II.

THE RATIONALE AND FRAMEWORK FOR ICTs AND TEACHER EDUCATION

This section provides a rationale and framework for the process of training teachers and their associates to adopt ICTs in education. It draws upon the new views of the learning process outlined earlier and describes appropriate approaches to professional development and organizational change. A detailed framework and objectives for the teacher education ICT curriculum are provided in the following sections. Models and frameworks for change are discussed and illustrated toward the end of this document.

In many of the countries targeted with this curriculum, ICTs are in the early stages of development in commerce, industry, and particularly, in society. Communities and regions may have very limited resources, so it is important to undertake a careful analysis using an ethnographic approach to develop an organic strategy for the growth and development of education and teacher education that takes advantage of ICTs. The vision is not simply of ICTs, but of better education facilitated through the adoption and promotion of ICTs. An explanation of this vision is attempted in a limited way in the illustration provided in the framework section.

The Society for Information Technology and Teacher Education has identified basic principles for development of effective ICT teacher education (SITE, 2002). These are:

• *Technology should be infused into the entire teacher education programme.* Throughout their teacher education experience, students should learn about and with technology and how to incorporate it into their own teaching. Restricting technology experiences to a single course or to a
single area of teacher education, such as methods courses, will not prepare students to be technology-using teachers. Pre-service teacher education students should learn about a wide range of educational technologies across their professional preparation, from introductory and foundations courses to student teaching and professional development experiences.

- **Technology should be introduced in context.** Teaching pre-service students basic computer literacy—the traditional operating system, word processor, spreadsheet, database, and telecommunications topics—is not enough. As with any profession, there is a level of literacy beyond general computer literacy. This more specific or professional literacy involves learning to use technology to foster the educational growth of students. Professional literacy is best learned in context. Pre-service students should learn many uses of technology because they are integrated into their coursework and field experiences. They should see their professors and mentor teachers model innovative uses of technology; they should use it in their own learning, and they should explore creative uses of technology in their teaching. Teacher educators, content specialists, and mentor teachers should expose pre-service teachers to regular and pervasive modelling of technology and provide opportunities for them to teach with technology in K-12 classrooms.

- **Students should experience innovative technology-supported learning environments in their teacher education programme.** Technology can be used to support traditional forms of learning as well as to transform learning. A PowerPoint presentation, for example, can enhance a traditional lecture, but it does not necessarily transform the learning experience. On the other hand, using multimedia cases to teach topics that have previously been addressed through lectures may well be an example of a learning experience transformed by technology. Students should experience both types of uses of technology in their programme; however, the brightest promise of technology in education is as a support for new, innovative, and creative forms of teaching and learning (SITE, 2002).

While the proposed ICT in teacher education curriculum should aspire to no less, the trajectory of the development for countries, regions, and organizations should be appropriate to the level of resources, including expertise, leadership, and ICTs themselves. A widespread approach to reach a scattered population of teachers and organizations that are ready to move a small step forward with very limited resources may be helpful at an early
stage. Creating centres of transferable excellent practice that encourage ‘reference site’ visits, and mentoring teachers in other locations, are also approaches that may be effective. This section will review the stages of teacher education and provide examples of approaches for teacher education in ICTs and through ICTs.

**STAGES OF TEACHER EDUCATION**

Approaches to the professional development of teachers must be dependent on context and culture. Since there are a variety of approaches, an overview of the many stages in which teachers receive teacher education may prove helpful. Professional development to incorporate ICTs into teaching and learning is an ongoing process and should not be thought of as one ‘injection’ of training. Teachers need to update their knowledge and skills as the school curriculum and technologies change. Individuals develop in stages and mature over time. Personal development must be accompanied by organizational development in schools, training centres, and universities.

In many regions, teachers engage in preparation before they start teaching in schools, a stage referred to in this document as pre-service teacher education. When pre-service teachers begin to teach they may be given additional support to handle the complexity of their work for the first to third years of their career. This stage of professional development is called induction. The induction stage demands a great deal of effort and commitment, and research in developed countries reveals that around 30% of teachers may drop out during this time. Some teachers do not have the benefit of a preparatory course and must learn while teaching in schools, a condition referred to as on-the-job training. Such training is probably carried out within the school, perhaps with the teacher receiving some release from normal duties. Teacher education is an ongoing process of lifelong learning. The final stage, consisting of additional professional development, is called in-service teacher education.

