to determine whether a firm is a learning organization. We selected a subset of these 30 items in order to construct the survey shown in Table 1. We used a subset of the thirty items because we did not want to burden respondents with an excessive number of questions. Before we conducted the survey, we first had to perform a pre-test in order to ensure validity and reliability of the instrument we designed. Section III of the survey provides twenty inventory items organized according to the four major categories identified by IBM. While the items are grouped according to the four categories of ***leadership, structure and processes, culture, and managing people as assets***, each of the five items under each of the four categories is associated with one of Senge's five disciplines. For example, question number 36 (*The*

leaders of this organization act as facilitators of our vision) is really about ***shared vision***, while question 37 (*Management welcomes new ideas and initiatives from staff*) is really about ***personal mastery***, etc. Examination of companies that participated in our study reveals that almost every organization possessed at least one of the learning organization characteristics identified by IBM**.**

Internet Technologies

What is the Internet exactly? The "Information Super Highway" as it is called is just that, a super electronic highway for the rapid distribution of data and information. It runs over narrow band telephone lines and links over 60,000 independent, interconnected computer networks that use TCP/IP protocols. It evolved from the ARPANET of the late 1960's.

Anyone with a computer, a modem and Internet software can establish a site or a home page containing information for other Internet users to examine, download, or print. A few sites pay for use or require a password, but the vast majority are free. The minimum hardware recommended to explore the Internet is a 486DX-33MHz processor with 8 MB of memory, sound blaster sound card, mouse, super VGA card and monitor, speakers, and a 14.4 baud modem. The minimum operating system level recommended is Microsoft Windows 3.1/Windows 95 and a web browser such as Netscape Navigator [Mayfield & Ali, 1996]. The Internet was initially built by governments and universities as a research tool to allow for rapid exchange of data among scientists. Today, most of the phenomenal expansion is fueled by commercial firms selling on-line access or marketing goods and services.

The Internet, the largest computer network in the world, is receiving considerable attention and has become so prominent that it simply cannot be ignored. It connects over 11 million host computers, and over 50 million users in over 100 countries, and it is growing at the rate of 10-17 percent per month (International Internet Usage Forecasts [IIUF], 1998). Interestingly, nobody is responsible for the entire network.

The Internet represents new ways to enhance communication, collaboration and the sharing of knowledge. The Internet provides the backbone for sharing knowledge with customers, partners, and industry analysts. A basic understanding of the delivery methods is crucial to understanding how the Internet supports organizational learning. Floridi [1996] states there are four distinguishable categories of communication on the Internet: **e-mail, file transfer, discussion groups and remote control**. E-mail and World Wide Web (WWW) are the two most commonly used Internet capabilities. A study conducted of Internet usage during a 24-hour period found that the WWW was used 72 percent of the time, and e-mail 65 percent of the time. Electronic mail is simply a means of interpersonal communications. Letters are exchanged, memos and private messages are sent to friends and colleagues. Even electronic journals are published. File transfer enables users to send and receive files such as text, graphical bit maps, and video clips and sound bytes. Discussion groups or newsgroups are collections of individuals interested in a particular topic who post messages, questions, problems or issues and reply to those posted by others. An example of a remote control tool is the WWW. The WWW is based on “home pages” combining text, graphical images, musical sounds, video using HTTP and HTML to hyperlink related sites on thousands of subjects.

As a result of an extensive review of the literature, we identified twenty-eight Internet tools. In the survey we grouped the twenty-eight tools into five categories that we believe correspond to the various disciplines identified by Senge (i.e., ***shared vision, mental models, personal mastery, team learning, and systems thinking***).

As can be seen from Table 1, Section II, we grouped e-mail, WWW, and home page together, and web browser, Internet search engines, file transfer, etc. together. We did this by mapping the features and functionality of the technology to the learning tools associated with each of the disciplines. For example, Table 5 shows that the Internet tools of newsgroups and discussion databases map to the learning tools of dialogue, deeper listening, etc. This we believe helps facilitate the learning discipline of ***team learning***. We also contend that e-mail and WWW help accomplish ***shared vision*** by providing networks and creating electronic communities.

