

# The Engineering Graduate Training Scheme ‘A’ (Civil) of the Hong Kong Institution of Engineers—a comparison with civil engineering graduate training schemes\*

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*An engineering graduate training scheme refers to a scheme for transforming graduates of engineering degree programmes to become professional engineers through supervised or controlled on-the-job training. The background, content and administration of the established Engineering Graduate Training Scheme ‘A’ (Civil) of the Hong Kong Institution of Engineers were detailed and compared with other similar civil engineering graduate training schemes. An evaluation on its position amongst these comparable training schemes was also performed.*

**Keywords:** training objectives; practical experience; continuing professional development (CPD); training log book; professional experience; professional assessment; accredited degree; training certificate; engineering supervisor; training tutor; mentor

## INTRODUCTION

THE HONG KONG INSTITUTION of Engineers (HKIE) is the local qualifying body for engineers in Hong Kong. Graduates who attained an engineering degree in Hong Kong accredited by the HKIE [1], or other signatories of the Washington Accord including Australia, Canada, Ireland, Japan, New Zealand, South Africa, UK and USA can join the HKIE as graduate members, and obtain their engineering graduate training under HKIE’s Training Scheme ‘A’ (the Training Scheme).

Under the Training Scheme, a graduate engineer shall have his/her practical training supervised by the assigned Engineering Supervisor (ES) and Training Tutor (TT) for two to three years as required in the respective engineering discipline. Upon successful completion of the Training Scheme and one to two further years of experience, a graduate is eligible to sit for Professional Assessment to become a corporate member of HKIE.

Not every engineering graduate can receive his/her training under the Training Scheme. Only those employers who have their training scheme endorsed by the HKIE can sponsor this formal training to their graduate employees and assign their respective ESs. At present, HKIE has about 4,200 Graduate members, only about 900 of them are being trained under the Training Scheme.

Graduates who are not receiving training under the Training Scheme have to acquire at least 6 years of experience before they can sit for Professional Assessment [2]. This is at least 2 years more than those of Scheme ‘A’ trainees.

Although the engineering profession is not fully regulated in Hong Kong, the HKIE corporate membership is a recognized professional qualification, attainment of which is a significant step in the career development of engineers. Hence, engineering graduates have the incentive of joining the Training Scheme and completing it on time so that they can sit for the Professional Assessment at the soonest.

The Training Scheme was originated from an earlier engineering graduate training scheme of the Institution of Civil Engineers, UK, and has been modified and developed to suit local conditions. It has been in force since 1984 and now encompasses the following 17 disciplines:

- a) biomedical engineering
- b) building engineering
- c) building services engineering
- d) control, automation and instrumentation
- e) chemical engineering
- f) civil engineering
- g) electrical engineering
- h) electronics engineering
- i) environmental engineering
- j) gas engineering
- k) geotechnical engineering

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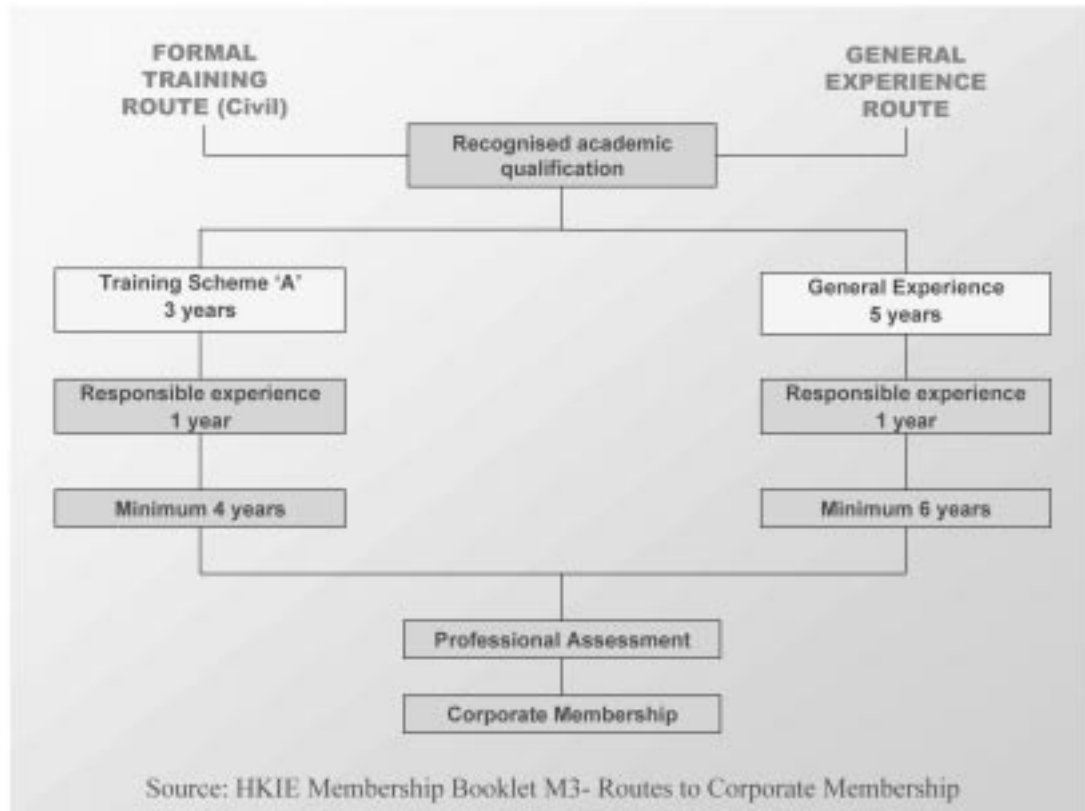


