

INTEGRATING TECHNOLOGY AND TEACHING  
AT A TECHNICAL INSTITUTE:  
AN INTERSHIP REPORT

CENTRE FOR NEWFOUNDLAND STUDIES

**TOTAL OF 10 PAGES ONLY  
MAY BE XEROXED**

(Without Author's Permission)

CORINNE BREEN









**Integrating Technology and Teaching at a Technical Institute: An Internship  
Report**

**by:**

**© Corinne Breen, B.Sc. B.Ed.**

**An internship 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  
June 1995**

**St. John's**

**Newfoundland**



National Library  
of Canada

Acquisitions and  
Bibliographic Services Branch

395 Wellington Street  
Ottawa, Ontario  
K1A 0N4

Bibliothèque nationale  
du Canada

Direction des acquisitions et  
des services bibliographiques

395, rue Wellington  
Ottawa (Ontario)  
K1A 0N4

Your file    Votre référence

Our file    Notre référence

THE AUTHOR HAS GRANTED AN  
IRREVOCABLE NON-EXCLUSIVE  
LICENCE ALLOWING THE NATIONAL  
LIBRARY OF CANADA TO  
REPRODUCE, LOAN, DISTRIBUTE OR  
SELL COPIES OF HIS/HER THESIS BY  
ANY MEANS AND IN ANY FORM OR  
FORMAT, MAKING THIS THESIS  
AVAILABLE TO INTERESTED  
PERSONS.

L'AUTEUR A ACCORDE UNE LICENCE  
IRREVOCABLE ET NON EXCLUSIVE  
PERMETTANT A LA BIBLIOTHEQUE  
NATIONALE DU CANADA DE  
REPRODUIRE, PRETER, DISTRIBUER  
OU VENDRE DES COPIES DE SA  
THESE DE QUELQUE MANIERE ET  
SOUS QUELQUE FORME QUE CE SOIT  
POUR METTRE DES EXEMPLAIRES DE  
CETTE THESE A LA DISPOSITION DES  
PERSONNE INTERESSEES.

THE AUTHOR RETAINS OWNERSHIP  
OF THE COPYRIGHT IN HIS/HER  
THESIS. NEITHER THE THESIS NOR  
SUBSTANTIAL EXTRACTS FROM IT  
MAY BE PRINTED OR OTHERWISE  
REPRODUCED WITHOUT HIS/HER  
PERMISSION.

L'AUTEUR CONSERVE LA PROPRIETE  
DU DROIT D'AUTEUR QUI PROTEGE  
SA THESE. NI LA THESE NI DES  
EXTRAITS SUBSTANTIELS DE CELLE-  
CI NE DOIVENT ETRE IMPRIMES OU  
AUTREMENT REPRODUITS SANS SON  
AUTORISATION.

ISBN 0-612-06108-6

Canada

## ABSTRACT

The classroom of the future, with technology that allows a greater degree of independence from the current textbook driven curriculum, will require talented teachers. The teachers will need to be optimistic, open minded, and adaptable to change. They will also need to view education as an ongoing process whereby they are constantly improving themselves. Future teachers will be required to manage a greater range of educational experiences well beyond the typical classroom of today.

This paper is made up of three main sections: an overview, the research component, and the reflective journal. Chapter one, the overview, provides both the background and a summary of the goals of the internship.

Chapter two, the research component, outlines the research concerning both the value of information technology and strategies for implementation in a post-secondary technical institute. The sections include: the value of technology, strategies both for successful implementation and professional development, possible deterrents from using technology, and practical projects for educators to implement as a starting point. Thus the all encompassing research question to be investigated in this paper is as follows; What general guidelines need to be considered in designing professional development activities for instructors who are beginning to integrate information technology into their teaching at a technical institute?

Chapter three, the reflective journal, illustrates and evaluates what was learned, accomplished and experienced.

Over a three month period, group sessions were held with various faculty members to discuss their professional development needs. Ideas and strategies were addressed at subsequent meetings and group projects were followed up on a continual basis.

It was found that many teachers find the entire process of technological teaching in areas where they will be a guide, not an authority, to be professionally threatening. The only solution here is an attitudinal change on the part of administrators, educators, and students. Change is not an event or a technological process. Change is primarily a people process. Thus it is crucial that teachers understand that their roles will not be diminished but enhanced and that they need to be open to change.

## ACKNOWLEDGEMENTS

I would like to express my sincere thanks to my supervisor, Dr. Jean Brown, for her advice, encouragement, and patience.

I am grateful to the faculty and staff of the Marine Institute for their full cooperation.

Special thanks to God who regularly saves me and never lets me quit

# TABLE OF CONTENTS

	PAGE
ABSTRACT.....	i
ACKNOWLEDGEMENTS.....	iii
LIST OF TABLES.....	vi
CHAPTER	
1 OVERVIEW OF INTERNSHIP REPORT.....	1
Background to the Internship.....	1
Rationale for Internship.....	1
Internship Activities.....	2
The Research Component.....	4
Self Evaluation Model.....	5
Limitations of the Study.....	5
Organization of the Report.....	6
2 INTEGRATING TECHNOLOGY AND TEACHING AT A TECHNICAL INSTITUTE: PROFESSIONAL DEVELOPMENT GUIDELINES.....	7
Introduction.....	7
Background.....	10
Embracing Technology and Change.....	14
Changing Teachers' Roles.....	17
Strategies for Implementing Technology.....	20

	Deterrents to Technology.....	28
	Planning and Organizing Relevant Projects.....	34
	Principles and Guidelines.....	47
3	INTERNSHIP EXPERIENCES: A CRITICAL, REFLECTIVE JOURNAL.....	49
	Chronological Journal.....	49
	Conclusion.....	70
	References.....	71
	Appendices.....	74

**LIST OF TABLES**

<b>TABLE</b>	<b>PAGE</b>
I. Principles and Guidelines.....	48



## **CHAPTER 1**

### **OVERVIEW OF INTERNSHIP REPORT**

#### **Background to the Internship**

Although technology's influence is inevitably growing stronger, today's traditional curriculum and teaching methods are still quite resistant to change. Unfortunately, many people believe that learning only occurs via textbooks in a teacher centred environment, that the whole class should be working on the same things, that competition should be encouraged, and that traditional tests are the only true measure of learning.

Most educators agree that global and multicultural pressures are slowly and irreversibly altering our lives. Life will be characterized by rapid change and future workers will need high level thinking skills as well as the ability to adapt. To meet these changes educators should think about the existing curriculum and teaching methods, and therefore reexamine the nature of teaching and learning.

#### **Rationale for Internship**

The Fisheries and Marine Institute has earned itself an international reputation as one of the foremost marine related technical colleges in the world today. The spirit of its motto "strive for excellence" is an ongoing aim of students, faculty, and administration. To facilitate this objective, a Teaching and Learning Support Centre has been established.

This centre operates with a curriculum specialist, a computer analyst, and the technical computer services team. The centre houses current computer facilities and appropriate software for use by faculty and staff when using or creating teaching and learning materials. There is also a faculty/staff professional development unit which provides opportunities for enhancing teaching skills, developing competence with computer technologies, and pursuing other job related skills enhancement activities. Finally, the centre extends beyond its existing role into the provision of a variety of learning software and other independent learning resources for both teachers and students.

### **Internship Activities**

This internship focused on the professional development needs of instructors who were attempting to incorporate information technology into their teaching. There were opportunities for practical experiences requiring me to work one-on-one with instructors, as well as to plan and deliver seminars, based on my research and collaboration with the curriculum specialist. I acquired knowledge necessary to address the professional development needs of post-secondary instructors in a technical institution.

The internship has involved the following experiences:

1. Involvement with faculty in determining their needs for professional development in information technology, and active participation in the planning of professional development activities, for both individuals and groups.
2. Active participation in ordering and reviewing computer software appropriate for the Marine Institute's needs.
3. Assistance to faculty in previewing and evaluating computer software.
4. Extensive personal use of the Internet and examination of its potential for instruction at the Marine Institute, as well as assisting faculty members to retrieve information appropriate for their subjects areas.
5. Experience in the use of the computer and hypermedia tools (sound cards, CD roms, image scanners, etc.).
6. Involvement with all aspects of operating a Teaching and Learning Centre in a post-secondary institute.

## **The Research Component**

### **The Research question**

What general guidelines need to be considered in designing professional development activities for instructors who are beginning to integrate information technology into their teaching at a technical institute?

### **Design of the study**

This research component will require an examination of the literature to answer two specific questions:

1. What does the research reveal about the value of information technology for teaching at a technical institute such as the Marine Institute?
2. What does the research suggest as effective professional development strategies for use in a post-secondary technical institute?

Answers to these two questions has lead to the formulation of general principles and guidelines to address the research question above. Th principles and guidelines have been integrated into the internship by incorporating them into group seminars and other professional development activities.

### **Self Evaluation Model**

During the internship, my main objectives were to accomplish the preceding goals. To personally evaluate my progress I kept a daily journal of what I had learned, accomplished, and experienced. Frequent consultation with the curriculum specialist, educational supervisor, and fellow teachers helped me gauge my performance and direct my energy. The self analysis, constructive criticism, and reflection guided my work.

### **Limitations of the Study**

Chapter three, the reflective journal, is an informal record of what was learned, accomplished and experienced during the internship at the Marine Institute. During this time I was privy to confidential information sometimes of a sensitive nature. It was never the intention to make such information public, and no written consent forms were obtained. Due to these ethical considerations, some experiences have been omitted from this report, and every attempt has been made to guarantee confidentiality. No personal names will be used.

