

ELECTRICITY SUPPLY INDUSTRY

NATIONAL INTENSIVE TRAINING POLICY GUIDELINE FOR ESI APPRENTICESHIPS



**ElectroComms and EnergyUtilities Qualifications Standards
Body of Australia Ltd, trading as **EE-Oz Training Standards****

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ELECTRICITY SUPPLY INDUSTRY APPRENTICESHIP TRAINING POLICY

Intensive up-front “off-the-job” training in an off and on-the-job Training Model

BACKGROUND

Many Electricity Supply Industry Apprenticeship¹ vocations are heavily underpinned with technical theory and employ a combined off-and on-the-job model of competency development. Integration of technical education (the off-the-job or knowledge component) with on-the-job practice is critical for long term retention and safe work in all these vocations. Long term retention is greatly enhanced by ‘overlearning’. Overlearning occurs in this model when there is substantial workplace (ie on-the-job) reinforcement of the material learnt in the off-the-job component. There should be, as far as is practicable, a concordance between learning and practice for the development of competently qualified personnel.

PURPOSE

The purpose of the ElectroComms and EnergyUtilities Qualifications Standards Body of Australia Ltd, Electricity Supply Industry (ESI) Training Policy is to provide the industry position on training delivery arrangements to those implementing the following National Training Packages:

- UTP98 ESI Generation National Training Package
- UTT98 ESI Transmission and Distribution National Training Package

SCOPE

The ElectroComms and EnergyUtilities Qualifications Standards Body of Australia Ltd/**EE-Oz Training Standards** Training policy is to apply to the Electricity Supply Industry Apprenticeship vocations.

POLICY FEATURES

1. Evidence² shows, that where significant deviation from a coherent Training Model occurs learners fail to maintain relevance, and indeed may pose a danger to themselves, others and the equipment worked on.
2. Developers and deliverers of quality apprenticeship training programs, aligned to the National Generation and Transmission/Distribution Training Packages would be familiar with this notion, and would recognise the long term consequences and likely

¹ *Electricity Apprenticeship Vocations - communications; computer systems including information technology; data communications including networks, fire and security; electrical; electronics; electricity supply transmission/distribution (powerline); instrumentation; refrigeration & air conditioning; and renewable energy*

² *Integrating on and off the job assessment – is it counterproductive?, B. Thomas, July 1996*

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disadvantages to learners and employers if a desegregation of the Training Model were to be introduced. For instance, segregating the underpinning knowledge component from the Training Model, so that it is delivered in full, up-front, without concurrent practice/employment is considered inappropriate; educationally deficient, and therefore unsafe. The up-front delivery means that all the theoretical work done early in the off-the-job program is not properly reinforced, the work experience reinforces only the latter (more recent) parts of the off-the-job component.

3. **EE-Oz Training Standards**, and its following affiliated advisory committees, support the integrated and concurrency approach to training, that is the preferred industry Training Model:
 - Electricity Supply Industry – National Training Council (ESI-NTC)
 - ESI – Generation State Training Advisory Group (STAG)
 - ESI – Transmission and Distribution STAG
 - ESI – Hydro STAG
 - State & Territory ITAB Network
 - National Electrotechnology Training Advisory Group (NETAG)

Registered Training Organisations (RTOs) wishing to deliver a segregated model in order to please a minority of enterprises within the industry, being well aware of the consequences of their actions, are advised to reconsider such an approach. The **EE-Oz Training Standards**, its State and Territory ITAB Network, and Industry all oppose such an approach.

Similarly Industry would be concerned if the **EE-Oz Training Standards** Electricity Supply Industry (ESI) Training Policy was *not* adopted as it could lead to unsafe work practices, increased accidents and decreased enterprise productivity and profitability.

POLICY CONTENT

1. Members of the **EE-Oz Training Standards** ESI Advisory Network have endorsed a Training Model that integrates on-and off-the-job training (*refer to the ESI endorsed Training Model for policy details*)
2. Members of the **EE-Oz Training Standards** ESI Advisory Network reject any program that substantially segregates the off-the-job training program from the preferred Training Model
3. Members of the **EE-Oz Training Standards** ESI Advisory Network reject the notion of off-the-job training (underpinning knowledge and skills) being undertaken as a stand alone delivery arrangement
4. Members of the **EE-Oz Training Standards** ESI Advisory Network reject off-the-job training delivery arrangements which attempts to achieve competence over a very short period without regard of the integration of on the-job-training and, assessment of competency being undertaken

**Queries regarding the ESI Advisory Network's policy can be directed to
Tony Palladino, CEO – EE-Oz Training Standards on (02) 9280 2566**

INTEGRATING ON AND OFF THE JOB ASSESSMENT - IS IT COUNTERPRODUCTIVE?

