CHAPTER – I

INTRODUCTION

1.1 BACKGROUND AND CONTEXT

Keeping abreast of the medical advances occupy an important, ongoing responsibility of medical professionals, which categorizes physicians as lifelong students. In Iran just like in United States, Continuing Medical Education (CME) is the bridge that connects basic research and the practicing physician who must fulfill credit requirements for licensure and board certification. Developments in multimedia technology and the Internet have made online CME courses possible, making the process of obtaining CME credits more efficient and convenient for physicians. Although first generation courses have been criticized for the lack of interactivity, new developments in multimedia technologies and broadband connectivity promise a new online learning experience where distant participants can communicate using voice or video channels. In addition, future online CME generations may incorporate virtual reality modules that will enable physicians to learn and practice procedural techniques as well as gain knowledge. Continued application of sophisticated technologies and continued content-development promises to add new dimensions to traditional learning and may identify online CME courses as a major medical educational paradigm.
Since the time of Sir William Osier, it has been recognized that a career in medicine means a lifetime and life long learning, a philosophy that represents a physician’s commitment to patient care in an environment where new research developments continually evolve better clinical practice standards. In the United States, Continuing Medical Education (CME) has become the official mechanism that brings advances in basic medical research to the practicing physician and emerging technologies have made critical changes in CME course formats that have improved accessibility and cost effectiveness. This trend will continue well into the future as new technologies promise to add new dimensions to computer-based learning modules.

The CME concept has been institutionalized in the United States to ensure the quality of health care delivery. Over the past six decades, a growing number of American Medical Boards and societies have incorporated CME credit requirements for membership. The Accreditation Council for Continuing Medical Education was created in 1975, and, as of 1997, 24 out of 28 American specialty boards required that physicians earn CME credits to obtain certification and licensure. As a result, United States physicians must now engage in a lifetime pursuit of CME credits. However, earning required CME credits is no small feat given physicians’ lifestyles, especially in academic settings where clinical, research and teaching responsibilities must be juggled.

Fortunately, new technologies have eased the burden, increasing the convenience, efficiency and cost-effectiveness of CME courses. Over time,
technology has evolved CME course formats from the traditional didactic sessions held in vacation destinations to include more accessible, mass-distributed courses available on videotape, audiotape and CD/ROM. However, the Internet and computer-based technology perhaps have the greatest potential to improve CME offerings.

In recent years, widespread use of the Internet and new multimedia data communication technologies have created the first generation of on-line CME courses taught in virtual classrooms. While first generation courses are little more than recorded courses with the increased convenience of immediate accessibility, the industry is in its infancy and technology is developing rapidly.

Second generation courses may include interfaces that allow user interactivity, allowing the experience to approximate the traditional “live” lecture, the current educational gold standard. The on-line experience will continue to be improved as new technology develops, and subsequent generations may include remote access to computer-based virtual reality programs that enable physicians to learn and practice procedural techniques. At some point in this evolution, more powerful handheld machines with wireless connectivity will become the norm, enhancing accessibility even further.

A concept that began as an annual anatomy refresher course for Venice physicians in the fourteenth century, CME may be a mobile, interactive, tactile, on-line, virtual reality experience in the 21st century. Such new dimensions will give the on-line CME learning experience unique advantages over the traditional
“live” experience, and may earn it the position as the new educational gold standard.

Emergence of On-line CME Courses: In the early 1960s a division of the United States Defence Department, created the Internet. At that time, no one could have predicted the profound impact of this high-speed communication network on society at large. The medical field was no exception, and the Internet was initially used solely to exchange scientific information. However, improvements in data transmission technology and computer hardware have expanded the Role of the Internet to Medical Education.

The idea of creating virtual classrooms, including on-line CME courses, was born out of two major developments. In Iran five years back medical sciences underwent explosive growth when it became possible to deliver information using “high end multimedia formats,” and, in the late 2002s, faster computer processors and updated networks enabled the transmission of streaming video/audio with Internet. Subsequently, academic institutions, non-profit organizations and the private sector recognized the potential for Internet-based, remote learning programs, and the first on-line CME courses emerged in 2006. These first generation on-line CME courses, offered mostly by Universities, are pre-recorded courses or text with illustrations that can be accessed instantaneously twenty-four hours a day from any computer connected to the Internet. Typically, a one-time fee ranging from five to fifteen dollars an hour is assessed, requiring the physician to make an on-line payment.
As a result, course material can be mass distributed to a global audience at their convenience and to the point of care.

Many authors have acknowledged the potential power of distant learning programs, specifically; on-line CME courses represent a cost-effective, convenient option and one that affords physicians much flexibility when fulfilling credit requirements. Physicians can select the subject, the speaker, the pace of the course, and the location where they learn. Importantly, research has identified on-line CME courses as an efficacious teaching tool that many physicians like. Recently, the American Cancer Society and Medical Directives, Inc reported that on-line course takers demonstrated a greater improvement in knowledge than physicians who attended the same course presented in the traditional “live” format. In study, a 2006 e-mail survey of Midwest physicians conducted by the University of Wisconsin reported that 80% of the respondents favored on-line courses, a result that lead the University to offer on-line clinical and administrative courses.

Considering the research statistics and the theoretical advantages, it is no surprise that on-line CME offerings are expanding. From 1997 to 1999, the number of on-line CME courses increased by 110% and the number of CME websites increased by 58%, as a result, we now have links to, and descriptions of, more than 320 Online CME sites offering about 16,000 activities and more than 26,000 hours of AMA Category I CME credit. Last Updated February 5, 2008. There is a growing selection in a variety of specialty areas.
As the on-line CME supply continues to grow, physicians will have a broader selection, affording them even greater flexibility in how they fulfill CME credit requirements.

1.2 TRENDS IN ON-LINE CME USAGE

The supply of on-line CME courses is increasing in an environment where an increasing number of physicians are computer savvy and take advantage of Internet resources. However, despite the ripe environment and the recognized power of on-line learning, studies show that while physician usage is increasing, existing CME courses remain underutilized. Over the last five years, the proportion of physician Internet users has increased significantly from 3% in 1995 to almost 80% in 1999. A Medical Association Marketing Group survey of American Medical Association physicians also reported a 15% increase in on-line physicians from 1997 to 1999. However, the majority of these “MD surfers” are not taking advantage of on-line CME courses. Surveys conducted at two major medical meetings revealed that physicians still receive the majority of their credits from lectures and out-of-town conferences and that less than five percent of credits are earned online. Research has pinpointed several issues that may explain why physicians are reluctant to use this valuable resource. Major shortcomings of first generation on-line CME courses include access problems, the lack of interactivity, a perceived lack of sufficient computer skills and a mistrust of e-commerce. Because CME courses operate on a fee-for-view basis, course content is secured behind firewalls where it can only be accessed via log-in/password protocols. As a
result, course content is invisible to search engines, and it can be difficult for physicians to locate specific courses related to their specialty. According to a 1999 survey of Pediatricians and Family Physicians, 22% of the respondents reported that they would be unwilling to use online CME due to the impersonal nature of the experience and thus preferred live sessions.

Another study found that some physicians are uncomfortable with the logistics involved in connecting to and using the Internet and that they did not feel they had the time to learn these skills. Finally, a number of physicians are reluctant to use any Internet resource that requires online payment.

Many of these problems have simple solutions. Informational billboards describing the title and content of CME courses can be posted on the Internet and would be visible to search engines. Equipping such billboards with the appropriate links would further facilitate the matching of physicians with relevant CME courses. Connecting to and using the Internet requires minimal skill, and one study reported that, once shown how to use this resource, the majority of physicians were willing to try online CME courses.

The technology exists to incorporate some degree of interactivity into online courses. Readily available web interfaces including instant messaging, web telephony, discussion forums or chartrooms can be used create a two-way communication channel, more closely simulating live formats. In fact, some CME sites have already incorporated chat interfaces embedded into WebPages that
allow interaction while slide presentations or other multimedia content (video/slides/sounds) is played.

However, despite the shortcomings, projections for future on-line CME utilization are still optimistic. Studies predict that the number of physicians seeking on-line CME credits will increase from an actual 2% in 2000 to 50% over the next several years. Perhaps improvements on existing formats (creating the second generation) and interventions to improve access and Internet skills will also increase demand to match the supply. Computer-based CME courses clearly have tremendous potential, which will expand as technology advances. Future directions for on-line course development: Existing technology is continually being improved and new technologies are always on the horizon. As these are applied to improve on-line education modules, each subsequent generation of CME courses become a more powerful teaching tool, possibly rendering live sessions obsolete.

Technology enabling interactivity exists, and it is only a matter of time before second generation online CME courses will be offered that incorporate this technology, more closely simulating the live experience while preserving the convenience of delivery to the point of care. Broadband Internet connectivity, which allows the transmission of large amounts of data, is rapidly becoming available in the United States. The number of installed high speed lines increased from 2.7 million in 1999 to 9.1 million at the end of 2006.
Currently, in the United States, cable modem users total 6.7 million while DSL users account for 2 million. Thus, it is not difficult to imagine that these keyboard based modules will soon be replaced with IP (Internet Protocol) videoconference interfaces where user will be able to ask verbal questions in real time from their own computer terminal.

By integrating fast Internet access and computer-generated simulated worlds, subsequent generations of on-line CME courses may incorporate a tactile dimension, integrating knowledge and practical training. On-line training in procedural techniques can be accomplished by combining Virtual Reality Markup Language (VRML) protocols with hepatics devices that allow users to “feel” and “touch” objects. For example, at the University of Kentucky, a virtual reality simulator (ImmersaDesk, Fake space Inc.) equipped with a force feedback device (Phantom TM) simulates tracer insertion for a laparoscopic cholecystectomy and is used to teach medical students and surgical residents. This exercise, although practiced using the virtual reality machine, can actually be practiced (with almost no delay) from a remote location as long as all computers are linked through a high-speed network. Developing a generation of on-line CME courses incorporating this technology will allow physicians to learn and practice technical skills from their desktops.