As noted above, we grouped the twenty-eight Internet tools into five categories that we believe best correspond to Senge's five disciplines. Group 1 we hypothesized, are tools that support *shared vision*, Group 2--*personal mastery*, Group 3--*mental models*, Group 4--*team learning*, and Group 5--*systems thinking*.

Factor analysis was performed on the data obtained from the survey to determine the degree of relationship between what can be described as learning organization factors and Internet technologies. We analyzed the Internet and mail survey responses separately as well as together. As seen from Table 6, the five disciplines were factored into eight groups. For example, as a result of our analyses, we were able to distinguish between ***mental model inquiry*** and ***mental model reflection***. The results of our analysis required these distinctions, but the choice of suffixes was ours and based upon our understanding

of the tools and what the survey was designed to elicit. Likewise, we were able to discern three ***personal mastery*** factors: ***personal mastery workflow***, ***personal mastery access***, and ***personal mastery knowledge***. An analysis of the survey results (see table 6) showed that the tools were properly grouped.

Results

Results show that learning organizations use the Internet to a greater extent than non-learning organizations. The mean number of Internet hours per day for learning and non-learning organizations for those surveyed by mail, by Internet and combined, were 4.00 vs. 1.74, 5.75 vs. 1.98, and 5.67 vs. 1.85, respectively. The criterion to identify learning organizations was stringent; above the mean on all four learning organization characteristics. Given this rigorous criterion, the results are still significant with 4 to 6 percent of the respondents identified as learning organizations. If the criterion is relaxed (say above the mean for only three out of four learning organization characteristics), more learning organizations can be identified. Under these relaxed conditions, up to 49 percent of responding firms can be identified as learning organizations.

Results also show, that learning organizations use Internet tools differently than non-learning organizations. Internet tools that are used differently by learning organizations include online services, web browser, multimedia, entertainment, push technology, e-mail, WWW, home page/web site, search engines, data mining, newsgroups, chat rooms, intranet, groupware, e-business, and business applications. Due to the small sample size, the results are only generalizable for each of the learning organization components.

Implications for Practitioners

What does this mean, and how might we use the knowledge obtained from this study? Basically, it means that we believe that it is possible to help organizations become more like the learning organization envisioned by Senge, and IBM if they employ Internet tools such as those presented in Table 6. For example, if it was determined that an organization was deficient in the area of ***shared vision*** then tools such as web browsers should be employed. If they are found to be deficient in the area of ***personal mastery access***, then tools such as Web TV might remedy the problem.

Finally, as a result of this study we were able to identify a set of best practices for firms wishing to become learning organizations. In other words, organizations can use the results of this survey to generate Internet tool strategies for building learning capabilities.

We offer the following as an example of recommendations concerning how Internet tools can support specific learning disciplines for the learning organization on managing people as assets. For a more detailed and complete set of recommendations see Marchi [1999].

Best Practices to Enhance Managing People as Assets

1. Recognize each person's contribution as being valuable to the organization's overall future vision. Support this learning discipline of ***shared vision*** by establishing a home page/web site to publish significant contributions within the organization. Utilize push technology to schedule and distribute mass e-mail notices of major achievements and explain how they contribute to the organization's vision.

2. Establish clear operational guidelines for learning to help people work in ways that turn learning aspirations into concrete business results. Support this learning discipline of ***personal mastery*** by encouraging the use of the Internet to research for best-of-breed ideas via web browser, search engines, and data mining. Provide tips on how to maximize searches for pertinent information. Migrate legacy business applications to the Internet and adopt an e-business strategy to provide products and services.
3. Encourage off-the-job learning opportunities both outside and inside the organization. Support this learning discipline of ***mental models*** by offering entertaining, multimedia learning tools (e.g., web site to documentation and multimedia files that can be downloaded for self-paced certification education) in order to enhance professional development. Encourage chat rooms with peers working on similar projects in order to exchange knowledge.
4. Instill confidence in people that if they make mistakes they will not be penalized. Support this learning discipline of ***team learning*** by establishing an Intranet for internal proprietary communication, with password protected newsgroups for *need to know* team members. Utilize e-mail distribution lists to communicate policy that risk taking and mistakes are part of learning and show examples of mistakes that turned the business around.
5. Conduct lessons learned sessions and produce clear, specific and permanent structural and organizational changes. Support this learning discipline of ***systems thinking*** by posting lessons learned on a newsgroup or discussion database and show lessons that have been applied to improve the business.