Fig. 1. Routes to HKIE corporate membership (Civil).

- l) information engineering
- m) materials engineering
- n) mechanical engineering
- o) manufacturing and industrial engineering
- p) marine and naval architecture engineering
- q) structural engineering.

At present, more than 45% of the HKIE members are in civil engineering. About the same ratio of Graduate members being trained under Scheme 'A' are civil engineering graduates. Their training scheme (the civil training scheme), or the schemes for disciplines related to construction, requires a training period of three years, about one year of which shall be on a construction site. The training period can however be extended if the training is not progressing as planned. The trainees can sit for the Professional Assessment with another year of responsible experience after successful completion of the Training Scheme [2].

For disciplines that are not related to construction, the Training Scheme requires a training period of two years. But two further years of responsible experience after successful completion of the Training Scheme is necessary before the trainee can sit for the Professional Assessment.

#### CONTENT OF THE CIVIL TRAINING SCHEME

There are two major elements in the 3-year Training Scheme, namely the practical experience

and the meeting of training objectives through the practical experience. There is also an additional requirement for the trainees to attend courses or involve in activities for Continuing Professional Development (CPD).

#### Training by experience

The acquisition of adequate practical experience is considered the necessary requirement in completing the Training Scheme. The trainees have to involve in real civil engineering projects and their tasks varied in nature so that they can have sufficient exposure to develop the qualities of professional civil engineers. They are assigned tasks in relation to the project development and design phases, normally in design offices. They are also assigned tasks in project implementation phase, normally during their training placement in construction sites.

All practical experience acquired by a trainee during the whole Training Scheme period will be recorded by the trainee onto the 'Graduate Training Log Book' [3] in the form of monthly and quarterly reports. The reports normally contain a description of the projects that the trainee was involved, the actual tasks assigned to him/her and how they were performed, and what he/she had learnt through achieving these tasks. The monthly reports and quarterly reports have to be reviewed, commented and endorsed by the TT and the ES. Through regular review of the logbook, the TT and the ES are well informed of the adequacy

and variety of exposure given to the trainee and the training progress.

#### *Training by objectives*

The HKIE strongly believes that having three years practical experience may not necessarily imply sufficiency of a trainee to complete the training. Hence apart from demonstrating that a trainee has three years of relevant experience, he/she has to demonstrate that all the pre-determined training objectives through practical experience were met before he/she can complete the Training Scheme and get the training certificate from HKIE. The pre-determined training objectives are grouped into three types and contained in the book of 'Record of Objectives'. They are common core objectives, core objectives and specific objectives.

Common core objectives are the training objectives that are common to all 17 engineering disciplines of the Training Scheme. There are 11 common core objectives [4] covering:

- a) knowledge on the history, role and organization of the HKIE, and the participation in its activities;
- b) respect of professionalism including the observance of responsibilities of professional engineers, the HKIE 'Rules of Conduct' and the latest related technical development;
- c) general personal development through keeping up-to-date with local, regional and international current affairs, and involvement with local organization or community services;
- d) development of personal qualities such as innovative abilities, interpersonal, negotiation and time management skills;
- e) knowledge on responsibilities of professional engineers and relevant legislation in occupational safety and health, and a good grasp of safety management systems;
- f) knowledge on legislation relevant to environment and the inter-relationship of technology with environment;
- g) good command of oral and written communication in English;
- h) knowledge on general human resources matters such as employment criteria, labour deployment and staff training;
- i) general understanding on what leadership and management skills are about and their relationship;
- j) good understanding of the trainee's own organization in various aspects; and
- k) general understanding of the engineering business operation.