Wireless connectivity will give even more flexibility to physicians who seek online CME credits “on the road,” adding more choices in the location where they learn. Downloading on-line CME courses into a handheld computer equipped
with fast, wireless Internet access will free physicians from their desktop computers and other wired infrastructures. Again, this technology exists and it is only a matter of time before it becomes common place.

Continually evolving new generations of on-line CME courses by applying new Internet and computer-based technologies promise to add new dimensions to the online learning experience. However, given the complexity of designing compelling and efficient on-line educational programs, the real challenge is not on the technology or tools used, but on the content offered. Websites offering CME courses must contain a sufficiently large library of materials, including courses relevant to each specialty and a variety of formats to choose from. In addition, CME programs must provide physician consumers with global authorities on a particular topic, and each curriculum must be accredited by an academic institution and/or by the ACCME (www.ACCME.org). Such diligence in technology and content development may define on-line, computer-based learning as the new gold standard.

1.3 ALLIANCE FOR CONTINUING MEDICAL EDUCATION

COMPETENCY AREAS FOR CME PROFESSIONALS

In today’s world, CME professionals are being asked, and expected, to provide a new direction for Continuing Medical Education. There is a need for CME professionals to identify the competencies they need to meet those demands and expectations. The difficulty with that challenge is that CME is not clearly defined and therefore identifying competencies for the CME professional is very
difficult. This is further complicated by the complex settings in which CME professionals and their staff work.

How do we define CME today? Will the definition be different in the future? What factors influence the current and future definition of CME? The AMA defines CME as “educational activities that serve to maintain, develop, or increase the knowledge, skills, and professional performance and relationships a physician uses to provide services for patients, public, or profession.” The ACCME provides a broader definition by saying that CME is “a process of lifelong learning that serves to maintain, develop, or increase the knowledge, skills, professional performance, and relationships that physicians use in the care of patients.”

While the ACCME and AMA definitions are similar, the ACCME does not emphasize CME as a formal educational activity. CME is implied to be a process such as self directed learning that goes beyond the provision of formal educational activities and therefore broadens CME to include continuous professional development (CPD). The AMA has been a strong advocate for the CPD concept and is broadening its definition by changing their credit statement from listing “hours” for credit.

ACCME points out that “the CME enterprise supports physicians’ learning and improvement that contributes to their maintenance of competence, licensure, certification, and privileges in the context of competency in professionalism, patient care, systems based practice, interpersonal skills and medical knowledge.”
These competencies, including practice-based learning and improvement, have been identified and adopted by the ACGME and ABMS as standards for the medical profession and will influence the competencies needed by the CME profession in the future.

Moore et al. in a 1994 article in JCEHP entitled “Creating a New Paradigm for CME: Seizing Opportunities Within the Health Care Revolution” addressed these variations in the definition of CME by asserting that the traditional model, that was teacher driven, untimely, emphasized credit and reflected little collaboration between the learners and CME providers, demonstrated little evidence of impact on physician practice, or patient outcomes. The article pointed out that there were forces and facilitating factors that were leading to a new paradigm that emphasized learning, blended quality management with CME, and was a data driven and collaborative learning system that focused on improving patient outcomes.

Supporting Moore et al., Candy identifies the need to emphasize self directed learning and notes that the of Physicians has introduced a program called Maintenance of Professional Standards (MOPS) Program that provides credit over a 5 year period for accredited learning projects, accredited self-assessment and practice-related CME activities. These categories suggest that self-directed activities are regarded as legitimate – even vital – building blocks in the whole structure of CME. In that context, Candy suggests a changing role for CME to move beyond the traditional model, but not to eliminate it entirely.
In 2000, Bennett et al. reported on a new vision for the professional development of physicians in which the authors discussed six types of literature that influenced how CME providers should think about and understand CME. The literature emphasized adult development principles, problem-based/practice-based learning, continuing professional education, change, organizational development and health services research. They describe CME as a “distinct and definable activity that supports the professional development of physicians and leads to improved patient outcomes. It encompasses all of the learning experiences that physicians engage in with conscious intent of regularly and continually improving their performance of professional duties and responsibilities”.

The Council of Medical Specialty Societies Task Force Report on Repositioning for the Future of Continuing Medical Education released in 2002 focused on CME provided by medical specialty societies, but had an impact on all of CME with 16 recommendations for the future role of CME including emphasizing self-directed learning, use of evidenced based learning and measurement of the impact of learning activities. The report recommends that the CME enterprise should encourage the development of educational opportunities for CME providers to engage in continuous learning and professional development to acquire the skills and competencies necessary for effective implementation of the new CME system.

Mazmanian and Davis in a recent article note that current “evidence suggest that physicians benefit from reflection on their progress and development of their
next learning projects or questions.” They point out that “physicians should reconsider the perspective of CME consisting solely of lectures, grand rounds, or medical staff meetings. They should participate in educational activities that offer personal involvement in thinking about professional practice and in identifying learning needs.”

It seems logical to assume that a new system is the direction in which CME is heading, but that many of the traditional methods of instruction will be maintained and improved based upon what CME providers know as effective educational interventions. What does all this mean for the CME professional? It clearly means that CME professionals at all levels (leader, manager and coordinator) will need to maintain and/or develop new skills and competencies to serve the medical profession and the public in this changing environment.

Before addressing the needed competencies for CME professionals, it is important to identify some other key considerations in the health care professions environment that will help shape the CME profession and consequently the roles and responsibilities of the CME professional and their staffs. Considerations include the following:

- Medicine is a profession and as a result the physician is responsible ultimately for maintaining his/her competency in medical practice.
- The medical profession has identified six core competencies that will be required for physicians in attaining their initial and maintaining their certification in the future.
• The physician is part of a health care team/group and system for which the physician has leadership responsibility.

• While the individual physician learner has been the major focus of the CME provider in the past, the CME profession will need to understand that the physician, while still the major focus, is a part of a group/team that provides care in a system. These elements will need to be considered by the CME profession in supporting physician learning.

• The result, or outcome, of CME will be equally as, or perhaps more, important as the process, or methods, of the educational intervention in the future.

• Every effort must be made to bring the learning as close to the problem of the learner as possible. This is called problem-based/practice-based learning.

• In the CME “profession” there is various levels of skill and responsibility among the diverse CME provider population.

The elements above are considerations for the CME professional in the current and future environment of health care and CME. They, along with how CME is being redefined, will influence the future culture of CME and the competencies needed by the CME professional and CME staff.

Definition of Competence: Miller defined competency based education with four levels: the learner knows (cognition), knows how, demonstrates how and does (behavior). For this version of competency development, the CME professional is competent when they use (practice, or apply) the knowledge, skill, or behavior. This pushes the envelope because it requires assessment and
performance measurements and some form of certification process, which do not exist currently.

Since 1991, the Alliance has promoted at least six competency areas in their formal material and training sessions at the Annual Conferences. Those areas include Strategic Leadership, Needs Assessment, Objectives, Design, Evaluation, and Management. The major focus is on the teaching process that supports formal educational activities. There is detailed content on each of the competency areas.

Currently, the Alliance learning categories in the annual meeting reflect four different foci for needed competencies. The few areas are accreditation, educational activity delivery, personal skills and health care delivery systems. These 10 competency areas are noted in Table 1.1 along with the new competency areas that are recommended.

In addition to the Alliance competencies, and those noted by Bennett et al., Candy, and Maxmanian and Davis, Casebeer et al. Reported survey results from attendees at the 1994 Annual Alliance Conference. The survey listed knowledge (of accreditation and health care reform), personal skills, management skills, and educational skills as competency areas. Quality improvement skills were listed as the most important followed by change as a management and personal skill. Interestingly, educational skills were ranked the lowest in this survey.
1.3.1 Competencies of CME Professionals

All of these data suggest a need for the reinforcement of existing competencies and the addition of new competencies for the CME provider and some distinction about those needed by the CME professional. As Cervero noted in a recent Thought Leader Conference on Practice-based Learning and Improvement in September “CME needs to move from developmental tools for the individual to strategic tools for the team to enhance performance.”

With those considerations in mind the Alliance for CME recommends the following competencies for the CME professional:

1.3.1.1 Adult/Organizational Learning Principles

Comprehend evidenced-based adult and organizational learning principles that improve the performance and outcomes of the physician learner and the organizations in which they work. CME professionals are expected to
1. Maintain awareness of current evidenced based adult learning principles.
2. Maintain awareness of organizational development practices that improve individual and organizational learning and performance.
3. Conduct, support and/or apply educational research on how physicians learn and change.
4. Remain current on the CME literature.

1.3.1.2 Educational Interventions

Apply and improve educational interventions using evidence-based adult and organizational learning principles in appropriate contexts (learners, content
and settings) that produce expected results for the physician learners and the organizations in which they work. CME professionals are expected to

1. Use evidenced based adult learning principles to guide the practice of CME.
2. Identify physician learning needs using data, especially clinical practice data.
3. Facilitate physician self assessment, self-directed learning and evaluation using appropriate data.
4. Assist physician-learners to reflect upon present and desired levels of performance and plan the next steps in their personal education.
5. Translate physician needs into measurable objectives.
6. Consider the learning environment, select and apply learning formats that are effective for physician learning and meeting the expected outcome.
7. Consider multi disciplinary educational interventions when appropriate.
8. Provide longitudinal interventions when appropriate.
9. Provide interactive learning and opportunities to practice skills that lead to change in physician performance.
11. Assure content validation in any CME educational intervention.
12. Offer consultation within physician organizations to identify goals for education that are specific to the practice and measurable.
1.3.1.3 Performance Measurement

Use appropriate data to assess two components:

1. Educational-the success of learning interventions, especially physician performance (CME activities)

2. Administrative-the performance of the CME program. CME professionals are expected to
   - develop, use and support an effective data management system for educational and administrative purposes.
   - use measurement data to assess outcomes/results of the learning intervention as a basis for determining future learning needs and for determining the application of the educational knowledge and skills.
   - use data to assess the performance of the CME office in meeting its mission and organizational goals.
   - promote continuous improvement and performance measurement as skills for physicians during educational interventions.
   - promote continuous improvement as an administrative skill for the staff of the CME office.
   - provide measurement tools and utilize reliable data to enable physician-learners to compare present levels of performance with optimum performance.
1.3.1.4 Systems Thinking

Recognize that physicians and CME professionals are part of a complex healthcare system with processes, other health providers and patients that must be considered in providing learning interventions. CME professionals are expected to

1. Recognize that, when offering learning interventions, CME professionals and the individual physicians they serve are part of a team and the system in which they work.

