

Accelerated Capacity Building Step-by-Step

By

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Abstract

We define accelerated capacity building as a step-by-step approach to meet the demand for trained people, especially in developing countries. The focus is on “training-the-trainers” and “learning-by-doing”. Elements include: 1) taking part in eLearning courses and exams, 2) participating in hands-on training workshops, and 3) passing knowledge on to national and regional colleagues by mentoring and using standard training materials at seminars and/or workshops.

Accelerated capacity building is an integrated approach that demands good cooperation and coordination among affiliates, both in-house and externally. This ensures coherent information/approaches, avoids duplication of work, reduces costs, and broadens expertise. Further, it facilitates the development of regional centres of experience. The target audience of accelerated capacity building is staff in Member States working in the field of sustainable food security.

Accelerated capacity building depends on eLearning, as this provides virtually unlimited training opportunities. Fundamental to the eLearning strategy is the re-use of information, thus avoiding unnecessary duplication. An open source eLearning platform implements Web-based standards, such as Sharable Content Object Reference Model (SCORM) to enable sharing of content. Resources, student management and communication tools are key elements in the eLearning system.

Experts foster knowledge creation and preservation through the development of high-quality, harmonised eLearning courses. Their action expresses the belief that sharing knowledge is powerful and will drive development. Gatekeepers, peer-review and feedback to the editors ensure the quality of the materials.

The concept of accelerated capacity building has clear benefits while placing demands on training organisers and end-users. Benefits include sharing and focussing resources and using them more efficiently; however, teamwork, close cooperation and coordination are essential. Similarly, strong commitment of individual end-users and their management is necessary to allow efficient utilization of available training opportunities and contacts with regional training centres and mentors. It is concluded that accelerated capacity building provides the opportunity for a multiplier effect, and can thus promote sustainable development and foster decentralisation and empowerment of partner institutions.

Key words

Accelerated capacity building, eLearning, training-the-trainers, sustainable development, knowledge commons

1 Background and objectives

Education and learning are widely recognised as essential components of development (McLean, 2001). As stated in the Dakar framework on Education for All in 2000:

“education is a fundamental human right. It is the key to sustainable development and peace and stability within and among countries, and thus an indispensable means for effective participation in the societies and economies of the twenty-first century, which are affected by rapid globalisation.”

The 2002 Johannesburg Summit re-affirmed that education constitutes the foundation for sustainable development. At this summit, the Decade of Education for Sustainable Development for the period 2005–2014 was proposed, which was proclaimed by the UN General Conference in 2002.

In this spirit, the Joint FAO/IAEA Division has increased its efforts to promote training and capacity building in developing Member States. Developing improved strategies for sustainable food security, the Joint FAO/IAEA Programme’s mandate, depends on the capabilities and actions of individuals, communities and organisations.

1.1 Target audience

The target audience of accelerated capacity building is staff in Member States working in the field of sustainable food security. Accelerated capacity building is intended to be used as further training by those already working, as technicians or professionals, for example, in research institutions, universities, national and international organisations.

1.2 Training issues

Training in general is resource intensive, particularly when travel is involved. Thus, training activities need to be cost-effective to be justifiable. This applies particularly for further training, which targets people already in the work force, who not only have to pay for the training, but also have to account for work time spent on training.

Difficulties encountered with training workshops and fellowships include the different knowledge background of participants and that the knowledge acquired through training is not being used in the home institution. The latter may arise from trained people getting back into their usual routine once they have returned to their home institution or because participants are ‘lost’ to projects, institutions or countries through promotions or job changes. All of these points lead to an inefficient use of training resources, reducing cost-effectiveness and being unsustainable in the medium- and long-term.

1.3 Improving cost-effectiveness

There are three ways of improving cost-effectiveness of training:

- by reducing training costs;
- by increasing training effectiveness for individuals; and
- by increasing the number of participants.

Training costs can be reduced in several ways including minimising the time spent outside the home institution, reducing travel and accommodation costs. Training delivery costs may also be reduced.