### **Organization of the Report**

In this internship report, there is a blending of the academic and the personal; the practical and the theoretical. Chapter one provides an overview of the goals of the internship and is written in the first person. Chapter two is the research component, and is written in the standard third person academic style although personal experiences gained through the internship are integrated into the text. Chapter three, the critical journal, is a personal evaluation of experiences on a daily basis. The reflection served to gauge performance and guided the work. It is therefore written using an informal, first person approach.

## **CHAPTER 2**

### **INTEGRATING TECHNOLOGY AND TEACHING AT A TECHNICAL INSTITUTE: PROFESSIONAL DEVELOPMENT GUIDELINES**

#### **Introduction**

"In times of change, learners inherit the Earth, while the learned find themselves beautifully equipped to deal with a world that no longer exists" (Thornburg, 1992, p.2).

Times have changed. Revolutionary advances in transportation, communications, science and technology have brought nations and peoples together. These advances would be undreamed of by previous generations (Merryfield, 1991). The global marketplace of today is built upon the existence of powerful technologies. As we face the 21<sup>st</sup> century, we must avoid taking these scientific advances for granted. We must remember that communities across the planet are often more closely connected than neighboring towns were at the turn of our present century. It is an established fact that technology has also become an integral part of discussions about teaching and learning.

Unfortunately, new technology in the classroom is often met with either resistance or indifference. The reasons for this usually stem from the teachers' past experiences. Many teachers find comfort in their tried and true methods, do not see the benefits of computers and generally view computers as much ado about nothing. Even after a decade

of efforts to integrate technology into instruction, classrooms today resemble those of 50 to 100 years ago much more closely than today's assembly plants, scientific laboratories, operating rooms, and businesses match their equivalents from the same time periods.

There are those teachers who have and use computers in their classrooms mainly to teach and reinforce concepts that are normally taught by human teachers. Some teachers have ventured into statistical packages, graphics programs, and test generators. The most common functions for the students include drill and practice, tutorials, games and simulations. Although these instructional uses are valuable, schools can achieve much greater educational goals if educators try to expand their vision of what computers can do for the advancement of education.

It has been said that today's technology will revolutionize teaching and learning. In reality, the teachers - not the technology - are the only ones truly able to make the changes and improvements in learning. Therefore, teachers must receive training to make technology the revolutionary tool that it is touted to be. This is the crucial starting point which deserves the utmost attention and planning.

The teachers need to have the following difficult questions answered before they can be expected to alter their present teaching styles:

- What are the elements of educational technology?
- How can this improve my teaching?
- What can it do for the students?
- What are some specific, practical suggestions for improvement?



To help teachers find answers to these questions, effective professional development strategies must be developed to nurture and support each teacher's learning process and growth. As a starting point, the value, purpose, and general capabilities of today's technological advances must be discussed but that alone is not enough. Current educational literature may help to clarify the complicated relationship between today's teachers and today's technology, and how teachers' professional growth in this area can best occur.

This paper will attempt to address these important questions and issues with respect to teachers as learners in a post-secondary technical institute. Specific attention will be paid to the value of technology, strategies both for successful implementation and professional development, possible deterrents from using technology, and practical projects for educators to implement as a starting point.

## Background

"A commitment to excellence is a commitment to continuous improvement and meaningful change" (Donald & Naff, 1993, p.9).

The motto statement of the Fisheries and Marine Institute of Memorial University of Newfoundland is "Strive for Excellence", whereas the mission statement is to "...foster economic development in strategic areas of the Newfoundland economy, particularly the fishery and offshore development, and to enable Newfoundlanders to participate in the marine industry nationally and internationally".

Anyone who reads these sentences, is left with the impression that the Marine Institute is on the leading edge; a reputable post-secondary institute. This, of course, is the desired impression - a dynamic, worthwhile place to study which will help students compete in the technologically advanced, global workplace.

In keeping with the promise, the administrators, faculty, and staff work together to stay innovative and current. Presently, the building houses millions of dollars worth of equipment such as a fully equipped planetarium, various bridge ship simulators, a complete fish processing plant, a full motion and video equipped ship simulator, and an aquaculture unit. The students have access to three computer labs and a help centre containing an on-duty teacher/tutor, computers, applicable software, and resources. The faculty and staff have offices with computers, access to software, and network connections.

Although the equipment and desire exists, structured professional development activities have been neglected for the past few years. There has been a complete restructuring of the Marine Institute - the common first year was implemented across the province, some programs have been transferred to Cabot College, new programs were added due to the closure of the fishery, departments and divisions were continuously restructured and renamed, and almost 50% of all faculty were hired on a contractual basis. Under these conditions, professional development activities are very difficult to successfully accomplish. Low morale coupled with the fact that many people were unaware whether they would be hired for the subsequent term, left faculty generally unconcerned with teaching innovations.

Since the Fall of 1994, the work environment has become more stable. The faculty and staff have been through many trying changes during the long process and are now more secure in their divisions. Many contracts are longer, people seem more settled, and together, plans are being made for the future of the Institute as a whole.

In September 1994, the Instructional Development and Student Services (IDSS) division was formed. The general aims and responsibilities of the division include: the organization of professional development activities, dealing with a wide range of student issues, and computer services for the building.

With respect to professional development, the vision is to provide a fully equipped facility with educational personnel to provide support. This facility/staff room has been

named the Teaching and Learning Support Centre (TLSC). The centre will provide long awaited opportunities to ...

- develop competence with computer technologies.
- explore new technologies.
- enhance teaching skills and techniques.
- complete project work.
- enhance other job related skills.

The centre will assist users to:

- prepare documents.
- create presentations.
- prepare spreadsheets.
- read electronic mail (E-mail).
- surf the internet.

It is with regard to this specific, post-secondary situation that the following paper is based. The aim is to review the current, educational literature concerning the combination of the three general themes of professional development, post-secondary technical institutes, and technology in teaching.

The all encompassing research question to be investigated is as follows;

What general guidelines need to be considered in designing professional development activities for instructors who are beginning to integrate information technology into their teaching at a technical institute?

To tackle this topic the following specific questions will be answered:

1. What does the literature reveal about the value of information technology for teaching in a technical institution such as the Marine Institute?
2. What does the research suggest as effective professional development strategies for use in a post-secondary technical institute?

Answers to these two questions will lead to the formulation of general principles and guidelines to address the research question.

## Embracing Technology and Change

“We need to be as unwilling to teach without basic technology resources as we would be if asked to teach without other basic supplies, such as books, paper, and chalkboards.”

(Dyrli & Kinnaman 1994, p.16)

It is a fact that technological advances are increasing at an exponential rate. Whether we want to believe it or not, vast educational changes are inevitable. Change is always intimidating. It is easier to teach using tried and true methods than to spend the time learning and incorporating new technology. This is the primary reason why educators need to be made aware of the value of technology and the justification for change. These are the first and most crucial tasks which must be accomplished before technology is implemented successfully.

Teachers have many legitimate concerns that must be addressed such as:

- Is this just another educational fad of the year?
- Is it really worth the time, effort, and money?
- Will my role change?

Without satisfactory answers to these questions, the first link of the chain will be broken and change will not occur.

Computers have been around for decades and during this time business and industry have experienced many changes. These changes were critical to their survival in

the increasingly competitive business world. Companies realized that increasing capital and human resources did not necessarily lead to success. Instead, the focus shifted to addressing issues surrounding service, quality, speed of response, and innovation (Donald & Naff, 1993). In response to these developments, more people began to invest in themselves by becoming more educated. This is increasingly evident in today's post-secondary education enrollment.

Yet many of the instructors in these learning institutions have changed their ways very little. They have heard "buzz" words from educational researchers for years such as "student centered", "global learning", and "cooperative learning" to name a few. Perhaps eventually the hype will die down and they will be able to continue teaching using traditional methods. However, technology is here to stay and it can only expand.

Teachers are aware that they are preparing the leaders of tomorrow. These leaders will need a competent grasp of how to learn new ideas, how to utilize technology, and how to adapt to change. It is the combination of these three objectives that will help them succeed. To accomplish this, there needs to be a considerable investment in time, effort and money but, it is necessary and worthwhile in today's world. If student success is to be the ultimate goal, then teaching philosophy and methods must adapt. This does not mean that previous methods were incorrect or somehow inferior, what it does mean is that teachers and technology have the ability to enhance and improve the entire teaching and learning experience.

In theory, when technology based instruction is used correctly, the instructional process changes, school management changes, teaching roles change, and training changes. In practice, this is not usually the reality. Boe (1989) states that most schools bought "...huge quantities of the latest technology for the revolution but neglected to recruit and train the troops" (as cited in Standish, 1993, p.5). The front line teachers desperately need ongoing training and support. If administrators declare victory before the war starts and purchase hundreds of thousands of dollars of technology without making it work for their own situation, then the real battles will start (Doyle & Levinson, 1993).

Most educational institutions see the need to invest the money for the technology but neglect to encourage the teachers in terms of education, time to the develop projects, or ongoing technical support. Roberts (1989) states that it is important to remember that while technology of all kinds has provided exciting opportunity for new teaching methods and technologies, and for new ways to enhance and expand the learning experience, it is still the teacher who must make it all work (as cited in Jordan and Follman, 1993, p.19). Teachers can be helped to see that today's technology is not a threat but a blessing, and that it is merely a tool that can help them improve what they do best.



### **Changing Teachers' Roles**

Various theorists argue that the era of the teacher as a sage or guru has passed, that the teacher does not need to be the expert or the focus of attention, and that the spotlight has finally moved to the students where it belongs. One such theorist states, "Take the terrible, impossible burden of "know-it-all" off your poor adult shoulders and become a new kind of taskmaster - equally demanding, equally essential to the educational experience" (D'Ignazio, 1994, p.40).