It is important to note that some very strong models of teacher education provide simultaneous professional development for more than one group. For example, pre-service preparation can be aligned with in-service teacher education. A practising teacher may work with a pre-service teacher education student on an innovative educational project. This not only increases the research potential of the in-service teacher, but the pre-service teacher also experiences role modelling and, as a result, may have an easier transition into teaching.
Professional learning communities allow teachers to support the professional development of colleagues and receive support themselves. ICTs have increased the access to and reach of such professional associations. Mentorship can be fostered across geographic distances and supported by synchronous and asynchronous interaction. Professional development may also be enhanced by public or private partnerships with the community. Such partnerships may be particularly appropriate for professional development related to ICTs, with financial and technical support contributed by ICT companies, such as the Intel Teach to the Future Programme, or by local communities.

The professional development of teacher educators is also essential. Unless teacher educators model effective use of technology in their own classes, it will not be possible to prepare a new generation of teachers who effectively use the new tools for learning. It is also important to consider the question of who may teach. With ICTs, students often become teachers, using the processes of peer tutoring or reciprocal mentoring. Indeed, a teacher may facilitate learning by reversing the teaching-learning roles, with students acting as expert learners who model the learning process. ICTs provide extensive opportunities for this to occur in ways that can increase the self-esteem, motivation, and engagement of students. Teachers need encouragement to adopt such strategies rather than to feel ashamed to be taught by young learners. Members of the community also may become teachers, or at least invited experts. ICTs extend the range of such opportunities and provide access to extensive relevant supporting materials. The teacher’s role changes to manager and facilitator in many of these situations as the teacher helps the expert communicate with the learners and scaffolds the learning process. The teacher also acquires professional development by learning from the expert.

The focus of professional development should also be expanded to those who work with teachers: the classroom assistants, school leaders, and members of regional and national organizations for curriculum and professional development. A common vision for the role of ICTs in education is important for its success. Teachers may find it impossible to incorporate ICTs into their work without support and encouragement from colleagues, parents, and leaders. To bring this about, these community members may also need professional development, along with the teachers.

**Teacher Education in ICTs**

The most obvious technique for professional development for teachers is to provide courses in basic ICTs knowledge and skills, delivered by experts in national
and regional centres. These types of courses, taught at training centres or universities with a syllabus set by regional or national agencies, have been a common practice in many countries. However, this approach has had limited success without follow-on training and support, as compared to effective use of ICTs by trained teachers. Similarly, courses for teachers in particular software and hardware applications are difficult to implement in a way that results in use of these applications in classroom instruction or other professional practices without additional support. As noted in an earlier section, the development of ICTs does not improve education if the focus is on ICTs. The vision must focus on what ICTs can do to improve education.

A more successful approach is to provide on-site training in schools that addresses the concerns of individual teachers and is supported by leadership within the school. Two examples of this approach follow:

- In a programme in the UK, advisory teachers were trained and given ICT resources and an opportunity to work alongside classroom teachers. The advisory teachers were able to see the context in which the teachers worked and, with the teachers, were able to develop appropriate deployment of ICTs for curriculum use and promote the successful organization of resources in the school and the region. This approach, however, is resource-intensive and is not feasible for many schools.

- In a recent project at the University of Virginia, teacher educators assigned project work for pre-service teachers requiring innovative use of ICTs, and at the same time, provided in-service ICT training for the teachers in the schools where the pre-service teachers taught. The teacher educators coordinated these activities with the school technology plans. In this model—although it, too, is resource-intensive—the ongoing partnership between the university and the school provides for capacity building.

Over the last decade, many countries that included ICTs in education were slow to also include it in teacher education. Only recently have national agencies begun to realize the importance of educating teachers at the beginning of their careers. Younger people are more likely to be familiar with ICTs, to be adaptable, and to not yet have formed habitual modes of instruction that are more difficult to change with more experienced teachers. It is in the pre-service stage that they are most open to learning how to infuse technology into instruction. Based on their long experiences with traditional modes of learning, teacher educators may find it challenging to incorporate ICTs into their own instructional practices. They may also lack experience in developing the com-
plex partnerships between higher education and schools that facilitate technology-rich contexts for training student teachers. To bring this about, it is usually necessary that the faculty be held accountable to standards and that the institution provides both incentives and resources to support technology-rich programmes and initiatives.