Shepherd (1999) indicates that an increase in the effectiveness of training for the individual learner may be achieved by a combination of four factors:

- individualisation,
- immediate constructive feedback,
- active learner involvement, and
- an appeal to multiple senses.

The main issues identified to cause a reduction in training effectiveness of training courses were the lack of background knowledge (technical and language) and the lack of using acquired knowledge in home institutions. The former can be addressed by filling gaps before the participants get additional training and by conducting training at different steps or levels, i.e., through individualisation of training. The latter issue can be, at least partially, addressed by training people within their home institution and by having personal contacts to allow them immediate constructive feedback and active learner involvement. Finally, an appeal to multiple senses can be achieved by using different media and a hands-on approach to learning.

Increasing the number of training participants improves cost-effectiveness through economies of scale. In other words, since the costs for the development of the training materials and administration of the system remains constant, the costs per participant decreases with rising numbers of learners enrolled (UNESCO, 2002). Due to the great interest and need for training identified by Member States, it would be extremely beneficial to raise the number of training participants. The aim is to get beyond the threshold where a few trained people leaving a project or job does not mean going backwards. A method of achieving a larger number of trained people is through improved accessibility of training opportunities.

The Joint FAO/IAEA Programme addresses these issues through accelerated capacity building.

2 Accelerated Capacity Building

We define accelerated capacity building as a step-by-step approach to meet the demand for trained people, especially in developing countries. The focus is on “training-the-trainers” and “learning-by-doing”. It is assumed that people in the target group have already received an initial professional education (secondary and/or tertiary), and are only lacking specific job- or field-related knowledge and skills/qualifications.

2.1 Step-by-step approach

The step-by-step approach to training-the-trainers through accelerated capacity building aims at reaching a greater number of people than possible through training workshops alone. Figure 1 shows the three steps of accelerated capacity building, where learners:

- 1) take part in eLearning courses and exams;
- 2) participate in hands-on training workshops; and
- 3) pass their knowledge on to national and regional colleagues.

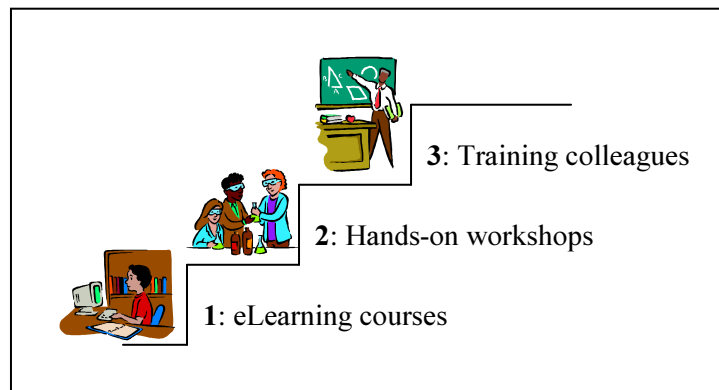


Figure 1: The step-by-step approach of accelerated capacity building for the individual: After updating their knowledge through eLearning (step 1), some participants pass the eLearning exam and continue on to participate in train-the-trainer workshops (step 2). After participating in the hands-on workshops, they pass their enhanced knowledge and skills on to their colleagues in their home country (step 3).

The first step to accelerated capacity building is for the participants to take eLearning courses to obtain the necessary background information. This includes both getting technical information and practicing the language required for the workshop. At the end of each lecture students have practice questions before they continue with the exam. Any student wishing to go on to the next step, i.e., to participate at the training workshop, needs to pass the exams.

In the second step learners participate in hands-on training workshops. These focus on a “learning-by-doing” approach where the participants apply the acquired knowledge.

In the third step the participants pass their knowledge and skills on to their national and regional colleagues. This is done at a series of seminars and/or workshops by mentoring and using standard training materials, which the participants receive during steps one and two. In this third step knowledge and skills can be shared with colleagues through either “formal” training or “informal” training. In formal training, the trained trainers organize one or a series of workshops in their home country to train their colleagues and/or colleagues from other institutions. Informal training can be carried out through on-the-job training, through conversations with individual colleagues or through mentoring of individual colleagues, as shown in Figure 2 below.