2. Consider a multi-disciplinary focus for needs assessment, educational design and evaluation, as appropriate.

3. Consider healthcare organizational needs and goals when offering CME interventions.

4. Enable physicians, or teams, to apply in practice what is learned with limited fear of failure.

5. Design activities with a cumulative goal of helping physicians, or teams of learners, to adopt change incrementally, assuring there is compatibility with present systems and advantage over present behaviors.

6. Identify and help modify processes that are barriers to change and the implementation of new knowledge.
1.3.1.5 Partnering

Identify and collaborate with key partners and stakeholders in accomplishing their CME mission. CME professionals are expected to

1. Identify and collaborate with critical internal partners, including the quality improvement unit, performance improvement unit, the library, patients and other related units, to accomplish the CME mission.

2. Identify and collaborate with external partners that enhance effective CME activities.

3. Collaborate and build relationships that support educational improvements for the patient, the physician and the organizations in which the physician works.

4. Apply effective communication and interpersonal skills to facilitate partnering with appropriate organizations.

1.3.1.6 Leadership

Provide leadership for the CME program which emphasizes continuous improvement, professionalism and appropriate ethical practice. CME professionals are expected to

1. Provide a vision of present role and future direction for CME and physician role and responsibilities in continued learning.

2. Develop a model learning organization.

3. Provide and support an environment for continuous improvement in educational practice and office operations.
4. Promote and support appropriate change as an essential component of an effective CME program.

5. Maintain a high standard of professionalism and ethics for all CME staff.

6. Be an advocate for the CME program, its mission and its activities.

1.3.1.7 Administration/Management

Manage office operations to meet personnel, finance, legal, logistical, and accreditation standards. CME professionals are expected to

1. Document the value of the CME program to its own organization and to the physicians that it serves.

2. Manage finances of the CME program to meet the organizational needs.

3. Provide appropriate logistics for educational activities to enhance the educational experience.

4. Facilitate the work of educational committees to achieve CME program goals.

5. Develop a management culture of the office that will reflect a collaborative, service oriented, continuous improvement system that meets the needs of the physicians served, the organization of the CME program and the accreditation standards.

6. Assure that the CME program is in compliance with the Accreditation Essentials, Elements, and Policies and other regulatory requirements.

7. Apply effective management skills including problem solving, communication and interpersonal skills, performance management, delegation and supervision, and organizational development.
1.3.1.8 Self Assessment and Life Long Learning

Continually assess individual and organizational performance and make improvements through relevant learning experiences. CME professionals are expected to

1. Engage in self assessment, identify gaps in knowledge/practice and design an individual learning plan for ongoing improvement.
2. Continually improve educational performance of the CME program through professional development.
3. Promote professional development for self and staff.

These competency areas reflect the current literature and indicate what CME professionals should be able to do to provide effective CME. Adult/Organizational learning principles, partnering, performance measurement, and self assessment and lifelong learning are the newest competencies. There is an increased emphasis on measuring outcomes, not just providing quality processes, and collaboration with key partners to produce and measure those desired outcomes. CME providers are being asked to take responsibility and demonstrate the value of CME products and services to physicians and the organizations in which they work.

How are these competencies broken down among the CME professionals? Three levels of professional responsibility have been identified in a typical CME office: leader, manager and coordinator. For each professional level of responsibility there will be different skill levels identified for each competency
area. That matrix will be prepared in the future as development of the Alliance Competency Areas for CME Professionals continues.

1.4 IMPLICATIONS FOR CONTINUING MEDICAL EDUCATION

Medical education, particularly Continuing Medical Education (CME), has been greatly influenced by studies of adult learning. The observation that it is not teaching but learning that leads doctors to change their practice has resulted in a shift in perspective: rather than education being regarded as instruction, it is regarded as facilitation of learning. This paradigm shift has been based on research into how and why doctors change their practice and into the role of learning in that process.

The direction of Continuing Medical Education in Iran and elsewhere has changed in response to the new perspective that has emerged from contemporary studies of learning and change. The nature of this new perspective is evident from a comparison of the common elements of CME in the 1980s with the approach that is now being used. Traditionally a CME programme was an educational event that applied appropriate resources and methods to fulfill set instructional objectives. Such programmes were often considered to be good if the information was valuable, the lecturer skilful, and the setting comfortable. Too often, however, there was little or no actual effect on medical practice, even though all three conditions were met.

The critical difference in the 1990s is that it has increasingly been accepted that CME programmes are based — or should be — on the principle of teaching
and education as a means of facilitating learning. This new approach has been adopted in response to studies on how and why doctors change their performance in clinical practice and the role of learning in that process. This article describes some of these models and sets out the key principles that have emerged for Continuing Medical Education in the past decade.

1.5 SUMMARY OF THE IMPLICATIONS OF ACME RECOMMENDATIONS

- The purpose of Continuing Medical Education is to facilitate change in clinical practice.
- CME should be based on the natural processes learners use to change.
- Three interconnected systems are used in making changes: self directed curriculums, small group interaction, and organizational learning.
- CME must construct systems to complement and support the learning of practice based learning.

Understanding and managing change is an essential part of professional practice. Just as doctors wish to intervene in illness to change the health status of patients, the aim of CME is to intervene in those aspects of medical practice that can be improved. CME is a systematic attempt to facilitate change in doctors’ practice.

Differences observed over time in patients’ health and in doctors’ performance and their knowledge and skills are the types of changes that have been the focus of research on CME. Change in one of these areas may or may not
lead to changes in another. For example, a change in the ability to perform a clinical procedure does not always result in that procedure is being incorporated into clinical practice. Furthermore, a change in clinical performance does not automatically lead to a change in patients’ outcomes.

These distinctions have challenged planners of Continuing Medical Education to identify their objectives more clearly. What has emerged is an emphasis on doctors’ performance as the target of strategies to facilitate learning and change. This focus calls for needs and outcomes that are described in terms of the performance of doctors rather than their competence or the health status of their patients.

1.6 UNDERSTANDING THE CONTEXT OF CHANGE AND LEARNING

Clinical practice is influenced by many factors. Doctors who participated in a study of how and why doctors change described a collection of forces as the reason they changed their practices. The forces emerged from their personal lives, their professional aspirations, and the social and cultural milieu of their practice settings. They included curiosity, sense of personal and financial wellbeing, and stage of career, desire for new or enhanced competence, pressures from patients and colleagues, and pressures from the healthcare institutions in which they worked.

Different forces seemed to scatter doctors in different directions. Personal forces were associated with larger and more complex changes, professional and
social forces with smaller and simpler changes. Regulations were associated with only small accommodations, which were usually made with resentment.

Once doctors note forces for change, they begin to imagine what it would be like to perform differently in the clinical setting and how the role of their staff may change. The image of change varies according to what forces are at work and what type of change is being pursued by the learner. Large or complicated changes are difficult to imagine.

1.7 FEATURES OF AN INNOVATION THAT MODIFY ITS ADOPTION

- Complexity of the innovation.
- Relative advantage over existing practices and procedures.
- Opportunity to observe the innovation in use before adopting it into practice.
- Compatibility with other similar products and procedures already in the professional’s practice.
- Opportunity to try the innovation before adopting it.

These ideas have been validated by a study on Canadian radiologists which found that these five features are characteristic clues as to why different types of changes are pursued and how this happens. It also suggested that how the change is imagined affects its adoption.

1.8 UNDERSTANDING THE ROLE OF NEEDS AND MOTIVATION

Once doctors develop an image of change, they use this image to estimate their personal need to make a change and to seek new levels of
competence related to the image of change. This process of self assessment involves four stages:

- The doctor estimates where he or she ought to be in terms of knowledge, skill, and performance related to the change;
- He or she also makes an estimate of what he or she presently knows or is able to do in terms of the image of change;
- The doctor estimates the discrepancy between what he or she ought to know or do and what he or she currently knows or does; and
- The doctor experiences a level of anxiety because what is known or done does not match what ought to be.

For example, a doctor considering prescribing a new drug for depression must imagine what he or she ought to know to manage the drug and its side effects. Then the doctor estimates what he or she currently knows about prescribing drugs for depression. This “gap” between what is and what ought to be is an estimate of his or her learning need. The drive to reduce anxiety associated with this need is the motivation to learn and change.

This model of need and motivation shows that altering doctor’ perceptions of where they are, where they believe they ought to be, and the size of the discrepancy can alter their perception of need and the extent of their motivation to learn and change.
1.9 UNDERSTANDING WAYS OF LEARNING

Research into the effects of continuing education on doctors’ behavior has fuelled further investigation into how learning explains changes in practice. Two different facets of practice based learning have emerged.

1.9.1 Self-Directed Learning

The first model, referred to as the self directed curriculum, consists of three stages.

- Stage 1 — learning is directed toward understanding and estimating personal levels of need to learn in order to adopt a change in practice
- Stage 2 — energies are applied to learning the new competencies needed to practice differently
- Stage 3 — learning is organized around the problems of using new skills, altering the practice environment, or adapting the new way of practice to increase the goodness of fit.