Offer fast, internal access to newsgroups via groupware software such as Lotus Notes or GroupWise.

Conclusion

The purpose of the study was to determine how learning organizations use the Internet, and to what extent their use differs from non-learning organizations. Results show that learning organizations use the Internet to a greater extent and differently than non-learning organizations. We believe further, that the **Best Practices** of learning organizations identified in this study can be employed by other organizations to promote organizational learning.

Table 1

MAIL SURVEY
INTERNET LEARNING SURVEY

Instructions

Please take a few minutes to answer all the questions to the best of your ability. Please complete the survey by* December 15, 1998 *by mail, fax, or Internet. You may complete and return this mail survey in the enclosed postage-paid envelope or fax it. Otherwise, point your Web browser to the Internet survey at* http://phd.ml.org *(See cover letter for Priority Access Code). It should take about 10 minutes to complete the survey. All responses are anonymous and confidential. Thank you for your participation.

Definitions

- The **Internet** is a worldwide connection between many different computers and computer networks.
- A **learning organization** is an organization that purposely constructs structures and strategies so as to enhance and maximize organizational learning.
- **Organizational learning** is the process of improving actions through better knowledge and understanding and is the outcome of individual, team and systems learning.
- A **business unit** is a strategic, independent group that performs a particular function. It may be an entire company, division, product group, function, department or team.

I. BACKGROUND INFORMATION

1. What is your **position/title?** _____

2. What is the **name of the business unit** where you work? _____

3. What is your **business unit market position**? (*Check only one*):
___Dominant market leader ___Major competitor ___ Minor competitor ___Other (*Please specify*): _____

II. INTERNET USE

4. On average, how many hours per day do employees in your business unit use the Internet? (*Assume 7 days a week. Circle only one*): Number of Hours/Day

0	1	2	3	4	5	6	7	8	Other___

5. Where is the primary place your business unit accesses the Internet from? *(Check only one):*
__Work only
__Home only
__Primarily work, but also at home
__Primarily home, but also at work
__Distributed mobile work place
__Other *(please specify):* _____

6. Which of the following most accurately describes the role of the Internet in your business unit? (*Check one*):
___ Internet gives us information to reduce costs and risks.
___ Internet fosters increased information sharing and creativity internally.
___ Internet enhances knowledge exchange with sources outside the firm.
___ Internet helps us continually improve the quality of products and services.
___ Internet increases our ability to meet market needs rapidly and gain competitive advantage.
___ All of the above.
___ Other (*please specify*): _____

7. To what extent do you feel the Internet is vital in facilitating organizational learning (*Circle only one*):
1 = not at all; 2 = to a small degree; 3 =to a moderate degree; 4 =to a great degree; 5 =to a very great degree

	1	2	3	4	5
To what extent does your business unit use the following Internet technologies? (C*ircle only one for each item):*					
1 = not at all; 2 = to a small degree; 3 =to a moderate degree; 4 =to a great degree; 5 =to a very great degree					
Group 1					
8. E-mail (such as Microsoft Exchange to send and receive mail)	1	2	3	4	5
9. World Wide Web (WWW)	1	2	3	4	5
10. Home page or web site (to promote organization goals and services)	1	2	3	4	5

Table 1 (Cont.)

To what extent does your business unit use the following Internet technologies? (*Circle only one for each item):*
1 = not at all; 2 = to a small degree; 3 = to a moderate degree; 4 = to a great degree; 5 = to a very great degree

Group 2

11. Web browser (such as Netscape to search the World Wide Web)	1	2	3	4	5
12. Internet search engines (such as YAHOO to gather information)	1	2	3	4	5
13. File transfer (such as downloading a document)	1	2	3	4	5
14. Subscribe to on-line services (such as America On-Line, CompuServe)	1	2	3	4	5
15. Distance learning (on-line education and training)	1	2	3	4	5
16. Internet phone (telephony to make and receive phone calls)	1	2	3	4	5
17. Internet fax (to send or receive fax over the Internet)	1	2	3	4	5
18. WebTV (television with a Web browser)	1	2	3	4	5