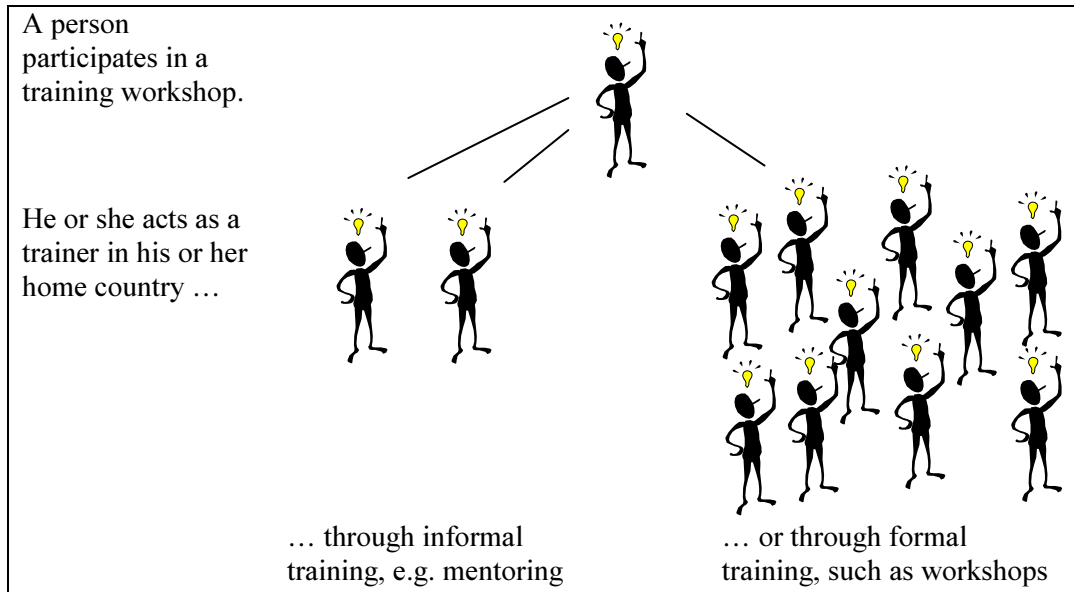


Figure 2: The trained trainers pass their knowledge on to their colleagues in their home country through formal or informal training.

The eLearning system is open to anyone. Not everyone who uses it will go on to participate in a training workshop (reduction of participants from step 1 to step 2, see Figure 3). Those participating in the train-the-trainer workshops are expected to pass on their acquired knowledge and skills to their national and/or regional colleagues. Yet, it is assumed that not all workshop participants will in fact act as trainers, due to institutional, personal or other reasons (e.g., job change). This anticipated reduction of participants from step 2 to step 3 is also visualized in Figure 3.

