REPORT OF A POST-SECONDARY STUDIES INTERNSHIP AT XWAVE SOLUTIONS, INCLUDING A RESEARCH REPORT ON THE COMPUTER-BASED TRAINING (CBT) NEEDS OF XWAVE SOLUTIONS EMPLOYEES

CLARISSA DICKS

Report of a Post-Secondary Studies Internship at xwave solutions, Including a Research Report on the Computer-Based Training (CBT) Needs of xwave solutions Employees

by

Clarissa Dicks

A report submitted to the
School of Graduate Studies
in partial fulfillment of the
requirements for the degree of
Masters of Education

Faculty of Education
Memorial University of Newfoundland

1999

St. John's Newfoundland

ABSTRACT

This report presents the results of a training needs analysis conducted for **xwave solutions** by a student intern completing graduate work in the M. ED. Post-Secondary Studies Program at Memorial University. The 12-week internship began January 18, 1999 and was designed to assess the Computer-Based Training (CBT) needs of all **xwave solutions** employees consisting primarily of Information Technology (IT) professionals. Results from this assessment showed that "soft" skills were in significantly higher demand than "hard" or technical skills. In addition, "soft" skills were significantly more important to complete in 1999. This report presents the research methodology and results, and recommendations for delivery of a new CBT program at **xwave solutions**. The research study was one component of the internship experience, and this report begins with a summary of the placement setting, internship goals and objectives, a description of activities, and the intern's personal reflections.

ACKNOWLEDGEMENTS

I would like to extend my sincere thanks to all those who helped me during my internship and completion of this research report.

I am grateful to Dr. Dennis Sharpe, my Faculty Advisor, for his guidance and support. This report would not have been possible without his direction, advice and encouragement.

I would also like to express my sincere appreciation to Ms. Sharon Duggan, Mr. Pat Angel, Ms. Donna Davis and Ms. Karen Morry for providing me with a rewarding and challenging internship. Their contributions were invaluable to the success of this project.

A special thanks is extended to Mr. Gerry White for his assistance in analyzing the data for this report.

I would like to thank Roger and Sarah for their unconditional love, support and encouragement, and my other family and friends, who were always there for me.

Finally, I would like to dedicate this report to my mother, Kathleen Dicks, a former teacher, who has always been my touchstone and inspiration.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF TABLES (CONTINUED)

LIST OF TABLES (CONTINUED)

CHAPTER 1

INTRODUCTION

Students in the Master of Education degree program at Memorial University may choose from one of four options for degree completion: internship, paper folio, project or thesis. The internship is a full-time placement for a minimum of 10 weeks in an approved professional setting, which is undertaken after or near completion of 24 credit hours of course work. The purpose of the internship is to enable a graduate student to gain professional experience in the adult educational field. This includes providing opportunities for the development of personal and professional competencies, practical experience, and the development of creative and reflective perspectives given the stated goals of the intern. In addition, the graduate student is required to undertake a research project appropriate to the chosen internship setting.

An internship must be undertaken in a setting separate and distinct from an intern's place of employment. The intern is presently employed in the telecommunications industry as Manager Market Communications with NewTel Communications. NewTel Communications is a member of Aliant, a group of advanced technology companies engaged in four main lines of business: telecommunications, information technology (IT), mobile satellite communications, and emerging business. **xwave solutions**, one of Aliant's leading IT businesses, was selected as a dynamic site for an internship in adult education. While the demand for IT products and services is growing, the IT industry is challenged by a lack of IT professionals and the need to keep up with rapidly changing technology. These factors are driving both an industry-wide

and **xwave solutions** corporate focus on training and human resources. Therefore, an internship at **xwave solutions** was considered to be beneficial for the following reasons:

1. It would provide practical experience in the field of human resources management and training, as well as the opportunity to apply theoretical concepts in adult education from the formal part of the program.
2. It would offer opportunities to work with professional Information Technology staff in the development of training programs, including such areas as needs assessment, curriculum development, course delivery and other professional activities.
3. It would provide the opportunity to conduct a training needs assessment in the area of computer-based training (CBT) courses, and to use the results as the basis for a tender call to CBT suppliers.
4. It would provide the environment to build upon existing professional skills and to develop new abilities, which would contribute to future career opportunities in the human resources and training areas at NewTel Communications.

The Internship Setting

Today, **xwave solutions** is one of the top five Canadian owned IT companies, with 1200 people located in St. John's, Halifax, Ottawa, Calgary, Edmonton and Dallas. At the time of the internship, **xwave solutions** comprised approximately 860 people located in St. John's, Halifax, Calgary, Edmonton and Dallas (the Ottawa location was acquired later). Focusing on clients in the telecommunications, oil and gas, and public sectors, **xwave solutions** offers customized IT business solutions based on a blend of strong

technological capability and knowledge of the clients' industries. Services and supported technologies provided by **xwave solutions** include Enterprise Management, Systems Integration, Value Added Resale and IT Consulting.

xwave solutions places great importance on professional development and human resources management. All employees undergo extensive training and are provided with the tools and support necessary to reach their professional goals. That commitment to professional development is clearly reflected in **xwave solution**'s corporate positioning statement: "We're an IT company unlike any other IT company that plans, designs, builds, and runs corporate IT solutions. We champion a sense of excitement, zest, passion, and urgency that is unrivaled in the business. Each employee is the company."

During the internship, the intern was affiliated with the Career Development Team. This team of 15 human resource professionals is responsible for training, orientation, recruitment, compensation, human resource management (including career development and policy formation), mentoring, service recognition, and occupational health and safety. The intern was assigned to the training group with responsibility for assessing computer-based training needs in order to provide specific recommendations for introduction of a new CBT program. In addition, the intern was included in group planning and other sessions involving the entire Team.

Through the joint support of Sharon Duggan, Director-Human Resources for NewTel, and Pat Angel, Director Career Development at **xwave solutions**, the internship was arranged for 12 consecutive weeks, January 18, 1999 to April 9, 1999. The CBT needs analysis project was designed to be completed at the end of this period,

so that the resulting information could form the basis for a Request for Proposals (RFP) to go to CBT vendors in April 1999.

Internship Goals

The overall goal for the internship is to gain practical experience in human resource management and training to further the development of personal and professional competencies. To achieve this, the following specific goals were pursued:

1. To become familiar with the human resource management and training programs provided by **xwave solutions**.
2. To become familiar with the roles of human resource management personnel in the delivery of training programs.
3. To gain experience in offering IT training programs to employees, through working with human resource personnel and taking part in any professional development meetings, workshops, and seminars that may occur during the internship period.
4. To conduct a research component in the area of training needs assessment. The proposed research project would focus on the development and administration of a CBT needs assessment survey to all **xwave solutions** employees. The survey would be designed to identify the types of CBT content employees require to meet their professional development needs, as well as technology and decision factors important to the delivery of computer-based training. The resulting data would be analyzed to identify overall CBT course priorities. In conjunction with development of the survey, supervisory management personnel identified by the Career Development Team would be interviewed to identify corporate directions for CBT content, as well

as technology and other considerations in the delivery of a new CBT program. This information would then be integrated into specifications for a tender document requesting proposals from established CBT suppliers.

Supervision and Evaluation of the Intern

Supervision of the intern was shared by the Faculty of Education at Memorial University and the Human Resources Department at **xwave solutions.** The Faculty of Education Supervisor was Dr. Dennis Sharpe. The Field Supervisors were Ms. Karen Morry, Systems Analyst, and Mr. Pat Angel, Director-Career Development at **xwave solutions**.

Dr. Sharpe was responsible for assisting the intern in preparation of the internship proposal, including the research component, and collaborated with the Field Supervisors at **xwave solutions** during the internship period. The Field Supervisors had primary responsibility for supervision of the intern's professional development activities and assessment of the intern's progress during the internship.

The intern had regular meetings with Ms. Karen Morry to develop the CBT training needs assessment, and to discuss any issues or concerns about the internship. During the fourth week of the internship, Dr. Sharpe met with Mr. Angel and Ms. Karen Morry to discuss the internship and to assess the intern's progress. The intern also met with Dr. Sharpe on several occasions during the internship to discuss various aspects of the research project.

CHAPTER II

DESCRIPTION OF ACTIVITIES

This chapter describes the activities carried out by the intern during the internship period January 18, 1999 to April 9, 1999. The primary purpose of the internship was to conduct a CBT training needs assessment for **xwave solutions;** however, other internship goals were met through a variety of activities associated with the research project. A training needs assessment plan was developed to guide the project, and activities designed to accomplish the plan were set out in a 12-week timeline for the project. In undertaking these activities, the intern learned about CBT providers, course offerings, CBT training philosophies and methods of deployment. Knowledge about the **xwave solutions** organization, its human resources and training structure, and its teams of IT experts came from interaction with personnel in various geographic regions of the company. In particular, the intern learned how to manage development of a Web-based survey from start to finish, working with a highly skilled team of Internet professionals at **xwave solutions**. As a member of the Career Development team at **xwave solutions,** the intern also participated in a Career Development Planning session during the internship period.

The activities presented here begin with an overall review of the weekly tasks that were completed to accomplish the training needs assessment plan, followed by learnings on key aspects of CBT and the role of Career Development in IT training.

Activities for Training Needs Assessment

The 12-week internship began with an orientation in which the intern reviewed CBT courses available on a trial basis to **xwave solutions** in order to gain some knowledge and experience with computer-based training formats. During week one the intern also gathered information on training usage and needs from existing sources in Career Development and drafted a CBT training needs assessment plan and timeline for feedback and approval from Career Development. The needs analysis proposal was based on the model recommended by Rothwell and Kazanas (1998) and will be discussed in detail in the Methodology section of this report.

During week two the training needs assessment plan was approved, including development and distribution of a survey to go to all **xwave solutions** employees and one-on-one interviews with key corporate decision makers. The intern generated a list of information to be gathered from the survey, paying particular attention to avoid any questions that might be perceived as "threatening" to employees. At the same time, options for getting the survey out to all employees, including delivery via e-mail or through the **xwave solutions** Intranet site, were investigated with appropriate internal personnel. Electronic options were considered preferable from the start, given that the timeline for the project would not permit completion of a pen and paper questionnaire given distribution, collection and data coding issues, which would all have to be handled manually. At this stage as well, the intern considered communication requirements that would ensure a high level of employee response to the survey. In addition, contacts were established with individuals in Nova Scotia and Western regions who would act as coordinators on the project.

During the third week, the intern developed a draft list of over 200 CBT courses for use in the survey. This list was based on CBT courses available from vendors and appropriate to potential skill requirements at **xwave solutions**. Feedback on the course content was first sought from individuals responsible for training and evaluation of employees, including the individual responsible for developing job competencies within **xwave solutions**. At the same time, a list of questions was drafted for the survey and later reviewed with managers directly responsible for training. It was decided that a Web-based survey would be the best vehicle to reach all employees and an Internet Team resource was subsequently made available to work on the project.

In week four, the intern was provided with the first run-through of the survey in its new Web format, and meetings were held with the Internet team on Web survey design, development and data collection requirements. This was a very busy period in which several activities were occurring simultaneously. The course content was sent to members of a Client Team Committee in Newfoundland and to contacts in the other regions to get feedback on the appropriateness of the courses listed, and what additional courses, if any, should be included in the survey. Discussions then began with the Internet team to resolve such issues as: 1) What server should the survey reside upon to be accessible to all employees? 2) How should the data be collected? and 3) What functionality should the survey have with respect to its various questions? This survey would be the first Web survey to be sent by **xwave solutions** to all employees; therefore, it was important that it be recognized by a sophisticated IT audience as a high quality product with easy navigability. In addition, the intern was working with the coordinators in Nova Scotia and Western and members of the Career Development

Team in Newfoundland to identify key corporate managers who should be asked to participate in the interviews. Work also began on the script for the interview questionnaire.

During weeks five and six, Web development of the survey continued, with many back and forth discussions leading to resolution of the issues. The goal was to have the survey completed and accessible for pilot testing the first week of March. A plan for pilot testing was developed, including questions to be asked of participants who were selected by coordinators in the various regions to participate in the pilot testing process. During this time as well, the interview questionnaire was completed and a message went to 21 key corporate decision makers across **xwave solutions** requesting interviews in their offices or by phone. Interviews with the managers began on February 23 and continued through March, resulting in the completion of a total of 15 questionnaires.

On March 05, the survey went out for pilot testing to some 58 employees across **xwave solutions**. All employees were asked to complete the survey and send back their responses to three questions concerning the effectiveness of the survey by Monday, March 08. Details of the pilot testing are presented in the Methodology section of this report. During the next two weeks, employee feedback on the survey was analyzed in conjunction with the Internet Team and managers in Career Development, and necessary changes were incorporated into the survey design and data collection process. In addition, the intern drafted a bulletin to be sent to all employees from the People Vice-President. It was agreed that the message should come from the executive office in order to increase the likelihood that busy **xwave solutions** employees would open their e-mail and find the url linking them directly to the survey.

On Wednesday, March 17, the survey went out to all employees in an e-mail bulletin from the People Vice-President. Employees were asked to complete the survey by Monday, March 22. The deadline was subsequently extended to Friday, March 25. Two reminder messages went out again to all employees on Monday, March 22 and Friday, March 25. The survey was also accessible to employees through the **xwave solutions** Intranet site. The intern spent the final two weeks of the internship involved in the process of data analysis and report writing.

Key Aspects of Computer-Based Training

CBT Providers and Course Offerings

Through the needs assessment process, the intern developed a knowledge of CBT providers and their course offerings, either through reading vendor promotional materials or through telephone or face-to-face discussions with sales representatives. Among others, these vendors included CBT Systems, FirstClass Systems, NetG, DPEC, and DigitalThink. In some cases, the intern was able to access CBT courses from CBT providers for assessment purposes. Without getting into comparisons of CBT providers, which was not the purpose of the internship, the following sections will discuss in general terms broad observations about the vendors' training philosophies and their approach to instructional design, as well as methods of CBT deployment. Overall, the intern was impressed with the long way that computer-based training has come in recent years, and with its evolution towards a future in which CBT learning will be totally interactive, building on two-way communication components that are there today.

CBT Training Philosophies/Instructional Design

The intern observed that the leading CBT vendors base their computer-based training philosophy on the cognitive approach. The constructivist or cognitive approach to learning promotes the idea of active learning and has become the theoretical base for new directions in education. Merriam and Caffarella (1991) state that "cognitivists are interested in how the mind makes sense out of stimuli in the environment – how information is processed, stored and retrieved" (p. 137). Simonson and Thompson (1997) contend that "constructivist and situated cognition principles are causing educators to rethink computer-based learning" (p.43). The reasons they cite for this are twofold: "First, learner control and authentic information are critical to effectiveness" and "Second, use of multimedia that includes still visuals, graphics, motion, segments, visual mnemonics, and sound is important" (p. 43). CBT courseware includes features that address a key weakness of this form of training: the perception that it is a passive form of learning. The CBT courseware assessed by the intern was instructionally designed to be as highly interactive as possible, with the use of concept demonstrations, independent practice, and immediate feedback on results, all aimed at active learner involvement.

Several examples will be used to attempt to demonstrate the real-world aspects of computer-based training. At one stage in the project, the intern found herself without the ability to develop tables in Microsoft Office, a skill that was necessary in developing the needs assessment survey. Rather than ask a co-worker for assistance, the intern went to the CBT course on creating tables in Microsoft Office. Within 15 minutes, the intern had mastered the skill required due in large part to the simulation exercises embedded in the practice exercises. In this instance, the lesson on how to create a chart was presented, and

then the intern was able to practice the skill in an authentic Microsoft Office environment that was simulated automatically on the screen. Towards the end of the project, the intern was confronted with another training need when the data collected for the survey was provided to the intern in a Microsoft Access program. Having no prior knowledge of this program, the intern began to learn the basics, in particular how to interpret the data presented from the survey. The Microsoft Access course provided hands-on experience on a job-related task, and the knowledge acquired was a key factor in the intern being able to assist the statistician at Memorial University in interpreting the survey data for further analysis.

From the intern's experience with CBT courseware, it was concluded that, in general, CBT courseware is effective because it is designed in accordance with educational guidelines based on appropriate research. Simonson and Thompson (1997) report that research on microcomputer use has produced several generalizable conclusions about how computer-based instruction (CBI) should be designed. They are presented here as principles that leading CBT vendors were observed to follow:

KCR: Knowledge of Correct Results. Students should have correct responses reinforced in some positive manner.

Feedback. Students should be given information about their progress through a lesson, both during the lesson and at the end of the lesson.

Branching. Branching, the route a student takes through a lesson, is directly related to KCR and feedback.

Assessment. Students should be assessed during and at the conclusion of lessons.

Advance Organizers. Lessons that indicate to students where they are going and what is expected of them generally produce higher achievement levels than lessons without this kind of simple advance organizer.

Prompts. Effective teachers prompt or give clues to students to help them reach correct conclusions. Good CBI should do the same.

Pacing. Students proceed through learning activities by themselves, at their own pace.

Screen Design. Resolution of the screen should be the first style consideration when CBI is designed. Also, the use of visual metaphors has been found to be useful.

Screen Information. Words, graphics, and space are the three kinds of 'information' on a computer screen. Usually, it is best if one idea or topic is presented on one screen at a time. Simple is usually better than complex. On the other hand, if topics are closely related, it may be necessary to retain portions of one screen when a new topic is presented. When graphics or drawings are shown to students, they tend to look at them in a clockwise sequence.

Screen Components. The way the computer screen is organized should give the student a feeling of control.

Readability. Because the resolution of a computer screen is generally lower than for a page of a book, extreme care must be taken to ensure that what is written can be read. (p. 49-52)

Deployment Methods

How CBT will be delivered to users within an organization is an important consideration in choosing a vendor. A growing number of CBT vendors are offering on-line courseware through the Internet or an organization's Intranet or LAN, as well as the more traditional methods of hard disc or CD-ROM technologies. Some of the questions that Woodall (1998) suggests the organization should ask a vendor with respect to deployment are: Do you offer training on multiple platforms? Will I need to purchase non-standard equipment or add special components to run your courseware? How easy is it to setup and use your courses? If companies have employees in remote locations, they will need to make sure they have CD-ROM, LAN and Intranet options at a minimum.

Role of Career Development in IT Training

The mandate of the Career Development Team at **xwave solutions** is to build a new employment experience that engages and empowers all employees in the organization. This mandate flows from **xwave solutions** mission to be focused on people and passionate about results.

The Career Development Team is dedicated to providing new and existing employees with the training required to meet each employee's professional development needs. New hires are enrolled in a 13-week Training and Orientation Program (TOP) conducted at the College of the North Atlantic (CONA). The curriculum is developed by **xwave solutions** but conducted by CONA contract employees. Existing employees are involved in a Professional Development Plan (PDP) process designed to help

employees meet their professional development needs by providing a structured approach to competency/skill development. Training needs are met either through internally designed training programs offered through traditional classroom or CBT delivery mechanisms or through training provided by outside consultants, agencies or organizations. In addition, all employees can take advantage of the 100% Motivation Program designed to keep **xwave solutions** new values, focus, passion, people, results, uppermost in everyone's minds. The program consists of Lunch and Learn sessions, along with the display of motivational materials, including posters, within the **xwave solutions** organization.

Career Development Planning Session

This was a one-day planning session held at Pippy Park on March 03, 1999. All managers working in the Career Development Team were invited to present their plans for the year. During this session, the CBT needs assessment project was presented and discussed in terms of its objectives and expected outcomes. Overall, this session provided the intern with an overview of the services provided by the Career Development Team to **xwave solutions** employees, and an insight into the functions and roles of Human Resources Management in an IT organization.

Summary

The intern felt that the first three goals of the internship were accomplished through the activities outlined in this chapter. As anticipated, the intern became familiar with the human resource management and training programs provided by **xwave solutions**,

and with the roles of human resource management personnel in the delivery of training programs. In addition, the intern acquired a great deal of experience in how to offer IT training programs to employees through computer-based training methods, an experience which also resulted in considerable learning about the types of skills and competencies required by employees within an IT organization.

CHAPTER III

RESEARCH COMPONENT

Statement of Purpose

A research project is a required component of an internship in the Master of Education degree program at Memorial. The project should provide both the internship site and the intern with useful information and insights. The intern decided, in collaboration with **xwave solutions**, to conduct an assessment of the computer-based training (CBT) needs of employees. The assessment involved two major components: 1) a survey of 854 full-time **xwave solutions** employees from the Corporate, Newfoundland, Nova Scotia and Alberta Business Units; and 2) interviews with key corporate decision makers in the **xwave solutions** organization.

The primary purpose of the employee survey was to identify the types of content and curriculum required to meet employees' job training and professional development needs, as well as appropriate delivery mechanisms. The survey was supplemented by interviews with key corporate decision makers to determine the skills and knowledge required to meet the strategic goals of the organization, as well as trends and directions in training requirements. The results of both the survey and the interviews were compared and analyzed to identify overall CBT course priorities. This information was then used to develop tender specifications for a call for proposals to provide CBT courses to all **xwave solutions** employees.

Rationale for the Study

According to the Canadian Advanced Technology Association (CATA), "the majority of Canadian advanced technology companies face a skills shortage, and half have job openings going unfilled" (1997). In 1996, IT market growth in Canada was 12.7 percent, which was significantly higher than other major industry sectors, including mining at 7.7 percent, manufacturing at 3.3 percent, and telecommunications at 2.5 percent. The IT market is forecasted to continue to grow faster than other industries, but this growth will be constrained by the supply of qualified people.

Industry Canada, in a speech entitled Ensuring Canadian Competitiveness in the New Global Economy (1997), cited a quality workforce as the key to creating a competitive edge in knowledge-based enterprises. The report stated that with the need for knowledge workers companies will require the ability to attract and retain skilled workers, and will have to place more emphasis on continuing education and training to upgrade the existing skills of the workforce.

In Newfoundland and Labrador, **xwave solutions** plays a leading role in nurturing and developing the local IT industry, including the facilitation of skills transfer. The acquisition and retention of qualified people is recognized as the key to breaking into new markets and building a strong local IT community. Specifically, **xwave solutions** is focusing on the requirement for knowledge and skill workers by investing in excess of a million dollars annually for continuous technical upgrading of employees. A significant portion of this investment is spent on CBT courses, including software, facilities and equipment. In addition to the benefits of skill upgrading, **xwave solutions**

has found that the availability of CBT courses is a positive factor in retention of employees, who view the training as a benefit of employment with the company.

The contracts **xwave solutions** had in place with CBT suppliers were due to expire in early 1999. **xwave solutions** had recently expanded its operations with the acquisition of two IT companies - one based in Western Canada and the other in Nova Scotia - and wanted to achieve economies of scale by amalgamating CBT requirements across regions. Therefore, it was important to undertake a study across all regions to decide CBT priorities for 1999 and for long-range strategic planning, and to provide specific recommendations for the delivery of a new company-wide CBT program. In addition, this study sought to identify factors that would affect an individual's decision to carry out computer-based training, as well as employee experience with CBT or multi-media training. The results of this study, it was anticipated, would also have significance for training in the IT industry and for the field of CBT training in general.

Literature Review

Introduction

Determining training needs is often a hit-and-miss proposition for many organizations. The result can be training programs that do not relate to the real needs of the organization or to its corporate strategic goals. Without some systematic procedure for determining the performance needs of workers, training results are destined to be inconsistent at best and, at worst, a waste of the organization's time, effort and money. The American Society for Training and Development (1985) states that, for many

organizations, "a sound needs analysis contributes to a return on training investment and reduces the risk of funding inappropriate programs" (p. 1).

The area of what is variously called needs analysis, needs assessment, and training needs analysis has been an important first step in the training process for many years. Bowman (1987) states: "Everyone who's anyone in the corporate education business is quick to avow that a needs assessment is the essential first step in planning a training program" (p. 5). However, in this case, the intern had to ask a number of questions before planning a needs assessment, including: What is a needs assessment? What are the types of needs assessment and data sources? What models are available to guide the needs assessment process? What research is already available on IT training needs? What factors are important to consider in the delivery of computer-based training? This literature review will address these questions and other related issues.