Knowledge is exploding too fast and in too many formats for teachers to even attempt to be complete experts. Information on a specific subject area is now available over computer networks, television channels, CD ROM's, electronic bulletin boards, and electronic mail (E-mail) systems just to name a few. Instead of trying to stay as the classroom expert, some teachers are involving students more, and are demanding technical education so that they can start experimenting with some of these educational advancements. They see this as a way to improve teaching and to prepare their students for the world they will inherit.

Although research is limited, teachers with experience using computers in the classroom report significant improvements in their teaching practice (Cavalier, 1992; Harris, 1995; Jordan & Fullman, 1993; Russell, 1994; Schrum, 1991; Standish, 1993). These changes include presenting more complex material, having more time for individual students, allowing more independence, and functioning more as coaches and facilitators of

learning. This of course is a gradual process - a person's teaching philosophy and style can not be modified overnight.

The following distinct shifts in attitudes and behavior as teachers become more comfortable with the use of computers in the classroom have been noted by Jordan & Fulman (1993, pp.19-20):

- Teacher centered to student centered activities: Teachers move from lecturing and directing to facilitating and coaching.
- Whole class to small group instruction: Teachers promote activities involving small groups of students working cooperatively.
- Structured to exploratory: Activities and projects become less controlled and more open ended.
- Competitive to cooperative: Teachers involve students in fewer isolating, competitive activities and more collaborative, cooperative activities.
- Classroom to whole-world interaction: Teachers expand learning to "real world" problems requiring interdisciplinary awareness and multiple resources.

These paradigm shifts in learning arranged by classroom teachers, determine their expanded roles. Teachers expand their style and role to become multifaceted. Roberts (1989) identifies five key roles for teachers who use technology:

1. The collaborator shares knowledge with colleagues and initiates and nurtures relationships that expand the boundaries of the classroom.

2. The mentor/mentee teaches and learns from students, the community, and colleagues.
  3. The planner creates a vision of the future, develops methods to achieve that vision, and structures the revised learning environment.
  4. The researcher accesses, analyzes, and organizes information in order to guide students in understanding problem - solving strategies and developing discovery and learning skills.
  5. The seeker ventures outside the classroom to gain new ideas and resources.
- (as cited in Jordan & Fullman, 1993, pp.20-22).

This is an exciting, frustrating, and overwhelming time to be a teacher. Change can be viewed by teachers as something that is forced, that they are not ready for, and that they do not need or want. However, change could also be viewed as refreshing and relieving. Either way, it will take time and encouragement for teachers to rethink their roles, redesign their teaching, and implement technology. The ultimate and daunting challenge is to change a culture. To accomplish this requires professional development for the teachers involved.

### Strategies for Implementing Technology

“As valuable as technology can be, it won't make a difference unless we offer teachers.....opportunities to use it in new ways” (Penning, 1991, p.35)

Assuming that the administrators and instructors are convinced of the possible value of incorporating information into the teaching and learning process, the next step is implementation. Around the world, professional development support centres are being established in an effort to begin the journey into educational technology. The success and failure of many of these ideas has led to an overall consensus of proven, worthwhile recommendations, drawn from a review of the literature<sup>1</sup>, which reveals general strategies for the successful implementation of technology with education:

- Preliminary strategic planning.
- A support centre with reliable equipment.
- Ongoing faculty training and support.
- Procedures to assure quality.

---

<sup>1</sup> (Hale(1989); Epple et al (1992); Buchsbaum (1992); Clemente (1991); Cousins (1994); Paul (1994); Browne & Ritchie (1991); Hawkins (1994))

### Preliminary Strategic Planning

Hale (1989) states that there are six important steps in strategic planning for a new support centre;

- assess needs,
- write a mission statement,
- determine services,
- identify supported computing hardware, software, and services,
- develop policies and procedures, and
- choose measures for evaluation of the program. (p.19)

These steps will help the person(s) who are setting up the centre focus their ideas and bring them closer to accomplishing the broader goals. By careful planning they would be answering the following basic questions with respect to professional development;

- Where are we now?
- Where are we going?
- How do we plan to get there?
- How will you know when you've arrived?

During the preliminary process the planners should both recognize and address the concerns and needs of the faculty. Ideally the two groups would be involved in the decision-making procedure and work together to accomplish common goals.

### A Support Centre with Reliable Equipment

To make this process a success, the faculty will need convenient access to up to date computers, printers, presentation devices, Internet connections, and any other applicable facilities. The equipment and room in general must be dedicated solely to their usage and available to them outside of school hours to make it truly convenient. Many schools have a number of laptops that teachers can sign out for a night or weekend. Easy access to current technology is the goal.

The room itself should have adjustable lighting and relatively quiet air conditioning so that the trainers can be heard. The tables should be big enough for the computers and teachers' papers, and there should be extra chairs so that the teachers could work in groups if they desired. There is also a need for shelves, magazine racks, storage cabinets, folders for session handouts, and a suggestion box. The walls should be decorated with colourful, useful posters, and a phone should be made available. Overall, the atmosphere of the room should be informal, personable, helpful, and generally non-threatening.

### Ongoing Faculty Training and Support

Training and support is the most important component of any successful professional development centre. It is also the most frequently cited area that is used to justify the failure of a technology plan. Thus it deserves to be broken down into its intertwined components of trainers, adult learners, and motivation.

### Trainers

The function of a trainer would be to wholly support the integration of technology into teaching by educating and guiding the faculty. The four components of providing professional development are; instruct, model, coach, and empower (see Appendix A). Paul (1994) describes a trainer as a person who performs all orientations with new classes, organizes the lab schedule, does maintenance on the hardware and software, coordinates all telecommunications projects, works with teachers on curriculum projects and develops new inservice models. The person would perform these duties in a helpful, encouraging way and would be there for questions or assistance on a continual basis.

The trainer would need to be very familiar with both techniques for teaching adult educators and educational technology. Clemente (1991) believes that whenever possible the trainer should be a faculty member who happens to be an expert in the topic, thus teachers should teach teachers.

There exists some general guidelines for trainers who will be teaching adult educators. The following pertinent tips for trainers is modified from Hawkins (1994, pp.16-17):

#### **Do...**

- engage the group by asking about their experiences and interests.
- engage the group in discussions of what technology they themselves use or that helps them in their daily lives.
- make them feel comfortable with their current place and their current knowledge.

- limit the presentation to one or two strategies that are within the immediate reach of the audience.
- provide time for doing, trying, and experimenting.
- reflect your enthusiasm.
- make the experience positive, focusing on sharing and collaborating.

#### **Don't...**

- imply that what teachers have been doing for years is no longer of worth.
- “tell” them they need to change what they are doing!
- suggest that they ought to move into the present or current century.
- present them with a slick, glossy, glitzy, high-tech demonstration and say, “and this is what you too *could* be doing in your classroom if you wanted”.
- invite or require them to attend after school workshops that will *help* them become better teachers.
- assume that all teachers are as excited about technology as you are.
- impose a required approach for a certain type of task in a discipline just to be sure that you get people involved as users.

Thus the trainer must focus on the positive aspects of each teachers’ approach and then teach any ways in which technology can enable them to improve. The trainers will also be the ones who convince the teachers of the purpose, value, and relevance of



technology. Hawkins (1994) believes that the more the trainers connect the present with the past, the future with the former - the greater will be the gains for education.

### Adult Education

To expand and enhance the relationship between the trainers and the participants, the trainers should keep the following tested techniques for teaching adults in mind (as modified from Murk, 1993);

1. Use an "ice-breaker" to get any issues or hostile feelings out into the open.
2. Create a non-threatening, positive learning climate.
3. Get to know the interests and learning styles of the individuals.
4. Use an array of teaching strategies, making sure you allow sufficient time for information to be processed.
5. Set activities with purposes and goals - no busy work.
6. Provide positive, descriptive feedback and compliments.
7. Use learning materials that feature adults. E.g. realistic case studies.
8. Use small group techniques.
9. Use humor and enthusiasm to show that you really like and respect your students.
10. Treat your students as adults, and slowly gain their trust and respect. (p.26)

Overall, successfully providing professional development to faculty members is complicated and challenging. These learners will need to know why they should learn a

new method and if you can not provide a sufficient answer, they will usually tune out. Craig (1987) states that adult learners are motivated to learn by both extrinsic and intrinsic motivators. The problem is that they may not value or be motivated to learn what trainers want to teach them.

### Faculty Motivation

Initially many promising new ideas are greeted with enthusiasm but the positive momentum inevitably dies down. The goal, with respect to educational technology and professional development, is to keep the momentum and enthusiasm going.

To tackle this situation, faculty should be encouraged to start with simple projects that will improve instruction with relatively little effort. For example, exercises and demonstrations are relatively easy to create with spreadsheets and databases. Commercial publishers in business, engineering, and other disciplines are beginning to provide such materials with many texts. Presentation aids and graphics packages can be used to prepare effective lecture materials rapidly. There are also varied test generators, drill and practice packages, and spreadsheets for teachers' marks.

The next stage for the teachers would be to gain further knowledge for the purpose of sorting out the worthwhile, educational applications. These ideas can then be tailored and modified by themselves to suit their classroom needs. Many teachers are currently developing or "authoring" courseware that addresses specific instructional

problems. There are also many global projects occurring via the Internet and the World Wide Web. The possibilities are very promising and continually changing.