In each of the three stages, the learner identifies and utilizes resources drawn from three broad categories: human resources, especially colleagues and coworkers; material resources, especially journals and other sources of information; and formal continuing education programmes, such as national specialty society programmes. Because the selection and use of resources is under the control of the learner, the “curriculum” is self directed — it is developed and managed by the learner.
Learners need to understand how they learn and how their learning strategies may improve in order to become more efficient and effective. Educators need to understand the natural patterns of doctors’ learning so that they can design learning programmes and experiences that complement self-directed curriculums in a profession where change and learning are routine and necessary.

1.9.2 Organizational Learning

In self-directed learning the focus is on the individual, but doctors also learn from their work with patients, on teams with other healthcare professionals, and in consultation with colleagues. Within the culture of healthcare, each setting from primary care to tertiary referral units represents a unique organization with a personality shaped by beliefs, norms, and ways of thinking, learning, and adjusting behavior to changes in the environment.

Explanations of organizational learning point to the potential power of adding together what each individual in an organization knows in order to create some new way for the organization to perform its functions. Understanding how knowledge grows in organizations, what fosters learning, and how organizations make changes in response is fundamental to the implementation of change. Senge asserts that organizations can learn and that learning can be enhanced by changes in organizational structure and climate. Structures can support evaluating experiences, transforming them into knowledge relevant to an organization’s core purpose and making them accessible to the whole organization. Watkins and Marsick define a learning organization as one that provides continuous learning
opportunities, supports collaboration within the organization, and fosters links between the organization and other relevant organizations and individuals outside the organization to promote its effectiveness and establish its place in society.

Health care has used ideas from studies of organizational learning to develop systems to review and change organizational behaviors. Practice review procedures, patient care audits, and quality assurance reviews are examples of techniques that have become popular. Continuous quality improvement techniques, which are based on activities such as reviews of quality of care, surveillance of infection control, case reviews, and measures of patients’ satisfaction, represent newer ways to shape organizational behaviors. All are intended to set standards that will ensure ongoing changes in clinical practice. Informal activities, such as morning reports and rounds are further support organizational learning by defining standards for behaviors appropriate to the culture. Healthcare organizations may also foster organizational learning by using outside resources. They may bring in a consultant to assess the protocol for coronary artery bypass surgery, incorporate standards set by an outside organization for screening techniques, or collect population health statistics to improve immunization rates in children.

1.10 IMPLICATIONS FOR THE FUTURE OF CME

In the future, comprehensive CME systems will incorporate what we know about learning and change into three interlocking components. The first, most
basic and essential component is the self directed curriculum designed by each
doctor to incorporate new knowledge and make use of his or her own experience.

1.11 ROLE OF CME PROVIDER

- Facilitate self directed learning by providing for self assessment, the
  acquisition of knowledge and skills, and the opportunity to reflect on clinical
  performance.
- Offer high quality individual and group education that provides authoritative
  information, knowledge, and skills based on expertise and evidence.
- Assist healthcare delivery systems to develop and practice organizational
  learning.

The second component is based on learning in groups. Ranging from
journal clubs to formal, traditional courses of instruction, these activities may be
sponsored by organizations such as medical schools and professional associations.
Group learning serves as a source of interaction and helps to shape the image of
change and the practice of medicine. Lectures and other formal teaching activities
have a long history. They are both a creator of meaning and an artifact of the
culture of medicine. Lectures will endure because they provide information on
what ought to be and the opportunity to reflect on what is being done, as well as
summarizing evidence as to what can be done, to improve patient care.

The third component is learning within learning organizations. Hospitals,
clinics, group practices, accreditation bodies, social service agencies, and
governments reflect societal needs and demands in different ways. By gathering
and processing information and feedback, learning organizations create some of the standards that govern practice and modify others to fit the local problems and needs. They also provide opportunities for doctors to learn how to adapt to these standards successfully.

These three systems must be integrated in order to be effective in facilitating change and learning in practice. Changes in health care, new research in CME, and future demands must be brought together in new ways that will be powerful and sensitive enough to respond to patients, practitioners, and healthcare systems.

As with many disciplines, the fields of CME in general and medicine, in particular, have made vast strides in improving patient outcomes and CME delivery. But, have medical professionals and medical academia been able to maximize the utilization of new technologies to improve the delivery of the right knowledge, to the right people, at the right time across geographical boundaries? In order to provide the best quality of care, regardless of patient or provider location, specific issues must be addressed.

CME consumers and providers recognize that the system is often over worked, time constrained, poorly funded and desperately in need of a means to maintain up-to-date knowledge and efficient skills in order to deliver the best quality of care (Health Canada, 1998). We also know that there is a large disparity in both the quality and types of CME available between developed and developing countries (Lown et al., 1998). Within a single country there are also differences in
healthcare services based upon location, wealth, age, gender and a host of other factors (Health Canada, 2004). However, because Information and Communication Technologies (ICT) can be a simple and cost effective tool, it can make desperately needed medical knowledge available to developing countries. Furthermore, it is becoming more difficult to get physicians and extended medical professionals to participate in face-to-face seminars in order to learn about the progress and changes in the delivery of CME. Time, travel requirements and cost are the biggest barriers to overcome. For developing countries these issues are even more evident (Ernst and Young, 1998). Today, many institutions and countries are exploring and implementing ICT solutions to help reduce these inequities. The fact remains however that in the case of developing countries, a critical shortage of medical professionals remains (Fraser and McGrath, 2000).

This study concentrates on two main aspects of ICT. First, it examines ways in which ICT can assist in information and knowledge transfer and second, it explores the challenges of ICT implementation.

1.12 ICT & ITS ROLE IN CONTINUING MEDICAL EDUCATION

Providing the right medical knowledge and training to medical professionals can be a challenge in the best of circumstances. In developing countries dissemination of the best clinical practice protocols at an affordable cost regardless of the location of the targeted audience is even more daunting. While technology such as CD-ROM based learning can be tremendously efficient in helping medical students learn fast and well, there may be a lack of individual
access to the necessary infrastructure such as equipment and power. In these cases the material is often used in classrooms and the goal of facilitating individual learning and allowing students to go at their own pace may not be met (Pakenham-Walsh, 2003). It is important to keep in mind that even developed countries have, in spite of relatively easy access to the necessary technology, difficulties in properly managing its introduction and use in medical schools (Greenhalgh, 2001).

Tele-education can help in reaching remote communities in developing countries. However, in many regions, technological compatibility and training remain a challenge (Pakenham-Walsh, 2003). The birth of the Internet, in spite of its many imperfections, has dramatically changed the way information, communication and learning are delivered. Although there still exist an imbalance (Davison & Harris & Vogel & Vreede, 1999), in many ways the Internet Age can reduce the gap between developed and developing countries in terms of access to all types of information (United Nations ICT Task Force – 1, 2004). While the full potential of the Internet as an ICT tool has yet to be defined it does allow access to information at a speed, quality, and cost previously unseen and defies the notion of geographical boundaries. The Internet allows access to medical information through online articles, video presentations, videoconferences, email-based information and communication. Today, a medical student or healthcare practitioner in India, Iran or any developing country can gain access to the latest, up to date, medical information from around the world. This new reality has set the foundation for a truly worldwide medical and healthcare community of
practice. However, the lack of technological infrastructure and training in developing countries can affect the delivery and use of this CME (Lown et al., 1998).

As mentioned earlier, users of ICT in the CME field face many challenges. Yet despite these challenges, we are at the beginning of a marvelous adventure that has the potential to create a CME for all with unrestricted access to information and knowledge for practitioners around the world. While this could be viewed by some as simple, utopian rhetoric, the group “Doctors without Borders (Medecins sans Frontières)” already demonstrates the willingness of medical communities to create a vast exchange of information and knowledge (Orbinski, 2000). The term “doctors without borders” captures the spirit of the new world order and sets the future stage for sharing healthcare information. This growing global community of healthcare workers may bring about the desperately needed improvement in the availability of medical information around the world (Jareg and Kaseje, 1998).

Despite the great potential, we need to both understand and address the limitations of ICT as a tool in the acquisition and transfer of information and knowledge. The Achilles’ heel of the ICT user is not, in our opinion, in terms of access to information, but rather in terms of prior training in CME, possession of the necessary technical skills, and an efficient infrastructure (United Nations ICT Task Force – 2, 2004). These are the basic requirements in understanding and transforming the rich information that is available into meaningful and useful
medical knowledge. When the introduction of ICT is paired with proper access and training it leads to the successful creation of a community ready, willing and able to use the ICT to its fullest extent possible (United Nations ICT Task Force – 2, 2004).

While such a community can create, share and apply important medicine knowledge on a wide range of issues, it has to be done accurately and in a timely manner in order to be beneficial (Using ICT to Empower Communities, 2003).

An additional benefit of ICT is the degree to which it can help reduce the sense of isolation often felt by medical professionals, especially in developing countries. As a result, staff morale can be improved (Using ICT to Empower Communities, 2003; Ballantyne, 2003).

At this point, the question arises: Can a viable knowledge community exist through the use of ICT?

Before answering, one must differentiate between ICT as a tool on the one hand and the knowledge it can help foster and transfer across boundaries on the other hand. Unlike Marshall McLuhan, who stated that the medium was the message (McLuhan, 1994), we say that ICT is not the knowledge but only its channel.

1.13 FOSTERING A KNOWLEDGE COMMUNITY

Up until now we have discussed the use of ICT as a method of sharing information and knowledge. However, there are conflicting opinions regarding the
differences between information and knowledge and the transferability of knowledge (Wilson, 2002).