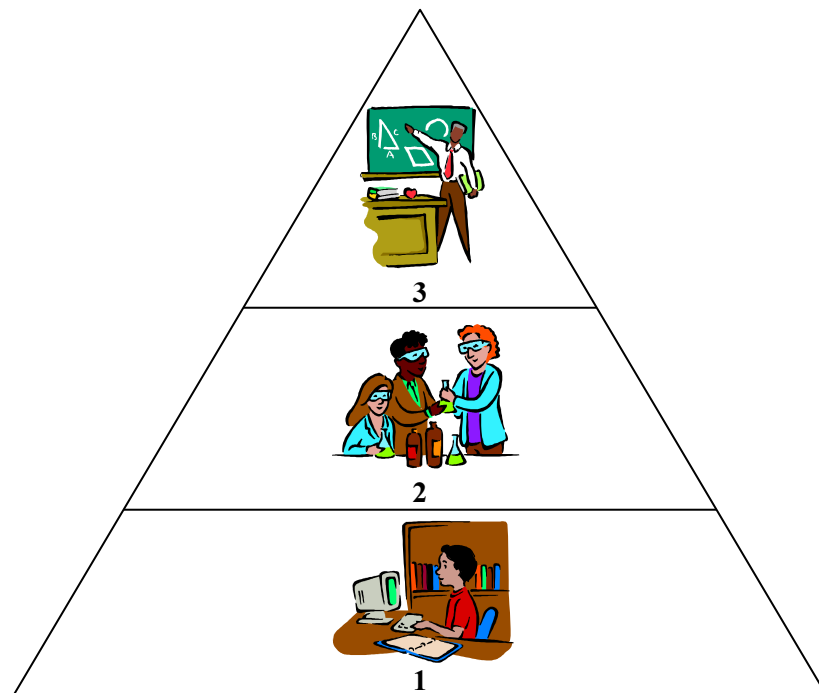


Figure 3: The step-by-step approach of accelerated capacity building: The reduction in the number of participants for each step is visualized by the narrowing of the pyramid.

2.2 Integrated approach

Accelerated capacity building is an integrated approach where various affiliates work together to provide training in a variety of fields. Affiliates can be universities and/or research institutions with their relevant staff and expertise. The affiliates develop the standardized course materials, i.e., eLearning courses, presentations as well as background materials, and conduct the train-the-trainer courses. Working together demands good cooperation and coordination among the affiliates, both in-house and externally. However, using each affiliate's expertise ensures coherent information and approaches, avoids duplication of work, and reduces costs. Further, it facilitates the development of regional centres of experience, i.e., centres in which training courses are held in the different regions.

3 eLearning and the knowledge commons

Training through the Internet, or eLearning, was chosen as the first step in accelerated capacity building as it was seen as the most cost-effective means of providing the first training step of the entire process. This improves accessibility since eLearning provides training opportunities to a much larger number of people than workshops and seminars. Apart from the target audience of accelerated capacity building, other people also use the eLearning materials, such as staff of FAO, IAEA and affiliates, decision makers, and the general public. Since the launch of the eLearning system about seven months ago, 329 students have registered for eLearning courses (for further statistics see section 3.4).

The use of eLearning materials also increases cost-effectiveness as the participants' time spent outside of the home institution is minimised. Moreover, travel and accommodation costs are reduced. An increase in the number of people using the eLearning materials also decreases the cost per person trained. McLean (2001) further stated in the framework for the FAO:

"A general conclusion that can be drawn is that distance education tends to be more economically attractive at higher levels of education. This is because the costs of distance education are relatively similar at all levels, whereas the costs per student of conventional education are higher at higher levels."

Furthermore, eLearning is more effective for higher than lower levels of education, since participants have had significant learning experience before. Hence, they can motivate themselves to learn and know how to study on their own.

Asynchronous eLearning, where learners access pre-packaged materials in their own time and at their own pace rather than having classes taking place in real-time (synchronous eLearning), has the advantage of giving learners more flexibility than classroom teaching does. It provides "what is wanted, when and where it is wanted" (Shepherd, 1999). Such flexibility is especially important to people who are already in the workforce.

3.1 Re-use of information

Fundamental to the eLearning strategy is the re-use of information as it avoids unnecessary duplication of work and wasting of resources.

3.1.1 Information resources pyramid

Knowledge commons, i.e., resources of common use, are created by splitting information into small parts, including glossary terms, references, multimedia items, and FAQs. These information subcomponents can then be aggregated into knowledge objects, such as eArticles and slide shows. For example, glossary terms, references, and multimedia items can be used to build a slide show about a particular topic. Various slide shows and eArticles can then be aggregated to an eLearning course that represents a wider topic (Figure 4).