Chin & Hortin (1993) report that the major obstacles to increasing the use of educational technology are as follows:

1. lack of funds,
2. lack of inservice training opportunities, a need for reliable trainers and the lack of time for appropriate staff development,
3. limited or inadequate facilities and lack of equipment and courseware,
4. teachers' attitude, problem of "teacher anxiety" or discomfort with technology. (p. 93)

These concise concerns represent the real problems that prevent teachers from staying motivated. The obvious solution for administrators is to guarantee that these problems will be eliminated.

### Procedures to Assure Quality

Operating within established policies, procedures, and practices is an important part of quality control. Having written policies and procedures means that there is no question how things should be done. When new situations arise, having well documented policies simplifies making new decisions. The support centre's personnel should keep these ideas in mind and stay focused on meeting the needs of the teachers and administrators.

The simplest way to evaluate the centre is to keep track of the number of faculty attending each session, review the evaluation forms they fill out, and monitor the suggestion box. Training lessons and trainers' performances should be evaluated regularly. This data will provide a clear overview of current attitudes, suggestions, and complaints.

### **Deterrents to Technology**

"People don't resist change... they resist being changed." - source unknown

Sammons (1993) states that, "higher education has lagged behind primary and secondary education in incorporating multimedia into both teaching and learning. The literature suggests that college faculty in general are slow to integrate new technology into the instructional process. Studies indicate that the traditional faculty lecture involves

mainly use of the blackboard, overheads, and occasional slides" (p.2). This may be the case but we must refrain from using the word "slow" to describe faculty, and instead investigate why many teachers avoid technology.

In conclusion, the studies by Chin & Horton (1993) as well as other studies by Killian (1994) and Sammons (1993) confirm that the common causes for technology avoidance are:

- inadequate funds, inservice, planning, facilities, and time.
- fear of technology, pedagogical fear, and fear of role changes.

To a large extent each cause is intermingled and influences the others, and therefore each needs to be considered.

#### Inadequacies

When teachers decide to take a chance and try to incorporate technology into their teaching, they may be faced with little or no training. If the training exists, it may be too far for them to travel, they may not have access to computers, or their computers may be simply obsolete. To compound this reality there is usually little or no release time for the teachers to attend the sessions, practice what they have learned, or revise and develop courseware. Administrators continually face cutbacks and this lack of funds influences the availability of expert trainers, teacher release time, and school facilities.

Many teachers who persist, and either obtain training or learn about educational technology themselves, are left wondering whether it is worth the effort. They return to schools whose equipment is old, inadequate, or not installed. They have no one to give

them assistance on an on-going basis, and most are still unaware exactly how technology can improve what they were already doing.

### Fear of Technology

For many teachers the issue is not simply a phobia of computers, but a particular dread of telecomputing and its implications. This problem can be quickly and easily cured by educating the teachers. The role of uneducated beginner is not an easy one for experienced teachers. They will need to learn many new ideas and slowly convince themselves of the necessity of computers in education.

Chin and Hortin (1993) state that teachers do not feel comfortable with technology in class for many reasons:

1. different computers require different procedures and are not compatible from one computer to another;
2. good software programs are scarce;
3. students' attention span is weakened due to considerable eye strain caused by watching the computer screen;
4. many software programs lack clear goals and objectives;
5. classroom recognition is required;
6. teaching style is affected;
7. they are not experienced themselves in computer use;
8. scheduling; and

9. equipment break down. (p.86)

Pedagogical Fear

Every year teachers are bound by the curriculum, specifically the information that they must "cover" before the end of term deadline. Many see computers and their related applications more as a time-consuming hindrance than a time saving resource. Killian (1994) has found that with limited time and a lot of material to get through, many teachers clearly preferred chalk, talk, and textbooks that didn't want to strike up a conversation.

Other pedagogical worries lie below the surface. Justifiably, many teachers see the Internet as a place that houses neo-Nazi newsgroups, pornographic files, flammers, and sexual harassers. However, the Internet would provide a student with the opportunity and freedom to explore their own interests. Rather than trying to deal with the details of new technology it would be easier to continue with the traditional format.

Another factor is the teacher's loss of power and control. With computers you could have your class working independently on an array of projects - there would not be one tidy plan being orchestrated by the teacher. The pedagogy would evolve into being student driven, and individual. The goal would be to foster independent, lifelong learning so that the student would be prepared for the changing world.

### Fear of Role Changes

Teachers' psychological need for control is largely a function of the industrial model school. Killian (1994) believes that "...the power and control we exercise over our students is psychologically rewarding and professionally necessary. If students can define their own curriculum and pursue their own interests, do they really need teachers at all?" (p.87). The catch phrase to describe this impending evolution has become "from mentor at the centre" to "guide on the side". Although teachers' roles will adapt, they will not become obsolete - just different.

The new role of an educator will be to save students from wasting time, provide encouragement, and set intriguing challenges. If the teachers will be promoting responsibility and initiative to the students, then the teachers themselves must be brave enough to display these traits.

### Professional Threats

Teaching teachers is not a task many people would envy. Teachers are accustomed to having the spotlight - the classroom expert at all times. This is their comfortable, everyday role and to walk into a world where they are merely uneducated beginners is not easy, and is definitely professionally threatening. After all, teaching is what they know and who they are. Coupled with this is the fact that educators inevitably critique the trainer in their minds. For instance, many teachers would be looking for reasons to cling to their traditional techniques and thereby trying to find fault with the



trainer, the new ideas, or the logistics of change. To combat this problem, many educational facilities have started by training the enthusiastic teachers first and therefore refraining from forcing ideas on anyone. Epple et al (1992) report that when training is deemed mandatory, only enthusiastic personnel should be chosen to participate.

Hale (1989) states that although faculty generally enjoy teaching, they are not accustomed to being taught. They are a critical but appreciative audience. Most are goal oriented, so training should be relevant to their goals. They are busy; training should be brief enough for them to attend, and good enough to justify coming back. Faculty are independent learners, so training to exhaustion is not necessary. However, many are technically timid and don't like abstract technical nonsense.

In addition to these various deterrents, experienced teachers have seen many failed "educational innovations" that have been presented to them by researchers and professional inservice educators. There is often an underlying cynicism amongst this particular group that is difficult to penetrate.

### **Planning and Organizing Relevant Projects**

Educational technology projects can involve choosing and implementing applicable software for your specific curriculum, or using computer networks to incorporate telecomputing activities. The exploration of these options is still relatively new to most classroom teachers. Many of these teachers may be wondering, "Where should I start?"

There is a sea of educational information available today but before a newcomer dives in, there are important questions to consider. Above all, an educator must determine if the proposed activity is a real one providing opportunities for relevant student learning, or a contrived activity providing, at most, only exposure to the technology?

Many software companies today offer versions of their educational titles for teachers to order. There are databases available on the Internet which are designed specifically for this purpose. For example, the database called Multimedia And Software for Teachers (MAST) serves as a source of information on new releases of software, videodisc, and CD-ROM products. Through MAST, teachers will be able to search for new products by specifications such as title, subject, or publisher.

As a starting point, teachers could work together and divide up all of the software they could find on a specific curriculum area. Then they could reuse, review, and create mini lesson plans on the impressive, worthwhile packages. The teachers would be able to pool their knowledge and accomplish together what none have the time to do individually.

Russell et al (1994) state that their teachers are taught to implement technology using the ASSURE model. The model was developed to help *assure* learning when combining software with teaching and learning. The function of the ASSURE model is to act as a general guide.

An outline of the ASSURE model as modified from Russell et al (1994) is as follows:

Analyze the needs and characteristics of the students.

State the instructional goals and objectives for the students.

Select the educational software and instructional methods that will be used to meet the objectives.

Use the software with individuals, small groups or an entire class.

Require student participation.

Evaluate and revise the lessons based upon student feedback, student achievement, and their own assessment of "how things went". (pp.68-69)

A more general and all encompassing model of instructional development is called the Four-D Model. This approach divides the instructional development process into four stages of Define, Design, Develop, and Disseminate. Thiagarajan et al (1974) briefly describe each stage as follows:

Define instructional requirements.

Design prototypical instructional material.

Develop trainee-tested and reliable instructional material.

Disseminate instructional material among teacher training programs. (p.5)

These guidelines would help a teacher to organize and implement any new approach into teaching and learning.

The process of using computer networks to incorporate telecomputing activities can be a much broader and more complicated area. To utilize the Internet as an instructional tool you should follow basic lesson design steps as you would when planning an instructional project;

Step one: Questions to Ask When Considering Telecomputing Tools.

Step two: Choosing Activities and Exploring Examples.

Step three: Monitor, Reflect, and Revise.

#### Step one: Questions to Ask When Considering Telecomputing Tools

Ross (1995) has formulated a list of question to consider;

- What is the educational goal I want my student to achieve?
- Is this a worthwhile educational goal, whether it be in electronic or traditional form?
- Am I trying to make my educational goals conform to the available technology, or am I using these tools to more effectively meet my instructional goals?
- Can this goal be reached just as effectively using more traditional methods?

- Is this electronic medium an effective way to teach an educational goal, or is this activity just a skill building exercise in the use of the tool? (p.28)

Answering these questions should help teachers to design telecomputing activities that are more meaningful and useful for the students. Also, this process will ensure initial planning and maximal time efficiency. Harris (1995) states that it is advisable to think not only about what students will be learning as they participate (the content goals), but also about what they will be doing online, and whether that activity matches one of the process goals that you have specified.

#### Step two: Choosing Activities and Exploring Examples

Effective activities and projects via the Internet can be separated into two distinct structures; *interpersonal exchanges* and *accessing information*. Each genre contains its own features, possibilities, and relevant educational applications. New project structures are emerging daily as students and educators use the Internet to suit their needs.