1.13.1 Exploring the Definition of Knowledge

What is knowledge? How can it be defined? These questions have been posed for thousands of years and answered with varying degrees of clarity. Plato described knowledge as justified true belief. Other definitions have been as simple and direct as what we know (Wilson, 2002), or as detailed as a mix of experience, values, information and insights that are applied in the minds of individuals as well as embedded in organizations (Davenport and Prusak, 2000).

Related to knowledge, but not interchangeable, are data and information. Although they are sometimes used interchangeably with each other and with knowledge, they are different. Data is considered the most basic level of discrete facts. Information is more sophisticated than data in that it is a set of related facts. Both data and information, while important, are not knowledge. They generally have no meaning attached to them, they are much more likely to be objectively measured and agreed upon by those preparing and using them. They are also likely to be more generally available than knowledge.

While related to each other, these three concepts are not interchangeable; there is a hierarchy. It is possible to have data and information without knowledge but it is not possible to have knowledge without data and information.

If there is no knowledge without first having access to data and information, then ICTs, by allowing the transfer of data and information
anywhere, anytime, allow individuals across the world to have the fundamental resources needed for the creation of knowledge. This makes ICTs a critically important aspect of knowledge creation and transfer.

While the creation of knowledge is important then too is the sharing of knowledge. Knowledge can become obsolete or be incomplete. If a community stays isolated it is very difficult for it to refresh its knowledge base. Communication with other communities keeps knowledge continuously updated and valuable. Even competing corporations communicate, either directly or indirectly, with each other in order to maintain their knowledge inventory. Diagram 1 describes a hierarchy of knowledge creation and sharing within a community. Note that knowledge also flows back to the individual.

![Hierarchy of knowledge creation and sharing within a community](image)

Another desired role of the knowledge creator is spreading the knowledge. Given there are no fixed borders and the technical infrastructure is becoming more readily available (telephone, internet, wireless technologies), the newly created knowledge could be shared with everyone in the world. In the case of healthcare, it
is the delivery of the best quality of care possible, enabling people to become healthier and to live longer and better lives.

In this paradigm, ICT, although not perfect, becomes the arteries of a mega community linked by these common objectives.

Classical Continuing Medical Education activities delivered through traditional means such as seminars, perceptorships, residency programs, and workshops seem quite inefficient and costly, poorly coordinated, supply driven, and the content of the information and learning provided is frequently not relevant to the diverse needs of today’s physicians, especially in the third world (Ballantyne, 2003).

ICT, by allowing medical professionals to interact together and with the public, can dramatically change the way medicine is practiced by allowing the timely and unlimited exchange of an ever-increasing quality and quantity of information and knowledge. The role of ICT in the CME domain has been so important that in some countries, such as Malaysia, it has been regulated and important financial and material support is provided (Minges and Gray, 2004). The number of online programs of Continuing Medical Education has, for example, increased by 110% in 1999 compared to 1998 (Reynolds, 2002). This shows a definite trend towards the acceptance and use of ICT in the field.

In addition to providing fast and easily accessible information, ICT helps create ties across geographical borders. When asked about their expectations of the use of ICT, medical professionals ranked sharing of information and experience
number one (Roundtable on ICT for Continuing Medical Education, 2003). The act of sharing helps to create a deeper sense of community (Bwalya, 2003; Grunwald, 2003; Roos, 2001).

The Myriam-Webster dictionary describes the “unified body of individuals” sharing “common interests” “characteristics” “history” or “professional interests scattered through a larger society” as defining factors of a community (Merriam-Webster Online Dictionary). ICTs transcend this definition by allowing the births and development of communities without pre-defined geographical, cultural or economical backgrounds. In the case of healthcare professionals, the common interest remains a binding factor for the existence of an ICT based community.

Moreover, when it comes to poorer, ICT can assist in reducing costs by minimizing redundancy and mismanagement of treatment by enabling medical professionals to have readily available clinical information about their patients. An economic argument can be made for greater use of ICT tools in that it will lead to more efficient use of CME resources available.

The use of ICT tools in healthcare allows people across the same country as well as across the world to collaborate, share ideas and information, and enrich the world’s most fabulous treasure: knowledge. The use of ICT tools has, for example, allowed migrants to stay in touch with and contribute to the development of their country of origin. It has also had an impact on immigration by allowing those who prefer to stay in their country to work globally while remaining physically close to their families and friends (Joshi and Granger, 2003).
ICT has completely and forever changed the way Continuing Medical Education can be delivered (Finkelstein, 2003). The agreements between universities for shared online delivery of education could very well result in future degrees being identified with more than one institution (Greenhalgh, 2001).

In order to be successful, the use of ICT tools in the CME field must be driven by a vision and policies that recognize the potential. As well, the involvement and buy in of the multiple stakeholders – medical academia, governments at national, regional and local levels, and healthcare practitioners and consumers – is critical.

1.14 CHALLENGES FOR ICT IN DEVELOPING COUNTRIES

Table 1.1: Some of the critical issues faced by the use of ICT tools in developing countries

<table>
<thead>
<tr>
<th>Issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scarcity and/or costs of telephone lines</td>
</tr>
<tr>
<td>Unreliability of telephone lines and internet connectivity</td>
</tr>
<tr>
<td>Lack of skilled workers to properly use the technology</td>
</tr>
<tr>
<td>Lack of vision and support from policy makers</td>
</tr>
<tr>
<td>Political instability leading to:</td>
</tr>
<tr>
<td>Prohibitive costs</td>
</tr>
<tr>
<td>Poor infrastructure</td>
</tr>
<tr>
<td>Poor funding</td>
</tr>
<tr>
<td>Electricity shortage</td>
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<tr>
<td>Low priority for ICT against the urgent need to spend the money on medication instead</td>
</tr>
</tbody>
</table>
The issues described in table 1.1 may seem surprising to some practitioners, especially in developed countries, but they are real. Countries facing political instability must also deal with issues that limit the use of ICT tools and the creation of a community of knowledge workers and a knowledgeable public. These inequities undoubtedly create a digital divide (Cullen, 2003) making difficult an efficient use of ICT in developing countries (Moghaddan & Lebedeva, 2004) In CME, this is unacceptable as it could mean the difference between life and death. Medical professionals as a community without borders must be accepted and supported and ICT tools must be developed and made available by international agencies. Access to information is instrumental to the success of CME systems in developing and transitional economies (Pakenham-Walsh, 2000). In developed countries however, resistance to change seems to be the main issue where older generations of medical professionals are less familiar with the use of ICTs and sometimes prefer not to use them (Peterson, 1999).

**International Support:** An agreement across countries and institutions must be reached to make the creation of healthcare communities a priority.

**Availability of an ICT Capability:** ICT tools must be made readily available particularly in developing countries. This allows communication amongst medical professionals, exchange of invaluable information, and fostering of knowledge creation and transfer. These can lead to economic maximization of medical resources.
Human Capital and Resources Management: Training must be provided to physicians as well as to the support personnel on how to efficiently use ICT tools.

User Acceptance: It is important that the CME users be made part of the process through discussions and seeking of their input.

Vision and Planning: Institutions and countries must be proactive and ensure timely technological changes and upgrades.

Medical Training: During their initial medical training, medical professionals must be prepared to work in interdisciplinary teams, developing ethics in the sharing of medical information and becoming socially accountable.

e-Health Regulations: Because of the widespread of Internet in the healthcare by medical professionals and the public, a code of e-Health has been created (eHealth Code of Ethics, 2000).

Mandatory Collaboration: Medical professionals, as a part of their continuing professional development credits, should have a mandatory number of designated hours per year to help fellow medical professionals, especially in developing countries, who require additional medical information or advice.

The creation of an international task force to encourage access to ICT tools by medical professionals across the world is essential. It will help reduce the gap in medical knowledge, improve infrastructure and quality of care among developing and developed countries. Quality of care should become a right, not a privilege. We must always keep in mind the patient and improved patient outcomes on a worldwide scale (Towle, 1998).
The researcher believes that use of ICT in CME will be instrumental in achieving this objective.

1.15 RATIONAL FOR REFORM

Continuous learning through Continuing Medical Education is an important part of the life of every practicing physician. However, many organizations and investigators have questioned the present CME system’s effectiveness in the ever-changing contemporary healthcare environment. There is abundant evidence that quality of patient care is variable, and that the safety of patients encountering the healthcare system is not uniformly optimal. One key to rectifying this lapse in consistency of quality care is a restructuring and strengthening of the existing CME system.

Today’s physician must stay current by learning smarter, not working harder. Continuing to educate physicians beyond medical school and medical specialty training requires a coordinated lifelong learning process of timely and effective CME, with measurable outcomes. Because it is imperative that every physician practice at the highest level possible, the CME system must be ever vigilant and responsive to a physician’s educational needs.

Every physician should focus on individual learning needs relevant to his/her practice. Personal clinically based needs assessment is the fundamental starting point, but self-assessment alone is inadequate. External assessments are also required to complete the process of directed self-learning.
It is crucial that the medical community as a whole share the responsibility of this lifelong learning process, with explicit attention to the relevance of content and assessment of outcomes.

Finally, the CME system and its established standards must be sufficient to support simultaneously the physician’s ongoing needs for periodic re-licensing, re-credentialing, reprivileging, and Maintenance of Certification.

1.16 CURRENT STATE OF CME AND SYSTEM INADEQUACIES

Physicians have relied on the current CME system for the past four decades to keep abreast of rapidly changing medical knowledge, including emerging skills and techniques, and to enable them to practice in the most competent manner possible. The CME system has contributed immensely in the physician’s pursuit of medical knowledge and has performed an invaluable educational service to practicing physicians in this process. Recent national reports have called for greater accountability with respect to patient safety, cost, and quality of care. These reports have stressed the importance of rapid dissemination of medical information and rapid adoption of evidence-based knowledge and skills necessary to improve physician practice performance. The CME system must be transformed to accommodate these aspirations. There is evidence that the system has not consistently:

- accommodated diverse physician learning styles and preferences.
- applied advances in educational research to ensure instructional best Practices.
• engaged in and supported the processes of physician-directed self-assessment and practice performance assessment to determine specific educational needs.
• facilitated rapid integration of newly acquired knowledge and skills into practice and changes in performance.
• balanced funding sources and thereby has relied excessively on commercial support from manufacturers of drugs and devices.

