

# Education and training: common needs and regional solutions

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## **Abstract**

Education and training in radiation protection is one of the main methodologies used to ensure the proper application of the safety standards. Since a General Conference Resolution in 1991 that established the current generation of training modalities, the training policy of the Agency has evolved moving from a reactive approach to a proactive approach.

The solution in this case has to be the establishment of regional training centers, which can be sustained collectively among the member states in the region or with some help from the IAEA. The center will be able to fulfill the national and regional needs in terms of radiation protection and medical physics. The center will also constitute an important and essential element for a sustainable education and training programme. A good example is the West Asia regional training center in Syria, where a significant national, regional and inter regional training have been conducted with the support of the IAEA.

## **1. Introduction**

The Agency already has a significant training programme, addressing a wide range of radiation protection and safety issues. It relies on several different training modalities, all of which fit into the total scheme for meeting the needs of Member States. These modalities include the postgraduate educational courses (PGEC), specialized short training courses (STC), on-the-job training (OJT), scientific visits (SV), and recently the distance learning model. The current popular modalities of IAEA sponsored education and training in the MS are:

- PGEC in Radiation Protection and the Safe Use of Radiation Sources have been running for many years in different Agency official languages and provides a very comprehensive level of education and training for professional level radiation protection and safety practitioners. These courses provide a thorough education in radiation protection and safe use of radiation sources. Attendance at this course should be encouraged for, amongst other persons, prospective qualified experts. The standard syllabus facilitates the integration of these courses into the curricula of educational institutions in Member States.
- STC vary from very technical courses for narrow target audience to more generalized courses for categories of persons such as regulators.
- OJT is an important component in the training programme for many radiation protection specialists. In OJT the participant will be working in normal place of work or other suitable training site, and will be working under direct supervision of an experienced person.

## **2. Sustainable education and training programme**

The possible strategies for developing education and training programmes consist of three options: (1) attempt to train all the persons who are requesting the training, (2) train the trainers so the programme can proceed further at the national level, and (3) change or modify national educational infrastructures. Due to the large number of persons to be trained worldwide and the difficulties in changing educational infrastructure in MS's, the only viable option is the second one. Therefore the implementation of train-the-trainer approach is desirable. Consequently, Member States requesting training have been encouraged to send their participants to the regional training center. The activities at the regional training centers then complement the existing national education and training infrastructure in addressing national education and training needs.

It should be stressed that there is a need to change from a reactive approach to a proactive approach in order to:

- Optimize effectiveness of its education and training programme to ensure availability of necessary expertise and competence.

- Answer the need for harmonization and quality of education and training according to International Basic Safety standards.
- Optimize finite resources of both the member states and IAEA.

Therefore it is essential to develop a sustainable education and training system involving a combination of national, regional, and collaborating centers which addresses the priority needs of Member States. This system should optimize cooperation between the training centers and competent authorities, employers, third parties such as professional bodies, scientific societies or regional or international organizations. It should take advantage of existing training resources in Member States. Such a system should build both short- term and long-term competence within Member States.

### **3. Methodology for reaching a sustainable education and training**

#### **3.1 The role of the IAEA**

The International Atomic Energy Agency (IAEA) has a statutory function to establish standards of safety against ionizing radiation and to provide for the application of these standards. This can be achieved through education and training in radiation protection, which is one of the mechanisms and primary strategies for assisting Member States in the application of these standards. A new strategy for the development of a self-sustaining education and training programme in radiation protection was proposed in response to GC(44)/RES/13. The strategic plan was endorsed by the General Conference GC(45)/RES/10 C in 2001. An Agency technical meeting held in March 2002, considering the implementation of the strategic plan also defined the role and responsibilities, member profile and method of operation of the Steering Committee. The GC(46)RES/9C in 2002 urged the Secretariat to continue implementing the strategic plan , including the convening of a Steering Committee to oversee and advise on the implementation of the strategic plan for a sustainable education and training programme.

The IAEA new strategy

The end point of this strategy is a sustainable education and training system in place in Member States compatible with the requirements of the BSS to contribute to an adequate radiation and waste safety infrastructure. This can be achieved with the following objectives:

1. To put in place an appropriate education and training programme as a mechanism for the implementation of the BSS.
2. To encourage appropriate knowledge and understanding to promote and sustain safe working practices.
3. To promote the continuous exchange of information between member states as an essential mechanism for establishing and maintaining safety.

The main characteristics of the strategy are:

- Sustainable education and training program
- Proactive approach based on a well-defined national training programme
- Emphasizing the “train-the-trainer” approach.
- Developing standardized syllabi and training material
- Strengthening the role of the national and regional training centers
- Intensive use of Post-Graduate educational course (PGEC).

The Agency should:

- Strengthen the Regional Training Centres approach as a way to implement the training strategy to ensure sustainability.
- Develop the network of National, Regional and collaborating centres to harmonize and facilitate the exchange of information and expertise.
- Prepare and make available to Member States, in all the IAEA official languages, the training material and standards and Agency’s reference literature (safety guides, safety reports, lessons learned from accidents, etc.).