#### Interpersonal Exchanges

Electronic mail (E-mail) is a computer function that allows one computer user to send an online "memo" to another computer user worldwide. If you have E-mail access,

you will have an E-mail address and other users will be able to send you text, and attach files to this text if required. A sender composes a message, the message is stored on the network, and the receiver can pull the message up onto the screen when he or she wants to read it. The receiver can reply to the message and a paper copy can also be made.

The educational applications of E-mail are many. For example you can...

Exchange keypal messages. Keypals, the electronic version of global penpals, can be teacher-to-teacher, student-to-student, or class-to-class. Groups of students from different parts of the world could work on cooperative projects. Dyrli (1994, p.35) reports that Nina Hansen's class in Connecticut got fascinating results from their Save The Beaches project, in which over 500 students worldwide analyzed local beach litter. These can obviously evolve into fascinating cultural explorations without overwhelming the teacher and students.

Work with electronic mentors. Electronic mentors are subject matter experts who volunteer to work closely with classes or individuals online, typically on a particular project. These experts may choose to be a special guest for an electronic "appearance" only. The students would be able to chat back and forth with the mentor synchronously.

Another variation would be the mentor communicating with students in character. For example, Harris (1993, p.36) reports that at the University of Virginia, an educational history professor "became" Thomas Jefferson via electronic mail for several local elementary classes.

Go to electronic expeditions. Participating electronically in actual events as they take place is an exciting way for students to experience the unknown. Recent projects in which students received periodic Internet reports and exchanged messages include; the Iditarod dog sled race in Alaska, a four-person bike journey in Africa, a multi-national trek across the Arctic Ocean, and an expedition to the Antarctic (Dyrli, 1994, p.35).

Keep informed through discussion groups. Literally thousands of these groups, also called mailing lists or LISTSERVs exist, and form an ongoing backdrop of conversation and exchange of ideas among people. LISTSERV is a computer program that can maintain many distinct mailing lists on a single computer. Each day the "lists" to which readers "subscribe," distribute items of mail to the subscribers. For example, a post-secondary instructor may want to subscribe to one or all of the following;

- AEDNET (adult education), LISTSERV@SUVVM
- EDTECH@OHSTVMA.BITNET (educational technology),  
LISTSERV@OHSTVMA.BITNET
- UNIVOC (University Vocational Educators), LISTSERV@PUCC.BITNET
- EDTECH (secondary education focus), LISTSERV@MSU.EDU
- EDNET (all educators), LISTSERV@NIC.UMASS.EDU

(Pierce et al, 1994)

Hold electronic office hours. More and more faculty members worldwide are beginning to use E-mail as a form of personal communication between themselves and their students. Moore (1991) states that no longer do the students have to call for an appointment or wait until the next class to address concerns, questions, or ideas (as cited in Schrum, 1991, p.40). They are able to express their anxieties and concerns in a personal, non-threatening environment.

Set up class specific electronic bulletin boards. Bulletin boards are yet another form of E-mail where the student would be able to browse and read messages about a specific topic of curriculum. The teacher may choose to participate or to be a silent monitor who would keep the discussion in line with the course lecture. The students may be required to make two or more postings a week, and the postings would follow the general content of the class.

Cavalier (1992) has found that his students are able to reflect and compose at their own pace and convenience, resulting in round the clock dialogues of surprising depth and insight. The students have created conversations that are, in effect, a series of sustained collaborative inquires. Students frequently refer to previous postings in order to deepen the reflection.



### Accessing Information

Activities and projects on the Internet often involve the many variations of accessing information. The Internet has been called the "information superhighway", the "national information structure", and the "mother of all networks". Santoro (1994) is not alone in his belief that the Internet is quite possibly the most important technical creation since the computer itself. Yet an overwhelming number of people do not even know of its existence and are unfamiliar with terms such as telnet, ftp, gopher, and the World Wide Web.

Telnet. One of the original Internet services, telnet allows a user to establish a link and connect with any Internet-connected computer and use it as if it were in their home. Originally the intention was to allow people to access their own computer accounts from remote hosts.

Telnet is a means for accomplishing most of the current network's educational activities. Eisenburg (1993) states that access to the Internet is a key part of plugging into the world of networking for educators today.

The following are some examples of Telnet sites suggested by Dyrli (1994, p.37-38) that teachers and students will find particularly valuable:

- Argonne National Laboratory in Illinois runs a special Newton bulletin board for teachers and students. Of special interest is the Ask a Scientist Service, where users

can leave questions and get answers back from scientists at the laboratory. To take part, TELNET NEWTON.DEP.ANL.GOV (and log in as BBS).

- Cleaveland Freenet houses a variety of educational resources, including online projects in which your class can take part. To learn more, TELNET FREENET-IN-A.CWRU.EDU.
- NASA Spacelink is a space information service for educators. To learn more, TELNET SPACELINK.MSFC.NASA.GOV (and log on as NEWUSER).
- SENDIT is a well developed state network with a host of valuable resources; TELNET SENDIT.NODAK.EDU (log in as BBS and use the password SENDIT2ME)>

File Transfer Protocol (FTP). FTP is a counterpart to telnet which allows people to transfer computer files between their computer accounts on different Internet hosts. As an educator you can now log on to FTP sites around the world, search through the available resources - including reports, articles, magazines, photographs, film clips and software - and bring copies back to your computer electronically.

Sites suggested by Dyrli (1994, p.39) include:

- The "December Guide" is one of the best guides to information sources and services on the Internet, including online publications and recommended FTP sites. To locate, type FTP FTP.RPI.EDU and get the file internet-cmc in the subdirectory pub/communications.

- The SURAnet Guide to selected Internet Resources is an Internet users guide to navigation tools. To locate, type FTP FTP.SURA.NET and look in the subdirectory pub/nic for the info guide.<month>-<year>files.

Gopher. A network of gopher services contain data arranged in a set of interconnecting, hierarchical menus and computer files. Gopher clients navigate this set of menus and files traversing the globe. Menu items have been expanded from their original format to include databases, FTP sites, archives, online library catalogs, and hundreds of other

Gophers around the world.

Gopher sites as suggested by Desey (1994, p.15-16) include:

- Michigan State University  
Type: telnet gopher.msu.edu  
Login: gopher
- Europe  
Type: telnet gopher.ebone.net  
Login: gopher
- U.S. Dept. of Education Gopher  
Type: telnet gopher.ed.gov
- The list of gopher jewels  
E-mail to gopherjewelslist-request@-pis.cactus.org

Leave the subject line blank and send this message:

subscribe gopherjewelslist (your name)

World Wide Web (W W W). The Web is another Internet application which is similar to gopher but it uses a hypermedia information retrieval system. Hypermedia describes text which contains "hot words" or "buttons" to other texts, images, audio, video, and animation. Web servers and clients communicate in Hypertext Transfer Protocol (http), while the standard language used for creating and recognizing hypermedia documents is Hypertext Markup Language (html).

The World Wide Web is a relatively new phenomena that has grown exponentially in the past few years. Everyday the number of interesting, educational Web pages is expanding. The Web now includes the majority of the information that was previously only available on telnet, ftp, and gopher. The Web is a far more intuitive graphical user interface which operates on a "point-and-click" system, whereas the old method involved a series of comparatively complicated commands. Below are a few great Uniform Resource Locators (URLs), or addresses, to try:

- Scholastic Internet Centre

<http://Scholastic.com:2005>

- The World Lecture Hall

<http://wwwhost.cc.texas.edu/world/instruction/index.html>

- Understanding the Internet

<http://www.screen.com/understand/explore.html>

- Ask ERIC

<http://ericir.syr.edu>

- The Staff and Educational Development Association

[http://www.ex.ac.uk/public\\_html/SEDA.html](http://www.ex.ac.uk/public_html/SEDA.html)

- Info Technology Conference

[http://jccnet.johnco.cc.ks.us/projects/league\\_conference.html](http://jccnet.johnco.cc.ks.us/projects/league_conference.html)

- The WWW Virtual Library

<http://www.w3.org/hypertext/DataSources/bySubject/overview.html>

- The EdWeb

<http://wwwhost.cc.utexas.edu/world/instruction/index.html>

- The Whole Internet Catalog

<http://nearnet.gnn.com/gnn/wic/index.html>

- Yanoff's Special Connections

<http://www.uwm.edu/Mirror/inet.services.html>

- Higher Education

<http://nearnet.gnn.com/gnn/wic/ed.toc/html>

- Aardvark Interlist

<http://www.theworld.com/subjects.htm>

- School Home Pages

<http://toons.cc.ndsu.edu/~sackman/k12.html>

All of these sites can be accessed through Corinne Breen's home page at the following address:

<http://www.ifmt.nf.ca/~cbreen/corinne.htm>

### Step three: Monitor, Reflect, and Revise

The importance of a well thought out critical analysis, when implementing any new ideas into an existing program, should not be overlooked. The teacher will need time to think about student reactions, the success or failure of projects, and the educational worth of the new approach. Through reflection they should answer for themselves their own initial questions, come to a conclusion, and make revisions or dramatic changes as required.

## **Principles and Guidelines**

A summary of principles and corresponding guidelines for professional development in a technical institute are presented in this section. The principles are derived from a review of the literature. The guidelines for each principle are stated in behavioural terms in reference to the actions needed for implementation in the technical environment.

Several principles require brief mention. Principle one, which states that teachers are the key to educational change, is the most important and crucial component. Administrators must be willing to invest time and money into their teachers since they are ultimately in control of classroom change. Change is a people process that requires energy, it is not merely the addition of computers.