Group 3

19. Entertainment (such as games on the Internet)	1	2	3	4	5
20. Internet business applications (such as Java)	1	2	3	4	5
21. E-business (commerce such as advertising, shopping, banking)	1	2	3	4	5
22. Digital signature and id cards (such as Verisign or RSA)	1	2	3	4	5
23. Push technologies (such as Pointcast, Castinet, Netcaster)	1	2	3	4	5
24. Internet audio streaming (such as RealAudio)	1	2	3	4	5
25. 3-D environments (such as VRML, Active 3D)	1	2	3	4	5

Group 4

26. Newsgroups, listservs, discussion databases (topic specific forums)	1	2	3	4	5
27. Intranet (private, internal network within organization)	1	2	3	4	5
28. GroupWare (such as Lotus Notes or Microsoft GroupWise)	1	2	3	4	5
29. Data mining or data warehousing (knowledge management)	1	2	3	4	5
30. Chat rooms (2-way, live, on-line discussion with no video)	1	2	3	4	5

Group 5

31. Multimedia (1-way video and sound like a movie rental)	1	2	3	4	5
32. Internet video conferencing (2-way, live dialogue such as NetMeeting)	1	2	3	4	5
33. Virtual learning (such as joining a team of scientists on a journey)	1	2	3	4	5
34. Microworlds (simulations such as a strategic business exercise)	1	2	3	4	5
35. Others (*please specify*): _____	1	2	3	4	5

III. LEARNING ORGANIZATION

Please answer the questions to the extent the following are true in your business unit. (*Circle one per item):*
1 = strongly disagree; 2 = disagree; 3 = neither agree or disagree; 4 = agree; 5 = strongly agree

Leadership

36. The leaders of this organization act as facilitators of our vision.	1	2	3	4	5
37. Management welcomes new ideas and initiatives from staff.	1	2	3	4	5

Table 1 (Cont.)

Please answer the questions to the extent the following are true in your business unit. (*Circle one per item):*
1 = strongly disagree; 2 = disagree; 3 = neither agree or disagree; 4 = agree; 5 = strongly agree

38. Senior staff of this organization facilitate working conversations which bring new knowledge.	1	2	3	4	5
39. Teams are recognized and rewarded for their innovative and paradigm breaking solutions to problems.	1	2	3	4	5
40. Strategy is a joint responsibility of people at many levels in the organization.	1	2	3	4	5
Culture					
41. This organization has a clearly stated and coherent shared vision of the future.	1	2	3	4	5
42. Time is allowed for exploratory learning, skill development & reflection.	1	2	3	4	5
43. Multiple viewpoints and open productive debates are encouraged and cultivated.	1	2	3	4	5
44. People are honest and open with one another when working together on teams.	1	2	3	4	5
45. Errors and problems are shared openly and recognized as resources for learning.	1	2	3	4	5
Structures and Processes					
46. There are formal and informal structures designed to encourage people to share what they learn with their peers and the rest of the firm.	1	2	3	4	5
47. The organization employs systems which enable individuals to continually learn from their work experience.	1	2	3	4	5
48. The organization employs systems to learn from external sources, including customers, suppliers and competitors.	1	2	3	4	5
49. Systems are in place to acquire, inventory, and disseminate knowledge sharing.	1	2	3	4	5
50. Systems guide people to search for creative solutions to difficult problems.	1	2	3	4	5
Managing People as Assets					
51. The organization recognizes each person's contribution as being valuable to the organization's overall future vision.	1	2	3	4	5
52. Clear operational guidelines for learning are in place to help people work in ways that turn learning aspirations into concrete business results.	1	2	3	4	5
53. The organization encourages off-the-job learning opportunities both outside and inside the organization.	1	2	3	4	5
54. People are confident that if they make mistakes they will not be penalized.	1	2	3	4	5
55. Lessons learned sessions are conducted so as to produce clear, specific and permanent structural and organizational changes.	1	2	3	4	5

56. What comments would you like to make concerning the value or use of the Internet for learning?

_____

Table 2

IBM Reality Checklist of Learning Organization Characteristics

The Reality Checklist: Characteristics of a Learning Organization

Leadership

1. Senior executives visibly reinforce values by talking about them frequently and behaving in ways consistent with the company's stated values.