### **3.2 The role of Member States**

To attain the sustainability in implementing its national education and training programme, a Member State should have an adequate number of trained people, sufficient number of trainers and training facilities. At the present time there are several National and Regional Training Centres that offer the IAEA postgraduate educational course and specialised courses. Hosting these course takes on special significance due to the need for establishing a collaborative agreement with an educational institution in the Member State. This contributes to the sustainability of the regional training center. The training centres play a critical role in the success of the aforementioned IAEA training strategy. They provide a regional or national point of reference where training in radiation protection may be obtained and hence it is important that the level of training provided is of the appropriate quality and that suitable training facilities and equipment are available. With this in mind, a systematic approach must be followed in the selection and development of these training centres.

It should be borne in mind, however, that for training to be sustainable it will need to be provided on a national or regional basis as part of the member state's national training programme or in terms of the regional needs. The Agency should engage in long-term formal agreements with the Regional Training Centres, especially in connection with the PGEC and specialised training events and fellowships. As the existence of Regional Training Centres is a real asset in the implementation of the training strategy to ensure a long-term sustainability because they (a) provide training courses in local languages, (b) improve efficiency of training delivery, (c) ensure a quicker adaptation to standard training material from the Agency, conveying it to the Member States in the region, and (d) optimize the use of staff, facilities and equipment for multiple purposes with the expectation of consistent quality of results.

### **4. Considerations in the recognition or establishment of national and regional training centres**

Member states are encouraged to establish national or regional training centres, and the IAEA may also identify a need for centres in geographical locations based on the training needs/analysis in the country profiles and the needs of the region. In determining the suitability of an applying country for this role, the following criteria should be used.

The demand for training in the country or region should be assessed using the available country radiation safety profiles, any training needs analysis carried out by the national authority (the procedure to be followed in the development of the training needs analysis is specified in the Safety Guide "Building competence in radiation protection and the safe use of radiation sources"), and the proximity of other training centres. The ability of the candidate centre to fulfil the IAEA requirements related to training should also be considered.

In the short to medium-term, while the IAEA is actively involved in the provision of training, the establishment of a regional training centre will generally be more cost-effective than one or more national training centres within the region due to the larger target audience. This will enable the regional centre to run more frequent training courses, and to provide these in a cost-effective manner. An important aspect of a regional training centre is also the exchange of information and experience among countries within the region. The course will be provided in the language that is best understood in the region.

Member states, with a large number of radiation practices and persons to be trained, may benefit from the establishment of national training centres. The target group in terms of the number of trainees in a national training centre would include, RPO's, operators, health professionals and workers, and the provision of effective and practically relevant training to this target group can have a very beneficial effect on the radiation safety culture in the country. The establishment of a national training centre should also be a long term objective of every MS, since such a Centre will enable it to fulfil its obligations on training, and provide self-sustaining training.

#### **4.1 National Training Centres**

The establishment of national centres is a national responsibility. It would be advantageous for the individual institutions to be recognised by the Agency. The following criteria should be used for this purpose:

- The centre should be recognised as a national centre by the competent body of the host country.
- The centre should have the capability to develop and conduct training courses in an effective way in terms of a quality assurance system.
- The centre should have an adequate administrative capacity for the training course, training facilities, infrastructure, selection of participants and trainers, and a formal system for assessing the students.

#### **4.2 Regional Training Centres**

In addition to the requirements for a National Training Centre, the following criteria should be applied for establishment and recognition of Regional Training Centres. Some of the existing Regional Training Centres already meet most but not all of these requirements and that new Regional Training Centres may initially meet part but not all of these requirements. These are the requirements that all Regional Training Centres should meet at least by 2010. The regional centre should have a PGEC in addition to fulfilling the requirements related to:

- Location in a region where a need for training and education has been identified.
- The distribution of actual and potential training centres shall be taken into account.
- Training should be conducted in a language widely used in the regional language.
- Adequate radiation protection infrastructure.
- Easy access for foreign participants from the region.
- Comply with Agency requirements related to training is an important consideration.
- Resources to carry out the experiments and practical exercises.
- Provide high quality training and education.
- Appropriate quality assurance system in place for these training activities.
- Ability to carry out on-the-job training for fellowship candidates, conducting seminars, hosting workshops and refresher courses.
- The necessary training and information technology infrastructure.
- Mechanism to confer academic diplomas or degrees for the PGEC.