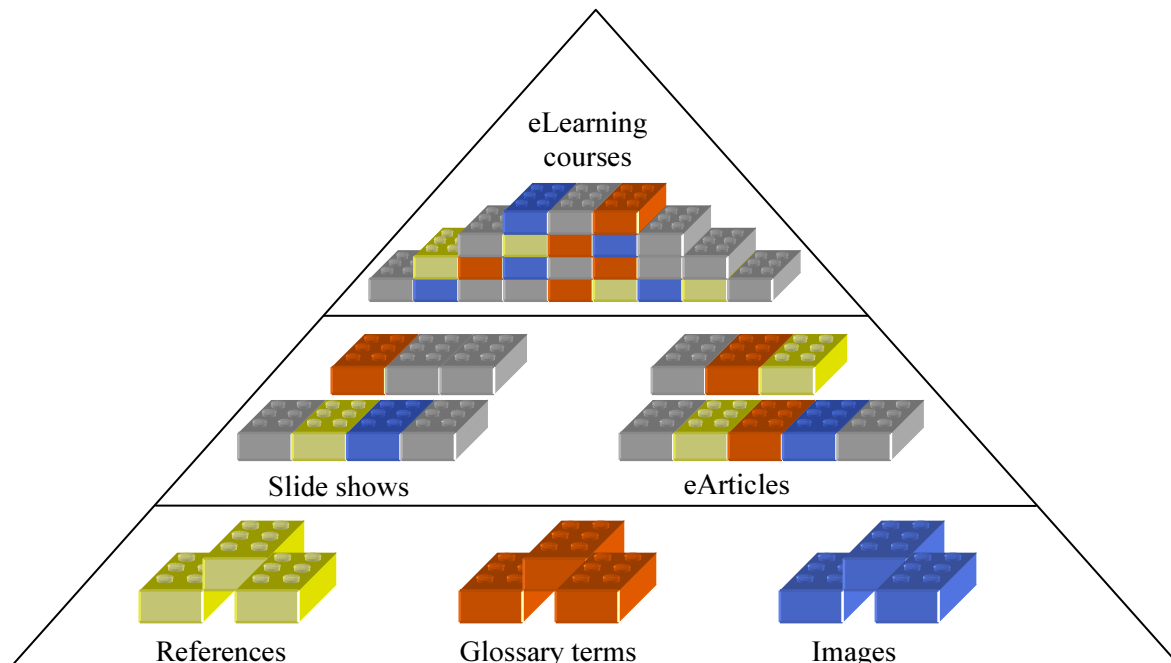


Figure 4: Information at lower levels serve as resources for the next higher level of aggregation.

The advantage of having information of different complexity is that the individual parts can be used more than once. For example, the glossary term “reference material” can be explained in a slide show on “Calibration” and an eArticle on “Statistics”. Similarly, a slide show on “Radiotracer use” can be included in a course on “Pesticide residue analysis” as well as in “Laboratory technology”.

3.1.2 Web standards including SCORM compliance

Web-based standards, such as the Sharable Content Object Reference Model (SCORM) mirror this concept at a higher level of information. The aim of SCORM is the development of flexible training materials by ensuring that the content is accessible, re-useable, interoperable, and durable, regardless of the content delivery and management systems used. The characteristics are:

- Accessible: the content is identifiable when it is needed to meet training requirements;
- Reusable: the content is independent of the learning context and can be used in a number of training situations with several development tools or delivery platforms;
- Interoperable: the content functions in multiple applications, environments, hard- and software configurations, regardless of the tools used to develop the materials and the platform on which they are delivered;

- **Durable:** the content does not require modification to operate when software systems and platforms are changed and upgraded (Carnegie Mellon University, 2003).

This means that affiliates can develop course materials with their own SCORM-compliant systems and all others can access these materials using their SCORM-compliant systems. As a result, considerable cost savings can be achieved for the development of training materials, and global expertise is used more effectively.

3.2 eLearning system tools

Apart from the actual eLearning courses, the system includes a number of tools. These include resource tools, student management tools and communication tools. They help increase cost-effectiveness of eLearning.

3.2.1 Resource tools

As described above, references, glossary terms, multimedia items, FAQs, slide shows and eArticles can serve as resources for eLearning materials. Resource tools make these resources available for use, helping reduce training development costs.

3.2.2 Student management tools

There are two types of student management tools: tools that enable students to keep track of their progress through the course; and tools that make it possible for course instructors to monitor student progress.