1.16.1 Barriers to information and communication technology (ICT) adoption and use

A number of barriers to the use and adoption of ICTs among health professionals and health institutions have been attributed to concerns about security, reliability, and confidentiality of information (Bigsby & Moehr, 1995; Robinson et al., 1998; Leeseberg Stamler et al., 1999; Lacher et al., 2000; Ferguson et al., 2000; Delaney, 2001). Ferguson et al. (2000), for example, report that general practitioners are wary of e-mail for receiving patient discharge summaries or drug information. Also reported as barriers are lack of the necessary time to learn how to use these technologies and lack of time to use them, as well as the difficulty in locating relevant and useful information on the Internet (Bigsby & Moehr, 1995; Rowe et al., 1995; Lacher et al., 2000; Lawton et al., 2001). Inadequate funding has been reported as another major barrier to the use of ICTs in the health professions (Rowe et al., 1995; Cameron, 1998; Hebert, 2000; Jerant & Lloyd, 2000). Forty nine percent (49%) of respondents in the Rowe et al. study identified the high cost of computers as a major barrier.
Lack of access to new technologies, rather than a lack of preference for them, has also been identified as a primary barrier in discouraging their use (Mamary & Charles, 2000). Royle et al. (1997) conducted a survey of nursing administrators in hospitals in central and northwest Ontario, and found that the larger the hospital, the more likely it was that electronic databases and other information resources were available. Of the 32 respondents who worked in hospitals with less than 100 beds, 90.6% had access to a library but only 6.2% had access to MEDLINE, and 3.1% had access to CINAHL. Manske et al. (2000) also report that a higher percentage of health units serving large (versus small) populations have greater accesses to ICT resources such as e-mail (91% vs. 69%) and the Internet (72% vs. 43%). Health units in smaller regions were less likely to have the infrastructure in place to use the technology (Manske et al., 2000).

The levels of comfort, experience, and skill that health professionals have with ICTs are also important factors influencing adoption and usage. Rowe et al. (1995) surveyed first-year family medicine residents from Canadian university-affiliated programs, and found that only 13% reported being very or extremely comfortable with computers, while 29% reported being somewhat comfortable and 24% not at all comfortable. They also found that 30% of Canadian family medicine residents felt they were not exposed to enough computer training during their education. Five years later, Jerant and Lloyd (2000) again identified lack of suitable training as a barrier to computer use.
1.16.2 Enhancing Information and Communication Technology (ICT)

Adoption and Use

It is believed that the benefits of adoption and usage of ICTs have not been realized, because individuals and organizations are unable to use these resources to their full capabilities (Hebert, 2000).

According to Moehr and Grant (2000), Canadian health professionals and students need a basic knowledge of the capabilities and limitations of information systems.

Saranto and Leino-Kilpi (1997) report that nurses need to know how to access and use hospital/management information systems, including those that address clinical and patient care.

Staggers, Gassert, and Curran (2001) have identified competencies for both the beginner and the experienced nurse. Beginner nurses should possess basic information management and computer technology skills, while experienced nurses should be highly skilled in these areas. Many family physicians now identify ‘improving computer skills’ as a core CME area more frequently than most clinical areas (McClaran et al., 2000).

Cameron (1998) has suggested that the informatics skills required by Canadian physicians should include an ability to use various word processing and presentation software, Internet and e-mail, Internet databases, and office management systems. Other medical informatics areas include: knowledge of computer-based information sources for patient care; knowledge of electronic
medical records (EMR); office-based and hospital-based management systems; and an increased knowledge of computer-based Continuing Medical Education, telecommunications, and telemedicine (Lacher et al., 2000; Candy, 2000).

Like other health professionals, pharmacists do not need to become informatics specialists, but they do need to understand how informatics works (Felkey & Barker, 1995).

Balen, Miller, and Malyuk (2000) suggest that the informatics skills for pharmacists need to include the use of computers to collect, store, retrieve, and send drug and patient-related data for both administrative and clinical purposes. Pharmacists also require knowledge of personal and network computing; hospital information systems; personal digital assistants; the Internet; word processing; and presentation, statistical analysis, and database management software.

However, Balen et al. (2000) believe that students are not necessarily receiving the instruction they require, as pharmacy has not taken the lead in developing informatics that meet the profession’s needs. The literature identifies a number of strategies and methodologies that can be used to introduce ICTs into health professional education.

Carty and Rosenfeld (1998) have identified a number of criteria related to how nursing education programs could achieve technological excellence. Their criteria include providing students and faculty with adequate access to computers, making informatics courses available, and providing the necessary infrastructure (i.e., technical support, computer labs, Internet and e-mail access, allocation of
financial and personnel resources, etc.). Other authors discuss the development of specific programs or workshops designed to improve the ICT skills of health professionals. From 1996 to 1997, three rural northwest Ohio hospitals, along with the state’s medical college co-sponsored sessions that addressed the medical application of computers for rural physicians (Hartmann, 1998). Program topics included medical databases, medical CD-ROMS, the Internet, and e-mail.

Allan et al. (2000) discuss a series of physicians’ workshops related to computer basics, introduction to computers in medicine, introduction to the Internet, and computer-aided learning (CAL) and information retrieval. Through follow-up surveys they discovered that more physicians reported increased use of computers as a result of participation in the workshops (Allan et al., 2000).

Patel & Arocha (2000) describe a meeting of a group of scholars from the fields of cognitive science, medicine, ethics, medical technologies, and intelligent tutoring systems, which was held in order to explore issues relevant to the education of the health professions in an information age. One of the research agendas suggested for future development was information technology-related research (Patel & Arocha, 2000). According to this agenda, there were a number of important questions that needed to be examined: Who uses information technologies in health care settings and how? Are such technologies integrated into clinical practice? Are they being used successfully? According to the scholars participating in this meeting, there was a need for improved studies of how best to
educate health professionals for the challenging practice environment of the future (Patel & Arocha, 2000).

1.17 RATIONALE OF THE STUDY

The Committee on Continuing Medical Education (Committee on CME), composed of key stakeholders, for the purpose of addressing the intellectual challenges facing the medical profession and determining the best approach in initiating steps toward repositioning CME. The conclusion was unanimous: CME as it exists today needs change and improvement. To achieve this goal, the Committee created a vision, addressed critical issues, and unanimously agreed upon recommended actions.

1.17.1 Vision Statement

The Committee defined a vision for CME focused on the physician learner:

Continuing Medical Education is an essential element in lifelong physician professional development and continuous improvement, and must facilitate appropriate learning for optimum patient care.

Effective CME for physicians should:

- Enhance quality care
- Support professional activities
- Assess professional/educational needs
- Evoke professionalism
- Motivate learners
- Produce measurable outcomes
1.17.2 Process and Outcome

Most fundamental change will require cooperation and coordination between and among present stakeholders and many others not as yet involved (i.e., individual specialty societies, accrediting organizations, medical schools, medical associations and faculty).

This study will be shared with all stakeholders, requesting their input and willingness to use the study, recommendations, and next steps, which have been specified as a blueprint for reforming and repositioning CME. Moreover, stakeholders with a related mission and interest have been invited to become actively involved and will be expected to take primary responsibility for these actions with specific time frames.

ICT tools are indispensable in providing desperately needed information and knowledge to medical professionals regardless of their geographical location. Much has been done and while improvements continue more remains to be accomplished (Dash et al., 2003). We have to understand that CME is a moral right. This should be universal and unconditional. Quality of care and best practices have to be made possible through ensuring that medical professionals have the clinically relevant training and education as well as the ability to improve their skills and knowledge throughout their professional lives. It is only through satisfying these conditions they will be able to provide the right treatment and fulfill their professional mission. ICT tools are, in that regard, invaluable and must
be available on an as-required basis. The following represents some of the specific conditions that must be met in order to reach these objectives.

1.18 SUMMARY

Continuing Professional Medical Educators enrich careers by providing information that enhances competence and opportunity. Clearly, how information is delivered has as strong an effect on individual success as what is delivered (Moore & Koble, 1995). More particularly, how Continuing Professional Medical Educators integrate human considerations into the selection process affects its outcome. This awareness of relevant issues is critical to successful instructional design and a supportive learning environment.

It is hoped that information learned from corporate educators about their decisions will provide rich and unique insights and will serve as a meaningful resource for further inquiry by researchers and practitioners in Continuing Medical Education.

1.19 PURPOSE OF THE STUDY

The purpose of this study was twofold. To begin with, the researcher was interested in identifying the extent and level of ICT usage among Iran CME providers. Secondly the researcher was interested in assessing the type and nature of ICT training and educational programming currently being offered by providers Iranian CME.

A questionnaire-survey of CME providers was conducted in order to identify the type of ICTs being used to deliver CME; to identify ‘best practices’
pertaining to the planning, development, delivery, and evaluation of distance learning programs for CME; and to identify programs and/or services that have been established to provide CME for the use, adoption, integration, and application of ICTs among Medical professional groups. The CME provider audience included academic respondents, national/provincial medical professional associations and non-governmental organizations, pharmaceutical industry, and hospital/health care authority organizational respondents of geographically isolated populations.

Some of the main barriers to the adoption, integration, and usage of these applications among health professionals have included negative attitudes, lack of awareness and understanding of the technologies and particular applications, and lack of knowledge and skills in ICT usage. ICTs have been used for many years to provide CME to remote medical professionals, and as a result they have addressed recruitment and retention challenges, allowed for the maintenance of competencies among CME providers, and enhanced the quality of care provided to remote communities.