Principle three, relating to the availability of global information for students is another essential aspect of today's classroom. Students will need to be active learners if they hope to compete in the changing workplace. They will need to be able to think critically, reason, question, be creative and remain intellectually flexible. The curriculum should be designed to challenge them in this way.

The principles and guidelines are summarized in table 1 on the following page.

Table 1

Principle	Guideline
1. Teachers are the key to educational change.	Teachers need comprehensive training about technology and practical suggestions for improvement.
2. Education and improvement must become a lifelong process for teachers and students alike.	Access to technology will help the teachers gain educational knowledge, and help the students assume more responsibility for their own learning.
3. Students must be able to access and critically analyze information globally.	The teacher will facilitate and guide, as opposed to totally control, the learning process.
4. Teachers may feel professionally threatened by the integration of technology into education.	Teachers will need to be reassured by the trainer that their roles will not be diminished but enhanced.
5. Technology must be implemented with a plan in mind.	Teachers should follow the most applicable instructional development model for their situations.
6. Computer equipment - including hardware, software, and network connections - is essential.	Teachers must have convenient access to current computers, both for their personal use and for their students.
7. Teachers need to be encouraged and gradually empowered both during inservicing and on a ongoing basis.	The trainer must be available, approachable, flexible, empathetic, positive, understanding, and enthusiastic.
8. Change will not occur without full teacher support.	Administrative support will be needed in terms of funds for inservicing and equipment, release time, and the encouraging of innovation.



### **CHAPTER 3**

#### **INTERNSHIP EXPERIENCES : A CRITICAL, REFLECTIVE JOURNAL**

##### **Chronological Journal**

The following journal is an informal, personal evaluation that has helped me to analyze my experiences and direct my energy. The chance to reflect and write about my work has helped me to judge how well I was completing my initial goals and objectives. I have enjoyed analyzing my weeks and I plan to continue this process in the future since I believe it has helped me to become a more effective and efficient professional teacher.

##### **Week 1 (17 - 21 April 1995)**

Early in the week I had a comprehensive meeting with the on-site supervisor to discuss my newly accepted internship proposal. We began the preliminary planning of my responsibilities for May and June. He suggested that I should familiarize myself completely with the various equipment and software currently available on the computers in the Teaching and Learning Support Centre (TLSC), which I did. We also started discussing the specifics of how to fulfill my stated goals and objectives. I decided I needed some time for a general orientation first to prepare myself.

Other than the computer science personnel, the room was usually empty - either people in the building weren't aware of its existence or they were intimidated. Using the

Internet and The World Wide Web (WWW) I began to take note of any educational sites which I thought could benefit various instructors here at the Marine Institute - everything from Chemistry to Aquaculture. I'm hoping that this will turn into a valuable data base of educational treasures. Everyday I was learning so much about computers, both in general and with respect to education, that it was mindboggling. I had to write everything down at first but eventually it became very natural. I'm hoping this will be a great asset when helping other teachers since they know I have started from zero. I was only somewhat competent with Word Perfect before I became interested in educational technology. Thus my background, coupled with the fact that I am not a computer science person, should give them some hope and encouragement. I'll tell them that my goal is to be a self taught computer nerd!

During the nights and weekends, I spent hours at the library searching for articles involving information technology, professional development, and technical education. I narrowed the sea of information down to 76 journals which I considered to be in the good to excellent range, and began wading through them.

### **Week 2 (24-28 April 1995)**

During this week I was asked to attend and become involved in ongoing meetings concerning the creation of Human Resource Development (HRD) proposals.

Those involved included two planning analysts, a curriculum specialist, a computer services person, and a human resources person.

We discussed the possibility of applying for HRD grants to generally expand and enhance the current Teaching and Learning Support Centre. After some debate we decided on the three ideas below:

1. A Partnership with Secondary Schools: Using the Internet to Develop Awareness on Marine Issues.
2. Developing Enhanced Learning Techniques: Technology in the classroom.
3. Enhancing Service to Client Industries by Building a Workplace Learning Culture.

Guidelines and details of what we can and want to do were discussed. The planning analysts were to write the draft proposals. This was accomplished over the next two days. I was consulted by them to clarify and expand on areas such as the technical aspects, curriculum, and education issues.

The same group had another meeting two days later to discuss the draft proposals. After some minor changes, they were submitted to the HRD committee.

It has become apparent that the Teaching and Learning Support Centre will serve many different functions for the Marine Institute (MI). The larger agenda includes; promoting the MI, promoting MI students, providing services for industry and schools in Newfoundland, providing services for the MI employees, and providing professional

development for the faculty and staff. I had originally thought that its sole purpose was to service the faculty and staff and to improve teaching and learning.

On Friday, 28 April, I had a meeting with the manager of computer services. During the meeting we discussed the following specific goals that we will accomplish during the month of May:

With respect to The Teaching and Learning Support Centre we will:

- 1 Enhance the Environment by:
  - explaining the role of each computer using individual posters that outline both their names and functions.
  - placing a poster on "How to Scan" above the scanner.
2. Work on the configuration of each computer and the local area network (LAN).
3. Create a program, called "Champions", in which people will be chosen to become mentors to other employees on the basis of their enthusiasm and skill level with respect to computers.
4. Develop and deliver professional development mini-seminars for faculty and staff throughout May and June, which will be hands-on, activity based, informal, and will be no more than two hours in duration. The learners will include both faculty and staff and they will work at the computers in groups of two.

The schedule for mini-seminars is as follows;

Technical Overview	11,23,30 May
Powerpoint	4,16,25 May

World Wide Web, (WWW)

9,18 May & 1 June

5. Meet with the following groups during May to discuss the integration of applicable software into their specific curricula , and to introduce them to the TLSC:  
Mathematics  
Chemistry  
Aquaculture  
Physics  
Nautical Science  
Communication Skills
6. Learn both the Powerpoint presentation software and the Asymmetrix Toolbook software thoroughly, so as to be able to produce demos, handouts, give seminars, and help people with any projects in the future.
7. Meet with the resource person at Bishop's College High School sometime in early May to investigate their learning centre and to discuss their plans for the future of educational technology.
8. Share any applicable, pertinent journal articles with my supervisors to read during the following months.
9. Investigate the needed components of a multimedia cart for the classrooms in September, and the logistics of how this will work with respect to scheduling.

10. Compile a document of the major advantages of using educational technology in teaching. This will be used to initially introduce the teachers to the current literature and show them some possibilities. It will include teachers' success stories along with the information to contact them personally via E-mail or the WWW.

These seminars will be followed by more in-depth, specialized seminars in June. There is so much work and responsibility on my shoulders for the next two months that I'm excited but apprehensive. With hard work and enthusiasm, I know that I can do a good job.

### **Week 3 (1-5 May 1995)**

During this week I assisted in the Powerpoint seminar. The learners enjoyed themselves and seemed very impressed. The word spread about the session and the next two seminars had waiting lists. I was very pleased that things were starting on a positive note. I decided to add more activities to the next seminars, including creation, saving, and printing of their own individual presentations that we would invent during the session.

I also started to add some posters, help individuals who wandered into the centre, and those who needed specific help with software or the Internet. I often needed the

assistance of the computer services personnel. This experience is really helping me learn the details about computers and educational technology.

The resource person at Bishop's College met with me to discuss their technology centre. I was very impressed. He provided me with many new ideas about training strategies, professional development of teachers, and practical ways of incorporating computers into teaching.

One of my supervisors has published a summary of the TLSC in the MI Window - the Institute's biweekly newsletter. He included a list of what the centre can do and encouraged everyone to visit and discover for themselves. I imagine that this place is going to get more traffic in the near future.

#### **Week 4 (8 - 12 May 1995)**

This week started out with a meeting of the nautical science captains/instructors, a supervisor and myself. It was the first organized meeting between us and one of the subdivisions at the Institute. To prepare for the meeting, I reviewed the nautical science curriculum and had some informal discussions with teachers. I then searched the Internet and some related software directories for information.

One of the Captains invited me over to their division for a tour of the top of the line, fully computerized ship simulators. I took the opportunity to ask how I could help them improve their teaching, and they were positive and enthusiastic. I think it is to my

advantage that I'm not slotted as either a teacher, curriculum developer, or computer sciences person. I'm actually trying to be all three but I believe I'm being viewed as a non-threatening, enthusiastic newcomer. I'm trying to fulfill a much needed role as an open-minded mediator.

The week progressed with a session on the World Wide Web. This included a brief history, scavenger hunt, discussion of major functions and creation of a home page. I made sure that it was a very informal, activity packed, group session. The faculty and staff sat in pairs around the computers to minimize on the intimidation factor.

A supervisor, who was sitting in his office down the hall, was amazed at their enthusiasm. As the faculty and staff members were leaving, many popped their heads into his office to praise the session. This was a wonderful compliment for me. They asked if there were plans for more sessions to continue on a regular basis throughout the '95 -'96 school year.

To improve this session I decided to invent two or three well designed handouts about the World Wide Web(WWW). I also needed to improve the look of the presentation equipment. Currently, there is a computer, monitor, and keyboard which is hooked to an overhead, palette, network connection, and cart, by means of a rat nest of wires. This set up looks very complicated and intimidating, and there's really no need to leave this impression. If I want teachers to use this in their teaching and learning, then it must be a user-friendly system. The teacher should be able to book the "multimedia cart" from the AV room. This lightweight cart should consist of a hard drive, keyboard, and



small projection device. It should be rolled in and simply plugged in. If it involves two carts and connecting wires then forget it - it will be too much trouble and too difficult to troubleshoot if it refuses to operate.