Needs Assessment Defined

Kaufman and English (1976) define a need as "the documented gap or difference between the results we are currently achieving and the results we wish to achieve" (p. 20). A needs assessment, according to the same authors, is "a formal collection of the gaps, the placing of the gaps in priority order, and selecting the gaps of highest priority for action and resolution" (p. 20). Kemp, Morrison, and Ross (1994) cite Kaufman and English (1979) in describing needs assessment "as a tool for identifying the problem and then selecting an appropriate intervention" (p. 27). Rothwell and Kazanas (1998) cite Kaufman's 1986 definition of needs assessment which is "to identify, document and justify gaps between what is and should be and place the gaps in

priority order for closure" (p. 55). Shambaugh and Magliaro (1997) refer to Kaufman (1988) in stating "needs assessment has traditionally been viewed as a means to identify the gaps between current results and needed results" (p. 65).

Other authors have expanded on Kaufman's traditional definition of needs assessment, viewing it as a process with a set of activities. Mills, Pace and Peterson (1988) state that analysis in human resource training and organization development:

> Involves all of the activities associated with recognizing the existence of a problem (differences between what is happening and what we would like to have happen) and its causes and consequences, and classifying the problem in terms of what kinds of interventions might reasonably be used to narrow the gap. (p. 5)

McClelland (1995) states that needs assessment, first used in the early part of the twentieth century, has evolved from a method used to pinpoint knowledge and skills deficiencies of newly hired workers to a variety of methods used for effective workforce planning.

> A needs assessment can be defined as a composition of analytical methods comprised of various diagnostic instruments and procedures whose purpose is to investigate performance deficiencies (the obvious as well as the not so obvious) and to pinpoint areas where an intervention strategy may be developed and applied to correct the deficiency or fill the knowledge gap. (p. 10)

"Needs analysis" is often used interchangeably for "needs assessment;" however, Pieters (1997) and Rothwell and Kazanas (1998) distinguish between the terms, arguing that they are two distinct steps in defining the problem to be solved. Pieters (1997)

states, "whereas needs assessment refers to identifying and prioritizing needs, needs analysis is breaking down needs and suggesting causes and solutions" (p. 318). Pieters (1997) cautions though that needs assessment and needs analysis cannot be completely separated, because "needs assessment does not end when needs analysis start" (p. 321), arguing that the phases are intermingled. He suggests the use of the term situational analysis, which he describes as "a combination of needs assessment and needs analysis" (p. 321).

Rothwell and Kazanas (1998) state that needs analysis pinpoints the causes of gaps in results and that "it is thus carried out following a needs assessment" (p. 56). Consequently, Rothwell and Kazanas argue that a training needs assessment is more accurately labeled a training requirements analysis because, as Watkins and Kaufman (1996) point out, "if you know that training is the solution, why do a needs assessment?" (as cited in Rothwell & Kazanas, 1998, p. 56). Rothwell and Kazanas (1998) conclude that "a training requirements analysis (TRA) thus specifies exactly what training is necessary" (p. 56).

Laird (1988) states that "a training need exists when an employee lacks the knowledge or skill to perform an assigned task satisfactorily" (p. 46). These needs may be "micro" or "macro," or what Rothwell and Kazanas (1998) call "situation specific" or "comprehensive." "A micro training need exists for just one person, or for a very small population. Macro needs exist in a large group of employees – frequently in the entire population with the same job classification" (Laird, 1988, p. 49).

Rothwell and Kazanas (1998) point to the necessity to distinguish between a need, which "is something essential to competent performance" (p. 55) and a want, which

"implies something merely desirable" (p. 55). In the same vein, McClelland (1995) recommends that needs be analyzed differently from wants. He states, "needs are defined as a gap between current and desired skill or knowledge levels, while wants are defined as those things that would be nice to have but that may not necessarily contribute to furthering individual and organizational performance" (p. 19). That does not mean that "wants" should be entirely dismissed, since wants and needs often represent the same things to different groups. "If viewed objectively, both individual as well as organizational needs and wants can be met simultaneously" (McClelland, 1995, p. 14).

In summary, a needs assessment will explore, analyze and define both the present condition and the desired condition, and look at ways of bridging the gap between the two, using appropriate diagnostic methods and procedures. A training needs analysis or training requirements analysis (TRA) will identify what training is necessary.

Types of Needs Assessment and Data Sources

A needs assessment is designed to determine the needs of the organization, and may be undertaken for many reasons (Donaldson & Scannell, 1986; Kemp, Morrison, & Ross, 1994; McClelland, 1995). Among the most commonly cited reasons to implement a needs assessment within an organization are: 1) to identify the existing level of employee performance; 2) to identify gaps or deficiencies in employee knowledge, skills and abilities; 3) to gain insight into employee morale and attitudes toward their jobs and the organization; 4) to target individuals who most need additional

training or development; and 5) to involve the entire work force in their comments about given content areas to help the organization design the training effort.

Rothwell and Kazanas (1998) state that the first question to be asked, before even embarking on the needs assessment, is why the needs assessment is being done. If the reason is to develop a long-term instructional plan, then a comprehensive needs assessment may be required, a long and difficult process requiring various assessments of job categories in the organization. If the reason is to close a performance gap through instruction, then a situation-specific needs assessment plan may be required which clarifies what is known about the performance gap.

According to Mills, Pace and Peterson (1988), three types of gaps tend to occur in an organization and they require various solutions. Performance gaps are deficiencies in the way employees carry out their assignments or duties, and are usually reduced through methods of training and development. Management gaps are deficiencies in the way in which people are managed and motivated in the organization, and require resolution through changes in management practices. Organization gaps are deficiencies in the way an organization is conceived and designed and are usually alleviated through procedures of organization.

McClelland (1995) states that these three traditional components of needs analysis – organizational analysis, operational analysis and person analysis - have led to more generalized assessment types that are in widespread use today. While there are many different forms, he presents twelve most widely recognized types, three of which are most widely used to identify training needs. The Competency/Skills assessment is used to identify skill or competency deficiencies by comparing current performance levels to

predetermined standards. The Organizational Climate assessment seeks to obtain feedback on the dynamics of the job and the physical work environment, including employees' trust in management's ability. Job and Task Analyses attempt to define what employees need to do to perform at consistent levels. McClelland (1995) states that implementation of these needs assessment systems "includes various types of data-gathering methods that ... can be focused on individual or group participation or they can be directed at total organizational systems, including operating environments and cultures" (p. 14). For example, surveys, interviews and observation are the most common diagnostic methods employed for Competency/Skills and Organizational Climate types of needs assessment while task inventories, interviews and on-site observations are the methods most widely used for Job and Task Analyses.

Kemp, Morrison and Ross (1994) identify six categories of needs: normative, comparative, felt, expressed, anticipated, and critical incident. The authors state that "these six categories provide a framework for designers to determine the type of information to gather and a means to classify needs" (p. 27). A normative need is identified by comparing the target audience against a national standard, and requires normative data such as test norms and records. Comparative needs are also defined by comparing the status of the target audience to an external measure or status but the target group may be compared to another company as opposed to the norm. A felt need is an individual desire or want to improve current performance or skills level, best identified through interviews and questionnaires. An expressed need is a felt need turned into action, such as enrolment in a specific workshop. Anticipated needs are a means of identifying changes that will occur in the future and are often identified

through interviews and questionnaires. Critical incident needs are failures that are rare but have significant consequences and are identified by analyzing potential problems.

When the needs are specific to training, they can be classified in terms of "who" is providing information within an organization. St. Francis Xavier University, in its manual for trainers, states that there are three levels of needs assessment: learning level, performance level and impact level (1987, 1:7). The learning level refers to the members of the target group for training who will provide data concerning the skills and knowledge felt to be required. These are "felt" needs. The performance level contains sources (usually supervisors of trainees) that can provide information directly about needs, which may be ascribed to prospective trainees. These are "ascribed" needs. At the impact level are sources (usually senior officials of an organization) who can provide information indirectly about needs that may ascribed to trainees based on such aspects as trends, statistics and new directions. The question then becomes how much of a needs assessment to do based on the number of sources or information that may be included.

Once the reason for the needs assessment is clear, and the assessment types and sources of data are considered, the instructional designer can move on to developing a needs assessment plan for an organization.

Models for Needs Assessment

There are many models in the literature for assessing training needs (Rothwell & Kazanzas, 1998; Shambaugh & Magliaro, 1997; McClelland, 1995; Kemp, Morrison, & Ross, 1994). However, the literature recognizes at least three basic steps in a needs

assessment or training needs analysis: identify the sources of information; identify the information required; and chose the methods for gathering information (Rothwell & Kazanas, 1998; Smith, 1989; American Society for Training and Development, 1985; Shambaugh & Magliaro, 1997).

McClelland (1995) recommends a Systems Model for Designing and Conducting Organizational Needs Assessments that has three major stages: the design stage, the implementation and facilitation stage, and the analysis and report stage. Each stage is broken down into a number of tasks. The design stage includes setting goals, preliminary planning, selection of assessment types (such as competency/skills, organization climate), and data collection instruments. The implementation and facilitation stage includes final stages of preparation, schedule and implementation, and gathering feedback. The analysis and report stage consists of feedback analysis, the drawing of conclusions, and presentation of findings and recommendations for corrective actions.

According to McClelland, the model's systems approach "allows the designer or HRD analyst maximum flexibility while emphasizing a logical sequence and format" (p.31). The model recognizes that each assessment project is unique, and that tasks may occur in a different order depending on their significance to the project.

The model proposed by Kemp, Morrison and Ross (1994) is similar to McClelland's in many respects. They identify four phases in the needs assessment process: planning, collecting data, analyzing data, and preparing the final report. Each phase consists of a number of individual steps. In the planning phase, the target audience is defined, participants selected, and a strategy developed for collecting

information on the appropriate types of needs (such as normative, anticipated), including how the data will be analyzed. The data collection phase involves consideration of sample size and distribution, as well as scheduling of data collection methods, such as questionnaires or interviews. Once the data is collected, phase three involves analysis of the data and prioritizing of needs. The final phase is compiling a final report, which includes purpose, process, results and recommended actions.

Needs assessment models have also been developed specifically for the field of instructional design, and are similar to a training needs analysis in that it is assumed that training is the solution to the problem. Dick (1993, cited in Shambaugh & Magliaro, 1997) defines instructional design "as a process for determining what to teach and how to teach it" (p. 25). Within this context, Shambaugh and Magliaro (1997) provide a three-step approach to needs assessment for instructional designers based on "negotiating what we would like to see occur, the ideal, with what is possible, or the reality (p. 65)." The three steps for conducting a needs assessment are to describe your Intent (the ideal), gather information (reality), and summarize and revise your intent (goals).

The first step involves development of a mission statement, including personal beliefs and experiences, as well as statements on a possible solution. Step two is focused on finding out more about an instructional problem or opportunity by collecting data through such methods as on-site interviews and surveys. This phase answers questions related to what is known about the learning task, whom the learners are, and what the resources and constraints are. Step three involves a summary of the problem and a description of the solution, culminating in identification and prioritization of

goals. Shambaugh and Magliaro state that "needs assessment is a time to think through the 'content' of what you'll be teaching or what participants will be learning" (p. 62).

In similar fashion, Rothwell and Kazanas (1998) define a needs assessment plan as "a blueprint for collecting information about instructional needs" (p. 57). Furthermore, "by its very nature, a needs assessment plan assumes that sufficient justification already exists to solve a human performance problem" (p.57). Specifically, it should address seven issues: What are the objectives or the results required? Whose needs will be assessed? What sampling procedures will be used to select a representative group of people from the target audience? What data collection methods will be used? What instruments should be used and what approvals or protocols are required? How will the data be analyzed? How will needs be determined from the results of data collection and analysis? (Forhay, Silber, & WestGaard, 1986, cited in Rothwell & Kazanas, 1998, p. 57) Rothwell and Kazanas note that these issues will be given different weight depending on the project's constraints and stakeholder expectations.

While there are many models, varieties and concepts of needs assessment, it is helpful for the needs analyst to keep in mind Kaufman's (1977) advice that "none are either correct or incorrect, the only question concerns which one is most appropriate for any given application" (p. 112). It is also instructive to note that Kaufman (1977) reduced his earlier six varieties of needs assessment (Alpha, Beta, Gamma, Delta, Epsilon and Zeta) into two "overarching" types: internal and external. Kaufman strongly recommended that an external needs assessment be the first step in the process:

> The external needs assessment is suggested as a rational and logical starting place for organizational effort (including learning design) in that it studies and

> identifies the skills, knowledges and attitudes which are important outside of the school (or organization) and uses that information as the basis for educational design and effort. The internal needs assessment goes from that point forward to identify internally useful and worthy goals, objectives, methods and means to meet those required and desired outcomes. (p. 116)

Within the internal environment for needs assessment, it is important to note that the workplace is changing and that has other implications for trainers. Pieters (1997) states that new developments have created open learning systems in which learners decide what, when, how, with what, where and at what pace to learn. This has resulted in the recognition that learners "want to assess their own needs and have information about the way these needs can be fulfilled" (p. 335). In this environment, knowledge needs are being defined by employees. "On the knowledge acquisition level, individual employees, as trainee or learner, are becoming a more independent person responsible for their own knowledge acquisition and therefore allegedly capable of assessing their own needs" (p. 320).

A 1996 report of a regional training needs assessment conducted by Lane Community College of Oregon supports this view. It found that both employer and employee perspectives are essential to accurately assess employee needs for training. Goodkind (1996), the author of the study, contends that "few studies capture the training and education needs of employees by asking employees themselves what they need" (p. 3). The author recommends a model for accurately assessing regional training needs by gathering data on both employer and employee perceptions. "If researchers continue to base training needs assessments solely on the perceptions of employers rather than on

both employees and employers, education and training programs will remain inherently biased, possibly ineffective and of marginal relevance" (p.3).

Bowman (1987) also points to some other guidelines for needs assessments. Make sure to communicate the purpose of the needs assessment to everyone involved at the front end of the process, and then provide feedback to everyone again in the form of a final report once the needs assessment is completed. Bowman states that "properly conducted, a needs assessment not only identifies training needs, but also builds participant commitment, generates management support, increases the HRD department's credibility and provides data for that other sacred process: evaluation" (p. 5).

In summary, there are many models to guide the instructional designer in conducting a needs assessment, but in the end, the challenge is to develop an instructional plan that can identify the unique needs of the organization's internal as well as its external environment, relying on employees as a key source of information.

IT Training Needs Surveys

As noted in the previous section, there are many reasons for conducting a needs assessment. For example, Kemp, Morrison, and Ross (1994) note that an industry can expand so rapidly that qualified personnel are in short supply and a training intervention may be required. That was the situation in the petroleum industry during the 1970s, when it "grew faster than the industry could prepare engineers for higher-level positions" (p. 26). The IT industry today is experiencing the skills shortage that the petroleum industry experienced in the 1970s, but is further challenged to keep up with

rapidly changing technology. The skills gap in the IT industry is fairly well documented and will be discussed here within the context of the larger, external environment in which **xwave solutions** operates. This external needs assessment is, as Kaufman (1977) recommends, the logical starting place in that it identifies the skills and knowledge which are important outside of the organization and forms the basis for an internal needs assessment.

A review of the literature revealed several surveys on skill gaps in North America's Information Technology industry. A 1997 study by the Information Technology Association of America (ITAA) extensively surveyed large and mid-size IT and non-IT companies throughout the United States and among its findings were:

1. The number of unfilled positions for IT employees at large and mid-size U.S. companies is approximately 190,000 nationwide. Sixty-eight percent of IT companies cite a lack of skilled/trained workers as a barrier to their companies' future ability to grow.
2. Increased recruiting and training efforts are at best partial solutions to the current problems companies face in finding and retaining skilled IT workers. One-third of IT companies engage in full-time recruiting to fill IT positions at their companies, and U.S. companies overall spend billions on training their workers.
3. Education will be a key facet of any solution to this problem. However, universities are not doing an adequate job currently in graduating students in sufficient numbers. In addition, the skill level of those who graduate is a major source of concern for companies.

A 1999 study by ITAC, the Information Technology Association of Canada, found that the skills gap is still a problem for Canada's IT industry. ITAC conducted a survey of 34 companies, representing 20% of the employment in IT in Canada. The results showed that 7,848 positions will need to be filled over the next two years. Strongest demand was for the following positions: project managers, junior and senior software developers, technical consultants, web developers and designers, help desk technicians and systems engineers. The top three skills in demand by IT employers were client server implementation and management capability, database development and database administration. Strong demand was also noted for Java, C++ programming, web languages and web integration.

At the provincial level, this study is supported by the results of report entitled Information Technology - Closing the Human Resources Gap in Newfoundland and Labrador (1998). This report was the result of a combined effort of the Government of Newfoundland and Labrador, Human Resources Development Canada, the Canadian Information Processing Society (CIPS), Operation Online, and the Newfoundland Alliance of Technical Industries (NATI). The main goals of the study were to "identify the core skills required to work in the Information Technology industry," and "to generate solutions for the industry skills gap" (Information Technology, 1998, p. 6).

Thirty-eight IT core skills were identified and subsequently adopted for the study's analysis of the IT industry, including 13 core soft skills and 25 core technical skills. "The technical skills are specific to individual functions within the industry, while soft skills are transferable and bridge many disciplines and employment situations" (Information Technology, 1998, p. 23). An employer survey and an

employee survey were then developed for determining the skills gap in the industry. "Both surveys included a focus on the 38 core skills in order to provide results about whether employers and/or employees classified each skill as lacking upon graduation and, if so, as still lacking in experienced employees" (Information Technology, 1998, p.3).

When employers were asked which of the 38 core skills were most important, the skills isolated were primarily core soft skills. Of the core soft skills, over 45% of employers identified the following as most important: ability to work independently, ability to make decisions, oral communications skills, willingness to participate in training, problem-solving ability, customer service, interpersonal skills, and organizational skills. Both employers and employees were also asked to recommend areas for training, and the following emerged as top areas: oral and written communications, interpersonal skills, network training, all aspects of Internet/Intranet, programming, customer service, problem solving, project management, database management and programming, telecommunications, system design/analysis, management training, team building and human resource management.

The GartnerGroup states that the IT skills shortage is the number three concern of CIOs in North America. However, this IT skills shortage is complicated "by the fact that the role of the IT professional and that of the end user are becoming increasingly blurred as there is more emphasis on business skills for the IT employee and more emphasis on technical skills for the business employee" (1998, p.2). Consequently, 50% or more of the IT employee's skills picture is leadership, team building, marketing, business savvy, project management, manufacturing know-how, functional expertise

and institutional knowledge. According to the GartnerGroup, the most sought-after IT technical skills are Windows NT, Data Warehousing, ERM/ERP, Unix/C++, Client/server architecture, Internet/Intranet. The most sought-after IT soft skills are project management, communications skills, business management, presentation skills, interviewing skills, and meeting facilitation skills.

It is interesting to note that the types of new skills IT professionals require are similar to those that recent research has shown to be required by high skills/high-wage workers. Gray and Herr (1998) state that "to be successful, high-skills/high-wage workers are expected to have an expanded set of new skills referred to as "advanced workplace literacy skills'" (p. 184). These skills are summarized as the ability to be a self-learner, decision-making/problem solving skills, group/team participation skills, ability to work in a multicultural environment, computer software manipulation skills, and systems design and improvement skills. Gray and Herr contend that these advanced workplace literacy skills are associated with characteristics of a "world class" workforce, including such skills as self-learning. Self-learning is a characteristic of CBT, which will be examined in the next section in terms of the factors that need to be taken into account in considering it as a learning method.

Factors in Computer-Based Training

Donaldson and Scannell (1989) state that several generic terms are used to describe the use of computers for learning and training, including computer-based training (CBT) and computer-based instruction (CBI). CBT has developed from distance education, and is regarded by some as a fourth generation of practice in this area (Bourdeau &

Bates, 1997). According to Bourdeau and Bates (1997), the term distance learning means "media-based, remote or asynchronous learning supported by an instructional system" (p. 369). Tight (1996) states that the term "distance education" has been superseded by the term "open learning," which in practice involves "the adoption of measures to encourage widespread access to and participation in education, training and learning" (p. 94). The type of learning most commonly associated with distance or open learning systems is "self-directed learning." Knowles (1975, in Merriam & Caffarella), describes self-directed learning as "a form of study in which people take the initiative, with or without the help of others, for planning, conducting, and evaluating their own learning activities" (p. 208). Similarly, Bourdeau and Bates (1997) note that distance learning emphasizes learner autonomy through the use of such methods as "self-study, self-assessment, and self-pacing" (p. 373).

Self-paced instruction is one of the key advantages of CBT. Donaldson and Scannell (1989) state that it takes less time than group instruction, "reducing total training time anywhere from 30 to 50 percent, depending on the study used" (p. 80). Another advantage is that training is available when and where it is needed, a concept that has come to be known as "just-in-time" learning. Reinhardt (1996) states that in today's downsized corporations traditional, centralized teaching is giving way to distributed, "just-in-time" learning. He says the result is "increased flexibility, better retention, and lowered costs" (p. 143). Halal and Leibowitz (1994) are more specific, stating that studies of "just-in-time" learning "show that learning time is shortened by 50%, retention is increased by 80%, and costs are cut in half" (p. 230). Other benefits are that CBT courses are offered to each individual in exactly the same format, and

students can exit training at any point in the course and return to it later (Donaldson & Scannell, 1989; Halal & Leibowitz, 1994).

Distance learning, including computer-based training, is limited by a number of factors, with the key disadvantages related to issues of communication, types of learning, and student access to technology (Bourdeau & Bates, 1997; Simonson & Thompson, 1997). Distance learning reduces or altogether eliminates face-to-face contact between teachers and students, the types of learning that can be supported are limited (psychomotor and perceptual skills cannot be fully supported), and economic aspects of infrastructure and logistics must be considered. The problems that arise from these limitations have to do with providing accessibility to the instructional system and to content, preventing attrition due to isolation of students, and maintaining quality due to lack of feedback to students (Bourdeau & Bates, 1997).

Such problems must be considered by the instructional designer in the delivery of computer-based training. According to Bourdeau and Bates (1997), the solution for accessibility is to select an instructional system based on easy, economical access from home or the workplace or a resource centre and to choose readable, understandable and feasible content. To avoid high attrition rates, the designer must focus on providing opportunities for two-way communications and for peer collaboration. Maintaining quality involves providing timely feedback and evaluation of learning to the student, as well as conducting regular evaluation of the instructional materials or software.

Bates (1992, in Bourdeau and Bates, 1997) suggests that the factors that need to be considered in the delivery of distance learning can be covered by the acronym ACTIONS, in which the designer would ask the following questions:

Access: Where will students learn: home, work, local, centers?

Costs: What are the capital and recurrent; fixed and variable?

Teaching functions: What are the presentational requirements of the subject; required teaching and learning approaches?

Interaction and user-friendliness: Do students and teachers require a great deal of training to use this technology?

Organization: What changes in organization will be required to facilitate the use of a particular technology?

Novelty: To what extent will the "trendiness" of this technology stimulate funding and innovation?

Speed: How quickly and easily can material be updated and changed? How quickly can new courses be produced using this technology? (p. 384)

Simonson and Thompson (1997) support the recommendations of Bourdeau and Bates, reporting that, while studies which compare the effectiveness of CBI with some other method are controversial, the research has produced several general conclusions about how CBI should be designed. These general guidelines include providing knowledge of correct results, feedback on progress, assessment during and at conclusion of lessons, and readability of information on the screen.

Other research has indicated different factors for successful implementation of ILS or Integrated Learning Systems (that is, hardware/software systems that deliver courseware). Wiburg (1996) states that research on ILS has found four components to be important: adequate time on the system, teacher involvement, curriculum integration and staff development. Wiburg provides the results of a two-year qualitative study by

Britt, Eurich-Fulcer & Schofield in which the researchers found that students overwhelmingly preferred computer tutors to a classroom teacher. The researchers believed there were two reasons for this result: "First, the GPTutor did not replace the teachers, but functioned with them as a valuable additional classroom resource... Secondly ... the kind of help the teacher gave became more individualized" (p. 48). Cook (1996) also reports that students benefit most from ILS programs when teachers "coordinate computer instruction with classroom training" (p. 109). Reinhardt (1996) also recommends that "computers should be used to enhance, not replace, the teacher and supplement, not supplant, traditional training methods" (p. 151).