One approach that encourages collaboration between the teacher preparation programme and the community is the formation of computer clubs for students interested in computers and education. This approach was used successfully in Russia and works well where computing resources are limited. Care must be taken, however to ensure that the emphasis is on education rather than on games or competitions. Peer tutoring models are very effective in club settings and may develop into reciprocal mentoring with teachers in which the students provide ICT training for peers and teachers and the teachers mentor the tutors’ developing skills as teachers. Peer tutoring is a relatively common approach in classrooms of cultures around the world. This approach is effective even when teachers have little ICT skill and knowledge. Parents and other community members may also serve as teachers, tutors, and co-learners, and the whole community may benefit economically because of an increase in the ICT skills among diverse members of the community. GenY is a peer tutoring approach that has been successful in many places, including the Caribbean and the USA.

Teacher Education through ICTs

ICTs may also support effective professional development of teachers in to how to use ICTs. A limited initiative to integrate an innovative approach to teaching and learning with one new technology for a large population of teachers can be an important early step for a nationwide strategy. The UNESCO document, *Teacher Education Through Distance Learning* (UNESCO, 2001), describes interactive radio, a professional development model in which radio programmes provide daily half-hour lessons introducing pupils to English through active learning experiences with native English speakers. The radio programmes reach 11,000 teachers across South Africa. The initiative is successful in developing teachers’ pedagogical, language, and technology skills. Much of this success is due to the appropriateness of the technology choice for South Africa.

When ICTs are introduced into a community, they may address multiple goals and may expand our conception of education. For example, the Drik project in Bangladesh started as an ecology project. The goal was to
plant trees and educate the local population in how to care for them. The project brought a single computer with an Internet link into the community. The introduction of this computer, coupled with peer tutoring, resulted in the development of considerable ICT skills in the young people of the region, and today the school is a centre for ICT services both locally and globally (including the USA). Although the teachers were not the leaders in this initiative, they learned to adopt ICTs and incorporate them into the curriculum and administration of their school. This extension of the ‘business’ of the school beyond traditional education tasks is not unusual for schools in economically depressed communities that learn the value of technology in enhancing vocational opportunities.

MirandaNet is an important example of teachers who use ICTs to mentor each other and to establish new communities connected through the Internet. The brainchild of an active teacher educator and consultant, MirandaNet is supported by partners in business and commerce. Originating in the UK, MirandaNet has spawned related communities in the Czech Republic and Chile, and negotiations are underway for a Chinese MirandaNet. Further details of this project are provided in a case study in Section IV.

A final example of in-service teacher education is relevant to countries in transition, where development of skills, expertise, and resources have been disrupted. The MATEN European project provided expertise to a Ukrainian Centre which created a course for English teachers who wanted to teach through the Internet (MATEN, 2002]. The technology focus was on online learning and teaching. Challenges included retention of the very limited population of English teacher educators and their access to reliable Internet workstations. Despite this, the enthusiasm of a small percentage of teachers over a vast area of the former Soviet Union did result in ICT teacher education for an important cadre of teachers. The situation may improve, as technology facilities improve and curriculum resources increase due to grants from European countries and the USA, especially for teachers of English. A longer description of this project is provided within section IV. The important point to note here, in relation to professional development, is that transfer-ability of the majority of these materials remains questionable because they were developed for classrooms in very different cultures, many of which are considered extremely rich in resources by developing countries’ standards. The materials require adaptation and customization to meet the needs of the unique culture, context, and educational systems of UNESCO Member States.
A FRAMEWORK FOR INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTs) IN TEACHER EDUCATION

Introduction

In planning for the infusion of ICTs into teacher preparation programmes, several factors important to a programme’s success must be considered. This section provides a holistic framework to assist in designing the integration of information and communication technologies (ICTs) into teacher education. The framework is coherent with the context provided by today’s society and reflects more recent understandings of the nature of learning, including aspects of learning communities during the school years and beyond into lifelong learning. The holistic framework will help teacher educators and administrators consider the cultural and educational system context, technology resources, and other factors that are important in planning the integration of technology into the pre-service curriculum. Limited technology resources and conditions of rapid change in educational, economic and political systems challenge many contexts of this curriculum. In some regions, the shortage of teachers, teacher educators, facilities and standards has been chronic for years and has reached crisis proportions. Access to ICT resources may also be quite limited. Within this document, ICTs should be broadly defined as including ‘interactive radio’ and multiple media including TV, as well as computers and hand-held electronic devices.