The next scheduled meeting was with the Communication Skills personnel. These instructors know that they should be on the leading edge with respect to technology, but they admitted that they are presently quite unprepared. I was happy to know that they wanted to learn. They were open-minded about computers, yet they felt that they would never live long enough to know everything about them.

Lucky for me, this group of teachers knew that I was like them just last year - I couldn't save a file or print a document. This fact is helping me gain their respect and trust. I showed them pages of related software that I had found, and many success stories related to Communication Skills teaching. They immediately started to sketch out plans for September in their minds. They continuously asked me, "Is this sort of thing hard to do?" I continually reassured them and I think they are slowly starting to believe me.

I asked these teachers if they would like to attend any of the upcoming seminars. They told me that the invitation went out over E-mail and since many of them are still not connected, the sessions were full by the time they heard about them. Well, I thought, this is a huge problem. I decided to do a 3 hour, specialized session just for the Communication Skills group.

The first Technical Overview session, led by my supervisor and assisted by me, occurred during this week. The learners found it informative and asked about the upcoming plans for the centre.

### **Week 5(15-19 May 1995)**

This week involved further meetings with the Communication Skills group. They have decided to create a home page, and incorporate the Powerpoint presentation software into their teaching and student presentations for September. They are going to keep gradually adding and improving their course with electronic bulletin boards, E-mail office hours, and on-line technical writing labs. They seem so rejuvenated and I'm happy to help them. I get great satisfaction from helping teachers improve and basically providing professional development.

My supervisor and I also had beginning meetings with the Mathematics instructors and the Aquaculture Unit. The math teachers want some tutorial CD ROMS installed on the machines in the help centre and they have decided to start developing a math home page.

The aquaculture group wants to know more about the presentation software and the WWW. I decided that I would hold specialized sessions for both groups. I suggested to the aquaculture group that they could take all of their slides (1000's) and compile them

on a CD ROM. This way the CD ROM could be both installed on computers in the help centre, and available to instructors so that they could gather the picture for slide presentations when they are going on conferences. They loved this idea but wondered when they would have time to start on it. Giving the teachers time to develop such projects is so important and usually overlooked.

I'm beginning to realize it isn't easy to teach teachers for many reasons;

1. They are more accustomed to teaching than learning.
2. They inevitably critique your teaching techniques.
3. They resist being taught what they feel they already know.

I understand where they are coming from and I try to keep these facts foremost in my mind during the scheduled discussions and seminars. I will have to work hard to gain their trust and to impress them in my new role.

To help me better understand adult learners, I took my educational supervisor's advice and gathered some books about the professional development of adults. These books have been helpful for guiding me on general tips for success.

During this week I also visited with a French and Spanish professor at Memorial University of Newfoundland. He has successfully integrated computers into both his language teaching and learning labs. Now he couldn't live without it. His methods completely revolutionize and improve the old way of learning languages. The students say

that they really enjoy the entire experience and the software makes learning more enjoyable and dare I say fun!

This sounds wonderful but the background work that must happen before the MI is at this level is quite huge. We'll get there in time I guess.

### **Week 6 (22-26 May 1995)**

There were more meetings with the instructors of specific disciplines this week. They went well and afterwards some teachers always asked me to follow up on demo software or searches on the Internet. I'm slowly trying to turn this work over to them. I don't want people coming to me saying "multimedia this for me" or "please make my home page for me" or "search for this please". I'm trying to empower them by passing on what I've learned in general and specifically with respect to their disciplines.

It's a fine line to walk - I can't say no I won't do the work, yet I don't want to do it for them and leave them once again in the dark. So far, I think I've been quite good at showing them how to accomplish their tasks while I work next to them.

The third Powerpoint presentation session went well and was a huge improvement over the original. For this session I had two comprehensive overheads and two hours of informal, student driven, cooperative learning. I'll have to admit, all of those graduate curriculum courses I've done are actually useful. Above all, they've helped me understand learning styles and alternate forms of teaching.

### **Week 7 (29 May - 2 June 1995)**

To begin this week I decided to schedule a meeting with my supervisors for Monday morning. During this meeting we decided on the following plan for my activities in June:

1. The TLSC needs....

- Posters of the different functions available.
- Suggestion box and telephone.
- More magazines and books.
- Handouts and plastic wall folders for them.
- Video camera surveillance.
- A slide making machine.
- A viewer to replace the overhead and palette.

2. My individual projects will include...

- inventing a home page for myself and for physics.
- helping groups of teachers to invent their own home pages.
- order more software as needed.
- thoroughly learning and then teaching three seminars each of Wordperfect 6.1, Corel Draw, and the World Wide Web.

- working with a supervisor to prepare a comprehensive seminar for the Institute's top executives on the overall functions and capabilities of the Teaching and Learning Support Centre.
- arranging meetings with successful educators who have incorporated technology into teaching - I think I'll start at StemNET.
- learning the SPSS statistical package for the purpose of eventually holding seminars in September.

### 3. Overall comments

My supervisors are very pleased with how hard I have worked, what I have done, and the responses from teachers. They are impressed by the positive momentum and they realize it may be difficult to keep this going - after all, we are trying to change a culture.

The session schedule went out over E-mail after this meeting and by the afternoon, all nine sessions were full and had waiting lists! This does tell me one thing for sure - professional development at the MI is desperately overdue.

### **Week 8 (5 - 9 June 1995)**

I began this week with an orientation/overview session for a small group of instructors who had missed many of the seminars. They basically wanted to briefly know

how all of the equipment and software worked, and how it could help them. This type of activity gives me great satisfaction. I know how intimidated and ignorant they feel - and I know how happy they are to finally "get it". I let them know that they can come to me at any time and I'll help them straighten out their computer woes.

Last month I had held similar sessions with instructors. These instructors are constantly learning and occasionally asking for my assistance. I have been helping some groups to get their home pages on the World wide Web. They seemed very impressed with themselves and their new found knowledge. They never realized they would be able to accomplish such a task.

The organized seminars for the week included the WWW and Corel Draw. Learning the Corel Draw software wasn't easy. I consulted with other faculty and staff members who were well versed in this graphics package and I stayed up late playing with its functions. Eventually it all came together and the seminar went really well.

I think for the next seminar I'll invent an improved handout and perhaps an activity sheet. During this first session I found myself talking them through activities which they followed but probably won't remember. I should have had these done up in a logical format on a handout. The people were of various ability levels so some were finished and bored while others struggled. An activity sheet would allow them to work at their own pace and I could increase or decrease the difficulty level during the session as required. The people would then leave with a sketch of many of the software's functions.

I went to another meeting at MUN during this week about improving computer labs. A salesman from Montreal had the latest and greatest attachments that could transform teaching in a computer lab. I was impressed but it costs \$22000.00 and I don't know if it would be worth that much money. I gave the information both to a supervisor and to head of the audio visual department. They didn't think the cost was too high since the equipment would outfit an entire computer lab. Maybe we'll have more improvements for September.

My on-site supervisor and I had another meeting late in the week to discuss an important, upcoming meeting with Marine Institute's top executives. They want to see how they spent their money, what the computers can do, and generally what all the fuss is about. We want to impress them, and ask them for continued support in terms of money. We'll need to convince them that professional development is long overdue and very much needed at the Marine Institute. My supervisor would also like to present the idea of keeping me on as a curriculum specialist / educational technologist for the upcoming year, and bring in guest speakers who are experts in their fields. We have big plans for this place but nothing will happen without their support and money. I am going to have to choose my words carefully and be well prepared that day.

On Friday I began playing with Word Perfect 6.1 and reading the manuals. This package won't be as difficult as Corel Draw but the majority of the people there will be familiar with the basics, and they will want to know how to use the functions over and above the norm.



**Week: 9 (12 -16 June 1995)**

I'm beginning to feel the added stress of finishing off my internship. Before the end of June I'll have to continue with my projects at work and finish both my journal and internship paper. Since the beginning of the month, I've been working during the nights and weekends on my paper so that I'll be able to hand it in on the 30<sup>th</sup> of June - my own deadline.

I taught two afternoon sessions this week, continued on with ongoing projects with teachers, and finally started developing my own home page. By now I think I could teach home page creation in my sleep, but I haven't had the time to invent my own. I think I'll make a fairly simple page and keep adding to it over the summer. By September I plan to have both a physics page and a personal page that I can use as examples - they'll have to be both simple and useful.

On Thursday, I gave a World Wide Web seminar to the top executives/administrators in the Marine Institute. These people wanted to learn more about the Web. I had long ago suggested such a meeting since I knew that they must be going to conferences, hearing details about the Web, and not knowing the full story. They should always be informed and able to talk about new ideas that will impact post-secondary education.

My on-site supervisor introduced me during the meeting and praised me to the ceiling. This means a lot to me. He is quick to give credit and compliment his coworkers.

Perhaps this is unusual but I have nothing negative to say about any of my supervisors at the MI. They always try to be fair, open minded, and flexible. When I taught in the school system I always felt like I was also going to school there. There are no stringent rules here and its a great place to learn from a group of mentors.

The executive meeting went very well. My supervisor later told me that he got lots of positive comments and that I did an excellent job. This is probably due to the conversation that we had before the meeting. He told me how I should talk to these people and generally what I should teach them. These people are practically never in the position as novice or kindergarten student. It is new and tricky territory, and it need not be made worse by a young woman making them feel stupid. With this in mind I planned an activity based, group lesson and it was a success - thank God!

#### **Week 10 (19 - 23 June 1995)**

I handed in a draft copy of my internship paper to my educational supervisor on Monday. I know she will both provide some constructive criticism, and make sure that the paper will be acceptable to the review committee. I'm lucky to have been paired with such an understanding and helpful person.