In summary, the factors discussed as important to the delivery of CBT courses in an organization must be considered as part of any needs assessment in order to determine access requirements and what factors are most important for an individual in deciding to carry out computer-based training.

Summary

The review of the literature has defined needs assessment, types of needs and data sources, and needs assessment models to guide the process. It has also provided a context for the needs assessment conducted at **xwave solutions** by examining results of research into skill gaps in the IT industry, and by defining computer-based training and the factors that are important in its implementation. Several conclusions may be drawn for the purpose of the CBT needs assessment project to be outlined in the following chapters.

The study to be conducted at **xwave solutions** is a training needs assessment or a training requirements analysis as defined by Rothwell and Kazanas (1998), since its main

goal is to pinpoint training needs. Consequently, the process will involve the entire workforce in obtaining information about training needs to help **xwave solutions** design a new CBT program. The types of needs the study will examine are the "felt" needs of employees, determined through a survey, and the "ascribed" needs of employees, as determined by corporate managers through interviews. The process will be guided by a needs assessment plan, which Rothwell and Kazanas (1998) recommend when sufficient justification exists, as it does in the IT industry, that there is a skills gap problem. Finally, as the research on CBT shows, it is important for the study at **xwave solutions** to also determine factors important to employees in the delivery of CBT, such as access to technology, experience with CBT, and the importance of various factors in an individual's decision to carry out CBT.

CHAPTER IV

RESEARCH METHODOLOGY AND RESULTS

Introduction

This chapter describes the research component of the internship at **xwave solutions.** It contains information on the needs assessment plan, data collection instruments, survey and questionnaire development, research questions, methodology and limitations of the study. The results are presented based on an analysis of the data collected through the needs assessment process.

Needs Assessment Plan

Rothwell and Kazanas (1998) define a needs assessment plan as "a blueprint for collecting information about instructional needs" (p. 57). They recommend that an organization develop a needs assessment plan when sufficient justification exists to solve a human performance problem. It is widely recognized and confirmed in recent research that a skills gap exists in the IT industry, in terms of both new hires and experienced employees challenged to keep up with rapidly changing technology. **xwave solutions** wanted information on the skill or content areas most in demand in order to seek CBT courses from vendors. At the start of the project the following needs assessment plan was developed for **xwave solutions**, based on the seven steps recommended by Rothwell and Kazanas (1998):

Goals

1. To decide CBT priorities for 1999 and for long-range strategic planning.

2. To provide specific recommendations for a new CBT training program: scope, delivery methods, cost and geographic location.

Objectives

1. To determine overall demand for a specific set of CBT courses, with breakdowns by region;
2. To determine where and how CBT courses should be delivered to employees;
3. To determine the demand for future knowledge and skills and to identify those which can be developed through CBT course offerings;
4. To determine the technical compatibility, installation, and ease-of-use of proposed CBT options with **xwave solutions** current technology platform; and
5. To determine the relative costs of proposed CBT options.

Target Audience

1. All **xwave solutions** employees in all company locations.
2. Key **xwave solutions** corporate decision-makers.

Sampling Procedures

Not applicable. Required is a list of names/addresses of all **xwave solutions** employees, as well as identification of key decision makers.

Data Collection Methods

1. Questionnaire (Employees)
    - To provide information on required CBT courses by region ; and
    - Where and how they should be delivered.

2. Interviews (Corporate Decision Makers)

   - To provide information on both current and future demand for CBT courses by department, region and job title;
   - To provide information on where and how CBT courses should be delivered;
   - To obtain feedback on current use of CBT and delivery methods, as well as suggestions for improvements; and
   - To determine preferred technical compatibility, installation and ease-of-use requirements for CBT options.

Specification for Instruments and Protocols

1. Questionnaire

   - Design the questionnaire.

     Identify the information to be collected.

   - Pilot Test the questionnaire.

     Identify whom the draft questionnaire will go to.

   - Determine how the questionnaire will be administered.

     Identify format: paper/online/both.

     Identify distribution methods: mail to all employees or to managers to distribute.

     Identify return methods: mail/ fax/online

2. Interviews

   - Develop the interview questions.

     Identify the information to be collected.

- Critique the interview script.

  Identify managers to critique the questions.

- Determine how the interviews will be done.

  Identify managers to be interviewed.

  Identify format for interview: telephone vs. personal interview.

3. Protocols

   - Determine necessary approvals for conducting the needs assessment.
   - Identify whose approval is necessary to collect data in company locations.

Methods of Data Analysis

1. Descriptive Analysis

   - Data collected from the interviews will be tabulated and presented in descriptive terms.

2. Chi-square Analysis

   - A chi-square analysis will be performed on the data collected from the employee survey to determine if significant differences exist in course requirements or delivery mechanisms across locations.

How decisions will be made based on the data

1. Survey and interview findings on CBT course requirements will be compared and analyzed to determine the critical training requirement for 1999 and beyond.
2. Survey and interview data on where and how CBT courses should be delivered to employees will be compared and analyzed to determine the delivery methods that will best ensure comprehensive and easy access to courses.

3. Interview findings on the demand for future knowledge and skills will be used to determine which CBT vendors can best meet **xwave solutions** future needs.
4. Interview data and findings from vendor demonstrations and key consultations will be used to determine the best CBT technical "fit" for **xwave solutions** current technology platform.
5. Overall findings will be integrated to develop a variety of appropriate options for a new CBT program and vendors will be asked to submit quotes based on these proposed CBT options.

After the Career Development Team approved the needs assessment plan, an activity timeline was developed to map how the plan would be accomplished within the 12-week internship period.

Data Collection Instruments

A major consideration in conducting a needs assessment is selection of data collection tools, which may include knowledge and skill tests, questionnaires, interviews, observation, reports from supervisors, survey method, advisory committees, checklists, and examination of files and/or records. In selecting a method for a needs assessment, St. Francis Xavier University (1987) states that the choice "will be determined by the time you have available, the resources at your disposal, your own skill level and comfort with data gathering methods, the sources of data and their accessibility" (1:8). Given the goals of this proposed study, only the survey method/questionnaires and interviews will be discussed here.

Surveys usually involve a mail-out questionnaire sent to a specific population, often seeking opinions and felt needs. Donaldson and Scannell (1989) state that questionnaires or surveys are usually constructed to determine the types of training required. "Since it is often too costly or time-consuming to poll all the personnel in your organization, you may randomly select certain groupings that are deemed representative of the department or organization" (p. 24).

Mills, Pace and Peterson (1998) state that a survey questionnaire is desirable "if employees are both willing and able to give you correct/truthful answers, if more direct or reliable sources for gathering the data are not possible, and if the questionnaire is created specifically to meet your needs" (p.117). Among the advantages of a survey questionnaire (Mills, Pace & Peterson, 1998; Smith, 1989) are these factors: costs are minimal; mail reaches those unavailable by other methods; one individual can reach large numbers at one time and over large geographic areas; the questions are uniform; and anonymity leads to a more honest response. On the other hand, questionnaires or surveys have the following disadvantages: low return rates; the analyst may not be certain who responded; the questions may not have been interpreted consistently; and personal contact is absent. In summary, "it is a good method to use when collecting data from a large sample and when standardized information is available" (Smith, 1989, p. 10).

With the advent of e-mail capabilities, organizations are now able to communicate with employees electronically. Consequently, some organizations use e-mail to distribute survey questionnaires. McClelland (1995) cites several advantages in using e-mail for this purpose; the most obvious being that the costs associated with duplicating

and distributing large numbers of paper surveys are virtually eliminated. He states that studies have also shown "there is no relative difference in response rates between survey questionnaires administered via a computer system and those that are completed with pencil and paper" (p. 88). Among the disadvantages, according to McClelland, are that some individuals with access to sophisticated e-mail systems still refuse to enter the electronic age. In addition, e-mail poses a problem regarding respondent confidentiality, which may negatively impact the overall response rate, although some e-mail programs now have built-in safeguards designed to maintain sender anonymity.

Interviews are another needs assessment tool, which can provide a depth and quality of information that cannot be obtained simply from survey questionnaires. The American Society for Training and Development (ASTD) (1985) defines an interview as "an active interchange, either in person or via telephone with one individual or a group" (p. 7). It can be used to "supplement or expand data from instruments and observations" (p. 7). McClelland (1995) notes that when the assessment type is competency/skills, the survey questionnaire is "suitable for assessing needs in all jobs and positions" and interviews are "excellent for generating qualitative data when used in conjunction with survey questionnaires" (p. 92).

Interviews may be highly structured or unstructured, but McClelland (1995) states that structured interviews with prepared questions adds continuity to the data-gathering process. The disadvantages in using interviews as a data gathering method are the potential for interviewer bias and difficulties that may arise in analyzing the data accurately (ASTD, 1985). Telephone interviews offer significant cost savings over

face-to-face interviews, but it may be difficult to reach individuals and it is harder to establish rapport over the phone (McClelland, 1995).

The advantages and disadvantages of the survey/questionnaire and interview methods of data collection were carefully considered in developing the instruments used in this needs assessment. The survey was deemed to be the best instrument for reaching **xwave solutions** employees, given its clear advantages in reaching large numbers at one time and over large geographic areas. The decision to Web-enable the survey and then to distribute it through e-mail to all employees was considered to be more suitable to the target audience of IT professionals than a pen and paper survey delivered through internal mail. IT professionals at **xwave solutions** use e-mail on a daily basis both to access and send information. In addition, the organization delivers general corporate information to all employees through e-mail and/or through the employee Intranet site. Since electronic communications is the main means of messaging in the company, there was no concern that employees would be afraid to use the technology. In fact, it was felt that more employees would respond to an electronic survey than to a paper-based questionnaire. As for the problem of anonymity, an important consideration for any survey, it was possible to develop safeguards in the **xwave solutions** on-line environment to overcome this problem. With respect to interviews as a method of collecting data from key corporate decision makers, a script was prepared to ensure continuity in the data-gathering process and to help reduce the potential for interviewer bias.

Development of the Employee Survey

Survey Questionnaire Design

Information to be collected from employees was first identified and agreed upon by the Career Development Team. The employee survey was designed specifically to provide the following:

1. Limited demographic information about employees consisting only of the Business Unit and the Business Unit Team to which they belong;
2. Detailed information about the overall demand for specific sets of CBT courses in 24 different subject areas, with the priority of each course being defined by employees in terms of "Must Have," "Nice To Have" and "Not Required;"
3. Further information about the overall priority of the "Must Have" CBT courses selected by employees, with the goal of narrowing down the courses to those which are most important to offer in 1999;
4. Technology information about the employee's access to a computer at work and at home and the types of technologies in use, including the Internet;
5. Information about the employee's past experience with CBT or multi-media training; and
6. Specific information about the decision factors that are most important for employees to consider in choosing to carry out CBT.

The main focus of the survey was to determine the types of courses required by employees by Business Unit and Business Unit teams. Courses to be included in the survey were chosen from lists of courses available from major CBT providers, with care being taken to develop listings for the survey unique from any one provider. Subject

areas and associated courses developed for the survey were reviewed by an internal Career Development Client Team consisting of 14 individuals representing teams in the Newfoundland Business Unit, as well as by individuals representing employees in the Western Unit and in Nova Scotia. Nine of the 14 members of the Client Team responded with comments, resulting in the addition of two new subject areas with associated courses as well as several additions and deletions in course lists.

It was determined that the most effective method for obtaining the required information was through a survey posted on the Web and made accessible to all **xwave solutions** employees. The three main reasons for this decision were:

1. Employees would be asked to select courses from 24 subject areas, but most employees would be interested only in several of the subject areas presented. Consequently, the online environment provided a more efficient method of allowing employees to select or "click" on only the subject areas and courses of interest to them. A paper survey with the same information would have been unmanageable, and the survey objectives would have to have been downscaled considerably.
2. The timeframe for completion of this survey was only 12 weeks (January 18 - April 9, 1999), including design, development, pilot testing, distribution, completion, return, data coding, data analysis and a final report. A Web-based survey offered great efficiencies by eliminating the necessity to print the surveys, to distribute them by hand, and to code the data from the survey manually.
3. Finally, **xwave solutions** is an IT company and the survey was about CBT. For both these reasons, a web-based survey would be perceived as the most appropriate or fitting means of gathering information from employees.

Two questions with respect to course content formed the bulk of the survey. Question three presented employees with their choice of 24 subject areas, each consisting of a number of associated courses which employees were asked to prioritize as "Must Have," "Nice To Have," and "Not Required." Employees were asked to "click" on the subject areas they were interested in. When they did so, they were linked to a screen of courses available in that subject area from CBT providers. They were then asked to rate each course as "Must Have," "Nice To Have" or "Not Required" in order to meet their training needs. Question four presented employees with a list of all the "Must Have" courses they had chosen in the previous question (an option that was possible due to the online character of the survey). They were then asked to select from this list up to five courses that would be most important to complete in 1999.

Questions five and six were designed to provide information on the technology that employees had available for the delivery of computer-based training at work and at home, including access to the Internet. Question seven asked about an employee's experience with computer-based training. Question eight probed the factors that were important in an employee's decision to take computer-based training. The final question asked the employee for any additional comments on the survey in general or computer-based training in particular. (Please see Appendix A for a complete copy of the survey.)

Pilot Testing

The pilot testing for the Web survey began Friday, March 5, 1999. The Web survey was pilot-tested by a randomly selected sample of employees in each of the four **xwave solutions** Business Units: Corporate, Newfoundland, Nova Scotia, and Western. The

number of employees chosen to pilot test the survey in each Business Unit was based on the number of employees in the unit. Corporate has a total of 22 employees and two participated in the pilot. Of 506 employees in the Newfoundland Business Unit, 14 completed the pilot survey. Nova Scotia has 166 employees and eight participated in the pilot. Of 160 employees in Western, six completed the pilot survey. Overall, a total of 30 participants were involved in the pilot testing.

All participants in the pilot survey received the same message. First, they were given instructions on how to access the survey: "To access the survey site, open your web browser and go to: http://xwavecbt01.xwavesolutions.com/cbtsurvey/. They were then asked to complete the survey by Monday, March 8, and to get back to the intern with their feedback on the following four questions:

1. What is your overall impression of the Web survey?
2. Were any of the questions not clear to you, or in need of a change in wording?
3. How long did it take you to complete the survey?
4. Are there any other comments or suggestions you would like to make?

Overall, the feedback from the pilot testing was very positive, with such typical comments on overall impression as "Very well-designed," "Great survey," "Very impressive, easy to use and understand." Consequently, the survey required no major changes; however, comments from employees resulted in several modifications. These included a shortened list of teams for Newfoundland, the addition of another question to allow employees to provide comments on the survey, and changes in some of the course listings. From a technical standpoint, the survey was reconfigured to work well with a lower level of web browser. Employees who completed the final survey required an

Internet Explorer 3.x or Netscape 3.x browser as opposed to the 4.x version required on the pilot. This was done to ensure fewer technical problems in completing the survey.

One negative comment from the pilot testing that was made very strongly by one participant, and also mentioned by several others, requires an explanation here. It was suggested that there should be a default button for "Not Required" in each of the course listings to help speed the survey along. It is agreed that this approach would have been preferable, but it could not be done for statistical reasons. Specifically, there is a difference between courses that are considered and not required, and those that are not considered at all. To default to "Not Required" for all the courses would have blurred this distinction and corrupted the data for our study. A copy of the final survey is contained in Appendix A.

Development of the Interview Questionnaire

Questionnaire Design

Interview questions were developed in conjunction with the Career Development team. Managers to be interviewed were selected through consultation with the Career Development Team for the Newfoundland Business Unit, and management representatives in the Nova Scotia and Western Business Units. The interview questionnaire was designed to provide the following:

1. General information about the key corporate manager and the group, including the manager's job title, type of services provided within **xwave solutions**, and number of individuals working in the group.

2. Specific information about the key training needs of employees in each group for the current year.
3. Specific information about knowledge and skills that will be required of employees in each group in the next two to five years.
4. General information about types of training employees in each group has received in the past year.
5. Specific information about the manager's experience with computer-based training.
6. Information about the manager's perspective on the strengths and weaknesses of CBT.
7. Information on what recommendations the manager would make for delivery of a new CBT program within the Company.

A copy of the questionnaire is contained in Appendix B.

Research Questions

The intent of the survey or quantitative component of this study was to determine content requirements, technology considerations, and decision factors in CBT. The purpose of the interviews or qualitative data was to expand on the information from the survey, including information on training requirements, strengths and weaknesses of CBT, and other factors. A large amount of data was collected for this project, and provided by the intern to **xwave solutions** in a 163-page report with breakdowns by four Business Units and 27 Business Unit teams. Given the parameters of the internship report it is not possible to present all this information here; consequently, this internship

report focuses on key areas of the research and provides breakdowns only to the Business Unit level. As a result, the key research questions for this internship report were determined to be the following:

1. (a) What proportion of employees in each Business Unit has access to a computer at work and at home? (b) Are there significant differences between the groups?
2. (a) What proportion of employees in each Business Unit has access to the Internet at work and at home? (b) Are there significant differences between the groups?
3. What technologies are in use on computers at home?
4. (a) What are the most frequently required "Must Have," "Nice To Have" and "Not Required" courses across **xwave solutions**? (b) Is there a significant difference in demand between the top thirty "hard" skills and the top thirty "soft" skills? (For the purpose of this study, "hard" skills are defined as skills that are technical in nature and specifically related to IT while "soft" skills are skills that are non-technical in nature and not specifically related to IT or computers.)
5. What are the top thirty "Must Have" courses by Business Unit?
6. (a) What are the subject areas in highest demand across all **xwave solutions**? (b) What are the rankings for courses listed within each subject area?
7. (a) What are the courses that are most important to complete in 1999 across **xwave solutions**? (b) Is there a significant difference in demand between the top thirty "hard" skills and the top thirty "soft" skills?
8. What proportion of employees in each Business Unit has prior experience with computer-based or multi-media training and are there significant differences between Business Units?

9. What are the most important decision factors in CBT and are there significant differences between Business Units?
10. What "other" comments do employees have with respect to CBT?
11. What are the key training needs according to key corporate decision makers?
12. (a) What are the strengths and weaknesses of CBT according to key corporate decision makers, as well as their recommendations with respect to delivery of a new CBT program in the Company? (b) How do these results compare with "other" comments from the employee survey?

Methodology

Procedures

To address research questions one through 9 and 11(b), a Web-based survey was sent via corporate e-mail to all permanent full-time and permanent part-time employees in the Corporate, Newfoundland, Nova Scotia and Western Business Units of **xwave solutions**. The survey went to 22 employees in Corporate, 506 in Newfoundland, 166 in Nova Scotia and 160 in Western, for an overall total of 854 employees across the organization.

The survey was sent on three separate occasions to employees via corporate e-mail from the People Vice-President at **xwave solutions**. Each e-mail message included a url address for the survey site, which the employee could access directly by "clicking" on it. The survey went out for the first time on Wednesday, March 17, 1999. It was sent for a second time on Monday, March 22, and for a third and final time on Friday, March 19. The survey was also posted on the **xwave solutions** Intranet site and accessible only to

xwave solutions employees. On Monday, March 22, the survey was removed both from its existing url address and from its posting on the **xwave solutions** Intranet site.

The data was automatically coded and collected electronically through a Microsoft Access database program. This data was then transferred for frequency distribution analysis to an SPSSPC program. In some cases, chi-square analyses were performed to determine if there were any significant differences between various variables. The level of significance was preset at $p < .05$.

To address questions 11 and 12, interviews were requested with 21 key corporate managers in the **xwave solutions** organization. These managers were responsible for 11 key teams in the Newfoundland Business Unit, six teams in Nova Scotia, and four teams in the Western Business Unit. Information was collected through telephone interviews for the Nova Scotia and Western Business Units and through either telephone or face–to-face meetings in the Newfoundland Business Unit.

Each manager was interviewed consistently according to questions on the interview questionnaire. Data was recorded manually on the interview sheets and later typed for record keeping. Analytic coding was performed on the data by classifying and categorizing information along common patterns and themes. This same approach was also applied to "other" comments provided by employees on the Web-based survey.

Confidentiality

The employee survey and the interview questionnaire were designed to meet the ethical standards established by the Faculty of Education at Memorial University. Both

research instruments outlined the purpose of the survey, confidentiality safeguards, intended uses of the survey, and other information as indicated by the Ethical Review Committee in the Department. The Web-based survey was designed with built-in safeguards to protect the identity of respondents.

Limitations

The Career Development team did not want any questions that might be perceived as threatening by employees across the various Business Units, including the request for such information as job title, age, gender, and years of service; consequently, demographic information was limited to Business Unit and team. As a result of this, comparisons based on demographic variables that might affect learning or delivery of the program could not be made.

Results

This section reports on the major findings of the study, according to the research objectives outlined above. Please note that not all respondents chose to answer every question; consequently, response rates varied by question.

Survey Population

The employee population included all 854 full-time and part-time permanent employees, including all levels of management, in the **xwave solutions** organization as of

March 17, 1999. Table 1 presents the response rate to the survey for each Business Unit. Corporate had the highest response rate at 77%. The response from Nova Scotia was lowest at 48% of the sample population.

Table 1: The Survey Population

Business Unit	Sample	Responded	Response Rate
	F	f	%
Corporate	22	17	77%
Newfoundland	506	311	61%
Nova Scotia	166	80	48%
Western	160	112	70%
Total	854	520	61%

Note: $x^2 = 12.08$, $p < .05$

A chi-square analysis indicated statistically significant differences in response to the survey by Business Unit [$x^2 = 12.08$, $p < .05$]. The response in Western was significantly higher than would have been expected by chance while the response from Nova Scotia was significantly lower. Overall, response rates were considered satisfactory for the purposes of the needs assessment.

Interviews were also conducted with senior managers in the **xwave solutions** organization to provide an "employer" perspective on training needs. In a comprehensive needs analysis, both the employee and employer perspective is sought to determine both "felt" needs and "ascribed" needs. Employees provide data concerning the skills and knowledge "felt" to be required while senior managers provide information about the skills needed to accomplish the work of the department, as well as industry trends and new directions.

Interviews were requested with 21 key corporate managers, representing 11 Newfoundland teams, six Nova Scotia teams, and four Western teams. Fifteen (15) managers completed the interview questionnaire. Table 2 presents the number of managers who responded, and the response rate based on the survey population. Ten managers were interviewed in Newfoundland for a 90% response rate; 2 in Nova Scotia for a 33% response rate; and 3 in Western for a 75% response rate.

Table 2: Participants in Management Survey

Business Unit	Sample	Responded	Response Rate
	F	f	%
Newfoundland	11	10	90%
Nova Scotia	6	2	33%
Western	4	3	75%
Total	21	15	71%

Research Question 1: (a) What proportion of employees in each Business Unit has access to a computer at work and at home? (b) Are there significant differences between the groups?

To assist **xwave solutions** in making decisions about delivery methods for CBT, employees were asked to provide information about their access to a computer at work and at home. A total of 535 employees answered the question regarding access to a computer at work, while 533 responded to the item dealing with access at home. Most (98.7%) of all **xwave solutions** employees reported access to a computer at work while 87.4% of all employees reported access to a computer at home (see Tables 3 and 4).

Given the high proportion of respondents across all Business Units who indicated access to a computer at work, further analysis was limited to those who reported access to a computer at home. A chi-square analysis indicated a statistically significant difference in employee access to a computer at home by Business Unit [$x^2 = 7.98$, $p < .05$]. Respondents reported access to a computer at home in Western, Corporate and Nova Scotia that was higher than would have been expected by chance, while access in the Newfoundland Business Unit was lower than anticipated. Overall, however, access to a computer at home was high.

Table 3: Employees with Access to a Computer at Work (N=535)

Business Unit	Frequency	Percent
Corporate	16	94.1
Newfoundland	317	98.1
Nova Scotia	83	100.0
Western	112	100.0
Total	528	98.7

Table 4: Employees with Access to a Computer at Home (N=533)

Business Unit	Frequency	Percent
Corporate	16	94.1
Newfoundland	271	84.2
Nova Scotia	76	92.7
Western	103	92.0
Total	466	87.4

Note: $x^2 = 7.98$, $p < .05$

Research Question 2: (a) What proportion of employees in each Business Unit has access to the Internet at work and at home? (b) Are there significant differences between the groups?