This paper considers various forms of integration within the vocational education and training context (VET) and concludes that integrating off and on the job assessment ought not to be a major focus for curriculum developers. Furthermore it is argued that course structures ought to be determined by such things as sequences of entailment within the material to be covered and other implied sequences. This, in all likelihood, will preclude workplace experience and off the job experience aligning in such a way that integration of the assessment of these elements can take place.

Established practice in the development of vocational education curricula has seen a focus on various types of integration, for example the integration of practical elements with their related theory is long established. It is argued that the pursuit of integration is due to the increased coherence that results from integration and it is claimed that what is of greatest importance in respect of integration is the structure, which is necessary to provide the unification that integration seeks. That is, it is important that the greatest degree of unity is achieved in the curriculum overall. It is suggested that for some vocational courses there is little chance of integrating off and on the job assessment without reducing the overall unity of the curriculum of those courses and where this is the case that integration ought not be pursued. It is maintained that integration of on-the-job and off-the-job assessment can only be achieved in a great many courses by very substantial losses of more important forms of integration in other aspects of the curriculum

Integration is now probably one of the most used words in the discourse on vocational education and training. For this conference integration is specifically the integration of on-the-job and off-the-job assessment regimes. However integration is also very often used in relation to integrating the off and on job learning experiences and for some time there has been an emphasis on integrating theory and practice. More recently integration has been used in reference to key competencies and vocationally specific knowledge and skills.

All of the above forms of integration within the VET context are desirable; indeed some are necessary for a curriculum to properly function. That the curriculum requires the integration of so many things implies that integration is somehow central to the curriculum development process. The position of centrality which integration has is a function of the unity which integration brings to attributes, which may otherwise have been disparate. That is, the separation of material into strictly theoretical or strictly practical sub sets is to some extent contrived. Virtually all essentially theoretical subjects have some aspects, which are more easily and effectively learned by some practical/ experimental procedures. Similarly even very basic practical matters have some underpinning knowledge associated with them, likewise for aspects learned on and off the job and for generic competencies and specific knowledge and skills. In every case integration is an endeavour to unite what might otherwise have been segmented.

Ideally integration will exist between these sub sets (and others) as well as within them. It is essential that the elements which are being integrated are aspects which are in harmony with each other; which have a natural or due agreement of parts which is one of the Macquarie's dictionary's meanings of coherence.

That is, integration is a sub-set of coherence; we pursue integration because doing so will assist in maximising coherence and coherence is fundamental to effective teaching and learning.

Coherence is based on structure and for the curriculum the structures will be the logical and psychological/pedagogical relationships of all the content covered by that curriculum. There may be many ways in which coherence can be manifested (several different structures) and while not all will be equal there may be several of about equal efficacy for a given set of contexts and outcomes. A given industry has the complexities of having several or many occupations each of which has various possible areas of specialisation and each of these is likely to have the following apparent dichotomies, theory/practical, on and off job, generic/specific and each of these attributes will lead to an internal structure which needs to be reflected in the curriculum. Each of these characteristics will have some bearing on which structure is most likely to lead to the most effective curriculum format.

Within a curriculum some sub-structures are almost self-selecting. That is, some material has a logical priority over other material. For example, before the concept of "power", in an engineering sense, can sensibly be dealt with, the concepts of "work" and "time" need to be understood since $\text{power} = \text{work}/\text{time}$. But the understanding of "work" requires an understanding of "force" and "distance" ($w = fd$) and force subsumes "mass" and "acceleration" and so on through "velocity", "distance" and "time". That is, the teaching/learning sequence is imposed by that knowledge which is pre-requisite to that which is to be learned; there can be no real understanding of the concept of power if "work" is not clearly understood prior to the consideration of "power".

It is clear that in a great many cases the material that is being taught and learned presupposes a knowledge of what is fundamental and what is derived from those fundamentals and this should include a knowledge of what it means to be "fundamental" and what it means to be "derived". So, within a given course there will be several sub sets of logical sequence; of necessary order of delivery. Within a course, like a trades course, there may be several paths, which are either elective or compulsory, and each path (or strewn of study) will have a sequence inherent in it. Courses therefore are not strictly defined in respect to sequence since there will be options on the way the sub-sequences may be assembled.

The issue of integrating the "key competencies" is an interesting one. Some of them clearly are specific examples of logical structure: using mathematical ideas and techniques would be one such example. If, as a course progresses the mathematical skill requirements become more demanding then clearly it is the case that this competency is being developed by the subject area expert as part of the overall delivery of the vocationally specific material; the maths skills being developed by building on already possessed, more general maths skills which were part of the entry expectation of the vocational course. Those key competencies, which are not part of the logical

structure - which are not, of necessity integrated into the overall curriculum - are mechanisms for achieving the aim of the curriculum; using technology is an example. Focusing attention on the key competencies in isolation from the overall curriculum development process does more to separate them from the process than it does to integrate them - whatever the focus, they will be there to the extent that they are required as a result of both established practice and their logical necessity.