A greater understanding of the efforts to educate medical professionals in the integration and usage of ICTs in their practices, as well as a better understanding of how Iranian CME providers are applying best practices in their use of ICTs to deliver continuing education will contribute to effective decision-making and policy-making that will affect the medical and CME of all Iranian. The purpose of this study is to identify human elements addressed by decision
makers and continuing Medical educators in Ministry or University as they decide on delivery systems for faculty member continuing education opportunities. Also of interest is how they become aware of innovations in communications technology and their behaviors regarding the selection of delivery medium for their continuing education programs. Successful continuing education depends on knowledgeable, able faculty member who engage in continual learning to keep pace with changes in their university. This depends, for all practical purposes, on Continuing Medical Education, which depends on the latest communication technology.

Continuing Medical Education redefined into Telecommunicated Learning the rapid introduction of communications technology into the distance education world restructured its very nature. Continuing Medical Education brought teachers and students together, and they shared information over distance and over time, separated by miles and hours. Evolving communication technologies had, in a sense, allowed distance education to evolve into a learning experience that closely mimics the standard teaching environment it replaces. The purpose of the present is to know the impact of ICT on the CME personnel.

1.20 NEED AND SIGNIFICANCE OF THE STUDY

The explosion in advanced communication technology may have created a gap between educational needs and educational providers, but communication technology itself may very well be the best means of bridging that gap. Continuing Medical Education opens opportunities to more physicians, and promises to
improve the quality of education for everyone – but excitement concerning the opportunity to use new media must be overcome so that it doesn’t distract us from choosing the most suitable alternatives.

Institutions of higher learning have become involved to a moderate degree in professional training and development programs during the past ten years, and the trend is to be more responsive to the needs of industry rather than to stay with rigid traditional curricula (Moore & Koble, 1995). The Society of Continuing Medical Education (CME) has predicted that university will require more continuing education, more frequently and at more complex levels of application. It also has noted that, rather than being designed in an academic setting, programs will be designed to respond to identified needs of university.

1.21 STATEMENT OF THE PROBLEM

The title of the study is: “EFFECT OF USING INFORMATION AND COMMUNICATION TECHNOLOGY IN IMPROVING CONTINUING MEDICAL EDUCATION IN IRAN”

1.22 OPERATIONAL DEFINITIONS OF THE KEY TERMS

Asynchronous: Communication, in which the interaction between participants is delayed, allowing convenient interaction through self-determination of time and place.

Communication Technology: Telecommunications applications such as cable television, fiber-optic, microwave, slow-scan television, satellites or microcomputer networking as introduced and applied to distance education.
**Continuing Professional Education** (CPE): The education of professional practitioners, regardless of their practice setting, that follows their preparatory curriculum and extends learning throughout their careers. Ideally this education enables them to keep abreast of new knowledge, maintain and enhance their competence, progress from beginning to mature practitioners, advance their careers through promotion and other job changes, and even move into different fields (Queeney, 1996, p. 698).

**Continuing Professional Medical Education** (CPME): The pursuit of adding to knowledge in the professional Medical discipline throughout an individual’s career.

**Decision**: A specific commitment to action (usually a commitment of resources).

**Decision Process**: A set of actions and dynamic factors that begin with the identification of a stimulus for action and ends with the specific commitment to act.

**Distance Education**: The simultaneous telecommunicated delivery of instruction from a host site or classroom to distant sites, coupled through advanced communications technology between teacher and students.

**Distance Learning**: The teaching-learning relationship in which participants interact through advanced communications technology.

**Download**: Using the network to transfer files from one computer to another.

**Electronic Mail (e-mail)**: Sending messages from one computer user to another.
Facsimile (Fax): System used to transmit textual or graphical images over standard telephone lines.

Human Elements: Conceptual construct of the “soft” issues of human interaction, such as change forces, likes, barriers, constraints, pressures, stresses, attitudes and roles.

Instructional Television: Microwave-based, high-frequency television used in educational program delivery.

Interactive Video: (Two way interactive video) two sites interact with audio and video as if they were co-located.

Internet: An international network of networks primarily used to connect education and research networks begun by the United States government.

Managerial Choice: The process identifying a choice or judgment to be made, evaluating information about alternatives, and selecting from among the alternatives.

Multimedia: Any document that uses multiple forms of communication, such as text, audio, and/or video.

On-Line: Active and prepared for operation. Also suggests access to a computer network.

Protocol: A formal set of standards, rules, or formats for exchanging data that assures uniformity between computers and applications.

Satellite TV: Video and audio signals are relayed via a communication device that orbits around the earth.
Server: A computer with a special service functions on a network, generally receiving and connecting incoming information traffic.

Synchronous: Communication, in which interaction between participants is live, real time, and/or simultaneous.

Telecommunication: The science of information transport using wire, radio, optical, or electromagnetic channels to transmit receive signals for voice or data communications using electrical means.

Teleconferencing: Two way electronic communications between two or more groups in separate locations via audio, video, and/or computer systems.

Unstructured Decision: Decision process not previously encountered in the same form and for which no predetermined and explicit set of ordered responses exists.

Uplink: The communication link from the transmitting earth station to the satellite.

Video Teleconferencing: A teleconference including two way video.

World Wide Web (www): A graphical hypertext-based Internet tool that provides access to homepages created by individuals, businesses, and other organizations.

Community: A unified body of individuals, people with common interests living in a particular area. An interacting population of various kinds of individuals in a common location, or a group of people with a common characteristic or interest living together within a larger society. A body of persons or nations having a common history or common social, economic, and political interests. A body of persons of common and especially professional interests scattered through a larger
society (Merriam-Webster online dictionary). As we can see, many possible definitions of groups of individuals or nations, with however, common interests. Merriam-Webster Online Dictionary.

**CD-ROM**: (an abbreviation for “Compact Disc Read-Only Memory”) a non-volatile optical data storage medium using the same physical format as audio compact discs, readable by a computer with a CD-ROM drives. A CD-ROM is a flat, plastic disc with digital information encoded on it in a spiral from the center to the limit, the outside edge. Word IQ.

**CME (Continuing Medical Education)**: All learning by healthcare providers, after basic training. It encompasses in-service and post-graduate learning by all trained healthcare providers, including doctors, nurses, midwives, clinical officers, public health staff, etc.

**Digital Divide**: The phrase has been applied to the gap that exists in most countries between those with ready access to the tools of information and communication technologies (ICTs), and those without such access or skills. (Cullen R. 2003)

**e-Health**: Barely in use before 1999, this term now seems to serve as a general “buzzword,” used to characterize not only “Internet medicine”, but also virtually everything related to computers and medicine. The term was apparently first used by industry leaders and marketing people rather than academics. They created and used this term in line with other “e-words” such as e-commerce, e-business, e-solutions, and so on, in an attempt to convey the promises, principles,
excitement (and hype) around e-commerce (electronic commerce) to the health arena, and to give an account of the new possibilities the Internet is opening up to the area of health care.

**Information Technology (IT) or Information and Communication Technology (ICT):** The technology required for information processing. In particular the use of electronic computers to convert, store, process, transmit, and retrieve.

**Telehealth:** The use and transmission of video, voice and text data for a multitude of health related issues, including, health management, patient care, and health worker training and education, individual and patient education on health matters.

**The Internet:** The vast collection of interconnected networks that all use the TCP/IP protocols and that evolved from the ARPANET of the late 60’s and early 70’s. An “internet” (lower case i) is any computers connected to each other (a network), and are not part of the Internet unless the use TCP/IP protocols. An “intranet” is a private network inside a company or organization that uses the same kinds of software that you would find on the public Internet, but that is only for internal use. An intranet may be on the Internet or may simply be a network.

**1.23 RESEARCH QUESTIONS**

1. What is the effect of ICT on CME based on the perception of Medical Professionals?

2. Will the organization’s commitment enhance the quality of Medical education program?
3. Does technology-based input help improving Medical education program?

4. What factors influence organizational unit’s decision-making in the area of technology-based Continuing Medical Education program?

5. Will the types of technology use influence the quality of Continuing Medical Education Programs?

1.24 OBJECTIVES

1. To study the effect of Information and Communication Technologies (ICT) in Continuing Medical Education (CME) based on the perception of Medical Professionals.

2. To study the usage of ICT in Continuing Medical Education in Iran, in terms of organizational variables as follows:
   - the type of organization to which respondents belonged;
   - types of Continuing Medical Education programs offered in Iran of information and communication technologies.
   - the organization’s commitment to the provision of continuing Medical education by technology-based Continuing Medical Education program;
   - factors influencing decision to offer technology-based Continuing Medical Education;
   - source(s) of support for technology-based education program delivery, and access to internal resources to support Continuing Medical Education program development and delivery;
• type(s) and nature of partnerships formed for the purpose of sharing resources for technology-based Continuing Medical Education program development and delivery;
• type(s) of technologies used in delivering Continuing Medical Education programs to health professionals;
• type(s) of faculty development provided to support instructors and faculty in Continuing Medical Education program development and delivery;
• composition of target audience / participants in Continuing Medical Education programs.

3. To study the usage of ICT in Continuing Medical Education in Iran in terms of some specific variables as follows:
• factors influencing likelihood of use of information and communication technologies for technology-based Continuing Medical Education;
• factors changing in knowledge, attitudes, skills, practice, behavior, or clinical practice outcome in Continuing Medical Education program development and delivery;
• gender;
• experience in technology-based Continuing Medical Education delivery to health professionals;
• perception of physicians with regard to the following of usage of ICT, internet, their experience, beliefs, motivation, barriers and Important on
line CME in Continuing Medical Education program development and delivery.

1.25 HYPOTHESES

1. There is no significant difference between Medical Professionals who underwent CME in which ICT was used and the Medical Professionals who underwent CME in which ICT was not used in their perception on the effectiveness of ICT for CME.