Since most of the current CBT programs can be provided over the Internet, employees were asked if they had access to the Internet both at work and at home. If employees said they had access to a computer at work, they were subsequently asked if they also had access to the Internet. Similarly, employees who said "yes" to access to a computer at home were asked to check off what type of technology they had on their computer, including if they had Internet access. (Please see Questions 5 and 6 on the CBT survey in Appendix A.) Tables 5 and 6 present the figures for employee access to the Internet at work and at home by Business Unit. Across all **xwave solutions**, the results indicated that 97.8% of all employees had access to the Internet at work while 64% of employees had Internet access at home. The high penetration of Internet access at work meant that further analysis of the data was required only on the results for home access. A chi-square analysis indicated no statistically significant differences in the number of employees with Internet access at home by Business Unit [$x^2 = .14$, $p > .05$].

Table 5: Employees with Access to the Internet at Work (N=535)

Business Unit	Frequency	Percent
Corporate	16	94.1
Newfoundland	314	97.2
Nova Scotia	83	100.0
Western	111	99.1
Total	524	97.8

Table 6: Employees with Access to the Internet at Home (N=533)

Business Unit		Frequency	Percent
Corporate		11	64.7
Newfoundland		207	64.3
Nova Scotia		51	62.2
Western		72	64.3
	Total	341	64.0

Note: $x^2 = .14$, $p > .05$

Research Question 3: What technologies are in use on computers at home?

Employees also provided information on other types of technology in use on their computer at home. Table 7 presents the number and percentage of employees using a variety of technologies, including Internet access, which has been discussed separately.

Table 7: Technologies Used by Employees on Computers at Home (N=533)

	%				
Technology	Corporate	NFLD.	N.S.	Western	Total
386 Processor		1.6	2.4	9.0	1.5
486 Processor	5.9	11.2	25.6	18.8	14.8
Pentium Processor	70.6	49.1	42.7	59.8	51.0
Pentium 2 Processor	29.4	27.0	22.0	25.0	25.9
DOS-based		2.8	2.4	7.1	3.6
Windows 3.1		4.0	12.2	4.5	5.3
Windows 95	58.8	54.3	54.9	48.2	53.3
Windows 98	5.9	18.6	19.5	41.1	23.1
NT Workstation	17.6	8.1	7.3	15.2	9.8
OS/2				.9	.2
Macintosh				3.7	.6
Internet Access	64.7	64.3	62.2	64.3	64.0
Configured w/video	64.7	40.7	39.0	47.3	42.6
Configured w/audio	58.8	50.9	51.2	60.7	53.3
Other	23.5	5.9	3.7	6.3	6.2

Note: Usage of processors in Corporate exceeds 100%, indicating that some users have more than one computer at home.

The most popular technologies in use are the Pentium processor, used by 51% of respondents; Windows 95, used by 53.3%; audio capabilities, used by 53.3%; and video capabilities, in use by 42.6% of employees.

Research Question 4: (a) What are the most frequently required "Must Have," "Nice To Have" and "Not Required" courses across xwave solutions? (b) Is there a significant difference in demand between the top thirty "hard" skills and the top thirty "soft" skills?

In Question three of the survey, employees were asked to prioritize courses in their choice of 24 subject areas (see survey in Appendix A). Employees could choose as many courses as they wished, from as many subject areas as they felt that they required training in. However, employees had to rate *all* courses within any given subject area in one of three ways: as "Must Have," as "Nice To Have," or as "Not Required." If an employee skipped an answer for one course within a subject area, an error message would appear when s/he clicked "enter' to go back to the main subject area screen. The data could not be submitted unless all courses within the grouping were rated in one of three ways, as the question required.

A total of 211 courses were contained within the 24 subject areas. Table 8 presents a ranking of the top 64 courses, based on "Must Have" responses, for all **xwave solutions** employees, with the most frequently required courses appearing at the top of the list. The number 64 was chosen because a list of that length was required to capture the top thirty "hard" skills. A total of 519 employees responded to the question, and the number and percentage of employees ranking each course as "Must Have," "Nice to Have," and "Not

Required" is shown in Table 8. For a full listing of the ranking of all 211 courses, please see Appendix B.

Table 8: Most Frequently Required Courses (N=519)

		Must Have		Nice To Have		Not Required	
Rank	Course	F	%	f	%	F	%
1	Team Leadership	150	28.9	121	23.3	29	5.6
2	Leadership Skills	146	28.1	139	26.8	15	2.9
3	Team Problem Solving	122	23.5	137	26.4	41	7.9
4	Estimating	110	21.2	117	22.5	25	4.8
5	Scheduling	107	20.6	125	24.1	20	3.9
6	Stress Management	104	20.0	134	25.8	62	11.9
7	Time Management	100	19.3	138	26.6	62	11.9
8	Conflict Resolution	98	18.9	150	28.9	52	10.0
9	Fundamentals	95	18.3	117	22.5	40	7.7
10	Scope	94	18.1	127	24.5	31	6.0
11	Managing Change	94	18.1	148	28.5	58	11.2
12	Project Management	91	17.5	121	23.3	46	8.9
13	Communications	87	16.8	130	25.0	35	6.7
14	Exceeding Customer Expectations	87	16.8	141	27.2	36	6.9
15	Risk	85	16.4	133	25.6	34	6.6
16	Quality	84	16.2	137	26.4	31	6.0
17	Top Performance: Six Win-Win Principles	82	15.8	164	31.6	54	10.4
18	Control	79	15.2	131	25.2	42	8.1
19	Getting Message Across	78	15.0	154	29.7	32	6.2
20	Initiation and Startup	77	14.8	127	24.5	48	9.2
21	Negotiating a Positive Outcome	77	14.8	136	26.2	51	9.8
22	Inter/Intranet Security	77	14.8	133	25.6	48	9.2
23	Internet/ Intranet Skills	74	14.3	146	28.1	38	7.3
24	Coaching & Counseling	71	13.7	161	31.0	68	13.1
25	MS Project 98	70	13.5	123	23.7	59	11.4
26	Mentoring	67	12.9	156	30.1	77	14.8
27	Better Business Writing	66	12.7	141	27.2	57	11.0
28	Office 97	63	12.1	66	12.7	26	5.0
29	Attitude: Your Most Priceless Possession	62	11.9	171	32.9	67	12.9
30	Systems & Database Management	60	11.6	119	22.9	79	15.2

Table 8: Most Frequently Required Courses (Continued)

		Must Have		Nice To Have		Not Required	
Rank	Course	F	%	f	%	F	%
31	Managing Information Systems	59	11.4	138	26.6	61	11.8
32	Empowerment	59	11.4	168	32.4	73	14.1
33	Dealing with Diversity	59	11.4	150	28.9	91	17.5
34	E-Commerce	57	11.0	142	27.4	59	11.4
35	Measuring Customer Service	55	10.6	142	27.4	67	12.9
36	Web Application Developer	55	10.6	118	22.7	85	16.4
37	Human Resources	53	10.2	127	24.5	72	13.9
38	Web End-User Skills	52	10.0	116	22.4	89	17.1
39	Oracle Database Programming	48	9.2	93	17.9	59	11.4
40	Oracle8 Database Administration	48	9.2	85	16.4	67	12.9
41	Calming Upset Customers	47	9.1	144	27.7	73	14.1
42	E-Business	47	9.1	146	28.1	65	12.5
43	Telephone Courtesy and Customer Service	46	8.9	106	20.4	112	21.6
44	Human Touch Performance Appraisal	46	8.9	154	29.7	100	19.3
45	MS Visual Basic 6.0	44	8.5	89	17.1	84	16.2
46	NT Server 4.0 in the Enterprise	44	8.5	47	9.1	38	7.3
47	Windows NT Server 4.0	44	8.5	48	9.2	37	7.1
48	Computing Systems Infrastructure	44	8.5	125	24.1	89	17.1
49	Windows NT Workstation 4.0	43	8.3	50	9.6	36	6.9
50	Oracle8 New Features	43	8.3	78	15.0	79	15.2
51	Networking Essentials	42	8.1	52	10.0	44	8.5
52	Network Management and Security	41	7.9	55	10.6	59	11.4
53	Techniques for Interviewing the Right Candidate	41	7.9	124	23.9	135	26.0
54	Windows 95*	40	7.7	57	11.0	71	13.7
55	Windows 95*	40	7.7	44	8.5	32	6.2
56	Web Master	40	7.7	121	23.3	96	18.5

Table 8: Most Frequently Required Courses (Continued)

		Must Have		Nice To Have		Not Required	
Rank	Course	F	%	f	%	F	%
57	Web Publisher	40	7.7	125	24.1	93	17.9
58	Internetworking Essentials	40	7.7	62	11.9	53	10.2
59	Oracle Introduction	39	7.5	90	17.3	71	13.7
60	Procurement	38	7.3	134	25.8	80	15.4
61	Job Control Language	38	7.3	36	6.9	60	11.6
62	Oracle7 Database Administration	37	7.1	74	14.3	89	17.1
63	Microsoft SQL Server 7	37	7.1	77	14.8	86	16.6
64	Outlook 98	36	6.9	66	12.7	53	10.2

Leadership training tops the list of required training, with both Team Leadership and Leadership Skills ranked as "Must Have" by 28.9% and 28.1% respectively of survey respondents. Another 23.3% and 26.8% respectively ranked these courses as "Nice To Have." Only 5.6% and 2.9% respectively ranked the two courses as "Not Required." Team Problem Solving was the third most frequently required course, with 23.5% ranking it as "Must Have," 26.4% as "Nice To Have," and 7.9% as "Not Required." Courses under the Project Management subject area ranked highly on the list of "Must Have" courses as well, with Estimating, Scheduling, Fundamentals, Scope, Communications, Risk, Quality, Control, and Initiation and Startup ranking within the top twenty courses on the list. In addition, Project Management, which was listed as a course under the Information Technology Core Concepts subject area, ranked twelfth on the list, with 17.5% of respondents ranking it as "Must Have," 23.3% as "Nice To Have" and 8.9% as "Not Required."

Overall, the top 20 most frequently required courses are for "soft" skills. In addition to those highlighted above, included in this number are Stress Management, Time

Management, Conflict Resolution, Exceeding Your Customer's Expectations, Top Performance: Six Win-Win Principles, and Getting Your Message Across. The demand for "soft skills" also remained strong in the next 20 courses ranked as "Must Have," with nine or 45% of the courses numbered 21 to 40 involving "soft" skills, including Negotiating for a Positive Outcome, Coaching and Counseling, and Empowerment. Overall, the "soft skills" most frequently required fall into the areas of leadership, team building, change management, interpersonal skills, problem-solving skills, project management, communication skills and customer service.

The demand for "hard" or "technical" skills begins at number 22 on the list. Internet training tops the list of "hard" skills, with Internet and Intranet Security in twenty-second place and Internet and Intranet Skills following in twenty-third. They were ranked as "Must Have" by 14.8% and 14.3% respectively of survey respondents. Another 25.6% and 28.1% respectively ranked these courses as "Nice To Have" while 9.2% and 7.3% said they were "Not Required." Next in demand, but ranked further down the list in thirtieth and thirty-first place are Systems and Database Management, and Managing Information Systems. These two courses were ranked as "Must Have" by 11.6 and 11.4% of respondents, with another 22.9% and 26.6% respectively ranking them as "Nice To Have," and 15.2% and 11.8% respectively saying they are "Not Required." The demand for "hard" skills increased in the next twenty courses ranked most frequently required by employees, with 13 of the courses numbered 32 to 51 involving technical skills, including E-Commerce, Web Application Developer, Oracle Database Programming and Microsoft Visual Basic 6.0. Overall, the highest demand was for Internet/Intranet/Web skills, database development, visual basic programming, and client-server implementation.

Table 9 shows the top thirty "soft" skills and top thirty "hard" skills derived from the "Must Have" column of "Most Frequently Required Courses" listed in Table 7. A chi-square analysis indicated that there was a significant difference between the "hard" and "soft" skills selected as most frequently required "Must Have" courses [$x^2 = 97.51$, $p < .05$]. "Soft" courses were in significantly higher demand than "hard" or technical skills.

Table 9: Top 30 Must Have "Soft" and "Hard" Courses (N=519)

Rank	Soft Courses	Hard Courses
1	Team Leadership	Internet and Intranet Security
2	Leadership Skills	Internet and Intranet Skills
3	Team Problem Solving	Microsoft Project 98: Getting Started
4	Estimating	Office 97
5	Scheduling	Systems and Database Management
6	Stress Management	Managing Information Systems
7	Time Management	E-Commerce
8	Conflict Resolution	Web Application Developer
9	Fundamentals	Web End-User Skills
10	Scope	Oracle Database Programming
11	Managing Change	Oracle8 Database Administration
12	Project Management	E-Business
13	Communications	Microsoft Visual Basic 6.0
14	Exceeding Customer's Expectations	NT Server 4.0 in the Enterprise
15	Risk	Windows NT Server 4.0
16	Quality	Computing Systems Infrastructure
17	Top Performance: Win-Win Principles	Windows NT Workstation 4.0
18	Control	Oracle8 New Features
19	Getting Your Message Across	Networking Essentials
20	Initiation and Startup	Network Management and Security
21	Negotiating for a Positive Outcome	Windows 95*
22	Coaching and Counseling	Windows 95*
23	Mentoring	Web Master
24	Better Business Writing	Web Publisher
25	Attitude: Most Priceless Possession	Internetworking Essentials
26	Empowerment	Oracle Introduction
27	Dealing with Diversity	Job Control Language
28	Measuring Customer Service	Oracle7 Database Admin.
29	Human Resources	Microsoft SQL Server 7
30	Calming Upset Customers	Outlook 98

Note: $x^2 = 97.51$, $p < .05$; * Windows 95 is listed twice on the list of courses.

Research Question 5: What are the top thirty "Must Have" courses by Business Unit?

Another important question to ask of the data is whether there are any notable differences between Business Units in terms of course requirements. Table 10 presents the Top Thirty "Must Have" courses by Business Unit, with the most frequently chosen courses appearing at the top of the list, along with the number of times it was selected. This Table allows for descriptive comparisons of course requirements to be made across Business Units.

The Top Thirty "Must Have" courses for the Newfoundland Business Unit are primarily "soft" skill requirements, including Leadership, Team Problem Solving, and Project Management Skills. The only technical skills to make the Top Thirty list are Office 97 and Internet and Intranet Skills.

Course requirements for Nova Scotia have a similar focus on "soft" skills, but to a lesser degree than for Newfoundland. Web End-User skills and Internet and Intranet Security are higher on the list of course requirements. Nova Scotia has the same requirements for Office 97 and for Internet and Intranet Skills as Newfoundland, in that these courses appear in the same place on the list, in twenty-fifth and twenty-seventh places. In addition, requirements for Web Application Developer and Oracle Database Programming make it into the tail end of the Top Thirty "Must Have" courses.

The Corporate Business Unit shares the "soft" skill focus with Newfoundland and Nova Scotia; however, four technical courses make the lower third of the list: UNIX Foundation Level, Internet and Intranet Security, Network Management and Security and Internetworking Essentials.

Table 10: Top Thirty "Must Have" Courses

	Newfoundland		Nova Scotia		Western		Corporate	
Rank	Course	f	Course	f	Course	f	Course	f
1	Leadership Skills	93	Team Leadership	26	Internet and Intranet Security	31	Team Leadership	8
2	Team Leadership	85	Team Problem Solving	23	Team Leadership	31	Leadership Skills	8
3	Team Problem Solving	70	Stress Management	17	Leadership Skills	28	Team Problem Solving	6
4	Estimating	68	Leadership Skills	17	Estimating	26	Stress Management	6
5	Scheduling	63	Scope	16	Microsoft Sequel Server 7	26	Conflict Resolution	6
6	Time Management	63	Scheduling	16	Inter/Intranet Skills	25	Scope	5
7	Stress Management	61	Project Management	15	MS Visual Basic 6.0	23	Risk	5
8	Conflict Resolution	60	Estimating	14	Communications	23	Fundamentals	5
9	Fundamentals	57	Fundamentals	14	Scheduling	23	Scheduling	5
10	Managing Change	57	Exceeding Customer Expectations	14	Team Problem Solving	23	Empowerment	5
11	Scope	55	Quality	13	Managing Change	23	Managing Change	5
12	Exceeding Customer Expectations	55	Communications	13	E-Commerce	22	Microsoft Project 98: Getting Started	4
13	Project Management	54	Measuring Customer Service	13	Windows NT Server 4.0	21	Quality	4
14	Quality	49	Getting Your Message Across	13	Systems/Database Management	21	Measuring Customer Service	4
15	Initiation and Startup	49	Conflict Resolution	13	Top Performance: Win-Win Principles	21	Project Management	4
16	Risk	48	Risk	12	Time Management	21	Top Performance: Win-Win Principles	4

Table 10: Top Thirty "Must Have" Courses

	Newfoundland		Nova Scotia		Western		Corporate	
Rank	Course	f	Course	f	Course	f	Course	f
17	Communications	48	Initiation and Startup	12	NT Server 4.0 in the Enterprise	20	Mentoring	4
18	Control	48	Web End-User Skills	12	Risk	20	Time Management	4
19	Negotiating for a Positive Outcome	46	Internet and Intranet Security	12	Managing Information Systems	20	Human Resources	3
20	Top Performance: Win-Win Principles	45	Coaching and Counseling	12	Stress Management	20	Communications	3
21	Getting Your Message Across	44	Top Performance: Six Win-Win Principles	12	Windows NT Workstation 4.0	19	Initiation and Startup	3
22	Microsoft Project 98: Getting Started	43	Dealing with Diversity	12	Control	19	Better Business Writing	3
23	Better Business Writing	42	Time Management	12	Fundamentals	19	Negotiating for a Positive Outcome	3
24	Empowerment	40	Attitude: Your Most Priceless Possession	11	Negotiating for a Positive Outcome	19	Getting Your Message Across	3
25	Office 97	39	Office 97	10	Web Application Developer	19	UNIX Foundation Level	3
26	Coaching and Counseling	39	Control	10	Conflict Resolution	19	Internet and Intranet Security	3
27	Internet and Intranet Skills	38	Internet and Intranet Skills	10	Scope	18	Network Manage-ment & Security	3
28	Dealing with Diversity	36	Negotiating for a Positive Outcome	9	Quality	18	Internetworking Essentials	3
29	Human Resources	35	Web Application Developer	9	Getting Your Message Across	18	Coaching and Counseling	3
30	Mentoring	35	Oracle Database Programming	9	E-Business	18	Performance Appraisal	3

Western is differentiated from the other three business units in that, while "soft" skills such as Leadership and Project Management are important, it places more importance on certain "technical" skills. Internet and Intranet Security shares top place on the list with Team Leadership. Four of the top ten course requirements are technical: Internet and Intranet Security, Microsoft Sequel Server 7, Internet and Intranet Skills, and MS Visual Basic 6.0. In total, 12 of the top thirty required courses are in technical areas, compared with two for Newfoundland, six for Nova Scotia and four for Corporate.

Common across all Business Units is the requirement for Internet and Intranet skill sets. Nova Scotia shares with Western a need for database development skills, with its requirement for Oracle database programming. Western is differentiated from the three business units, however, in having a higher demand for training on a wider variety of Internet/Web development skills, systems and database management skills, and client-server management.

Research Question 6: (a) What are the subject areas in highest demand across all xwave solutions? (b) What are the rankings for courses listed within each subject area?

The data collected on CBT course requirements in question three of the survey was also broken out into most frequently required courses for each of the 24 subject areas. This information was required for two main reasons:

1. To find out the number of employees who were interested in each subject area, as determined by their completing the section; and

2. To show which courses were in highest demand within each subject area, thereby providing a format for approaching CBT vendors with course requirements.

Table 11 shows the number and percentage of **xwave** employees who completed the questions for each subject area, with the most frequently completed subject areas appearing at the top.

Table 11: Subject Areas In Highest Demand (N=519)

Rank	Subject Areas	Frequency	Percent
1	Leadership	300	57.8
2	Business Communications	264	50.9
3	Information Technology Core Concepts	258	49.7
4	Web/Internet/Intranet	258	49.7
5	Project Management	252	48.6
6	Application Development and Programming	217	41.8
7	Database Development and Administration	200	38.5
8	Internetworking	155	29.9
9	Microsoft End-User Operating Skills	155	29.9
10	UNIX	149	28.7
11	Mainframe	134	25.8
12	Microsoft Certified Systems Engineer Curriculum	129	24.9
13	Microsoft System Administration	123	23.7
14	Netscape	109	21.0
15	MS Certified Solution Developer Curriculum	104	20.0
16	Lotus	102	19.7
17	Personal Computer Technician	90	17.3
18	Occupational Health and Safety	85	16.4
19	Novell Certified Internet Professional	84	16.2
20	Novell IntranetWare	84	16.2
21	Technical Support: Supporting Courses for Help Desk Personnel	84	16.2
22	Technical Support: Core Modules A+ Certification	80	15.4
23	Technical Support: Microsoft DOS/Windows Module for A+ Certification	73	14.1
24	SAP R/3 3.0		11.4

Occupying the top seven positions are Leadership, Business Communications, Information Technology Core Concepts, Web/Internet/Intranet, Project Management,

Application Development and Programming, and Database Development and Administration. The skills most in demand in these subject areas are shown in Table 12.

Table 12: Courses Most in Demand by Subject Area

Subject Areas	Courses
Leadership	Team Leadership Leadership Skills Team Problem Solving Stress Management Time Management
Business Communications	Exceeding Your Customer's Expectations Getting Your Message Across Negotiating For A Positive Outcome Better Business Writing
Information Technology Core Concepts	Project Management Internet and Intranet Skills Systems and Database Management Managing Information Systems
Web/Internet/Intranet	Internet and Intranet Security E-Commerce Web Application Developer Web End-User Skills
Project Management	Estimating, Scheduling
Application Development and Programming	MS Visual Basic 6.0 Microsoft Access Object-Oriented Analysis Object-Oriented Design SQL Windows Java by IBM Javasoft/Netscape
Database Development and Administration	Oracle Database Programming Oracle8 Database Administration Oracle8 New Features Oracle Introduction

While the "Must Have," "Nice To Have" and "Not Required" rankings for courses in each subject area were important to the needs assessment project, they are not shown in the results section of this report for three main reasons. Firstly, there are 24 tables and

they would take up too much space in this section. Secondly, and more importantly, information on the key "Must Have" priorities are already contained in the information above. Thirdly, rankings of courses by subject area will appear in the recommendations section of this report as information provided to vendors in a Request for Proposals.

Research Question 7: (a) What are the courses that are most important to complete in 1999 across xwave solutions? (b) Is there a significant difference in demand between the top thirty "hard" skills and the top thirty "soft" skills?

In Question four of the survey, employees were presented with a list of all the "Must Have" courses they had chosen in question three and asked to select from this list up to five courses that would be most important to complete in 1999. Table 13 shows the top ranked 80 courses judged to be "Most Important To Complete in 1999." The number 80 was chosen because a list of that length was required in order to capture the top thirty "hard" skills seen in Table 12. A full listing of the courses is shown in Appendix D.