2. Top executives' visions for business success focus on personal as well as profit aspirations.

3. CEOs view their role not as commander-in-chief, but as the chief supporter of people throughout the organization.

4. CEOs and other top managers spend less time in their offices and more time meeting with employees at many levels to share ideas and concerns.

5. The outward trappings of executive privilege and management authority based on hierarchical position are diminishing. Earned authority, based on quality of individual knowledge, skills and effectiveness, is on the rise. Performance and reward systems are shifting to reflect those changes.

6. Responsibility for business decision-making is, as often as possible, delegated to the person who actually does the work.

7. Strategy is no longer the exclusive province of senior managers. Rather, it is a joint responsibility of people at many levels in the organization.

Table 2 (Cont.)

IBM Reality Checklist of Learning Organization Characteristics

The Reality Checklist: Characteristics of a Learning Organization
Culture
8. Corporate values and principle are formally articulated and are a source of inspiration and unity. They provide a framework for behavior and performance that helps the organization reduces bureaucracy.
9. Values commonly expressed include the following: respect for individual freedom, honesty, learning from mistakes, and appreciation of the personal and business significance of continuous learning.
10. Management encourages employees to contribute to the success of colleagues by sharing information and wisdom.
11. Time is allowed for exploratory learning, skill development and reflection.
12. The company publicizes internally the successful applications of ideas.
13. Employees feel comfortable expressing criticism of the organization.
14. Values are a strong consideration in the recruitment of prospective employees.

Table 2 (Cont.)

IBM Reality Checklist of Learning Organization Characteristics

The Reality Checklist: Characteristics of a Learning Organization
Structures and Processes
15. Investment patterns are consistent with corporate messages. If learning and knowledge transfer are high on a company's strategic list, the funding reflects these priorities.
16. The organization has a process to archive and distill learning from past experiences and distinguish what works and what does not.
17. The company conducts events frequently to share ideas, wisdom and experience.
18. Business information on performance, current activities and best practices is widely accessible and shared.
19. IT facilitates the rapid dissemination of knowledge and improves communication and collaboration among employees at all levels and all locations.
20. IT systems are designed to increase the speed and precision with which tasks are completed.
21. The organization encourages and work routines allow people to capitalize on opportunities for informal learning.
22. Procedures exist to retain business knowledge acquired by people who leave the organization.
23. The company uses a variety of mechanisms to learn from external sources, including customers, suppliers and competitors.

Table 2 (Cont.)

IBM Reality Checklist of Learning Organization Characteristics

The Reality Checklist: Characteristics of a Learning Organization
Managing People as Assets
24. All employees understand short and long-term business missions, which are significant motivational factor in their day-to-day work lives.
25. Non-financial measures of business performance include employee perceptions of work conditions, workforce diversity and other measures of human assets.
26. Management considers expenditures on individual skill development as an indispensable investment, not a luxury.
27. Self-knowledge and personal growth are formally recognized as important elements in the improvement of management skills and the success of the organization.
28. Training and development emphasize the responsibility of individuals for their own learning experiences. The company provides support for self-paced learning.
29. Human-resource professionals play an active role in developing business strategies with line managers.
30. The organization promotes specific periodic off-the-job learning experiences both outside and inside the organization.

Note. From Economist Intelligence Unit and IBM Corporation. (1996). The Learning Organisation: Managing Knowledge for Business Success. New York, NY: EIU and IBM.

Table 3

Learning Organization Inventory by Learning Disciplines

Characteristics of a Learning Organization
Leadership
1. The behavior of senior staff matches the stated priorities of the firm.
2. The leaders of this firm act more as facilitators of our vision than as masters of it.
3. Management welcomes new ideas and initiatives from staff.
4. Our senior staff of this firm is encouraging of and interested in the aspirations of staff members.
5. The leaders of this firm are open to challenging their own preconceived ideas.
6. Our senior staff of this organization facilitates working conversations, which bring new knowledge.
7. Whatever their level of seniority, people of this firm have an attitude of working together.
8. The work demands of this firm are made attainable by creative, high quality management.
9. Leaders here effectively assist in making lasting improvements to quality of work output.
10. Senior staff demonstrates an ability to listen skillfully and draw the best out in other by questions asked.