The student's tracker enables each student to view which pages he/she visited and for which amount of time. More importantly, it also indicates which pages have not been visited. This allows students to keep an overview of their progress through the course, especially if they do not complete the individual lessons in sequence.

Another management tool enables students to check their exam results. The tool lists all available exams of a course. It indicates which ones the student has taken and what score was achieved. Further, students can view the questions they have submitted, encouraging them to learn from their mistakes. As mentioned in section 1.3, this addresses two of the four factors that Shepherd (1999) identified as determining the effectiveness of training for the individual, namely individualisation and immediate constructive feedback.

The system also provides course instructors with an opportunity to track the progress of students. The course tracker shows content and feature usage patterns of all as well as individual students. The course tracker is a good source of information on student interests.

Course instructors can also view student achievements. The system lists when students submitted an exam, how often a student has taken an exam and what mark was attained. The instructors can even view the submitted exams. Moreover, the system provides statistics on the answers of the exam questions. Such information can give important insight into the difficulty of the training materials and exam questions, revealing the need for further development and improvement of training materials. Thus, the student management tools for instructors give valuable feedback that can help improve training effectiveness of the eLearning courses.

3.2.3 Communication tools

Several means of communication are available to students and course instructors to contact each other. These include sending email messages, creating discussion fora and having chat sessions.

The communication tools help students reduce their isolation. They can get guidance and give feedback on course content and contact each other for support. Such contact helps students learn as well as build and strengthen a global network. Shepherd (1999) identified active learner involvement and the possibility for immediate constructive feedback as important factors to increase the effectiveness of training (see section 1.3).

3.3 Editors and peer-review

Experts foster knowledge creation and preservation through the development of high-quality, harmonised eLearning courses. Their action expresses the belief that sharing knowledge is powerful and will drive development.

Editors can easily enter course content into template-like pages directly over the Internet. The What-You-See-Is-What-You-Get (WYSIWYG) editor abolishes the need for editors to be familiar with HTML coding. Different text styles, justification types, bullets, numbering, and tables can be chosen and inserted easily.

Gatekeepers, peer-review and feedback to editors ensure the quality of the materials. The gatekeepers at the Joint FAO/IAEA Division need to approve instructor account requests before courses can be put onto the system. Peer-review among affiliates is acknowledged by the option of placing one's signature on a reviewed slide show or eArticle. This is similar to the peer-review of scientific articles on a global scale. Finally feedback can be sent to course instructors and editors by email.

These tools and measures make editing and updating course materials easy, from anywhere around the world, and help ensure a high and improving quality of eLearning courses.

3.4 System statistics

The system statistics shows the number of hits, files, and pages requested during a given time period (hour, day or month). As shown in figure 5 the use of the eLearning system has increased tremendously since its launch in February 2005.

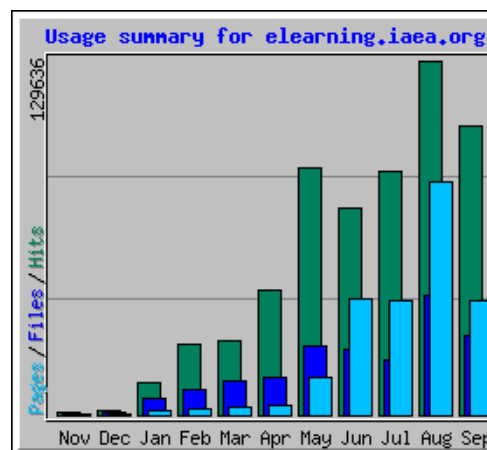


Figure 5: Access statistics of the eLearning system showing hits, files and pages.

“Hits” represents the total number of requests made to the server during the given time period. These requests include actual pages as well as other individual items such as graphics or flash animations.

“Pages” counts requests to the actual pages, disregarding the individual items that make up the page (such as graphics or flash animations).

“Files” represents the total number of requests that actually result in something being sent back to the user.

The difference between “hits” and “files”, gives a rough indication of repeat visitors, as pages are being requested that have already been cached (viewed). The access statistics of the eLearning system clearly show a trend of getting more repeat visitors.