Table 13: Courses That Are Most Important to Complete in 1999 (N=392)

Rank	Courses	Frequency	Percent
1	Leadership Skills	84	21.4
2	Team Leadership	78	19.9
3	Project Management	45	11.5
4	Exceeding Your Customer's Expectations	35	8.9
5	Estimating	34	8.7
6	Stress Management	34	8.7
7	Time Management	33	8.4
8	E-Commerce	30	7.7
9	Team Problem Solving	30	7.7
10	Microsoft Visual Basic 6.0	29	7.4

Table 13: Courses That Are Most Important to Complete in 1999 (Continued)

Rank	Courses	Frequency	Percent
11	Top Performance: Six Win/Win Principles	29	7.4
12	Managing Change	29	7.4
13	Office 97	25	6.4
14	Web Application Developer	24	6.1
15	Microsoft Project 98: Getting Started	23	5.9
16	Communications	23	5.9
17	Better Business Writing	23	5.9
18	Negotiating for a Positive Outcome	23	5.9
19	Internet and Intranet Security	23	5.9
20	Oracle8 Database Administration	23	5.9
21	Conflict Resolution	23	5.9
22	Oracle Database Programming	21	5.4
23	Internet and Intranet Skills	21	5.4
24	Oracle Introduction	19	4.8
25	Attitude: Your Most Priceless Possession	19	4.8
26	Scheduling	18	4.6
27	Getting Your Message Across	18	4.6
28	Oracle7 Database Administration	18	4.6
29	Microsoft SQL Server 7	18	4.6
30	Coaching and Counseling	17	4.3
31	Internetworking Essentials	16	4.1
32	Quality	15	3.8
33	Systems and Database Management	14	3.6
34	Empowerment	14	3.6
35	Mentoring	14	3.6
36	Object-Oriented Design	13	3.3
37	Scope	13	3.3
38	Fundamentals	13	3.3
39	UNIX Foundation Level	13	3.3
40	E-Business	13	3.3
41	SQL Windows	12	3.1
42	Risk	12	3.1
43	Oracle Developer/2000 Toolset	12	3.1
44	Oracle8 New Features	12	3.1
45	Network Management and Security	12	3.1
46	C/C+ Programming	11	2.8
47	Networking Essentials	11	2.8
48	Windows NT Server 4.0	11	2.8
49	Initiation and Startup	11	2.8
50	MVS Operating System	11	2.8
51	Microsoft Access	10	2.6

Table 13: Courses That Are Most Important to Complete in 1999 (Continued)

Rank	Courses	Frequency	Percent
52	Java by IBM/JavaSoft/Netscape	10	2.6
53	NT Server 4.0 in the Enterprise	10	2.6
54	Windows NT 4.0 Server, Workstation, Enterprise	10	2.6
55	Measuring Customer Service	10	2.6
56	HP-UX	10	2.6
57	Managing Information Systems	10	2.6
58	Dealing with Diversity	10	2.6
59	Human Touch Performance Appraisal	10	2.6
60	Supporting Courses for HelpDesk Personnel	9	2.3
61	IMS	9	2.3
62	Application Development & Programming	9	2.3
63	Job Control Language	9	2.3
64	Microsoft Visual InterDev	8	2.0
65	Internet Information Server (IIS) 4.0	8	2.0
66	Windows NT 5	8	2.0
67	Outlook 98	8	2.0
68	Project 98	8	2.0
69	Windows 98	8	2.0
70	JavaScript	8	2.0
71	Calming Upset Customers	8	2.0
72	Solaris	8	2.0
73	Object-Oriented Analysis	7	1.8
74	Windows NT Workstation 4.0	7	1.8
75	SQL Server 7.0	7	1.8
76	Technical Support: Core Modules For A+ Certification	7	1.8
77	Web Master	7	1.8
78	TCP/IP on Windows NT 4.0	6	1.5
79	NetWare 5	6	1.5
80	Telephone Courtesy and Customer Service	6	1.5

From the results it appears that the "hard" technical skills become more important when employees have to narrow their choices. While Leadership Skills, Team Leadership and Project Management continue to top the list, six of the top twenty "Most Important to Complete" courses are of a technical nature: E-Commerce, Microsoft Visual Basic 6.0, Office 97, Web Application Developer, Internet and Intranet Security, and Oracle8

Database Administration. The type of technical skills that are "most important" has also changed, with E-Commerce replacing Internet and Intranet Security in top importance.

Table 14 shows the top thirty "soft" skills and "hard" skills derived from the "Most Important to Complete in 1999" courses listed in Table 13. A chi-square analysis indicated a significant difference between "hard" skills and "soft" skills selected as "Most Important to Complete in 1999" [$x^2 = 49.76$, $p < .05$]. Despite the increased number of "hard" courses selected, employees ranked "soft" courses as significantly more important to complete in 1999.

Table14: Top Thirty Most Important "Soft" and "Hard" Courses (N=392)

Rank	Soft Courses	Hard Courses
1	Leadership Skills	E-Commerce
2	Team Leadership	Microsoft Visual Basic 6.0
3	Project Management	Office 97
4	Exceeding Customer's Expectations	Web Application Developer
5	Estimating	Microsoft Project 98: Getting Started
6	Stress Management	Internet and Intranet Security
7	Time Management	Oracle8 Database Administration
8	Team Problem Solving	Oracle Database Programming
9	Top Performance: Win-Win Principles	Internet and Intranet Skills
10	Managing Change	Oracle Introduction
11	Communications	Racle7 Database Administration
12	Better Business Writing	Microsoft SQL Server 7
13	Negotiating for a Positive Outcome	Internetworking Essentials
14	Conflict Resolution	Systems and Database Management
15	Attitude	Object-Oriented Design
16	Scheduling	UNIX Foundation Level
17	Getting Your Message Across	E-Business
18	Coaching and Counseling	SQL Windows
19	Quality	Oracle Developer/2000 Toolset
20	Empowerment	Oracle8 New Features
21	Mentoring	Network Management and Security
22	Scope	C/C+ Programming
23	Fundamentals	Networking Essentials
24	Risk	Windows NT Server 4.0
25	Initiation and Startup	MVS Operating System

Table14: Top Thirty Most Important "Soft" and "Hard" Courses (Continued)

Rank	Soft Courses	Hard Courses
26	Measuring Customer Service	Microsoft Access
27	Dealing with Diversity	Java by IBM/JavaSoft/Netscape
28	Human Touch Performance Appraisal	NT Server 4.0 in the Enterprise
29	Calming Upset Customers	NT 4.0 Server, Workstation, Enterprise
30	Telephone Courtesy/Customer Service	HP-UX

Note: $x^2 = 49.76$, $p < .05$

Question four of the survey was designed to narrow the number of courses that would be required in 1999 from CBT vendors. A total of 179 courses were identified as 'Most Important To Complete in 1999" as compared with 211 courses identified as "Must Have" in question three. Table 15 presents the 32 courses that did not make the "Most Important" list. These may be dropped from the requirement for CBT vendors for 1999.

Table 15: Courses That Did Not Make the List of Most Important to Complete in 1999

Courses	Courses
1. ANSI Material Safety Data Sheets	18. PC Configuration II
2. Basis	19. PowerBuilder 4.0
3. Business Process Introduction	20. PowerBuilder 5.0
4. Communicator 4.0	21. Procurement
5. DOS 6.2	22. Project Team Financials
6. End User	23. Project Team Logistics
7. Exchange 4.0	24. Project Team Technical
8. Exchange Server 5.0	25. Release 2.2 Curriculum
9. INFORMIX Database Programming	26. Routed Network Protocols – OSI Protocols
10. INFORMIX Online Dynamic Server	27. Routed Network Protocols – Technologies Level
11. Internet Information Server (IIS) 3.0	28. Safety and Preventative Maintenance
12. IntranetWare –NetWare 3 to NetWare 4.11 Update	29. Safety and Preventative Maintenance
13. LiveWire	30. Telecommunications Signaling System 7 (SS7)
14. Marimba	31. Web Authoring and Publishing
15. Microsoft Visual C++ 5.0	32. Windows 3.1
16. Netware 3.11	
17. PC Configuration I	

Research Question 8: (a) What proportion of employees in each Unit has prior experience with computer-based or multi-media training and are there significant differences between Business Units?

Employees were asked to report whether they had prior experience with computer-based or multi-media training. This information was required in order to help **xwave solutions** training staff in making decisions about how to promote any new CBT program that might be introduced within the company. Obviously, Business Units and teams with the least experience would require more information on how to most effectively use CBT courses. (Please see Question 7 of the CBT survey in Appendix A.) The results, presented in Table 16 below, show that 81.6% of 528 respondents report having used CBT or multi-media training in the past while 18.4% report that they have not used CBT or multi-media training in the past. A chi-square analysis indicated that there is a significant difference in experience with multi-media training by Business Unit ($x^2 = 33.95$, $p<.05$). Newfoundland has more experience than would have been expected by chance while Western had significantly less than would have been expected.

Table 16: Employee Experience with CBT or Multi-Media Training (N=528)

	Business Units									
	Corporate		NFLD.		Nova Scotia		Western		Total	
	f	%	f	%	f	%	f	%	f	%
Used	13	76.5	280	88.1	67	82.7	71	63.4	431	81.6
Not Used	4	23.5	38	11.9	14	17.3	41	36.6	97	18.4

Note: $x^2 = 33.95$, $p<.05$

Research Question 9: What are the most important decision factors in CBT and are there significant differences between the Business Units?

All employees, whether or not they had past experience with CBT, were asked to provide information on the factors that would affect their decision to carry out computer-based training. Fifteen factors were listed, and survey respondents were asked to "select up to five that would be most important to you in deciding to do computer-based training." (Please see Question 8 on the CBT survey in Appendix A).

A total of 523 employees responded to the question. Table 17 lists the factors that were selected in order of importance. The five most frequently cited factors were flexibility to choose own time/place for learning, ability to take courses to meet current job requirements, ability to complete course at own pace, ability to take courses to train for a new job assignment, and ability to access training at home.

Table 17: Ranking of Most Important Decision Factors in CBT Training (N=523)

Rank	Factors	Frequency	Percent
1	Flexibility to choose own time/place for learning	400	76.5
2	Ability to take courses to meet current job requirements	344	65.8
3	Ability to complete course at own pace	316	60.4
4	Ability to take courses to train for a new job assignment	251	48.0
5	Ability to access training at home	229	43.8
6	Ability to access training faster (just-in-time training)	184	35.2
7	Access to most current technical course content	175	33.5
8	Ability to take courses to pursue personal interests	131	25.0
9	Easy access to computer	84	16.1
10	Availability of instructional assistance	82	15.7
11	Availability of credits for successful course completion	74	14.1
12	Ability to access training through in-company learning centre	57	10.9
13	Availability of technical support	44	8.4
14	Need to reduce training expenses	36	6.9
15	Need to reduce travel expenses	18	3.4

The data provided for this question were also broken out to determine if there were variances on factors among the four Business Units. Tables 18–21 show the ranking of these factors for each Business Unit. The top four factors for the Corporate Business Unit were the same as for all of **xwave solutions**; however, the fifth factor was ability to access training faster, which was sixth on the list for all **xwave solutions**. A chi-square analysis indicated no significant differences in the importance of ability to access training faster by Business Unit [$x^2 = .26$, $p.>.05$]. However, it is interesting to note a chi-square analysis indicated significant differences by Business Unit in the importance of reducing travel expenses [$x^2 = 33.02$, $p<.05$] and training expenses [$x^2 = 21.35$, $p<.05$]. These factors were significantly more important to employees in the Corporate Business Unit.

Table 18: Ranking of Most Important Decision Factors in CBT Training by the Corporate Business Unit (N=17)

Rank	Factors	Frequency	Percent
1	Flexibility to choose own time/place for learning	15	88.0
2	Ability to take courses to meet current job requirements	9	53.0
3	Ability to complete course at own pace	9	53.0
4	Ability to take courses to train for a new job assignment	6	35.0
5	Ability to access training faster (just-in-time training)	6	35.0
6	Ability to access training at home	6	35.0
7	Need to reduce travel expenses	5	29.0
8	Access to most current technical course content	4	24.0
9	Need to reduce training expenses	4	24.0
10	Easy access to computer	3	18.0
11	Ability to take courses to pursue personal interests	3	18.0
12	Availability of credits for successful course completion	2	12.0
13	Availability of technical support	1	5.8
14	Ability to access training through in-company learning centre	0	0
15	Availability of instructional assistance	0	0

The top five factors for the Newfoundland Business Unit were the same as for all **xwave solutions**, but ability to access training at home was more important than taking courses to train for a new job assignment. The order of these fourth and fifth items was reversed on the overall **xwave solutions** list. A chi-square analysis indicated that there was a significant difference in the importance of ability to access training at home by Business Unit [$x^2 = 8.86$, $p < .05$]. This factor was significantly more important to employees in the Newfoundland Business Unit.

Table 19: Ranking of Most Important Decision Factors in CBT Training by the Newfoundland Business Unit (N=313)

Rank	Factors	Frequency	Percent
1	Flexibility to choose own time/place for learning	238	76.0
2	Ability to take courses to meet current job requirements	216	69.0
3	Ability to complete course at own pace	191	61.0
4	Ability to access training at home	153	49.0
5	Ability to take courses to train for a new job assignment	147	47.0
6	Ability to access training faster (just-in-time training)	108	35.0
7	Access to most current technical course content	103	33.0
8	Ability to take courses to pursue personal interests	92	29.0
9	Easy access to computer	48	15.0
10	Availability of credits for successful course completion	43	14.0
11	Availability of instructional assistance	43	14.0
12	Ability to access training through in-company learning centre	39	12.0
13	Availability of technical support	21	6.7
14	Need to reduce training expenses	10	3.2
15	Need to reduce travel expenses	7	2.2

The top five decision factors for Nova Scotia were exactly the same as for the Corporate Business Unit. A chi-square analysis indicated that there was a significant difference in the importance of instructional assistance by Business Unit [$x^2 = 8.38$, p

<.05]. This factor was significantly more important to employees in the Nova Scotia Business Unit.

Table 20: Ranking of Most Important Decision Factors in CBT Training by the Nova Scotia Business Unit (N=80)

Rank	Factors	Frequency	Percent
1	Flexibility to choose own time/place for learning	60	75.0
2	Ability to take courses to meet current job requirements	54	67.0
3	Ability to complete course at own pace	46	57.0
4	Ability to take courses to train for a new job assignment	44	55.0
5	Ability to access training faster (just-in-time training)	30	38.0
6	Ability to access training at home	26	33.0
7	Access to most current technical course content	24	30.0
8	Availability of instructional assistance	19	24.0
9	Ability to take courses to pursue personal interests	15	19.0
10	Availability of credits for successful course completion	12	15.0
11	Easy access to computer	12	15.0
12	Need to reduce training expenses	11	14.0
13	Availability of technical support	11	14.0
14	Ability to access training through in-company learning centre	7	8.8
15	Need to reduce travel expenses	3	3.8

Employees in the Western Business Unit had the same top four decision factors as for all of **xwave solutions**, with the small difference that factor two and three are reversed on the Western list. The fifth factor for Western is access to most current technical course content, which is seventh on the list for all **xwave solutions**. A chi-square analysis, however, indicated no significant differences in the importance of current content by Business Unit [$x^2 = 2.93$, $p > .05$].

Table 21: Ranking of Most Important Decision Factors in CBT Training by the Western Business Unit (N=80)

Rank	Factors	Frequency	Percent
1	Flexibility to choose own time/place for learning	87	78.0
2	Ability to complete course at own pace	70	62.0
3	Ability to take courses to meet current job requirements	65	58.0
4	Ability to take courses to train for a new job assignment	54	48.0
5	Access to most current technical course content	44	39.0
6	Ability to access training at home	44	39.0
7	Ability to access training faster (just-in-time training)	40	36.0
8	Ability to take courses to pursue personal interests	21	19.0
9	Easy access to computer	21	19.0
10	Availability of instructional assistance	20	18.0
11	Availability of credits for successful course completion	17	15.0
12	Ability to access training through in-company learning centre	11	9.8
13	Need to reduce training expenses	11	9.8
14	Availability of technical support	11	9.8
15	Need to reduce travel expenses	3	2.7

Research Question 10: What "other" comments do employees have with respect to CBT?

The final question on the CBT survey gave employees the opportunity to provide additional comments. A total of 86 employees submitted comments with the following breakdown by Business Unit: 1 (1.2%) in Corporate, 43 (50%) in Newfoundland, 17 (19.8%) in Nova Scotia, and 25 (29%) in Western. The data was then analyzed to discern common patterns. The comments were subsequently grouped around 20 predominant themes, including availability of CBT courses, past experience with CBT, and general usefulness/effectiveness of CBT. These themes are shown in Table 22, which compares employee's "other" comments with those of management concerning CBT strengths and

weaknesses, as well as their recommendations with respect to delivery of a new CBT program in the company. Employee's comments will be summarized here as they relate to the introduction of a new CBT program for **xwave solutions.**

Overall, employees generally view CBT as an "inexpensive way to promote learning;" however, there appear to be general concerns around how the program is managed and structured. The biggest stated concern is the fear that CBT will replace instructor-led training, which is seen as a preferable learning method by many of those who commented. Typical of such comments were "I learn better from instructor-led Vs CBT courses," and "I believe CBT is the wrong medium for courses in management, supervision, team building and project management." Another concern is the expectation that the employer will expect the employee to do the training at home. Finding time to schedule CBT on the job is an issue for a number of survey respondents. One employee suggested a Learning Centre environment to get away from interruptions and noise. Others had concerns about the currency of content in CBTs, in particular with respect to the courses provided for Certification curriculum.

Despite these concerns, there was general enthusiasm for the idea of having CBT courses as an option. One employee wrote "Great idea. Hope to see some available soon," and another felt "CBT will become more important to our success as an organization." CBT courses were also generally viewed as a cost-effective way to provide "much needed training" when costs and budget restraints are an issue. Others saw CBTs as a way to provide "Just-in-Time" training. Flexibility, ease of use, and access from home to CBTs, in particular Internet access, were also seen as benefits.

Research Question 11: What are the key training needs according to key corporate decision makers?

Managers were asked to provide information on the key training needs of people in their group for the current year and the specific knowledge and skills their group would require in the next two to five years. This information was requested to expand on the data about training needs from the employee survey, as well as to provide additional information on trends and directions in the business that might affect future training requirements

As expected, the training requirements are similar to those reported by employees. In general, the interviews with senior management provide qualitative data that support the key findings from the employee survey. Just as Leadership Skills, Team Leadership and Project Management top the list of courses that were deemed most important to complete in 1999, so too do these courses dominate the discussion by senior management of the most required training for **xwave solutions** employees. Seven senior managers across the **xwave solutions** organization reported a need for these skills, as well as Account Management and what one manager called "plain old fashioned business skills."

A senior manager in Newfoundland responsible for a large group of IT professionals explained the need for these "soft" skills as part of "a change in focus" by the organization: "People have the IT background, but now they're being asked to play a different role. They need more knowledge of a client's business – none of it is technical – the technology we will always get ourselves trained in." This manager underlined the need to push leadership training and consulting skills further down in the organization. On the same point, another manager in Nova Scotia noted, "We're becoming a consulting

organization. Typically we have not dealt with customers. Now we need a customer focus and basic consultancy skills." This manager also called for leadership development training, "at all levels of the organization," as well as team building skills. A manager in Western noted that employees need "more formal project management training as the group moves from a 'body shop' focus to a larger project type of work."

With respect to the "hard" skills, these varied according to the jobs performed by employees in each group; however, overall there was a significant demand for "hot" skills, in keeping with the findings of the employee survey. The need for Internet skills, Java, Microsoft Access training, Visual Basic programming, Oracle and Client Server technology were clearly identified by managers. A challenge for training at **xwave solutions,** according to another senior manager, is to "keep the old skills going, and at the same time develop new sets of skills." The reference was made with respect to the need to maintain legacy systems that use old languages such as PLI and Cobol, versus the "shiny new development skills" of MS Access, Visual Basic, Oracle, Web Development, IVR and Java. Another senior manager in Nova Scotia suggested that employees on the mainframe side of the organization should be given opportunities to develop new "hot" skills: "We need to bring juniors in on mainframe support to provide an opportunity for our mainframe staff to get trained on new things."

As for future needs, managers identified more of the same types of training for both "hard" and "soft" skills, including leadership, project management training, and further development of Internet, Oracle and client-server skills.

Research Question 12: (a) What are the strengths and weaknesses of CBT according to key corporate decision makers, as well as their recommendations with respect to delivery of a new CBT program in the Company? (b) How do they compare with "other" comments obtained from the employee survey?

In order to provide information to help **xwave solutions** with the implementation of a new CBT program, managers were asked for their perspectives on the strengths and weaknesses of CBT. The resulting comments were analyzed and organized according to common themes that emerged. The results are, not surprisingly, very similar to the themes that emerged for "other" comments from employees.

The key strengths of CBT as noted by the managers were:

1. Learning at one's own pace;
2. Cost-effectiveness;
3. Ease of use;
4. Accessibility;
5. "Just-in-Time" training;
6. Flexibility; and
7. Convenience.

The weaknesses of CBT as noted by managers were:

1. CBT requires finding time to schedule training;
2. CBT is not everyone's preferred learning style;
3. CBT requires discipline, motivation;
4. CBT lacks interaction with an instructor; and

5. CBT requires technical components.

The key recommendations by managers for delivery of CBT in the Company were:

1. CBTs need to be screened/assessed;
2. Time on the job should be allotted to employees for CBT training;
3. Make CBTs easy-to-use;
4. Understand where and how CBTs can best be used, such as to provide "Just-in-Time" training;
5. CBTs must be current;
6. Need flexibility to swap out courses;
7. Courses should be available at the desktop;
8. Need an awareness/publicity campaign for CBT introduction;
9. Learning Centres in key sites would be useful;
10. Use incentive programs to encourage use;
11. Courses need to be available on the Web from all company locations;
12. Content has to be engaging and sophisticated;
13. Feedback and/or credits for courses should be offered;
14. Need ongoing needs assessment; and
15. Need buy-in from employees, achieved through some sort of CBT trial.

In the discussion with key corporate decision makers on strengths, weaknesses and recommendations, they echoed many of the factors that employees said were important in their decision to carry out computer based training, as well as the reservations or cautions that came through in the "other" comments. In the data analysis, comments from key

corporate decision makers were grouped around many of the same themes as "other" comments from the employee survey, as reflected in the findings shown in Table 22.

Table 22: Comparison of Employee and Management Comments on CBT

	Employees	Managers
Type of Comment	Frequency	Frequency
Accessibility	2	3
Available as Introduction to Topic	2	
Awareness/Promotion of CBTs	1	5
CBT trial		3
CBT versus Instructor-led/Lack of interaction with instructor	16	14
Cost-effective way to promote learning	5	5
Credits/Feedback		3
Current content	1	3
Discipline/Motivation	1	6
Ease of use	2	3
Engaging Content		4
Finding time to schedule CBT courses	5	6
Flexibility	2	9
General usefulness /effectiveness of CBT	7	1
Internet Access	1	2
Just-in-Time Training	1	3
Learn at own pace		9
Learning Centre	1	3
Manuals	1	
Ongoing needs assessment		1
Other required courses	15	
Past experience with CBT	2	
Preferred learning style	1	1
Simulations/Examples	3	
Travel	1	

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Internship Goals

The mission of **xwave solutions** is to be focused on people and passionate about results. Flowing from this, the mandate of the Career Development Team is to build a new employment experience that engages and empowers all employees in the organization. The 12-week internship at **xwave solutions** resulted in the achievement of three major goals, outside of the research component. First, the intern became familiar with the human resource management and training programs provided by **xwave solutions**, including the Training and Orientation Program for new hires and the Professional Development Plan process for existing employees. Second, the intern became knowledgeable about the roles of human resource management personnel in the delivery of training programs, including functions associated with traditional classroom training and CBT delivery mechanisms. Third, the intern had the opportunity, through the needs assessment process, to acquire experience in how to offer IT training programs through CBT methods.

The intern drew several conclusions from the activities undertaken in pursuit of these three goals. It was discovered that CBT courseware is instructionally designed to be highly interactive, based on the principles of the cognitive approach to learning. CBT courses aim to stimulate active learner involvement with the use of concept demonstrations, simulated practice, and immediate feedback on results. It is expected that the evolution toward fully interactive computer environments will continue. As

Simonson and Thompson (1997) state, "computer learning environments will continue the trend to use the computer to produce student-controlled, discovery environments that allow students to explore and test hypotheses in particular content areas" (p. 337). Consequently, CBT courseware should become an increasingly attractive alternative to classroom instruction.

It was also observed that the breadth and depth of technical training currently required by IT personnel, along with the new skill requirements emerging through rapid changes in technology, present the corporate trainer with a tremendous challenge in developing IT training programs. The 211 courses listed in the CBT survey are but a portion of the entire spectrum of IT courses that might be provided to employees. Consequently, it is not possible for the trainer to be a subject matter expert in all IT skill areas. More importantly, within a limited budget, the trainer must decide where training priorities lie, which may be based on employee demand and/or the strategic objectives of the organization. As Donaldson and Scannell (1989) point out, training needs must be carefully researched before a training program is designed. "A well-designed training program is an integrated collection of knowledge, skills and attitudes, all carefully blended to mold a specific product – the desired learning under specified conditions" (p. 19). It must be concluded, then, that a needs assessment is a very necessary first-step in establishing training priorities. The results of the needs assessment project for **xwave solutions**, summarized under the next section, provided such a foundation for development of a new CBT program.