Similarly, there will be some material, which has a psychological/pedagogical priority over other material. The use of structure as an aid to hearing is well established with its effectiveness being demonstrated in many language based and similar experiments. Miller (1956) provides the example of a student of morse code learning each “dit” and “dah” individually at first each, a “chunk” in its own right, later he is able to organise these into letters which become the new "chunks" then words and phrases are “chunked” into units. Bower and Clark (1969) demonstrated that learning a list of words was greatly enhanced by weaving them into a story (a single entity). Similarly Collins and Quillian (1969) demonstrated that concepts closer together semantically are responded to more quickly (known better) than those more distant in a given structure and Schaeffer and Wallace (1969) produced similar results.

Psychological structure will frequently mean sequencing the material in order of greatest generality first and greatest specificity last. For example, in mechanical cutting, the cutting edge is generally a wedge of greater hardness and strength than the material to be cut and immediately adjacent to the cutting edge there will be a clearance from both the object being cut and the material that has been removed. This applies to such things as knives, chisels, saws, drills and so on. It is advantageous for knowledge transfer purposes, as well as knowledge acquisition, that the teaching of mechanical cutting is grounded on a knowledge of these general principles. Exceptions of course help prove the rule, the cutting of soft cheese is an interesting example, which can be used to highlight the difficulties associated with achieving appropriate clearance and the problems associated with not achieving it.

Moates and Schumacher (1980) define concepts as “one or more attributes related by a rule” and in respect of learning attributes they observed that “when the salient attributes are relevant, learning the attribute is easy”. Knowing the general principles helps immensely in seeing the relevance of specifics and it is for this reason that general principles ought be taught first as all that follows is more easily separated as being either relevant and deserving attention or irrelevant and not deserving attention.

I believe I have established that within a given course there will be well defined sub sequences, which must be followed for the material to be better understood and learnt. In overall sequence there is room to move by virtue of the fact that there are several sub sequences. The sub sequences are relatively fixed entities but there may be various ways of combining them into an overall structures. Generally, there will be a fairly fixed path through the fundamental theory, then several options may open up as more specific application is made of that theory. Similarly, for practical streams there will often be a basic area to be covered first and then a limited range of alternative structures might exist. Once the essential sequences of the content have been identified the course is constructed such that those sequences are implemented and other pedagogical good practices are followed as far as possible; for example an appropriate mix of activities for

the students during their off-the-job day of attendance at college, if that is the attendance pattern.

What is absolutely fundamental is that the sequence is determined by best practice in course design NOT on what “Johnnie” happens to be doing at work that week. If there is to be integration between the off and on job aspects of an overall vocational education and training plan the sequence is governed by the best teaching/learning sequence and this will be common to most students undertaking the modules of a given course.

Integrating on and offjob assessment clearly implies that on and off job experiences relate to very much the same sorts of things, several issues need to be considered. Firstly, it is the units of competence, which are assessed on the job, and the content of the curriculum is what is assessed off the job. Whilst it is true that the off the job content underpins the units of competence that content is a different sort of thing to the content of units, especially for more abstract knowledge requirements supporting vocations such as those in the electrical/electronics areas. Secondly, it is generally not the case that the on job experience can be made to align to the off job sequence and it is clearly not to be the case that the reverse alignment ought to apply. This is for the reasons given above (not to mention the chaos in determining what content is applicable in any given week for each individual in attendance if the workplace experience of that week determines the classroom experience).

Factors which militate against the on and off the job experiences being aligned include,

- i) course duration, the longer the course the less likely is alignment
- ii) course complexity, the more complex the course the less likely is alignment
- iii) degree of abstraction, the greater the degree of abstraction the less likely the alignment
- iv) breadth of the industry, the greater the breadth of the industry the less likely the alignment
- v) narrowness of the enterprise, the more narrow the enterprise, the less likely the alignment

Asking the question “To what degree should on and off the job assessment be integrated?” implies that contiguous on and off job experiences ought be very similar in content otherwise we are asserting that for assessment purposes we ought to integrate different types of content - to try to unify things which have no real harmony. But since a sequence (or set of sequences) can be distilled on educational grounds and since it is unlikely that workplace activities will parallel this educational sequence the opportunities for integration of the assessment regimes seems limited. What I believe clearly to be the case is that the best educational sequences ought not be sacrificed in some effort to force a higher degree of integration than that which occurs naturally. That is, integrating off and on job assessment ought not to be made a focus of curriculum development; curriculum designers ought not attempt to maximise the degree of integration of off and on job assessment as the net effect of that would be negative.

Brian Thomas, July 1996

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