The system also indicates the “countries” from where requests are made to the server. “Countries” are determined based on the top level domain of the requesting site, i.e. of the participant’s electronic location. The most common domains seen are .COM (US Commercial), .NET (Network), .ORG (Non-profit Organization) and .EDU (Educational). Yet, as there is no longer strong enforcement of domains, a .COM domain may reside in the US, or somewhere else. Similarly, an .IL domain may actually be in Israel; however it may also be located elsewhere. A large percentage shows as Unresolved/Unknown as dialup and other customer access points do not resolve to a name and are left as an IP address.

4 Envisaged benefits and demands of accelerated capacity building

The concept of accelerated capacity building has clear benefits and demands on training organisers and end-users. “End-users” are the participants in all three steps of accelerated capacity building, i.e., the people that are being trained as trainers.

4.1 Training organisers

Involving several affiliates in the accelerated capacity building process places certain demands on every training organisation. Strong commitment is required of all stakeholders. Furthermore, close collaboration, cooperation and coordination among all key players are imperative to ensure high quality training.

Yet, accelerated capacity building also offers training organisers several advantages. As the development and use of training materials is shared between affiliates, resources of individual organisations can be focussed more effectively. Duplication of work is avoided and costs for training material development by the individual organisations are reduced. Moreover, the knowledge and expertise of the organisers is used, leading to high-quality, coherent training materials and approaches. The establishment of regional centres of experience reduces countries’ dependence for training outside their regions. Thus, although there are high demands on all organisers, the benefits to organisers and end-users outweigh the initial demands.

4.2 End-users

Individual end-users and their management must have strong commitment to learning. Such commitment is necessary to allow efficient utilization of available training opportunities and contacts with regional training centres and mentors.

End-users can benefit from each step of accelerated capacity building. All three steps of accelerated capacity building are geared towards increasing knowledge and skills of the participants. The eLearning courses, in particular, offer increased access and flexibility to participants, presenting them with the opportunity to learn regardless of geographic, socio-economic or other constraints (UNESCO, 2002). The learners can combine work and education. Furthermore, the establishment of networks can promote innovation through information exchange, particularly among developing countries.

5 Conclusion

Member States have identified the need for training, for example, to comply with international standards and take advantage of trade liberalization. Accelerated capacity building provides a mechanism for the sustainable development of adequately trained staff at institutions in Member States. This increases Member States' institutional capacity and thus contributes to the countries' advancement in nuclear science and technology. Thus, accelerated capacity building provides the opportunity for a multiplier effect. It is to be seen as a fundamental element in life-long learning. Through the expansion of knowledge and expertise accelerated capacity building can promote sustainable development, especially in developing countries, and foster decentralisation and empowerment of partner institutions.

6 References

- Carnegie Mellon University. 2003. SCORM Best Practices Guide for Content Developers. 1st Edition. Pittsburgh, Pennsylvania. <http://lsal.org/lsal/expertise/projects/developersguide/>
- Carnevale, D. 2001. Assessment Takes Center Stage in Online Learning. The chronicle of Higher Education, 47 (31). <http://chronicle.com/weekly/v47/i31/31a04301.htm>
- Dakar Framework on Education for All. 2000. http://www.unesco.org/education/efa/ed_for_all/dakfram_eng.shtml
- McLean, S. 2001. Distance Education and Distance Learning: A Framework for the Food and Agriculture Organization of the United Nations. FAO, Rome.
- Shepherd, C. 1999. Perspectives on cost and effectiveness in online training. Fastrak Consulting Ltd. <http://www.fastrak-consulting.co.uk/tactix/features/perspectives/perspectives.htm>
- UN Decade for Education for Sustainable Development (2005 – 2014): http://portal.unesco.org/education/en/ev.php-URL_ID=23279&URL_DO=DO_TOPIC&URL_SECTION=201.html
- UNESCO. 2002. Open and Distance Learning: Trends, Policy and Strategy Considerations. UNESCO, Paris.