Research component

The training needs assessment conducted for **xwave solutions** was designed to determine the CBT needs of employees. The assessment involved two major components: 1) a survey of 854 permanent full-time and part-time **xwave solutions**-employees from the Corporate, Newfoundland, Nova Scotia and Alberta Business Units; and 2) interviews with 15 key corporate decision makers from these same **xwave solutions** Business Units. The employee survey focused on course content requirements, technology considerations, experience with computer-based or multi-media training, and important decision factors in CBT usage. The interviews were designed to expand on the results of the employee survey with respect to training needs, strengths and weaknesses of CBT, as well as recommendations for delivery of a new CBT program in the company.

As intended, the results of the survey provided information on the most frequently required courses in 24 subject areas, with a total of 519 employees ranking 211 courses across all categories as "Must Have," "Nice To Have" and "Not Required." Overall, the top thirty most frequently identified "Must Have" courses were for "soft" or professional development skills. Team Leadership topped the list, required by approximately 29% of respondents, followed by Leadership Skills at 28%, and Team Problem Solving at 24%. Courses under the Project Management subject area were also ranked highly on the "Must Have" list, including Estimating in fourth place at 21% and Scheduling in fifth place at 21%. Stress Management was sixth, required by 20% of respondents. The demand for "hard" or technical skills began at number 22 on the "Must Have" list. Technical skills that made the top thirty list were: Internet and Intranet Security, required by approximately 15% of respondents; Internet and Intranet Skills at 14%; Office 97 at 12%;

and Systems and Database Management at 12%. A chi-square analysis showed that there was a significant difference in demand between the top thirty "soft" skills and the top thirty "hard" skills that were selected by employees as "Must Have" courses. "Soft" skills were in significantly higher demand than "hard" or technical skills.

The "hard" or technical skills appeared to become more important when employees were asked to narrow their "Must Have" course choices to five courses that were most important to complete in 1999. While Leadership Skills, Team Leadership and Project Management top the list, required respectively by approximately 21%, 20% and 12% of respondents, 10 of the top thirty "Most Important To Complete in 1999" courses were of a technical nature: E-Commerce, Microsoft Visual Basic 6.0, Office 97, Web Application Developer, Internet and Intranet Security, Oracle8 Database Administration, Oracle Database Programming, Internet and Intranet Skills, Oracle Introduction, Oracle7 Database Administration, and Microsoft SQL Server 7. However, despite the apparent increase in demand for "hard" courses, a chi-square analysis of the top thirty "hard" skills and the top thirty "soft" skills indicated that the "soft" skills were significantly more important to complete in 1999. This result is consistent with the findings of the Government of Newfoundland and Labrador report entitled Information Technology: Closing the Human Resources Gap in Newfoundland and Labrador (1998). This study showed that IT employers, when asked which of 38 core skills were most important, isolated primarily core soft skills.

The survey results found that the subject areas in most demand were Leadership, Business Communications, Information Technology Core Concepts, Web/Internet/Intranet, Project Management, Application Development and Programming,

and Database Development and Administration. This finding is consistent with the research in the Information Technology: Closing the Human Resources Gap in Newfoundland and Labrador (1998) study, in which the top areas for training as identified by employers and employees were: written communications, interpersonal skills, customer service, problem solving, management training, team building, human resource management, network training, all aspects of Internet/Intranet, programming, project management, database management and programming, system design/analysis. The **xwave solutions** results are also consistent with the finding of a study by the Information Technology Association of Canada (1997). ITAC found that the top three technical skills in demand by IT employers were client server implementation and management capability (found under Database Management and Programming, and Information Technology Core Concepts in the **xwave solutions** study), database development, and database administration. While Web/Intranet/Internet skills were identified as a top area for training in the **xwave solutions** study, the ITAC study simply noted strong demand for Java, C++ programming, web languages and web integration.

With respect to technical considerations for the delivery of a new CBT program, the survey found that approximately 99%, or 528 of 535 respondents, reported access to a computer at work. Of employees who said that they had access to a computer at work, approximately 98% or 524 employees reported having access to the Internet. These results indicate very favorable conditions for the delivery of CBT courses over the Internet at work.

Approximately 87%, or 466 of 533 respondents, said they had access to a computer at home and, of this number, 64% or 341 employees said they had access to the Internet.

There were significant differences among Business Units in their reported level of access to a computer at home. Access to a computer at home was significantly higher than expected among employees in Corporate, Nova Scotia and Western but significantly lower among employees in Newfoundland. There were no statistically significant differences in the number of employees with access to the Internet at home. These results point to the need for an alternative means of delivering CBT courses at home, given the fact that one-third of employees do not have access to the Internet.

Overall, experience with multi-media or computer-based training was high. Approximately 82%, or 431 or 528 respondents, reported that they have used CBT or multi-media training in the past. Employees in the Newfoundland Business Unit report the most experience, with approximately 88% saying that they have used CBT in the past. Employees in the Western Business Unit have the least experience with CBT, with approximately 63% saying they have used CBT training in the past. A chi-square analysis found that the difference between Newfoundland and Western is significant. Given these results, employees in Western may need more information about the use of CBT if a CBT program is introduced in this region.

A total of 523 employees provided information on the factors that would affect their decision to do computer-based training. Fifteen factors were listed, and employees were asked to select five that were most important to them. The five most frequently cited factors were: flexibility to choose own time/place for learning, ability to take courses to meet current job requirements, ability to complete course at own pace, ability to take courses to train for a new job assignment, and ability to access training at home. A chi-square analysis showed that ability to reduce travel and training expenses were factors

that were significantly more important to employees in the Corporate Business Unit, which is not surprising given the jobs people perform in that Unit. Ability to access training at home was significantly more important to employees in the Newfoundland Business Unit. This result is important in light of the finding that access to a computer at home was significantly lower for Newfoundland employees. Instructional assistance was a significantly more important factor to employees in the Nova Scotia Business Unit. While access to current content is in the top five factors for Western, it is interesting to note that there is no significant difference in the importance of this factor among the Business Units. This may indicate that while this factor is emphasized by Western employees in "other" comments and by Western managers in interviews, it is just as important to employees in all Business Units.

Interviews were conducted with 15 senior managers in the **xwave solutions** organization to provide an "employer" perspective on training needs. The interviews with senior management provided qualitative data that support the key findings from the employee survey. Just as Leadership Skills, Team Leadership and Project Management top the list of "Courses That are Most Important to Complete in 1999," so too did these courses dominate the discussion by senior management of most required training for **xwave solutions** employees. Seven senior managers across the **xwave solutions** organization reported a need for these skills, as well as Account Management and what one manager called "plain old fashioned business skills."

In order to provide information to help **xwave solutions** training staff with the implementation of a new CBT program, managers were asked for their perspectives on the strengths and weaknesses of CBT, as well as for their recommendations with respect

to delivery of a new CBT program in the Company. The findings mirrored the "Other" comments provided by 86 employees in the survey, which showed general enthusiasm for the idea of having CBT courses as an option. The key strengths included factors reported by employees as most important in deciding to carry out computer-based training, including flexibility, learning at one's own pace, accessibility, Just-In-Time training, and cost-effectiveness. The key weaknesses were that CBT requires finding time to schedule training, CBT is not everyone's preferred learning style, CBT requires discipline and motivation, CBT lacks interaction with an instructor, and CBT requires technical components. Overall, managers generally viewed CBT as a viable training option by employees in conjunction with instructor-led training and not instead of instructor-led or classroom training. Technical skills were seen as more appropriate for CBT courses than "soft" or "professional development" skills. Complex technical skills were also viewed as more appropriate for instructor-led learning. CBTs were seen primarily as an "introduction" to a topic or as "Just-in-Time" training.

Management's key recommendations for implementation of a new CBT program were to develop a structure around the training, so that time-on-the job is allotted to employees for CBT training. Courses should be available at the desktop and from home, through the Internet, and from computers in Learning Centres situated at key sites. An awareness campaign should be conducted to promote the availability of CBT, and incentives should be used to encourage their use, including credits/feedback on courses completed by employees. The qualitative findings from the **xwave solutions** study are consistent with views in the literature. Bourdeau and Bates (1997) point to the need for easy accessiblity to the course material, for two-way communication or collaboration

components to keep students motivated, and for feedback and evaluation mechanisms in order to ensure quality learning outcomes.

Recommendations

Based on the results of this internship research study, the intern made the following recommendations to **xwave solutions** with respect to delivery of a new CBT program in the company:

1. Based on the courses identified as required for CBT training, the following tables of courses should be provided in a Request for Proposals (RFP) to CBT vendors:

Table 23: Leadership

Courses
1. Team Leadership
2. Leadership Skills
3. Team Problem Solving
4. Stress Management
5. Time Management
6. Conflict Resolution
7. Managing Change
8. Top Performance: Six Win-Win Principles
9. Coaching and Counseling
10. Mentoring
11. Attitude: Your Most Priceless Possession
12. Empowerment
13. Dealing with Diversity
14. Human Touch Performance Appraisal
15. Techniques for Interviewing the Right Candidate
16. Documenting Discipline

Table 24: Business Communications

	Courses
1.	Exceeding Your Customer's Expectations
2.	Getting Your Message Across
3.	Negotiating For A Positive Outcome
4.	Better Business Writing
5.	Measuring Customer Service
6.	Calming Upset Customers
7.	Telephone Courtesy and Customer Service

Table 25: Project Management

	Courses
1.	Estimating
2.	Scheduling
3.	Fundamentals
4.	Scope
5.	Communications
6.	Risk
7.	Quality
8.	Control
9.	Initiation and Startup
10.	Microsoft Project 98: Getting Started
11.	Human Resources
12.	Procurement

Table 26: Information Technology Core Concepts

	Courses
1.	Internet and Intranet Skills
2.	Systems and Database Management
3.	Managing Information Systems
4.	Computing Systems Infrastructure

Table 27: Application Development and Programming

	Courses
1.	MS Visual Basic 6.0
2.	Microsoft Access
3.	Object-Oriented Analysis
4.	Object-Oriented Design
5.	SQL Windows
6.	Java by IBM/JavaSoft/Netscape
7.	C/C++ Programming
8.	MS Visual InterDev
9.	MS J Script
10.	COBOL
11.	MS Windows Architecture
12.	PowerBuilder 6.0
13.	MS Windows NT for UNIX Developers
14.	FOCUS
15.	MS Visual C++ 5.0
16.	ANSI C
17.	Marimba

Table 28: Database Development and Administration

	Courses
1.	Oracle Database Programming
2.	Oracle8 Database Administration
3.	Oracle8 New Features
4.	Oracle Introduction
5.	Oracle7 Database Administration
6.	MS SQL Server 7
7.	Oracle Developer/2000 Toolset
8.	IMS
9.	IBM DB2 Universal Database
10.	IDMS
11.	INFORMIX Database Programming
12.	INFORMIX Online Dynamic Server

Table 29: Internetworking

	Courses
1.	Network Management and Security
2.	Internetworking Essentials
3.	LAN Technologies
4.	Routed Network Protocols-TCP/IP Protocol
5.	LAN Network Operations and Protocols
6.	Routing, Bridging and Switching
7.	Telecommunications Essentials
8.	Routed Network Protocols-Technologies Level
9.	Cisco Routers
10.	Telecommunications Voice & Data Integration
11.	WAN Technologies – Access
12.	Routed Network Protocols-OSI Protocol
13.	WAN Technologies-Cell –Based
14.	Wan Technologies- Packet- Based
15.	Telecommunications Signaling System 7

Table 30: Lotus Products

	Courses
1.	Notes Domino 5 End-User
2.	System Administration for Notes
3.	Application Development for Notes

Table 31: Mainframe

	Courses
1.	Job Control Language
2.	MVS Operating System
3.	MVS Utilities
4.	DB2 Database System
5.	ISPF PDF Program Development
6.	DB2/SQL/DS Programming
7.	Application Programming Concepts
8.	Data Communications
9.	VS COBOL II
10.	COBOL Fundamentals
11.	REXX Programming for MVS
12.	CICS Programming Skills

Table 32: Microsoft System Administration

Courses
1. Networking Essentials
2. Windows NT 5
3. Windows NT 4.0 Server, Workstation, Enterprise
4. TCP/IP on Windows NT 4.0
5. Operating Systems Essentials
6. Internet Information Server (IIS) 4.0
7. Windows 95 – Service and Support
8. Exchange Server 5.5
9. Windows 98 – Implementation and Support
10. SQL Server 7.0
11. Internet Explorer 4.0
12. Proxy Server 2.0
13. Systems Management Server 1.2
14. Windows NT 3.5x Support Fundamentals
15. BackOffice and Small Business Server 1.0
16. Exchange Server 5.0
17. Internet Information Server (IIS) 3.0

Table 33: Microsoft Certified Solution Developer Curriculum

Courses
List all courses included in your MCSD curriculum.

Table 34: Microsoft Certified Systems Engineer Curriculum

Courses
List all courses included in your MCSE curriculum.

Table 35: Microsoft End-User Operating Skills

	Courses
1.	Office 97
2.	Windows 95
3.	Outlook 98
4.	Windows NT 4.0
5.	Windows 98
6.	Internet Explorer
7.	Project 98
8.	FrontPage 98
9.	Exchange 5.0

Table 36: Netscape Products

	Courses
1.	JavaScript
2.	Management and Security
3.	Communicator 4.0
4.	Enterprise Server 3.0
5.	LiveWire

Table 37: Novell Certified Internet Professional

Courses
List all courses included in the curriculum for a Novell Certified Internet Professional.

Table 38: Novell IntranetWare

	Courses
1.	NetWare 5
2.	IntranetWare CNE Requirements
3.	Integrating Windows NT and IntranetWare
4.	NetWare 4.1
5.	Advanced Web Authoring
6.	Web Authoring and Publishing

Table 39: Occupational Health and Safety

Courses
1. Industrial Ergonomics
2. Back Safety
3. Eye Safety
4. Fire Prevention and Safety
5. Slips, Trips and Falls
6. ANSI/Material Safety Data Sheets

Table 40: Personal Computer Technician

Courses
1. Technical Support: core Modules for A+ Certification
2. Microsoft DOS/Windows for A+ Certification
3. Supporting Courses for Helpdesk Personnel

Table 41: SAP R/3 3.0

Courses
1. Basis
2. Business Process Introduction
3. End-User
4. Release 2.2 Curriculum
5. Project Team Technical
6. Project Team Logistics (non-standard architecture)
7. Project Team Financials (non-standard architecture)

Table 42: Technical Support: Core Modules for A+ Certification

Courses
1. PC Configuration I
2. PC Diagnostics and Repair
3. PC Configuration II
4. Networking Support
5. Safety and Preventative Maintenance
6. Interaction with Customers
List any other core module courses included in your curriculum for A+ certification.

Table 43: Technical Support: Microsoft DOS/Windows Module for A+ Certification

Courses
1. Networking and Troubleshooting
2. Installation and Configuration
3. Application Support
4. Devices and Drivers
5. Dos 6.2
List any other MC DOS/Windows module courses included in your curriculum for A+ certification.

Table 44: Technical Support: Supporting Courses for Help Desk Personnel

Courses
1. Networking Support
2. Windows NT 4.0
3. Microsoft Windows 95 – Service and Support
4. Microsoft Windows 98 – Service and Support
5. Interaction with Customers
6. Safety and Preventative Maintenance

Table 45: UNIX

Courses
1. UNIX Foundation Level
2. Solaris
3. HP-UX
4. UNIXWare

Table 46: Web/Internet/Intranet

Courses
1. Internet and Intranet Security
2. E-Commerce
3. Web Application Developer
4. Web End-User Skills
5. E-Business
6. Web Master
7. Web Publisher

2. The following courses may be dropped, if necessary, from the lists above, as employees did not include these courses in the list of those most important to complete in 1999: Procurement, ANSI C, Marimba, INFORMIX Database Programming, INFORMIX Online Dynamic Server, Routed Network Protocols - Technologies Level, Routed Network Protocols – OSI Protocol, Telecommunications Signaling System 7, Exchange Server 5.0, Internet Information Server (IIS) 3.0, LiveWire, ANSI/Material Safety Data Sheets, all of the SAP R/3 3.0 courses, PC Configuration I, PC Configuration II, Safety and Preventative Maintenance.
3. Courses should be accessible to employees, preferably through the Internet, both at work and at home. Computers should be available for CBT training in Learning Centres situated at key company sites.
4. Policies should be developed for CBT training which clearly outline the company's position on factors that are most important to an employee's decision to do computer-based training. Employees would like access to courses both at work and at home. Preferably, employees should be able to choose from the full slate of CBT courses for both their professional and personal development, as well as for their advancement on the job. It is also recommended that guidelines be established that allow managers to allocate time on the job for CBT training.
5. Credits should be available for all courses, and should be maintained in the employee's training file. CBT should be incorporated as an option into the competency-based training plan developed for each employee.
6. Currency of content is very important, in particular for Western employees who are focused on "leading edge" technologies. The Microsoft Certification courses as

presented in this study were viewed by Western as out-of-date; therefore any Certification course content recommended by vendors should be examined carefully by Training Staff. It is recommended that a buy-in be sought from Western for courses in this area, and that these courses should be reviewed by other divisions as well.

7. Introduction of the new CBT program should be in conjunction with a promotion campaign and awareness program designed to communicate the benefits of the training to all employees, as well as the full slate of courses that are available. This communication should be designed to overcome the perceived weaknesses in many people's minds of CBT training. Consequently, CBT should be positioned as part of an overall corporate training strategy (See Recommendation 8).
8. While this study was designed to determine CBT training needs, the results point to a broader need for training in "soft" skill areas which cannot solely be met through CBT training. For example, both employees and managers perceive Leadership and Project Management training as top priority training needs. Neither group, however, see CBT as fully meeting the training need. It is recommended that these and other "soft" skill courses should be available in CBT format as an introduction to the topic or as "Just-in-Time" training. This CBT training would then be complemented and supplemented by an instructor-led or classroom training component in these subject areas. It is recommended that any training strategy should integrate CBT with instructor-led /classroom training for optimum learning results. Developing an instructional strategy for CBT in isolation from the overall training is likely to adversely affect the success of any CBT program.

Recommendations for Further Research

Based on the results of the training needs assessment research at **xwave solutions**, the following are recommendations for further research:

1. A limitation of the current study was its lack of detailed demographic information on employees, which was restricted to identification of the Business Unit and the Team to which each employee belonged. Any further research should include expansion of the demographic information to include such variables as job title, years of service, education achieved, age and gender. This would allow for comparisons to be made that would provide additional, valuable information about factors that are important to learning and the delivery of course material to employees. For instance, the researcher would be able to determine if there are gender or age differences in the training requirements of IT employees. In addition, information about training requirements by job title would enable the trainer to target course delivery based on various group functions.
2. The courses included in the needs assessment survey were limited to courses that were available from CBT vendors. Consequently, only a relatively small number of "soft" courses were included in the survey because CBT vendors are focused on training in technical or "hard" skills. Any further research on training requirements for **xwave solutions** should focus on including a broader range of "soft" skills that might be required in the IT business environment, but which may not be available through CBT vendors. For instance **xwave solutions** managers identified a number of "soft" training areas, such as Account Management, that should be included in any further research. At the same time, technical courses included in the survey should

also be reviewed and courses added or deleted according to suggestions from employees on the survey or manager's comments in the interviews.

Final Perspectives on the Internship

The internship at **xwave solutions** was valuable from many perspectives. Most importantly, it was an opportunity to put theory into practice. The training needs analysis plan was based on a model from Rothwell and Kazanas (1998) and guided the entire process, proving to be the foundation for the project's overall success. Development of the needs assessment survey and interview questionnaire were based on sound recommendations from the literature as well, including McClelland (1995) and Mills, Pace and Peterson (1998). Moreover, the intern discovered that CBT courseware is developed based on sound principles of instructional design recommended by such educational authorities as Bourdeau and Bates(1997) and Simonson and Thompson (1997). These experiences demonstrated that there is a true basis in reality for educational theory.

Other experiences during the internship provided challenges not encountered in the literature and, with them, the opportunity to be original and creative in a team-based environment. When efforts to find an off-the-shelf needs assessment survey were unsuccessful, the intern had to develop a customized survey to meet the objectives of the project. Considerations given to questions, course content and communications were further complicated by the requirement to Web-enable the survey. Working with staff in Career Development and an Internet Team, the intern had the opportunity to learn first-hand about Web-survey design and navigation principles, Web programming languages,

such as Java, and data collection programs, such as Microsoft Access. The result of that team effort was an original CBT needs assessment survey and the first Web survey to be accessible to all **xwave solutions** employees across Canada.

The results of the survey were interesting from two perspectives. Employees placed a greater importance on "soft" skills than would have been expected by chance. "Soft" skills were also in significantly greater demand than "hard' skills. These results were unexpected. It was anticipated that "hard" skills would be most in demand, given the preponderance of "hard" skills on the list and the fact that CBT vendors specialize in providing technical skills through CBT. From a research perspective, the findings confirm the changing role of the IT professional, and lend support to the stated need for a greater emphasis on "soft" skills training for IT workers. From a training perspective, the findings are problematical because the skills most in demand are those which employees and managers do not see CBT as capable of providing effectively. "Soft" skills are seen as more appropriate for instructor-led training. The question for training at **xwave solutions** then becomes how to provide the "soft" skills training outside the delivery of a new CBT program.

Finally, this intern believes that this study has significance for the delivery of IT programs within educational institutions. This study identifies training priorities for a large group of local IT professionals in terms of most important "hard" and "soft" skills. Post-secondary educational institutions might find it helpful to review their programs to determine if they are developing the skills that are most in-demand within the local IT industry.

References

American Society for Training and Development, (1985). Be a better needs analyst. Alexandria, VA: American Society for Training and Development.

Canadian Advanced Technology Association. (1997). Press release: Double or Nothing. [Online]. Available: http://www.cata.ca/cata/news/double.htm.

Bourdeau, J. & Bates, B. (1997). Instructional design for distance learning. In S. Dijkstra, N. Seel, F. Schott, & R. Tennyson (Eds.), Instructional Design: International Perspectives. London: Lawrence Erlbaum Associates.

Bowman, B. (1987). Assessing your needs assessment. In Beverly Geber (Ed.). Designing Training. Minneapolis: Lakewood Books.

Cook, C. (1996). Factors affecting ILS implementation. In John J. Hirschbuhl & Dwight Bishop (Eds.) Computers in Education. Connecticut: Duskin Publishing Group/Brown & Benchmark Publishers.

Davies, I.K. (1995) Re-Inventing ISD. In Barbara B. Seels (Ed.) Instructional design fundamentals: A reconsideration. New Jersey: Educational Technology Publications.

Donaldson, L. & Scannell, E. (1989). Human resource development: The new trainer's guide. Don Mills, Ontario: Addison-Wesley.

GartnerGroup. (1998). Enterprise Performance Improvement: People, Processes, Technologies, Conference Presentation.

Gilley, J. W. & Eggland, S. A. (1989). Principles of human resource development. Don Mills, Ontario: Addison-Wesley.

Goodkind, H. M. (1996). Regional training needs assessment: Dual perspectives eliminate the guessing game. Lane Community College: Oregon.

Gray, K. C. & Herr, E. L. (1998). Workforce education: The basics. Toronto: Allyn and Bacon.

Halal, W. & Liebowitz, J. (1994). Telelearning: the multimedia revolution in education. In John J. Hirschbuhl & Dwight Bishop (Eds.) Computers in Education. Connecticut: Duskin Publishing Group/Brown & Benchmark Publishers.

Industry Canada. (1997). Ensuring Canadian Competitiveness in the New Global Economy. [Speech] Presentation to Stentor CEO's Council by Kevin G. Lynch, Deputy Minister, Industry Canada.

Information Technology Association of America. (1997) Help wanted: The IT workforce gap at the dawn of a new century. [Online.] Available: http://www.itaa.org.

Information Technology Association of Canada. (1999). IT skills shortage in Canada-A Snapshot. [Online.] Available: http://www.itac.ca.