#### **4.3 The West Asia Regional Training Centre in Syria**

The Atomic Energy Commission of Syria (AECS) has strengthened education and training in radiation protection since early 90's. More recently this training has been coupled with the achievement of the five milestones in the IAEA model project. AECS have been successful in achieving most of the major parts of these milestones. Primarily focusing on the fulfilment of the training needs associated with these milestones. AECS has made use of all main training modalities including sort training course, scientific visits and on-the-job training fellowship. In its movement toward achieving training sustainability and self-sufficiency, AECS started, in 1997 a longer term 9-week Postgraduate Training Course (PGEC) in radiation protection and safety of radiation sources. This course was then repeated in 1999. Due to the need for recognition and accreditation by the employers and by the respective authorities of the students attending these courses, the AECS and the IAEA with collaboration with the Higher institute of Applied Science and Technology (HIAST) have upgraded this PGEC into one full year academic post graduated specialized diploma. This postgraduate specialized Diploma courses have been running for the last three years and is planned to continue for the coming years. In total, 112 Arab students (from 16 different countries) have been graduated from these PGECs until now, 30 of them are from Syria (see Table 1). This PGEC is the only educational programme for the Arabic speaking countries. In addition to the PGEC, there are on average 10 training courses, workshops and meeting every year, half of them are sponsored by the IAEA. According to the special evaluation review of the Agency's education and training activities in radiation protection 1994-2000, Syria was the first country in West Asia and the third country in the World in the number of foreign participants attending IAEA training courses hosted by Syria. Third of all trainees, between 1994 and 2000, from West Asia in the same period have done their training in Syria. ACES is also the host to a significant number of on-the-job training for trainees from all counties in the West Asia.

## **5. Sustainability of education and training in the regional centre in Syria**

AECS staff trained through Agency sponsored training are contributing effectively to the setting up and implementation of a national and regional training programmes. AECS have been very successful in hosting all kind of IAEA training modalities. Additionally several radiation protection training course have been staged and conducted with out Agency's assistance or support. This demonstrates the AECS's ability to provide all the basic radiation protection competencies required to meet the five milestones of the aforementioned model project. Participants to all tainting activities held in the AECS find the training better or similar to Agency sponsored activities held elsewhere. Many of the PGEC graduates have already assumed key or leadership positions related to radiation protection in their respective institutes and countries. According to the same evaluation report mentioned above there is strong evidence that the AECS actively support and engage in train the trainer approach to propagate radiation protection skills and knowledge.

This training centre in Syria fulfil, in addition to the requirement necessary to be a national training centre, all requirement be a regional centre, namely:

- The need for training and education in the West Asia region has been identified by the fact the most of the countries in the region are receiving IAEA assistance through the Model project.
- There are no other regional training centres in the region.
- Training is conducted mainly in Arabic that is widely used language in the region.
- There are adequate radiation protection infrastructures.
- It has easy access for foreign participants from the region.
- It complies with Agency requirements related to training.
- There are the necessary resources to carry out the experiments and practical exercises.
- It provides high quality training and education.
- There is appropriate quality assurance system in place for these training activities.
- It has the ability to carry out on-the-job training for fellowship candidates, conducting seminars, hosting workshops and refresher courses.
- There are the necessary training and information technology infrastructure.
- There is a collaboration educational agreement to confer academic diplomas for the PGEC.

Country	Number of students								Total Number for each country
	PGEC 1997	PGEC 1999	PGEC 1 Diploma 2000-01 HIAST	PGEC 2 Diploma 2001-02 HIAST	PGEC 3 Diploma 2002-03 HIAST	PGEC 4 Diploma 2003-04 Damascus University	PGEC 5 Diploma 2004-05 Damascus University	PGEC 6 Diploma 2005-06 Damascus University	
Algeria	1	1	-	-	-	-	-	-	2
Egypt	2	3	-	1	1	1	2	-	10
Iraq	2	2	-	-	-	-	-	2	6
Jordan	2	1	1	3	-	-	4	2	13
Kuwait	2	-	-	1	1	-	-	-	4
Lebanon	3	1	2	2	2	2	2	1	15
Libya	-	2	-	-	2	-	-	-	4
Morocco	1	-	-	-	-	-	-	-	1
Palestine	-	-	-	-	3	2	1	1	7
Qatar	1	2	-	-	-	-	-	-	3
Saudi Arabia	2	1	4	2	2	2	1	1	15
Sudan	1	1	-	2	1	2	1	-	8
Tunisia	1	1	-	-	-	-	-	-	2
Emirates	1	2	2	1	-	-	-	-	6
Yemen	2	2	3	3	3	4	1	4	22
Syria	8	8	4	5	5	5	9	11	55
<b>Total</b>	<b>29</b>	<b>27</b>	<b>16</b>	<b>20</b>	<b>20</b>	<b>18</b>	<b>21</b>	<b>22</b>	<b>173</b>

Table 1: Number of students graduated from the PGEC course in each country including the two PGEC's in 97 and 99 and the six diploma courses in HIAST and the University of Damascus

## 6. Summary and Conclusions

Education and training in radiation protection is one of the main methodologies used to ensure the proper application of the IAEA safety standards. Since a General Conference Resolution in 1991 that established the current generation of training modalities, the training policy of the Agency has evolved moving from a reactive approach to a proactive approach. More emphases are placed on train the trainer approach.

For developing countries a full functioning and adequately staffed and equipped national training center in each country might not be justified and more importantly difficult to sustain. The solution in this case has to be the establishment of regional training centers, which can be sustained collectively with some help from the IAEA. The center will be able to fulfill the national and regional needs in terms of radiation protection and the safe use of radiation sources and will constitute an important and essential element for a sustainable education and training programme. A good example is the West Asia regional training center in Syria, where a significant national, regional and inter regional training have been conducted with the support of the IAEA and/or the Arab Atomic Energy Agency.

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