A generic ICT in teacher education curriculum framework is provided in Figure 2.1. The encompassing oval underscores that the framework should be interpreted as a whole. To select parts or to simply copy the framework in rote fashion without taking care to understand the synergy of the whole would be a mistake. As the term synergy implies, the whole is more than the sum of its parts. For example, an approach resulting from informed leadership and vision is essential for ensuring that all the components of planning and implementing a technology integration plan are present and that they support one another.

The framework was designed by representatives of international projects to assist policy makers, course developers, teacher educators, and other professionals who are charged with developing the use of information and communication technologies (ICT) in teacher education. The model will help assure that national and local infrastructure, culture and context, among other factors, will be considered in designing new curricula, and that curricula will be kept up to date, as new developments are forged in education and ICTs.
Figure 2.1 shows the curriculum framework is comprised of four clusters of competencies encircled by four supportive themes. The curriculum framework also suggests that each teacher is allowed to interpret the framework within his or her context and personal approach to pedagogy, which is always related to the subject discipline or content area, rather than to the technology itself. The four themes that bind the curriculum as a whole are described briefly below, followed by descriptions of the four core competencies.

Finally, the core curriculum is illustrated with a hypothetical example that demonstrates how the framework may be applied to a specific situation. Further illustrations drawn from the collaborative development of teacher education across seven countries in Europe may be found online in the T3 Showcase at http://telematics.ex.ac.uk/T3 (Davis et al, 1999) and from projects in the USA in the PT3 national web site at http://www.pt3.org.

**Four Themes**

*Context and Culture* identifies the culture and other contextual factors that must be considered in infusing technology into teacher education curriculum. It includes the use of technology in culturally appropriate ways and the development of respect for multiple cultures and contexts, which need to be taught and modelled by teachers. *Leadership and Vision* are essential for the successful planning and implementation of technology into teacher education and require both leadership and support from the administration of the teacher education institution. *Lifelong Learning* acknowledges that learning does not stop after school. In common with the other themes, it is important that teachers and teacher preparation faculty model lifelong learning as a key part of implementation, and as an ongoing commitment to ICTs in teacher education. *Planning and Management of Change* is the final theme, born of today’s context and accelerated by technology itself. It signifies the importance of careful planning and effective management of the change process.

These themes may be understood as a strategic combination of approaches that help teacher educators develop the four core competencies. The core competencies may be seen as clusters of objectives that are critical for successful use of ICTs as tools for learning.
Four Competencies

The ICT competencies are organized into four groups. **Pedagogy** is focused on teachers’ instructional practices and knowledge of the curriculum and requires that they develop applications within their disciplines that make effective use of ICTs to support and extend teaching and learning. **Collaboration and Networking** acknowledges that the communicative potential of ICTs to extend learning beyond the classroom walls and the implications for teachers development of new knowledge and skills. Technology brings with it new rights and responsibilities, including equitable access to technology resources, care for individual health, and respect for intellectual property included within the **Social Issues** aspect of ICT competence. Finally, **Technical Issues** is an aspect of the Lifelong Learning theme through which teachers update skills with hardware and software as new generations of technology emerge.

As a final reminder of the holistic nature of this curriculum, the model illustrates the interdependence of the themes and competencies – all themes interacting with all competencies. The following is a description of the four competencies.

**Pedagogy**

The most important aspect of infusing technology in the curriculum is pedagogy. When implementing the pedagogical competencies for infusing tech-
nology, the local context and the individual approach of the teacher linked with that of their subject discipline must be paramount. Teachers move through stages as they adopt ICTs. Initially, the teacher adopting technology applies it simply as a substitute for current teaching practice where technology is not used (e.g., teacher lecture becomes electronic presentation supporting lecture, students writing papers by hand become students writing papers using a word processor, course syllabus on paper becomes course syllabus online). The adaptation of ICTs by teachers should (and does) challenge and support changes in teaching practice, building upon individual pedagogic expertise. As teachers’ pedagogical practices with new technologies continue to develop, and organizational support and access to ICTs grow, it becomes possible to move beyond the adaptation of ICT applications that fit with existing practice. Transformation of the educational process will start to emerge and may move toward more student-centred learning environments as shown in Figure 1.2.