Kaufman, R. & English, F. (1976). Needs assessment: A guide to improve school district management. Arlington, Va.: American Association of School Administrators

Kaufman, R. (1977). Needs assessments: internal and external. Journal of Instructional Development 1 (1), 5-8.

Kemp, J., Morrison, G., & Ross, S. (1994). Designing Effective Instruction. Toronto: Maxwell Macmillan Canada.

Laird, D. (1988). Approaches to training and development. Ontario: Addison-Wesley.

Merriam, B. & Caffarella, R. (1991). Learning in adulthood. San Francisco: Jossey-Bass.

McClelland, S. (1995). Organizational Needs Assessments: Design, Facilitation and Analysis. Westport, Connecticut: Quorum Books.

Mills, G. E., Pace. R. W. & Peterson, B. D. (1988). Analysis in human resource training and organization development. Don Mills, Ontario: Addison-Wesley

Government of Newfoundland and Labrador. (1998). Information technology: Closing the human resources gap in Newfoundland and Labrador. (Final report). St. John's: Government of Newfoundland and Labrador

Pieters, J. (1997). Training for human resources development in industrial and professional organizations. In S. Dijkstra, N. Seel, F. Schott, & R. Tennyson (Eds.), Instructional Design: International Perspectives (p. 315-340). London: Lawrence Erlbaum Associates.

Reinhardt, A. (1996). New ways to learn. In John J. Hirschbuhl & Dwight Bishop (Eds.) Computers in Education. Connecticut: Duskin Publishing Group/Brown & Benchmark Publishers.

Richey, R. & Tessmer, M. (1995). Enhancing instructional systems design through contextual analysis. In Barbara B. Seels (Ed.) Instructional design fundamentals: A reconsideration. New Jersey: Educational Technology Publications.

Rothwell, W. & Kazanas, H. (1998). Mastering the instructional design process: A systematic approach. San Francisco: Jossey-Bass.

Shambaugh, R. & Magliaro, S. (1997). Mastering the Possibilities: A Process Approach to Instructional Design. Toronto: Allyn and Bacon .

Simonson, M. & Thompson, A. (1997). Educational Computing Foundations. New Jersey: Merrill..

St. Francis Xavier University. (1987). Training for the trainer: Diploma in adult education. Antigonish, N.S: St. Francis Xavier University.

Smith, S. (1989). Assessing needs for education for employment: A product of the project "Change, technology and vocational education." Office for Vocational, Technical and Career Education: Northern Illinois University.

Tight, M. (1996). Key Concepts in Adult Education. London: Routledge.

Wiburg, K. (1996). Integrated learning systems: What does the research say? In John J. Hirschbuhl & Dwight Bishop (Eds.) Computers in Education. Connecticut: Duskin Publishing Group/Brown & Benchmark Publishers.

Woodall, D. (1998). Criteria for evaluating off-the-shelf multimedia training suppliers. Available: dwoodall@netg.com

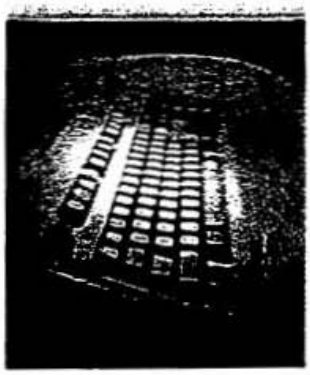
xwave solutions Internet site. (1999). Careers. [Online] Available: http://www.aliant.ca/english/home_frame.htm.

Appendix A

Computer-Based Training Survey

xwave

Computer-Based Training Survey



CBT Needs Assessment Questionnaire

The purpose of this survey is to assess the computer-based training(CBT) needs of all **xwave solutions** employees. Results from this survey will help **xwave solutions** in setting CBT priorities for 1999 and beyond.

Your confidentiality is ensured. You will not be asked to identify yourself anywhere on the questionnaire, nor will any attempt be made to identify individuals. The information will be used only for the purposes of this study, and will be reported anonymously and on a group basis only.

Your opinion is important. While participation in this survey is completely voluntary, your cooperation will help us better meet the training requirements of all **xwave solutions** personnel.

Please take the next 10-15 minutes to answer all nine (9) questions in the survey. **Surveys must be completed by Monday, March 22.**

If you have any questions or comments, please contact
Cris Dicks at: CrisDicks@xwavesolutions.com

This survey is best viewed using Internet Explorer 4.x or Netscape 4.x.

You are using:
Microsoft Internet Explorer 4.0 (compatible; MSIE 4.01; Windows 95)

If you would like to upgrade your browser, please click the link below and then return to the survey.

Get Microsoft Internet Explorer Netscape

Continue

1 *Business Unit*

Page 2

My primary business unit is:(*Select one.*)

- (•) Corporate
- ( ) Newfoundland Business Unit
- ( ) Nova Scotia Business Unit
- ( ) Western Business Unit

Team

Page 3

My team is: (*Select one.*)

- (•) Business Operations and Growth - Corporate
- ( ) Business Operations and Growth - Enterprise Management
- ( ) Executive
- ( ) Markets
- ( ) People
- ( ) Other: _____

1 *Business Unit*

Page 2

My primary business unit is:(*Select one.*)

- ○ Corporate
- ◉ Newfoundland Business Unit
- ○ Nova Scotia Business Unit
- ○ Western Business Unit

2 *Team*

Page 3

My team is: (*Select one.*)

- (•) Business Development
- ( ) Career Development
- ( ) Corporate Support
- ( ) Enterprise Management
- ( ) Marketing
- ( ) Public Sector
- ( ) Specialties and Practices
- ( ) Telecomm
- ( ) VAR
- ( ) Other: _____

[redacted]

1 *Business Unit*

[redacted]

Page 2

My primary business unit is:(*Select one.*)

- ○ Corporate
- ○ Newfoundland Business Unit
- ◉ Nova Scotia Business Unit
- ○ Western Business Unit

[redacted]

[redacted]

2 *Team*

Page 3

My team is: (*Select one.*)

- (•) Business Solutions Delivery
- ( ) CSM 2000+ Implementation
- ( ) Customer Help Centre
- ( ) Desktop Integration and Support
- ( ) IT Operations & Network Systems & Support
- ( ) The Link Project
- ( ) Other:

Continue

1 *Business Unit*

Page 2

My primary business unit is:(*Select one.*)

- ○ Corporate
- ○ Newfoundland Business Unit
- ○ Nova Scotia Business Unit
- ◉ Western Business Unit

2 *Team*

Page 3

My team is: (*Select one.*)

- (•) Account Management
- ( ) Branches
- ( ) Business Development
- ( ) Finance/Administration
- ( ) Resourcing and H.R.
- ( ) Services
- ( ) Talisman
- ( ) Other: [ ]

3 Training Needs

Page 4A

Please indicate if you have training needs in any of the following subject areas. Make **one (1)** selection at a time. With each selection, you will be linked to a screen with a listing of the courses available for that subject area. Select as many subject areas as you want. When you have finished, please **continue**.

- **Application Development and Programming**
- **Business Communications**
- **Database Development and Administration**
- **Information Technology Core Concepts**
- **Internetworking**
- **Leadership**
- **Lotus Products**
- **Mainframe**
- **Microsoft Certified Solution Developer Curriculum**
- **Microsoft Certified Systems Engineer Core Curriculum**
- **Microsoft System Administration**
- **Microsoft: End-User Operating Skills**
- **Netscape Products**
- **Novell Certified Internet Professional**
- **Novell IntranetWare**
- **Occupational Health and Safety**
- **Personal Computer Technician**
- **Project Management**
- **SAP R/3 3.0**
- **Technical Support: Core Modules for A+ Certification**
- **Technical Support: Microsoft DOS/Windows Module for A+ Certification**
- **Technical Support: Supporting Courses for Help Desk Personnel**
- **UNIX**
- **Web/Internet/Intranet**

Continue

Courses

Page 48

Application Development and Programming

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
ANSI C	○	○	○
C/C++ Programming	○	○	○
COBOL	○	○	○
FOCUS	○	○	○
Java by IBM/JavaSoft/Netscape	○	○	○
Marimba	○	○	○
Microsoft Windows NT for UNIX Developers	○	○	○
Microsoft Access	○	○	○
Microsoft J Script	○	○	○
Microsoft Visual Basic 4.0	○	○	○
Microsoft Visual Basic 5.0	○	○	○
Microsoft Visual Basic 6.0	○	○	○
Microsoft Visual C++5.0	○	○	○
Microsoft Visual InterDev	○	○	○
Microsoft Windows Architecture	○	○	○
Object-Oriented Analysis	○	○	○
Object-Oriented Design	○	○	○
PowerBuilder 4.0	○	○	○
PowerBuilder 5.0	○	○	○
PowerBuilder 6.0	○	○	○
SQL Windows	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 48

Business Communications

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Better Business Writing	○	○	○
Calming Upset Customers	○	○	○
Exceeding Your Customer's Expectations	○	○	○
Getting Your Message Across	○	○	○
Measuring Customer Service	○	○	○
Negotiating for a Positive Outcome	○	○	○
Telephone Courtesy and Customer Service	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 48

Database Development and Administration

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
IBM DB2 Universal Database	○	○	○
IDMS	○	○	○
IMS	○	○	○
INFORMIX Database Programming	○	○	○
INFORMIX Online Dynamic Server	○	○	○
Microsoft SQL Server 7	○	○	○
Oracle Database Programming	○	○	○
Oracle Developer/2000 Toolset	○	○	○
Oracle Introduction	○	○	○
Oracle7 Database Administration	○	○	○
Oracle8 Database Administration	○	○	○
Oracle8 New Features	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 48

Information Technology Core Concepts

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Application Development and Programming	○	○	○
Computing Systems Infrastructure	○	○	○
Internet and Intranet Skills	○	○	○
Managing Information Systems	○	○	○
Project Management	○	○	○
Systems and Database Management	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 4B

Internetworking

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Cisco Routers	○	○	○
Internetworking Essentials	○	○	○
LAN Network Operations and Protocols	○	○	○
LAN Technologies	○	○	○
Network Management and Security	○	○	○
Routed Network Protocols – OSI Protocol	○	○	○
Routed Network Protocols – TCP/IP Protocol	○	○	○
Routed Network Protocols – Technologies Level	○	○	○
Routing, Bridging, and Switching	○	○	○
Telecommunications Essentials	○	○	○
Telecommunications Signalling System 7 (SS7)	○	○	○
Telecommunications Voice and Data Integration	○	○	○
WAN Technologies – Cell Based	○	○	○
WAN Technologies – Packet-Based	○	○	○
WAN Technologies –Access	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 48

Leadership

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Attitude: Your Most Priceless Possession	○	○	○
Coaching and Counseling	○	○	○
Conflict Resolution	○	○	○
Dealing with Diversity	○	○	○
Documenting Discipline	○	○	○
Empowerment	○	○	○
Human Touch Performance Appraisal	○	○	○
Leadership Skills	○	○	○
Managing Change	○	○	○
Mentoring	○	○	○
Stress Management	○	○	○
Team Leadership	○	○	○
Team Problem Solving	○	○	○
Techniques for Interviewing The Right Candidate	○	○	○
Time Management	○	○	○
Top Performance: Six Win-Win Principles	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 4B

Lotus Products

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Application Development for Notes	○	○	○
Notes 3 to 4 Update	○	○	○
Notes 4 End-User	○	○	○
Notes Domino 4.5 End-User	○	○	○
Notes Domino 4.6 End-User	○	○	○
Notes Domino 5.0 End-User	○	○	○
System Administration for Notes	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 4B

Mainframe

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Application Programming Concepts	○	○	○
CICS Programming Skills	○	○	○
COBOL Fundamentals	○	○	○
Data Communications	○	○	○
DB2 Database System	○	○	○
DB2/SQL/DS Programming	○	○	○
ISPF PDF Program Development	○	○	○
Job Control Language	○	○	○
MVS Operating System	○	○	○
MVS Utilities	○	○	○
REXX Programming for MVS	○	○	○
VS COBOL II	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 48

Microsoft Certified Solution Developer Curriculum

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Developing Applications with Visual C++ 5.0	○	○	○
Visual Basic 5.0 Advanced Programming	○	○	○
Visual Basic 5.0 Fundamentals	○	○	○
Windows Architecture I	○	○	○
Windows Architecture II	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 4B

Microsoft Certified Systems Engineer Core Curriculum

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Networking Essentials	○	○	○
NT Server 4.0 in the Enterprise	○	○	○
Windows 95	○	○	○
Windows NT Server 4.0	○	○	○
Windows NT Workstation 4.0	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 4B

Microsoft System Administration

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
BackOffice and Small Business Server 1.0	○	○	○
Exchange Server 5.0	○	○	○
Exchange Server 5.5	○	○	○
Internet Explorer 4.0	○	○	○
Internet Information Server (IIS) 3.0	○	○	○
Internet Information Server (IIS) 4.0	○	○	○
Networking Essentials	○	○	○
Operating Systems Essentials	○	○	○
Proxy Server 2.0	○	○	○
SQL Server 7.0	○	○	○
Systems Management Server 1.2	○	○	○
TCP/IP on Windows NT 4.0	○	○	○
Windows 95 - Service and Support	○	○	○
Windows 98 - Implementation and Support	○	○	○
Windows NT 3.5x Support Fundamentals	○	○	○
Windows NT 4.0 Server, Workstation, Enterprise	○	○	○
Windows NT 5	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 48

Microsoft: End-User Operating Skills

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Exchange 4.0	○	○	○
Exchange 5.0	○	○	○
FrontPage 98	○	○	○
Internet Explorer	○	○	○
Office 4.3 (Word, Excel, Access, PowerPoint)	○	○	○
Office 95 (Word, Excel, Access, PowerPoint)	○	○	○
Office 97 (Word, Excel, Access, PowerPoint, Outlook, FrontPage)	○	○	○
Outlook 98	○	○	○
Project 98	○	○	○
Windows 3.1	○	○	○
Windows 95	○	○	○
Windows 98	○	○	○
Windows NT 4.0	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 4B

Netscape Products

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Communicator 4.0	○	○	○
Enterprise Server 3.0	○	○	○
JavaScript	○	○	○
LiveWire	○	○	○
Management & Security	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 48

Novell Certified Internet Professional

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Advanced Web Authoring	○	○	○
IntranetWare-NetWare 3 to Netware 4.11 Update	○	○	○
IntranetWare-NetWare 4.11 Administration	○	○	○
NetWare TCP/IP Transport	○	○	○
Understanding and Applying Internet Concepts	○	○	○
Web Authoring and Publishing	○	○	○
Web Server Management	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 4B

Novell IntranetWare

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Advanced Web Authoring	○	○	○
Integrating Windows NT and IntranetWare	○	○	○
IntranetWare CNE Requirements	○	○	○
Netware 3.11	○	○	○
NetWare 4.1	○	○	○
NetWare 5	○	○	○
Web Authoring and Publishing	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 48

Occupational Health and Safety

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
ANSI/Material Safety Data Sheets	○	○	○
Back Safety	○	○	○
Eye Safety	○	○	○
Fire Prevention and Safety	○	○	○
Industrial Ergonomics	○	○	○
Slips, Trips and Falls	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 48

Personal Computer Technician

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Microsoft DOS/Windows for A+ Certification	○	○	○
Supporting Courses for Helpdesk Personnel	○	○	○
Technical Support: Core Modules For A+ Certification	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 48

Project Management

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Communications	○	○	○
Control	○	○	○
Estimating	○	○	○
Fundamentals	○	○	○
Human Resources	○	○	○
Initiation and Startup	○	○	○
Microsoft Project 98: Getting Started	○	○	○
Procurement	○	○	○
Quality	○	○	○
Risk	○	○	○
Scheduling	○	○	○
Scope	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 4B

SAP R/3 3.0

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Basis	○	○	○
Business Process Introduction	○	○	○
End-User	○	○	○
Project Team Financials(non-standard architecture)	○	○	○
Project Team Logistics(non-standard architecture)	○	○	○
Project Team Technical	○	○	○
Release 2.2 Curriculum	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 48

Technical Support: Core Modules for A+ Certification

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Interaction with Customers	○	○	○
Networking Support	○	○	○
PC Configuration I	○	○	○
PC Configuration II	○	○	○
PC Diagnostics and Repair	○	○	○
Safety and Preventative Maintenance	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 48

Technical Support: Microsoft DOS/Windows Module for A+ Certification

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Application Support	○	○	○
Devices and Drivers	○	○	○
DOS 6.2	○	○	○
Installation and Configuration	○	○	○
Networking and Troubleshooting	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 4B

Technical Support: Supporting Courses for Help Desk Personnel

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
Interaction with Customers	○	○	○
Microsoft Windows 95 -Service and Support	○	○	○
Microsoft Windows 98 - Service and Support	○	○	○
Networking Support	○	○	○
Safety and Preventative Maintenance	○	○	○
Windows NT 4.0	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

Courses

Page 48

UNIX

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
HP-UX	○	○	○
Solaris	○	○	○
UNIX Foundation Level	○	○	○
UNIXWare	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel! Continue

Courses

Page 48

Web/Internet/Intranet

For each of the following courses, please indicate whether the course priority is "Must Have," "Nice To Have," or "Not Required" to meet your current training needs. Click **one** button for **every** course. When you have finished, click **continue** to save your selections and return to the subject area screen. Use the **cancel** button if you choose not to make any course selections.

Courses	Must Have	Nice To Have	Not Required
E-Business	○	○	○
E-Commerce	○	○	○
Internet and Intranet Security	○	○	○
Web Application Developer	○	○	○
Web End-User Skills	○	○	○
Web Master	○	○	○
Web Publisher	○	○	○

Please indicate if there are other courses you would like to see offered in this area.

#1 _____

#2 _____

#3 _____

#4 _____

Cancel Continue

[redacted] *Courses for 1999*

[redacted]
Page 5

You have given the following courses a "Must Have" priority. From this list, please select **up to five (5)** courses that are most important to complete in 1999.

No courses with a priority of **Must Have** selected.

Continue

5 *Technology*

Page 6

Do you have access to a computer at work?

- (•) YES
- ( ) NO

If yes, do you have access to the Internet?

- (•) YES
- ( ) NO

[redacted] *Technology*

[redacted]
Page 7

Do you have access to a computer at home?

- (•) YES
- ( ) NO

If yes, what type of technology do you have?
(*Check all that apply.*)

- [x] 386 Processor
- [ ] 486 Processor
- [ ] Pentium Processor
- [ ] Pentium 2 Processor
- [ ] DOS-based
- [ ] Windows 3.1
- [ ] Windows 95
- [ ] Windows 98
- [ ] NT Workstation
- [ ] OS/2
- [ ] Macintosh
- [ ] Internet Access
- [ ] Configured w/video capabilities
- [ ] Configured w/audio capabilities
- [ ] Other

[redacted] Continue

7 *CBT*

Page 8

Have you used computer-based or multimedia training in the past?

- (•) YES
- ( ) NO

Continue

CBT Decision Factors

Page 9

Of the factors listed below, please select **up to five (5)** that would be most important to you in deciding to do computer-based training.

- [x] **Flexibility to choose own time/place for learning**
- [x] **Easy access to computer**
- [x] **Ability to complete course at own pace**
- [x] **Ability to access training faster ("just-in-time" training)**
- [x] **Need to reduce travel expenses**
- [ ] **Need to reduce training expenses**
- [ ] **Ability to take courses to meet current job requirements**
- [ ] **Ability to take courses to train for a new job assignment**
- [ ] **Ability to take courses to pursue personal interests**
- [ ] **Availability of credits for successful course completion**
- [ ] **Availability of technical support**
- [ ] **Availability of instructional assistance**
- [ ] **Access to most current technical course content**
- [ ] **Ability to access training at home**
- [ ] **Ability to access training through in-company learning centre**

Comments

Page 10

If you would like to add any additional information on computer-based training in general or CBT course offerings in particular, please type your comments into the space below.

Comments:

[redacted]

xwave SOLUTIONS

Computer-Based Training Survey

[redacted]

Complete!

Thank you for taking the time to complete this survey. This information will help us to better meet your training needs.

We would appreciate any comments or ideas you have. Please contact:

Cris Dicks at: CrisDicks@xwavesolutions.com

[redacted]

Finish

Appendix B

Employer Interview Questionnaire

Employer Interview Questionnaire

Hello, may I speak with _____.

My name is Cris Dicks. I'm a graduate student in the Faculty of Education at Memorial University. As part of the completion requirements for a Masters degree in Post-Secondary Education, I am undertaking a survey to assess the computer-based training needs of all **xwave solutions** staff. Results from this survey will help **xwave solutions** in setting CBT priorities for 1999 and beyond.

As a team leader with **xwave solutions**, we would like you to participate in this survey to help us learn more about the training requirements of employees in your group. I estimate that it will take about 10-15 minutes of your time to answer the questions. If you wish, I can skip over any questions you would prefer not to answer.

The information provided to us will be held in strict confidence and will only be used by persons engaged in and for the purposes of this study. The information will be reported anonymously and on a group basis only.

You do not have to take part in this survey unless you want to. However, your opinion is important to us, and we would appreciate your participation.

(Note: The interview is to be done either by phone or face-to-face. Information from the interviews will be recorded manually on the interview sheet provided below.)

Q1. Please indicate your area of management at **xwave solutions**.

_____
_____
_____

Q2. What type of Information Technology services does your group currently provide?

_____
_____
_____
_____
_____

Q3. Please indicate the number of Information Technology employees working in your group.

_____
_____
_____

Q4. Do you have external clients for your services? Who are these clients?

Q5. From your perspective, what are the key training needs of employees in your group for the current year?

Q6. From your perspective, what are the specific knowledge and skills your group will require in the next two to five years?

Q7. What types of training have your employees received in the past year? How much of this training was acquired through CBT courses available from Career Development?

Q8. What is your experience with CBT courses?

Q9. Would you like to see more courses offered through CBT delivery mechanisms?

Q10. From your perspective, what are the strengths of CBT?

Q11. From your perspective, what are the weaknesses/barriers to CBT?

Q12. What recommendations, if any, would you make with respect to delivery of a new CBT program in the company?

Q13. Do you have any other comments or suggestions with respect to CBT?