I continued teaching seminars during this week - I think I finally have them perfected. I spent Wednesday and Thursday tackling an unusual project. I was asked to

teach a group of executives from Yemen about computers. The men are from a developing fisheries institute/community college in the fishing port of Aden, Yemen.

They wanted to become computer literate in six hours - I did my best! Using handouts, demonstrations, and hands on, group activities, I taught them about word processing, spreadsheets, powerpoint presentation software, and the world wide web. I was a little apprehensive at first but we had a great time. They taught me about their customs, culture, and country and I exposed them to what computers can do. The Yemeni were very impressed, and my coworkers were amazed at my patience!

I finished off my home page during this week but, I will be continually revising it. Everytime I think I'm satisfied, I learn about another way to make it look better, or about another important link that I feel would be valuable to include.

My educational supervisor came up to the Marine Institute and met with my supervisors to talk about my internship and what I have accomplished. She took the time out of her schedule to help me improve my paper, see the facilities, and meet them both. She was very impressed with the amount of work completed, and I was delighted to finally exhibit my hard work.

#### **Week 11 (26 - 30 June 1995)**

My last week has been spent making sense of it all - my research, everyday experiences, and the final paper. My reflection has led me to some informal guidelines

that help me better understand the complexities of working with faculty, supervisors, and senior administrators. I have arranged these ideas and recommendations for myself in the following list of “do’s” and “don’ts”:

Do...

- try to be available, flexible, helpful, encouraging, empathetic, positive, and enthusiastic.
- be aware of intimidation and try to minimize the stress of learning new ideas.
- provide time for the purpose of empowering them.
- decide on priorities and avoid work overload.
- treat all new learners with respect and patience.
- be aware of and prepare for the audience’s needs
- hold specialized sessions and modify the master plan if needed.
- be aware of how an expert’s skills may discourage a novice.

Don’t...

- make comments such as, “This is what you too *could* be doing in your teaching/work.”
- suggest that they should move into the current century.
- tell people how to teach or do their work.
- declare that the new ideas are “really easy”.
- try to generalize the information for everyone.

- struggle for power or control when teaching adults.
- become frustrated and impatient with new learners.
- make fun of peoples' jobs or ability levels.
- expect everyone to share your enthusiasm.

It is my hope that these points, derived from my reading, experiences, and reflection, will help me to both succeed in my new role as a resource person and accomplish my future goals.

## Conclusion

In the future there will be more technology, more home learning, more use of computers and satellites, and additional technologies; that is understood (Glines, 1991). There will be less need for both the school building and the teacher as an all knowing authority figure. Technology in the classroom is not being promoted to remove the teacher from the instructional loop, rather it can shift the focus of authority and control away from the teacher and the textbook. The teacher can use computers not to mechanize instruction but to change the classroom from the hierarchical situation to an egalitarian organization. The role of the teacher will be redefined as a dynamic facilitator who helps the students appreciate the importance of independent, ongoing education. It is a fact that young people can no longer educationally afford to ignore global dynamics and issues that can and will affect their lives.

Teachers can expect and anticipate the changes that technology will bring to education. Technological tools are undeniably better than people at one thing - the storage and retrieval of information. Students will be able to absorb information more quickly and effectively, analyze issues by immediately accessing world news coverage, and communicate with individuals globally. Consequently, technology will reduce the time teachers spend lecturing, while increasing the time available for individual student-teacher interaction.

Change is not an event or a technological process. Change is primarily a people process. Thus it is crucial that teachers understand that their roles will not be diminished but enhanced and that they need to be open to change.

## References

- Browne, D. & Ritchie, D. (1991). Cognitive Apprenticeship: A Model of Staff Development for Implementing Technology in Schools. Contemporary Education, 63(1), 28-33.
- Buchsbaum (1992). Portrait of a Staff Development Program. Electronic Learning, 11(7), 18-23, 26-27.
- Cavalier, R. (1992). Course Processing and The Electronic Agora: Redesigning The Classroom. EDUCOM Review, 27, (2), 33-37.
- Chin, S. & Hortin, J. (1993). Teachers' Perceptions of Instructional Technology and Staff Development. Instructional Technology and Staff Development, 22(2), 83-95.
- Clemente (1991). Effective Computer Inservice: Factors for Success. The Computing Teacher, 19(1), 28-29.
- Cousins, E. (1994). Developing effective User Training Programs at the University of Michigan. CAUSE/EFFECT, 17(2), 53-58.
- Craig, R. (1987). Training and Development Handbook: A Guide to Human Resource Development. New York: McGraw-Hill.
- D'Ignazio, F. (1994). Beyond Multimedia: The Student as Sherlock Holmes. The Computing Teacher, 21(5), 38-40.
- Desey, D. (1994). That Wonderful Gopher! Tech Trends, 39(2), 39-41.
- Donald, A. & Naff, M. (1993). Facilitating Change for Survival. CAUSE/EFFECT, 16(2), 8-15.
- Doyle, D. & Levinson, E. (1993). Doing More With Less. American School Board Journal, 180(3), 26-29.
- Dyrli, O. (1994). Riding the Internet Schoolbus. Technology & Learning, 15(2), 32-40.
- Dyrli, O. & Kinnaman, D. (1994). Gaining Access to Technology: First Step in Making a Difference for Your Students. Technology & Learning, 15(1), 16-20, 48, 50.
- Eisenburg, M. & Ely, D. (1993). Plugging into the 'Net. Emergency Librarian, 21(2), 8-16.
- Epplé, M., Gardner, J., & Warwick, R. (1992). Staff Training and Automated Systems: 20 Tips for Success. The Journal of Academic Librarianship, 18(2), 87-89.

- Glines, D. (1991). Imageneering : Key to Educational Futures. (ERIC Document Reproduction Services No. ED 332 310).
- Hale, M. (1989). Faculty Support Centers Technology in Higher Education: Current Reflections. Second in a Series. North Carolina University. (ERIC Document Reproduction Services No. ED 358 815).
- Harris, J. (1993). Using Internet Know-How to Plan How Students Will Know. The Computing Teacher, 20(8), 35-40.
- Harris, J. (1995). Organizing and Facilitating Telecollaborative Projects. The Computing Teacher, 22(5), 66-69.
- Hawkins, R. (1994). Teaching Teachers How to Teach With Technology: Do's and Don'ts. The Computing Teacher, 21(8), 16-17.
- Jordan, W. & Follman, J. (1993). Using Technology To Improve Teaching and Learning. (ERIC Document Reproduction Service No. ED 355 930).
- Killian, C. (1994). Why Teachers Fear the Internet. Internet World, 5(6), 86-87.
- Merryfield, M. (1991). Science-Technology-Society. Theory into Practice, 3(4), 288-293.
- Murk, P. (1993). Tested Techniques for Teaching Adults. Adult Learning, 4(4), 26.
- Paul, D. (1994). An Integration/Inservice Model That Works. T.H.E. Journal: Technological Horizons in Education, 21(9), 60-62.
- Penning, N. (1991). Wanted: Computers in Classrooms. The School Administrator, 48(7), 35-36.
- Pierce, J., Glass, G., Young, M., & Soucy, D. (1994). The Educational Research List (ERL - L). Educational Researcher, 23(2), 25-28.
- Ross, P. (1995). Relevant Telecomputing Activities. The Computing Teacher, 22(5), 28-30.
- Russell, B. (1994). Improving Technology Implementation in Grades 5-12 With the ASSURE model. T.H.E. Journal: Technological Horizons in Education, 21(9), 66-70.
- Sammons, M. (1994). Motivating Faculty to Use Multimedia as a Lecture Tool. T.H.E. Journal: Technological Horizons in Education, 21(7), 88-90.



- Santoro, G. (1994). The Internet: An Overview. Communication Education, 43, 73-86.
- Schrum, L. (1991). Teacher Education Goes Online. Educational Leadership, 49(3), 39-42.
- Standish, D. (1993). Ignite Technology: Making the Difference with Staff Development. (ERIC Document Reproduction Service No. ED 367 302).
- Thiagarajan, S. , Semmel, D., Semmel, M. (1974). Instructional Development for Training Teachers of Exceptional Children. Bloomington, Indiana: Indiana University.
- Thornburg, D. (1992). Learning Technologies Essential for Education Change. Washington, D.C.: Council of Chief State School Officers. (ERIC Document Reproduction Services No. ED 349 967).

## Appendix A

## Components of Staff Development for Acquiring Expertise

Components	Example Activities
Instruct	<ul style="list-style-type: none"><li>• Offer heuristic and metacognitive strategies.</li><li>• Use authentic activities.</li><li>• Form grade-level or discipline matched groups.</li><li>• Incorporate problem-solving activities.</li></ul>
Model	<ul style="list-style-type: none"><li>• Demonstrate how tasks may be used in classrooms.</li><li>• Show how experts work through problems.</li><li>• Offer aids or sets of written guidelines.</li><li>• Demonstrate progressive nature of expertise.</li></ul>
Coach	<ul style="list-style-type: none"><li>• Establish a collegial, nonthreatening environment.</li><li>• Observe teachers doing tasks.</li><li>• Provide feedback.</li><li>• Clarify misconceptions.</li><li>• Assist with tasks needing help.</li></ul>
Empower	<ul style="list-style-type: none"><li>• Gradually fade modeling and coaching sessions.</li><li>• Facilitate discussions for articulating knowledge, reasoning, and problem solving processes.</li><li>• Promote self-monitoring and diagnosis through reflection.</li><li>• Encourage exploration of new tasks.</li></ul>

Browne, D. & Ritchie, D. (1991)  
Contemporary Education  
Vol. 63, No. 1  
Fall 1991