In summary, as professional teachers educators continually develop their pedagogical use of ICTs to support learning, teaching, and curriculum development, including assessment of learners and the evaluation of teaching, they will:

- demonstrate understanding of the opportunities and implications of the uses of ICTs for learning and teaching in the curriculum context;
- plan, implement, and manage learning and teaching in open and flexible learning environments;
- assess and evaluate learning and teaching in open and flexible learning environments.

**Collaboration and Networking**

ICTs provide powerful new tools to support communication between learning groups and beyond classrooms. The teacher’s role expands to that of a facilitator of collaboration and networking with local and global communities. The expansion of the learning community beyond the classroom also requires respect for diversity, including inter-cultural education, and equitable access to electronic learning resources. There is growing evidence that communities learn through collaborative activities that reflect diverse cultures in authentic projects that serve society. Both local and global understandings can be enhanced using ICTs, as illustrated in the fictional example of School X later in this section. The development of teachers’ competencies in networking and collaboration are therefore essential to ICTs in
education. Through collaboration and networking, professional teachers promote democratic learning within the classroom and draw upon expertise both locally and globally. In this process, they will:

- demonstrate a critical understanding of the added value of learning networks and collaboration within and between communities and countries;
- participate effectively in open and flexible learning environments as a learner and as a teacher;
- create or develop learning networks that bring added value to the education profession and society (locally and globally); and
- widen access and provide learning opportunities to all diverse members of the community, including those with special needs.

Social and Health Issues

The power to access information and communication technologies brings increased responsibilities for everyone. Legal and moral codes need to be extended to respect the intellectual property of freely accessible information. Copyright applies to web resources, too, regardless of the ability of the user to purchase the rights. This respect can be modelled in classroom practice with students from an early stage. The challenges faced by society, locally and globally, by adoption of technology should become part of the curriculum in a way that involves learners and helps them to develop an effective voice in the debates. Health issues of ICTs also need to be addressed. For example, pro-longed engagement with ICTs (including screens and keyboards) requires appropriate support for the body, especially the hands and back. Similarly, hazards of electricity and other power sources require care and the modelling of safe practice. The technology standards for students and teachers from the International Society for Technology in Education (ISTE) offer guidelines for social issues, under the topic of social, ethical, legal, and human guidelines relating to the responsible use of technology. The ISTE standards may be found at http://cnets.iste.org.

In summary, professional teachers need to understand social and health issues surrounding ICTs and apply that understanding in their practice. Specifically, they need to:
understand and apply the legal and moral codes of practice, including copyright and respect for intellectual property;

reflect upon and lead discussion of the impact of new technology on society, locally and globally; and

plan and promote healthy use of ICTs, including seating, light, sound, and related energy sources (including electricity and radio signals).

Technical Issues

Technical issues regarding integration of ICTs into the curriculum include the technical competencies and provision of both technical infrastructure and technical support for technology use throughout the curriculum. Technical competencies of the individual are perhaps the most obvious but perhaps the least important in the long-term because use of technology should ultimately become transparent. When technology is robust and used competently, it moves from the foreground to the background and remains essential. This is similar to the process of gaining any new skillset, such as riding a bicycle. Each new skill must be consciously attended to and practiced until it becomes an automatic response. Competent bike riders do not focus on balance and the pedals of the bike, they focus on navigation and safety. However, we do recognize that in many contexts, the lack of technology competence, infrastructure, and technical support can create barriers to access and reliability resulting in diminished support for the curriculum. Additional technical support or training is therefore advised, depending on local circumstances.

Simply providing the technology for learners and teachers is not enough. The type and level of access is also important. ICTs will improve learning very little if teachers and students have only rare and occasional access to the tools for learning. Reasonable access to ICTs has been shown to be important for the acquisition of competence with hardware and software, especially for teachers. For example, provision of portable computers is an important strategy for ICTs teacher education. Teachers with portable computers can use them for both teaching in school and for other professional activities elsewhere.