Table 3 (Cont.)

Learning Organization Inventory by Learning Disciplines

Characteristics of a Learning Organization
Culture and Professional Environment
11. This firm has a clearly stated and coherent shared vision of its future.
12. The people with whom I work are committed to a shared philosophy and purpose.
13. I'm part of a firm of people who feel personally responsible for continual top quality in services.
14. The people of this firm see current reality as an ally, not an enemy.
15. People here take steps to stay awake to the assumptions that lie behind their thinking.
16. There are no real "class" distinctions which make working together difficult here.
17. People here are honest and open with one another, especially when working together on projects.
18. Conflict between people here is always resolved for the benefit of working together better.
19. The people of this firm review failures and successes with a view to learning from them.
20. Our main focus for competition is with similar firms offering similar services, not within the firm.

Table 3 (Cont.)

Learning Organization Inventory by Learning Disciplines

Characteristics of a Learning Organization
Competence and Innovation
21. The people of this firm have a good understanding of their specific contributions to the future.
22. People here communicate regularly and creatively with one another about their picture of the future.
23. This firm consistently provides information, encouragement and resources to develop abilities needed.
24. The people who work for this firm are continually working at improving their knowledge and abilities.
25. Quality of work output and development of better practices is not inhibited by clichés within the firm.
26. The people here engage in activities, which result in a better understanding of competition and realities.
27. People here are confident that if they make mistakes they will not be penalized.
28. The people who work here are continually focused on developing new and/or better services by working co-operatively together.
29. This firm deals thoughtfully and creatively with difficulties, knowing that quick fix solutions can produce worse problems later.
30. The people look for innovative solutions that will produce long term results.

Table 3 (Cont.)

Learning Organization Inventory by Learning Disciplines

Characteristics of a Learning Organization
Professional Development and Recognition
31. This firm recognizes each person's contribution as being valuable to the firm's overall future vision.
32. This firm develops creative career opportunities for individuals, which promote the firm's future vision.
33. The professional development of all people at this firm is geared to encourage them to advance their own aspirations.
34. People here are rewarded for taking initiative in their day-to-day work.
35. The people of this firm are continually reviewing the way they think about bringing the best out in people.
36. This firm actively encourages the belief that people are its best asset.
37. Team based initiatives and solutions are prized by this firm.
38. When teams or work groups acquire new skills or create new solutions to difficult problems, this is celebrated both formally and informally.
39. Innovative solutions, which stand the test of time, are most highly valued and rewarded by this firm.
40. The career development of people working here is integrated into a long-term plan for each individual.

Table 3 (Cont.)

Learning Organization Inventory by Learning Disciplines

Characteristics of a Learning Organization
Work Processes and Systems
41. Staff in this firm is aware of the specific measures used to plot the firm's progress towards shared goals.
42. The systems used here ensure that work produced is consistent with a clear picture of future directions shared by the people who work here.
43. The methods of accountability at this firm encourage individuals to take maximum responsibility and initiative in their work.
44. This firm employs work systems, which enable individuals to be continually learning from their work experience.
45. The work systems here actively encourage individuals to see themselves as more than their position or job title.
46. Our normal procedures of work guide people to look past their first impressions when looking for solutions to problems.
47. People at this firm find it easy to rely upon working with others for the successful completion of set tasks and responsibilities.
48. The organizational structure of this firm supports people working cooperatively together.
49. This firm has processes, which ensure that lessons learned from successes and failures are recorded and reviewed.

Table 3 (Cont.)

Learning Organization Inventory by Learning Disciplines

Characteristics of a Learning Organization
Work Processes and Systems (Cont.)
50. The work systems here guide staff to search for creative responses to difficult situations.