2. There is no significant difference between Type of organizational respondent category and organizational influences technology–based Continuing Medical Education in Iran.

3. There is no significant difference between Type of organizational respondent category and professional influences technology–based Continuing Medical Education in Iran.

4. There is no significant difference between Type of organizational respondent category and organizational strengths and resources technology–based Continuing Medical Education in Iran.

5. There is no significant difference between Type of organizational respondent category and Individual strengths and resources technology–based Continuing Medical Education in Iran.

6. There is no significant difference between organizational factors of organizations, and whether they did or did not provide technology–based Continuing Medical Education programs.
7. There is no significant difference between professional factors of organizations, and whether they did or did not provide of technology–based Continuing Medical Education programs.

8. There is no significant difference between an organization provision of technology–based Continuing Medical Education and perception of existence of strengths and resources within the organization for the delivery and development of CME in Iran.

9. There is no significant difference between an organization provision of technology–based Continuing Medical Education and the perception of Individual strengths and resources within the organization for the delivery and development of CME.

10. There is no significant difference between level of experience in technology–based Continuing Medical Education and organizational influences.

11. There is no significant difference between level of experience in technology–based Continuing Medical Education and professional influences.

12. There is no significant difference between level of experience in technology–based Continuing Medical Education and organizational strengths and resources.

13. There is no significant difference between level of experience in technology–based Continuing Medical Education and Individual strengths and resources.
14. There is no significant difference between organization units on whether they had access to the resources of a Continuing Medical Education division and their perceptions of organizational factors.

15. There is no significant difference between organization units on whether they had access to the resources of a Continuing Medical Education division and their perceptions of professional factors.

16. There is no significant difference between organization units on whether they had access to the resources of a Continuing Medical Education division and their perceptions of strengths and resources.

17. There is no significant difference between organization units on whether they had formed partnerships for the purposes of technology-based Continuing Medical Education development and delivery on the organizational factors influences.

18. There is no significant difference between organizations on whether they had formed partnerships with other organizations and their perceptions of professional factors influences.

19. There is no significant difference between organizations on whether they had formed partnerships with other organizations and their perceptions of strengths and resources.

20. There is no significant difference between organizations on whether they had formed partnerships with other organizations and their perceptions of individual strengths and resources.
21. There is no significant difference between organizations as to whether their parent institution offered Continuing Medical Education courses and their perception of the organizational factors influences.

22. There is no significant difference between organizations as to whether their parent institution offered Continuing Medical Education courses and their perception of the professional factors influences.

23. There is no significant difference between organizations as to whether their parent institution offered Continuing Medical Education courses and their perception of strengths and resources.

24. There is no significant difference between organizations as to whether their parent institution offered Continuing Medical Education courses and their perception of individual strengths and resources.

25. There is no significant difference between factors changing in knowledge, attitudes, skills, practice, behavior, or clinical practice outcome in Continuing Medical Education program development and delivery.

26. There is no significant difference among the medical professionals in their perception on physicians’ experience, beliefs, motivation and perception of barriers on the use of ICT in improving Continuing Medical Education.

27. There is no significant difference between specialists and other physicians medical professionals on their perception on online Continuing Medical Education programs for their professional development.
There is no significant difference between male and female physicians in finding and using technology-based Continuing Medical Education in Iran.

1.26 METHODOLOGY OF THE STUDY

1.26.1 Locale of the Study

The locale of the present study is Shiraz University of Medical Sciences in Iran. The city of Shiraz is the sixth most populous city in Iran, and the capital of Fars Province. Shiraz is located in the southwest of Iran. Shiraz has a moderate climate and has been a regional trade center for more than thousand years.

The earliest reference to the city, as Tiraziš, is on Elamite clay tablets dated to 2000 BC. In the 13th century, Shiraz became a leading center of the arts and letters, thanks to the encouragement of its ruler and the presence of many Persian scholars and artists. Shiraz was the capital of Persia during the Zand dynasty from 1750 until 1781.

Shiraz University of Medical Sciences (SUMS) is a public medical school located in Shiraz, Iran. It is ranked as one of Iran’s top medical schools, with more than 5000 students studying for 83 different degrees, and a staff of nearly 13,000 faculty and personnel. With 13 hospitals, SUMS is a regional health care provider and the main medical center in Fars Province.

Located in central Shiraz, SUMS was founded in 1950 as a college within Pahlavi University. In 1954, a Faculty of Nursing was added, followed by a Faculty of Dentistry in 1969. After the 1979 Islamic Revolution overthrew
the Pahlavi dynasty drastic changes were implemented at all universities. The name of Pahlavi University was immediately changed to Shiraz University. In 1986, the Iranian Ministry of Health, Treatment and Medical Education took over the departments and faculties in the medical sciences and SUMS became an independent institution.

1.26.2 Sample of the Study

The entire study has been undertaken in Shiraz Medical University, Shiraz city of Iran. The population of the study is medical professionals of Shiraz Medical University. The sample of 200 medical professionals who use ICT for CME and another 200 medical professionals who are not using ICT for CME were selected randomly. The present study is ex-post facto study and data was collected by surveying Iranian medical professionals. The detailed sampling technique has been made available in Chapter III.

1.27 VARIABLES OF THE STUDY

1.27.1 Dependent Variables

Improvement of Continuing Medical Education in Iran constitutes as the dependent variable.

1.27.2 Independent Variables

1. Gender: Male and Female
2. Length of Experience in the use of ICT
   <1 year
   1-5 years
   6-10 years
   11-15 years
   16-20 years
   > 20 years
3. Area of specialists: Cardiologist, Dermatologist, ENT, Pediatrics, Psychiatrists, Surgeon and medical basic science.

4. Faculty support and target audience, organizational influences, strengths and resources, effectiveness of ICT usage, usage of internet, perception on physicians experience, beliefs, motivation and barriers.

1.28 TOOLS USED FOR DATA COLLECTION

Two-research tools viz., Perception scale to know the effect of ICT on CME prepared by the researcher. The second tool is 4-E Model questionnaire developed by Collis et al. (2000) which included items on the type of organization to which respondents belongs to; the organization’s commitment to the provision of technology-based Continuing Medical Education programme; experience in technology-based Continuing Medical Education delivery to health professionals; factors influencing decision to offer technology-based Continuing Medical Education; source(s) of support for technology-based education program delivery, and access to internal resources to support Continuing Medical Education program development and delivery; type(s) and nature of partnerships formed for the purpose of sharing resources for technology-based Continuing Medical Education program development and delivery; type(s) of technologies used in delivering Continuing Medical Education programs to health professionals; type(s) of faculty development programmes provided to support instructors and faculty in Continuing Medical Education programme development and delivery; composition of target audience/participants in Continuing Medical Education programs; factors influencing
technology-based Continuing Medical Education; Types of Continuing Medical Education programs offered in Iran and Factors changing in knowledge, attitudes, skills, practice, behavior, or clinical practice outcome in Continuing Medical Education. These tools were tried out in a small sample to know the suitability of the tools. The questionnaire included items that were designed to collect information in the following areas:

• to study various types of organizations to which respondents belonged;
• to assess organization’s commitment to the provision of Continuing Medical Education by technology-based Continuing Medical Education programming;
• to assess experience in technology-based Continuing Medical Education delivery to health professionals;
• to assess factors influencing decision to offer technology-based Continuing Medical Education;
• to study source(s) of support for technology-based education program delivery, and access to internal resources to support Continuing Medical Education program development and delivery;
• to study type(s) and nature of partnerships formed for the purpose of sharing resources for technology-based Continuing Medical Education program development and delivery;
• to study type(s) of technologies used in delivering Continuing Medical Education programs to health professionals;
• to study type(s) of faculty development provided to support instructors and faculty in Continuing Medical Education program development and delivery;
• to assess composition of target audience / participants in Continuing Medical Education programs;
• to assess factors influencing likelihood of use of information and communication technologies for technology-based Continuing Medical Education;
• To assess types of Continuing Medical Education programs offered in the Iran of information and communication technologies;
• To assess factors changing in knowledge, attitudes, skills, practice, behavior, or clinical practice outcome in Continuing Medical Education program development and delivery;
• To propose factors influences in the perception of usage of programmes effectiveness usage of ICT, usage of internet, perception on physicians experience, beliefs, motivation, barriers and practice outcome in Continuing Medical Education program development and delivery;
• To study the influence of secondary variables (gender, designation, etc.) on the above mentioned factors, which influence the use of ICT;

**1.29 STATISTICAL TECHNIQUES USED FOR DATA ANALYSIS**

The descriptive statistics and inferential statistics are used for analysis and interpretation of data collected from medical faculty. The t-test was used to study the
effect of ICT in CME. The non-parametric tests like Kruskal-Wallis Test; Man Whitney U test and ANOVA are used for testing the formulated hypotheses.

1.30 DELIMITATIONS OF THE STUDY

1. In this study only Shiraz Medical Sciences University has been taken for the study.

2. Only the following types of medical professionals have been considered for study
   - Surgeon
   - Medical Basic Science
   - Paediatrics
   - ENT
   - Psychiatrists
   - Dermatologists
   - Cardiologists

3. The study is limited to Iran only.

1.31 OVERVIEW OF THE CHAPTERS

In the first chapter, Introduction contains background and context of the study, need and significance of the study, statement of the problem, operational definitions of the key terms, variables, objectives, hypotheses, statistical techniques used and delimitations of the study.

In the second chapter, Review of Related Literature, which contains studies conducted abroad and in India.
In the third chapter, Methodology of the study is described in a detailed way consisting of locale of the study, sample, tools used for data collection and statistical techniques used for analysis.

In the fourth chapter, details of the statistical analysis of the data and discussions of the results are attempted.

In the fifth chapter, a summary of the procedure, findings, discussion of major findings, recommendations, implications of the study and suggestions for further research in this area have been made available.