In summary, professional teachers, provided with reliable technology infrastructure and technical assistance, demonstrate continual growth in their skill
with ICTs and knowledge of their current and emerging applications within education and local and global society. Specifically they are able to:

- use and select from a range of ICT resources to enhance personal and professional effectiveness;
  and
- willingly update skills and knowledge in the light of new developments.

The following hypothetical description of School X provides one example of the application of the framework in designing ICTs in education and teacher education in the context of limited resources.

The focus of this illustration is the second stage of implementation of the curriculum framework into a context with limited resources within education. Today School X has little technology: only one personal computer with a floppy disk drive, a printer and a colour screen in the school office. The local manufacturing company has recently proudly provided the school with six hand-held graphic calculators with sensors to measure light and acid levels. School X also
has a TV with videotape player, a radio with amplifier, a tape recorder and a camera. There is a very small library. In the small town nearby there is a cyber cafe in which the population plays games, surfs the Internet and sends email to relations who work some distance away. Telephones are rarely in homes, but a shop sells time on phones and helps people send faxes and emails. Such shops also provide relatively cheap photocopying for businesses, and occasionally, for the school.

The associated teacher training centre has a range of resources and is working to support implementation of ICTs within regional curriculum standards. It plans to involve leaders within its target schools in the preparation of materials to support good practice. Target schools were chosen to represent the diversity in the region and based on their readiness for innovation with ICTs and pedagogy. Two leading teachers in each school were given a laptop computer with a printer and software to assist in publishing materials.

One young newly qualified teacher in School X has competence with ICTs and, as part of her course of teacher education in Hong Kong, worked on a class Newspaper Project. She has planned, with support from her mentor and head teacher, to stop her class curriculum for a day so that her class and that of her mentor can work under her leadership to produce a School Newspaper. Together the two teachers have developed plans for aspects of the entire core curriculum: language, mathematics, social studies and science. Work in the core subjects for half of the term provides the basis for one or more group’s knowledge. Their students are becoming accustomed to project work in addition to the more traditional whole class teaching. Each team within the two classes has their own section of the Newspaper to prepare. There is also an editorial team to put the sections of the paper together on the computer, and a marketing team, who have been ‘selling’ advertising space and finding out about potential readership among families and friends of the school, including the local newspaper company.

The newspaper copy will be produced on the computer using very limited publishing software (a word processor), so scissors and glue must also be part of the layout strategy. The printing press will be the photocopier of the local copy shop. The pupils will sell copies of their newspaper at the school gates at the end of the day, so the press deadline and the audience are real and very pressing!

Each group has been working to produce a story typed and edited on the computer. They may also have an illustration, using a photo, graph, or piece
of artwork. For example, the science group has written an article on the levels of acidity in several locations of the town over the last week. The graphing calculator and its sensors permitted them to work authentically, like scientists, taking many measures to investigate their questions. They also searched the Internet to find that there are others worried about the rapidly increasing levels of acidity.

The social studies group will produce more than one article. They have gathered oral histories and, in addition to their written story of a tragic event that occurred nearby 20 years ago, they have a collected a set of audio-taped interviews and photographs that will be stored in the school library for classes who come after them. This social studies topic was started with a visit by one of the parents, who told stories about the tragic day and what led up to it. She brought a newspaper from that time and a damaged article of clothing. These activities are part of the changes in the pedagogic approach to the history curriculum, which emphasizes the critical use of artifacts to explore concepts and issues.

The two classes have also discussed the place of newspapers and new technology in society today. The two teachers will hold a debriefing session later in the term with the students to help them reflect and build upon this intense educational experience.

This Newspaper Day is an example of good practice with ICTs that will be gathered for the region. This is part of the strategy to build capacity for ICTs in teacher education in the surrounding communities. The local centre for teacher training is sending observers with video cameras to record the activity and interviews with teachers, students, parents, and friends. They will also gather artifacts, including the final Newspaper, the groups’ drafts, and the examples used by the teacher to motivate and direct the student work. This will be edited into a pack of materials available for loan to district schools and advertised on the Internet in the local languages. It will be launched with a two-day training event in the regional teacher-training centre. The originating teachers will be guests of honour who will answer questions about the challenges and issues that arise when developing ICTs across the curriculum in their region. All target schools to be included in the next group will be represented. There will also be discussion of the potential of a Newspaper Day competition to stimulate more activity, with sponsorship and prizes from the regional press association.
REFERENCES