Appendix C

Most Frequently Required Courses

Table C1: Most Frequently Required Courses (Continued)

Rank	Courses	Must Have		Nice To Have		Not Required	
		f	%	f	%	f	%
62	Oracle7 Database Admin.	37	7.1	74	14.3	89	17.1
63	Microsoft SQL Server 7	37	7.1	77	14.8	86	16.6
64	Outlook 98	36	6.9	66	12.7	53	10.2
65	Windows NT 4.0	36	6.9	39	7.5	80	15.4
66	UNIX Foundation Level	36	6.9	73	14.1	40	7.7
67	Oracle Developer/2000 Toolset	36	6.9	83	16.0	81	15.6
68	Application Development and Programming	36	6.9	88	17.0	134	25.8
69	Networking Essentials	35	6.7	44	8.5	35	6.7
70	Windows NT 5	34	6.6	37	7.1	52	10.0
71	LAN Technologies	33	6.4	64	12.3	58	11.2
72	MVS Operating System	33	6.4	42	8.1	59	11.4
73	Microsoft Access	32	6.2	93	17.9	92	17.7
74	Object-Oriented Analysis	32	6.2	99	19.1	86	16.6
75	Windows NT Server, Workstation, Enterprise	32	6.2	34	6.6	57	11.0
76	Routed Network Protocols-TCP/IP Protocol	32	6.2	48	9.2	75	14.5
77	MVS Utilities	32	6.2	42	8.1	60	11.6
78	Windows 98	31	6.0	67	12.9	57	11.0
79	Object-Oriented Design	30	5.8	100	19.3	87	16.8
80	LAN Network Operations and Protocols	30	5.8	66	12.7	59	11.4
81	SQL Windows	29	5.6	85	16.4	103	19.8
82	TCP/IP on Windows NT 4.0	29	5.6	38	7.3	56	10.8

Table C1: Most Frequently Required Courses (N=519)

Rank	Courses	Must Have		Nice To Have		Not Required	
		f	%	f	%	f	%
1	Team Leadership	150	28.9	121	23.3	29	5.6
2	Leadership Skills	146	28.1	139	26.8	15	2.9
3	Team Problem Solving	122	23.5	137	26.4	41	7.9
4	Estimating	110	21.2	117	22.5	25	4.8
5	Scheduling	107	20.6	125	24.1	20	3.9
6	Stress Management	104	20.0	134	25.8	62	11.9
7	Time Management	100	19.3	138	26.6	62	11.9
8	Conflict Resolution	98	18.9	150	28.9	52	10.0
9	Fundamentals	95	18.3	117	22.5	40	7.7
10	Scope	94	18.1	127	24.5	31	6.0
11	Managing Change	94	18.1	148	28.5	58	11.2
12	Project Management	91	17.5	121	23.3	46	8.9
13	Communications	87	16.8	130	25.0	35	6.7
14	Exceeding Your Customer's Expectations	87	16.8	141	27.2	36	6.9
15	Risk	85	16.4	133	25.6	34	6.6
16	Quality	84	16.2	137	26.4	31	6.0
17	Top Performance: Six Win-Win Principles	82	15.8	164	31.6	54	10.4
18	Control	79	15.2	131	25.2	42	8.1
19	Getting Your Message Across	78	15.0	154	29.7	32	6.2
20	Initiation and Startup	77	14.8	127	24.5	48	9.2
21	Negotiating for a Positive Outcome	77	14.8	136	26.2	51	9.8
22	Internet and Intranet Security	77	14.8	133	25.6	48	9.2
23	Internet and Intranet Skills	74	14.3	146	28.1	38	7.3

Table C1: Most Frequently Required Courses (Continued)

Rank	Courses	Must Have		Nice To Have		Not Required	
		f	%	f	%	f	%
83	Internet Explorer	28	5.4	79	15.2	48	9.2
84	Project 98	28	5.4	67	12.9	60	11.6
85	Solaris	28	5.4	69	13.3	52	10.0
86	Documenting Discipline	28	5.4	157	30.3	115	22.2
87	Visual Basic 5.0 Advanced Programming	28	5.4	42	8.1	36	6.9
88	Operating Systems Essentials	27	5.2	52	10.0	44	8.5
89	Routing, Bridging and Switching	27	5.2	49	9.4	79	15.2
90	DB2 Database System	26	5.0	44	8.5	64	12.3
91	Visual Basic 5.0 Fundamentals	26	5.0	46	8.9	34	6.6
92	Internet Information Server (IIS) 4.0	25	4.8	38	7.3	60	11.6
93	Technical Support: Core Modules for A+ Certification	25	4.8	19	3.7	46	8.9
94	Microsoft DOS/Windows for A+ Certification	25	4.8	22	4.2	43	8.3
95	Supporting Courses for Helpdesk Personnel	25	4.8	21	4.0	44	8.5
96	Java by IBM/JavaSoft/Netscape	24	4.6	111	21.4	82	15.8
97	Windows 95 – Service and Support	24	4.6	44	8.5	55	10.6
98	Exchange Server 5.5	24	4.6	28	5.4	71	13.7

Table C1: Most Frequently Required Courses (Continued)

Rank	Courses	Must Have		Nice To Have		Not Required	
		f	%	f	%	f	%
24	Coaching and Counseling	71	13.7	161	31.0	68	13.1
25	Microsoft Project 98: Getting Started	70	13.5	123	23.7	59	11.4
26	Mentoring	67	12.9	156	30.1	77	14.8
27	Better Business Writing	66	12.7	141	27.2	57	11.0
28	Office 97	63	12.1	66	12.7	26	5.0
29	Attitude: Your Most Priceless Possession	62	11.9	171	32.9	67	12.9
30	Systems and Database Management	60	11.6	119	22.9	79	15.2
31	Managing Information Systems	59	11.4	138	26.6	61	11.8
32	Empowerment	59	11.4	168	32.4	73	14.1
33	Dealing with Diversity	59	11.4	150	28.9	91	17.5
34	E-Commerce	57	11.0	142	27.4	59	11.4
35	Measuring Customer Service	55	10.6	142	27.4	67	12.9
36	Web Application Developer	55	10.6	118	22.7	85	16.4
37	Human Resources	53	10.2	127	24.5	72	13.9
38	Web End-User Skills	52	10.0	116	22.4	89	17.1
39	Oracle Database Programming	48	9.2	93	17.9	59	11.4
40	Oracle8 Database Administration	48	9.2	85	16.4	67	12.9
41	Calming Upset Customers	47	9.1	144	27.7	73	14.1
42	E-Business	47	9.1	146	28.1	65	12.5

Table C1: Most Frequently Required Courses (Continued)

Rank	Courses	Must Have		Nice To Have		Not Required	
		f	%	f	%	f	%
99	Windows 98-Implementation and Support	24	4.6	47	9.1	52	10.0
100	Networking Support	24	4.6	27	5.2	34	6.6
101	Windows NT 4.0	24	4.6	23	4.4	37	7.1
102	IMS	23	4.4	29	5.6	148	28.5
103	Telecommunications Essentials	23	4.4	59	11.4	73	14.1
104	ISPF PDF Program Development	23	4.4	43	8.3	68	13.1
105	HP-UX	22	4.2	57	11.0	70	13.5
106	C/C++ Programming	21	4.0	77	14.8	119	22.9
107	PC Configuration I	21	4.0	32	6.2	21	4.0
108	Networking and Troubleshooting	21	4.0	20	3.9	32	6.2
109	Microsoft Windows 95 – Service and Support	21	4.0	23	4.4	40	7.7
110	Microsoft Windows 98 – Service and Support	21	4.0	26	5.0	37	7.1
111	DB2/SQL/DS Programming	21	4.0	46	8.9	67	12.9
112	Application Programming Concepts	21	4.0	40	7.7	73	14.1
113	SQL Server 7.0	20	3.9	46	8.9	57	11.0
114	PC Diagnostics/Repair	20	3.9	31	6.0	29	5.6
115	PC Configuration II	20	3.9	30	5.8	30	5.8
116	Interaction with Customers	20	3.9	29	5.6	36	6.9

Table C1: Most Frequently Required Courses (Continued)

Rank	Courses	Must Have		Nice To Have		Not Required	
		f	%	f	%	f	%
43	Telephone Courtesy and Customer Service	46	8.9	106	20.4	112	21.6
44	Human Touch Performance Appraisal	46	8.9	154	29.7	100	19.3
45	MS Visual Basic 6.0	44	8.5	89	17.1	84	16.2
46	NT Server 4.0 in the Enterprise	44	8.5	47	9.1	38	7.3
47	Windows NT Server 4.0	44	8.5	48	9.2	37	7.1
48	Computing Systems Infrastructure	44	8.5	125	24.1	89	17.1
49	Windows NT Workstation 4.0	43	8.3	50	9.6	36	6.9
50	Oracle8 New Features	43	8.3	78	15.0	79	15.2
51	Networking Essentials	42	8.1	52	10.0	44	8.5
52	Network Management and Security	41	7.9	55	10.6	59	11.4
53	Techniques for Interviewing the Right Candidate	41	7.9	124	23.9	135	26.0
54	Windows 95*	40	7.7	57	11.0	71	13.7
55	Windows 95*	40	7.7	44	8.5	32	6.2
56	Web Master	40	7.7	121	23.3	96	18.5
57	Web Publisher	40	7.7	125	24.1	93	17.9
58	Internetworking Essentials	40	7.7	62	11.9	53	10.2
59	Oracle Introduction	39	7.5	90	17.3	71	13.7
60	Procurement	38	7.3	134	25.8	80	15.4
61	Job Control Language	38	7.3	36	6.9	60	11.6

Table C1: Most Frequently Required Courses (Continued)

Rank	Courses	Must Have		Nice To Have		Not Required	
		f	%	f	%	f	%
117	IBM DB2 Universal Database	20	3.9	42	8.1	138	26.6
118	IDMS	20	3.9	30	5.8	150	28.9
119	Routed Network Protocols – Technologies Level	20	3.9	46	8.9	89	17.1
120	Data Communications	20	3.9	51	9.8	63	12.1
121	VS COBOL II	20	3.9	36	6.9	78	15.0
122	JavaScript	19	3.7	42	8.1	48	9.2
123	Networking Support	19	3.7	24	4.6	36	6.9
124	Installation and Configuration	19	3.7	23	4.4	31	6.0
125	UNIXWare	19	3.7	63	12.1	67	12.9
126	Microsoft Visual InterDev	18	3.5	52	10.0	147	28.3
127	Internet Explorer 4.0	18	3.5	59	11.4	46	8.9
128	Proxy Server 2.0	18	3.5	36	6.9	69	13.3
129	Application Support	18	3.5	22	4.2	33	6.4
130	Microsoft J Script	17	3.3	73	14.1	127	24.5
131	COBOL	17	3.3	26	5.0	174	33.5
132	Cisco Routers	17	3.3	51	9.8	87	16.8
133	Notes Domino 5.0 End-User	17	3.3	26	5.0	59	11.4
134	COBOL Fundamentals	17	3.3	34	6.6	83	16.0
135	Microsoft Windows Architecture	16	3.1	63	12.1	138	26.6
136	Microsoft Visual Basic 5.0	16	3.1	58	11.2	143	27.6

Table C1: Most Frequently Required Courses (Continued)

Rank	Courses	Must Have		Nice To Have		Not Required	
		f	%	f	%	f	%
137	Systems Management Server 1.2	16	3.1	41	7.9	66	12.7
138	Industrial Ergonomics	16	3.1	38	7.3	31	6.0
139	Back Safety	16	3.1	39	7.5	30	5.8
140	Safety and Preventative Maintenance	16	3.1	28	5.4	33	6.4
141	Devices and Drivers	16	3.1	24	4.6	33	6.4
142	Safety and Preventative Maintenance	16	3.1	31	6.0	40	7.7
143	NetWare 5	15	2.9	27	5.2	42	8.1
144	Interaction with Customers	15	2.9	31	6.0	33	6.4
145	Telecommunications Voice & Data Integration	14	2.7	41	7.9	100	19.3
146	Windows Architecture II	14	2.7	51	9.8	41	7.9
147	PowerBuilder 6.0	13	2.5	63	12.1	141	27.2
148	IntranetWare-NetWare 4.11 Administration	13	2.5	22	4.2	49	9.4
149	IntranetWare CNE Requirements	13	2.5	21	4.0	50	9.6
150	Notes 4 End-User	13	2.5	30	5.8	59	11.4
151	Windows Architecture I	13	2.5	55	10.6	38	7.3
152	Microsoft Windows NT for UNIX Developers	12	2.3	62	11.9	143	27.6
153	Management and Security	12	2.3	39	7.5	58	11.2
154	Integrating Windows NT and IntranetWare	12	2.3	21	4.0	51	9.8

Table C1: Most Frequently Required Courses (Continued)

Rank	Courses	Must Have		Nice To Have		Not Required	
		f	%	f	%	f	%
155	WAN Technologies – Access	12	2.3	43	8.3	100	19.3
156	Windows NT 3.5x Support Fundamentals	11	2.1	27	5.2	85	16.4
157	FrontPage 98	11	2.1	51	9.8	93	17.9
158	NetWare TCP/IP Transport	11	2.1	24	4.6	49	9.4
159	NetWare 4.1	11	2.1	23	4.4	50	9.6
160	DOS 6.2	11	2.1	22	4.2	40	7.7
161	System Administration for Notes	11	2.1	23	4.4	68	13.1
162	BackOffice and Small Business Server 1.0	10	1.9	39	7.5	74	14.3
163	Exchange 5.0	10	1.9	44	8.5	101	19.5
164	Communicator 4.0	10	1.9	38	7.3	61	11.8
165	Enterprise Server 3.0	10	1.9	27	5.2	72	13.9
166	Web Authoring and Publishing	10	1.9	41	7.9	43	8.3
167	Routed Network Protocols –OSI Protocol	10	1.9	51	9.8	94	18.1
168	Wan Technolgies- Cell Based	10	1.9	37	7.1	108	20.8
169	WAN Technologies – Packet Based	10	1.9	42	8.1	103	19.8
170	Notes Domino 4.6 End-User	10	1.9	24	4.6	68	13.1
171	Application Development for Notes	10	1.9	29	5.6	63	12.1

Table C1: Most Frequently Required Courses (Continued)

Rank	Courses	Must Have		Nice To Have		Not Required	
		f	%	f	%	f	%
172	Developing Applications with Visual C++5.0	10	1.9	47	9.1	49	9.4
173	FOCUS	9	1.7	33	6.4	175	33.7
174	Exchange Server 5.0	9	1.7	31	6.0	83	16.0
175	Internet Information Server (IIS) 3.0	9	1.7	42	8.1	72	13.9
176	Web Server Management	9	1.7	33	6.4	42	8.1
177	Understanding and Applying Internet Concepts	9	1.7	49	9.4	26	5.0
178	Eye Safety	9	1.7	42	8.1	34	6.6
179	Basis	9	1.7	21	4.0	29	5.6
180	Microsoft Visual Basic 4.0	8	1.5	44	8.5	165	31.8
181	Microsoft Visual C++5.0	8	1.5	82	15.8	127	24.5
182	ANSI C	8	1.5	25	4.8	184	35.5
183	Fire Prevention and Safety	8	1.5	42	8.1	35	6.7
184	Slips, Trips and Falls	8	1.5	41	7.9	36	6.9
185	Business Process Introduction	8	1.5	18	3.5	33	6.4
186	REXX Programming for MVS	8	1.5	42	8.1	84	16.2
187	Office 95	7	1.3	33	6.4	115	22.2
188	Advanced Web Authoring	7	1.3	26	5.0	46	8.9
189	End-user	7	1.3	15	2.9	37	7.1
190	Notes 3 to 4 Update	7	1.3	21	4.0	74	14.3

Table C1: Most Frequently Required Courses (Continued)

Rank	Courses	Must Have		Nice To Have		Not Required	
		f	%	f	%	f	%
191	IntranetWare-NetWare 3 to NetWare 4.11 Update	7	1.3	26	5.0	51	9.8
192	Advanced Web Authoring	6	1.2	31	6.0	52	10.0
193	Web Authoring and Publishing	6	1.2	35	6.7	33	6.4
194	Telecommunications Signaling System 7 (SS7)	6	1.2	29	5.6	120	23.1
195	Notes Domino 4.5 End-User	6	1.2	22	4.2	74	14.3
196	PowerBuilder 5.0	5	1.0	39	7.5	173	33.3
197	LiveWire	5	1.0	28	5.4	76	14.6
198	ANSI/Material Safety	5	1.0	26	5.0	54	10.4
199	CICS Programming Skills	5	1.0	45	8.7	84	16.2
200	PowerBuilder 4.0	4	0.8	37	7.1	176	33.9
201	Office 4.3	4	0.8	19	3.7	132	25.4
202	Exchange 4.0	4	0.8	33	6.4	118	22.7
203	Windows 3.1	4	0.8	12	2.3	139	26.8
204	Release 2.2 Curriculum	4	0.8	16	3.1	39	7.5
205	Project Team Technical	4	0.8	15	2.9	40	7.7
206	Netware 3.11	3	0.6	16	3.1	65	12.5
207	Project Team Logistics	3	0.6	16	3.1	40	7.7
208	Project Team Financials	3	0.6	15	2.9	41	7.9
209	Marimba	2	0.4	11	2.1	204	39.3
210	INFORMIX Database Programming	2	0.4	27	5.2	169	32.6
211	INFORMIX Online Dynamic Server	2	0.4	29	5.6	171	32.9

Appendix D

Courses That Are Most Important to Complete in 1999

Table D1: Courses That Are Most Important to Complete in 1999 (N=392)

Rank	Courses	f	%
1	Team Leadership	84	21.4
2	Leadership Skills	78	19.9
3	Team Problem Solving	45	11.5
4	Estimating	35	8.9
5	Scheduling	34	8.7
6	Stress Management	34	8.7
7	Time Management	33	8.4
8	Conflict Resolution	30	7.7
9	Fundamentals	30	7.7
10	Scope	29	7.4
11	Managing Change	29	7.4
12	Project Management	29	7.4
13	Communications	25	6.4
14	Exceeding Your Customer's Expectations	24	6.1
15	Risk	23	5.9
16	Quality	23	5.9
17	Top Performance: Six Win-Win Principles	23	5.9
18	Control	23	5.9
19	Getting Your Message Across	23	5.9
20	Initiation and Startup	23	5.9
21	Negotiating for a Positive Outcome	23	5.9
22	Internet and Intranet Security	21	5.4
23	Internet and Intranet Skills	21	5.4
24	Coaching and Counseling	19	4.8
25	Microsoft Project 98: Getting Started	19	4.8
26	Mentoring	18	4.6
27	Better Business Writing	18	4.6
28	Office 97	18	4.6

Table D1: Courses That Are Most Important to Complete in 1999 (Continued)

Rank	Courses	f	%
29	Attitude: Your Most Priceless Possession	18	4.6
30	Systems and Database Management	17	4.3
31	Managing Information Systems	16	4.1
32	Empowerment	15	3.8
33	Dealing with Diversity	14	3.6
34	E-Commerce	14	3.6
35	Measuring Customer Service	14	3.6
36	Web Application Developer	13	3.3
37	Human Resources	13	3.3
38	Web End-User Skills	13	3.3
39	Oracle Database Programming	13	3.3
40	Oracle8 Database Administration	13	3.3
41	Calming Upset Customers	12	3.1
42	E-Business	12	3.1
43	Oracle Developer/2000 Toolset	12	3.1
44	Oracle8 New Features	12	3.1
45	Network Management and Security	12	3.1
46	C/C+ Programming	11	2.8
47	Networking Essentials	11	2.8
48	Windows NT Server 4.0	11	2.8
49	Initiation and Startup	11	2.8
50	MVS Operating System	11	2.8
51	Microsoft Access	10	2.6
52	Java by IBM/JavaSoft/Netscape	10	2.6
53	NT Server 4.0 in the Enterprise	10	2.6
54	Windows NT 4.0 Server, Workstation, Enterprise	10	2.6
55	Measuring Customer Service	10	2.6
56	HP-UX	10	2.6

Table D1: Courses That Are Most Important to Complete in 1999 (Continued)

Rank	Courses	f	%
57	Managing Information Systems	10	2.6
58	Dealing with Diversity	10	2.6
59	Human Touch Performance Appraisal	10	2.6
60	Supporting Courses for HelpDesk Personnel	9	2.3
61	IMS	9	2.3
62	Application Development & Programming	9	2.3
63	Job Control Language	9	2.3
64	Microsoft Visual InterDev	8	2.0
65	Internet Information Server (IIS) 4.0	8	2.0
66	Windows NT 5	8	2.0
67	Outlook 98	8	2.0
68	Project 98	8	2.0
69	Windows 98	8	2.0
70	JavaScript	8	2.0
71	Calming Upset Customers	8	2.0
72	Solaris	8	2.0
73	Object-Oriented Analysis	7	1.8
74	Windows NT Workstation 4.0	7	1.8
75	SQL Server 7.0	7	1.8
76	Technical Support: Core Modules For A+ Certification	7	1.8
77	Web Master	7	1.8
78	TCP/IP on Windows NT 4.0	6	1.5
79	NetWare 5	6	1.5
80	Telephone Courtesy and Customer Service	6	1.5
81	Web End-User Skills	6	1.5
82	Routed Network Protocols –TCP/IP Protocol	6	1.5
83	Techniques for Interviewing the Right Candidate	6	1.5
84	Visual Basic 5.0 Advanced Programming	6	1.5

Table D1: Courses That Are Most Important to Complete in 1999 (Continued)

Rank	Courses	f	%
85	Exchange Server 5.5	5	1.3
86	Control	5	1.3
87	PC Diagnostics and Repair	5	1.3
88	Networking Support	5	1.3
89	Web Publisher	5	1.3
90	IBM DB2 Universal Database	5	1.3
91	Computing Systems Infrastructure	5	1.3
92	Cisco Routers	5	1.3
93	Routing, Bridging and Switching	5	1.3
94	Application Development for Notes	5	1.3
95	DB2/SQL/DS Programming	5	1.3
96	DB2 Database System	5	1.3
97	Windows Architecture II	5	1.3
98	Networking Essentials	4	1.0
99	Windows 95 – Service and Support	4	1.0
100	Windows 95	4	1.0
101	Industrial Ergonomics	4	1.0
102	Human Resources	4	1.0
103	Networking and Troubleshooting	4	1.0
104	Microsoft Windows 95 – Service and Support	4	1.0
105	IDMS	4	1.0
106	MVS Utilities	4	1.0
107	Application Programming Concepts	4	1.0
108	VS COBOL II	4	1.0
109	Visual Basic 5.0 Fundamentals	4	1.0
110	Microsoft Visual Basic 4.0	3	0.8
111	Windows 98 – Implementation and Support	3	0.8
112	Internet Explorer	3	0.8

Table D1: Courses That Are Most Important to Complete in 1999 (Continued)

Rank	Courses	f	%
113	Understanding and Applying Internet Concepts	3	0.8
114	Back Safety	3	0.8
115	Microsoft DOS/Windows for A+ Certification	3	0.8
116	UNIXWare	3	0.8
117	WAN/Technologies – Cell Based	3	0.8
118	Notes Domino 5.0 End-User	3	0.8
119	System Administration for Notes	3	0.8
120	Data Communications	3	0.8
121	Windows Architecture I	3	0.8
122	FOCUS	2	0.5
123	COBOL	2	0.5
124	Windows 95	2	0.5
125	Proxy Server 2.0	2	0.5
126	Office 95	2	0.5
127	Windows NT 4.0	2	0.5
128	Web Server Management	2	0.5
129	Advanced Web Authoring	2	0.5
130	Web Authoring and Publishing	2	0.5
131	IntranetWare CNE Requirements	2	0.5
132	Integrating Windows NT and IntranetWare	2	0.5
133	NetWare 4.1	2	0.5
134	Slips, Trips and Falls	2	0.5
135	Installation and Configuration	2	0.5
136	Interaction with Customers	2	0.5
137	Telecommunications Voice and Data Integration	2	0.5
138	Telecommunications Essentials	2	0.5
139	WAN Technologies – Packet-Based	2	0.5
140	Notes Domino 4.6 End-User	2	0.5

Table D1: Courses That Are Most Important to Complete in 1999 (Continued)

Rank	Courses	f	%
141	REXX Programming for MVS	2	0.5
142	Developing Applications with Visual C++ 5.0	2	0.5
143	Microsoft J Script	1	0.3
144	Microsoft Windows Architecture	1	0.3
145	PowerBuilder 6.0	1	0.3
146	Microsoft Visual Basic 5.0	1	0.3
147	ANSI C	1	0.3
148	Microsoft Windows NT for UNIX Developers	1	0.3
149	Operating Systems Essentials	1	0.3
150	Internet Explorer 4.0	1	0.3
151	Windows NT 3.5x Support Fundamentals	1	0.3
152	BackOffice and Small Business Server 1.0	1	0.3
153	Systems Management Server 1.2	1	0.3
154	Office 4.3	1	0.3
155	Exchange 5.0	1	0.3
156	FrontPage 98	1	0.3
157	Management and Security	1	0.3
158	Enterprise Server 3.0	1	0.3
159	IntranetWare-NetWare 4.11 Administration	1	0.3
160	NetWare TCP/IP Transport	1	0.3
161	Advanced Web Authoring	1	0.3
162	Fire Prevention and Safety	1	0.3
163	Eye Safety	1	0.3
164	Networking Support	1	0.3
165	Interaction with Customers	1	0.3
166	Devices and Drivers	1	0.3
167	Application Support	1	0.3
168	Windows NT 4.0	1	0.3

Table D1: Courses That Are Most Important to Complete in 1999 (Continued)

Rank	Courses	f	%
169	MicroSoft Windows 98 – Service and Support	1	0.3
170	WAN Technologies – Access	1	0.3
171	LAN Network Operations and Protocols	1	0.3
172	LAN Technologies	1	0.3
173	Documenting Discipline	1	0.3
174	Notes Domino 4.5 End-User	1	0.3
175	Notes 3 to 4 Update	1	0.3
176	Notes 4 End-User	1	0.3
177	CICS Programming Skills	1	0.3
178	COBOL Fundamentals	1	0.3
179	ISPF PDF Program Development	1	0.3