Note. From Cole, B. (1996). Learning Organization Inventory: First Impressions of Organizational Abilities [On-line]. Available: advan@powerup.com.au

Table 4

Learning Company Questionnaire of Characteristics

Learning Organization Characteristic	Description
1. Learning Climate	Managers create a supportive environment for learning from mistakes and experiments to continuously learn to do better.
2. Intercompany Learning	The learning company participates with customer's suppliers and others in its industry in joint learning events and uses bench marking to learn from best practices.
3. Boundary Workers as Environmental Scanners	All members who have contact with external customers gather, bring back, collate, and disseminate information that affects the organization.
4. Enabling Structures	Organization structure and procedures are flexible to meet current needs and respond to future changes.
5. Internal Exchange	Internal units and departments see themselves as customers and suppliers with an emphasis on collaboration rather than competition.
6. Formative Accounting & Control	Systems of accounting, budgeting and reporting are structured to assist learning, encourage self-responsibility and auditing, and managing for actions.

Table 4 (Cont.)

Learning Company Questionnaire of Characteristics

Learning Organization Characteristic	Description
7. Informating	IT is used to create databases and communication systems that help everyone understand what is going on.
8. Learning Approach to Strategy	Company policy and strategy formation, together with implementation, evaluation and improvement, are consciously structural as a learning process.
9. Participative Policy Making	All members of the company have a chance to take part, to discuss and contribute to major policy decisions.
10. Reward Flexibility	The underlying assumptions for reward systems are identified, shared and discussed. Alternative ways of rewarding people are explored.
11. Self-Development for All	Resources and facilities are made available to all members of the company. All members are encouraged to take responsibility for their own learning and development.

Note. From Boyell, T., Mike P., & John B. (1996, April). The Learning Company Project [On-line]. Available: http://www.cica.ca.

Table 5

Learning Disciplines, Learning Tools and Internet Tools

Five Learning Disciplines	Learning Tools	Internet Tools
1. Shared vision	Backing into a vision, informal networks and community, strategic priorities	E-mail, WWW, home page, web site.
2. Personal mastery	Personal vision, personal values checklist, ladder of inference dialogue, left-hand/right-hand column dialogue	Web browser, search engines, file transfer, telnet, on-line services, distance learning, Internet phone, Internet fax, Web TV.
3. Mental Models	Reflection and inquiry, scenarios and learning labs, ladder of inference dialogue, left-hand/right-hand column, writing to your loyalties	Entertainment, business applications, e-business, digital signature and id cards, push technologies, audio streaming, 3-D environments.

Table 5 (Cont.)

Learning Disciplines, Learning Tools and Internet Tools

Five Learning Disciplines	Learning Tools	Internet Tools
4. Team Learning	Dialogue, deeper listening exercises, skillful discussion, video fishbowl	Newsgroups, listservs, discussion databases, intranet, groupware, data mining, chat rooms.
5. Systems Thinking	Storytelling, the five whys, archetypes, causal loop diagrams and process mapping	Multimedia, video conferencing, virtual learning, microworlds.

Note. Internet tools are mapped to Senge's five learning disciplines based on literature review.

Table 6

Factor Loadings of Internet Tools for Combined Survey

Factor	Items	Loading
1. Systems thinking	1. Virtual learning	.79
	2. Video conferencing	.77
	3. Microworlds	.60
	4. Distance learning	.40
2. Shared Vision	1. Search engine	.87
	2. Web browser	.84
	3. WWW	.73
	4. File transfer	.48
	5. E-mail	.45
	6. Home page/web site	.37
3. Mental models inquiry	1. Audio streaming	-.89
	2. 3-D environment	-.57
4. Personal mastery workflow	1. Digital signature/id	-.92
	2. Push technology	-.55
	3. E-business	-.53
	4. Business application	-.40
5. Mental models reflection	1. Entertainment	.75
	2. Chat rooms	.56

Table 6 (Cont.)

Factor Loadings of Internet Tools for Combined Survey

Factor	Items	Loading
6. Personal mastery access	1. Web TV	.64
	2. Internet phone	.60
	3. Internet fax	.44
	4. Online services	.24*
7. Team learning	1. Data mining	.72
	2. Intranet	.67
	3. GroupWare	.58
	4. Multimedia	.43
8. Personal mastery knowledge	1. Newsgroups	-.39
	2. Others	-.38

Note. Factor loadings demonstrate high loadings for items associated with each factor. One item was deleted due to low factor loading.* Total sample from combined survey (i.e., mail and Internet) = 103.

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