Each of the 17 disciplines has its own set of core objectives. For civil engineering, the set is related to civil engineering fundamentals, engineering solution and the implementation process. There are 20 core objectives [4] including:

- a) general understanding of the overall civil engineering procedures;
- b) experience in identifying and defining a problem accurately;
- c) capability in the identification and evaluation of alternative solutions to a problem gained through involvement;
- d) application of appropriate local and international standards and know their limitations;
- e) capability in producing the solution to a problem;
- f) capability in presenting the solution to a problem;
- g) appreciation of how environmental issues affect the solution of an engineering problem;
- h) appreciation of the importance of technical specification as part of the solution through involvement;
- i) experience in estimating cost of solutions to problems by standard methods;
- j) capability to apply relevant regulations to meet safety requirements in solving engineering problems;
- k) knowledge of how contractual parties exercise their rights and duties through application of various documents of a civil engineering works contract;
- l) involvement in site documentary control such as registration and filing of instructions, drawings and their amendments;
- m) capability to keep accurate site daily record of events and instructions;
- n) capability to read/coordinate drawings and implement work instructions;
- o) capability in participating in dimensional control of works with appropriate accuracy;
- p) knowledge in the use, performance and cost of equipment/plant in solution implementation;
- q) capability in programme preparation and progress monitoring/reporting;
- r) capability to measure and record, or independently check, work done for payment purposes;
- s) capability to observe safe working practices through critical approach to safety matters in the implementation process; and
- t) experience in the use of quality assurance tools and procedures in construction.

Specific objectives are the additional training objectives that were set by the trainee's employer when its training programme was submitted to, and endorsed by, HKIE as approved Scheme A training programme. These specific objectives are inserted into the book of "Record of Objectives" appending the common core objectives and the core objectives already printed in the book. Some examples of specific objectives are:

- a) knowledge on typical consultancy agreements and the use of common conditions;
- b) knowledge on the legal structure of the company;
- c) good understanding in cost-related aspects of a works contract, such as claims, variations,

indices and fluctuations, settlement of disputes . . . etc.

The ES shall have private review sessions with the trainee at reasonable intervals within the training period and check against the status of each training objective. Where in his/her judgment the trainee has achieved an objective on a certain date, the ES shall initial against that objective with the date. It is a requirement that each and every training objective contained in the book of 'Record of Objectives' has to be initialed by the ES for completion of the Training Scheme.

#### CPD activities

The trainee is required to involve in CPD activities for at least 7.5 days per year during the training period. Normally 6 CPD hours accumulated can be counted as a CPD day. Such requirement will continue after the training period until his/her Professional Assessment. Recognized CPD activities include attendance of talks, courses, seminars, conferences . . . etc or development of personal qualities through services in voluntary organizations. CPD covers matters of direct technical relevance as well as broader studies that are relevant to the furtherance of the career and professional development of a trainee. CPD is about breadth of knowledge and so the trainee can choose any topics so long they are of some relevance to his/her development to be a professional engineer. However, there is a requirement for the trainee to involve in at least three days each within the training period for:

- a) health and safety
- b) environment
- c) general personal development

It is important to note that the physical duration of an activity does not necessarily equate the CPD duration. The CPD recognition is determined by the ES on judging the relevancy and substance of the activity, and any repetition in nature with other CPD activities already claimed. Only the introductory part is counted for a pro-longed intensive course since CPD is not about depth of a specific topic.

Similar to the 'Record of Objectives', all CPD activities have to be recorded in the trainee's 'CPD Log Book' [5] with the ES's initial and recognized CPD duration against each and every activity.

The 'Graduate Training Log Book', 'Record of Objectives' and 'CPD Log Book', often referred to as the Three Red Books, are the full documentation of the training received by a trainee under Scheme 'A' training.

### ADMINISTRATION OF THE CIVIL TRAINING SCHEME

The administration of the Training Scheme is common to all 17 disciplines. For convenience of explanation, it can be divided into three phases, namely the Registration phase, the Training phase and the Completion phase.

#### Registration phase

The process is shown in Figure 2.

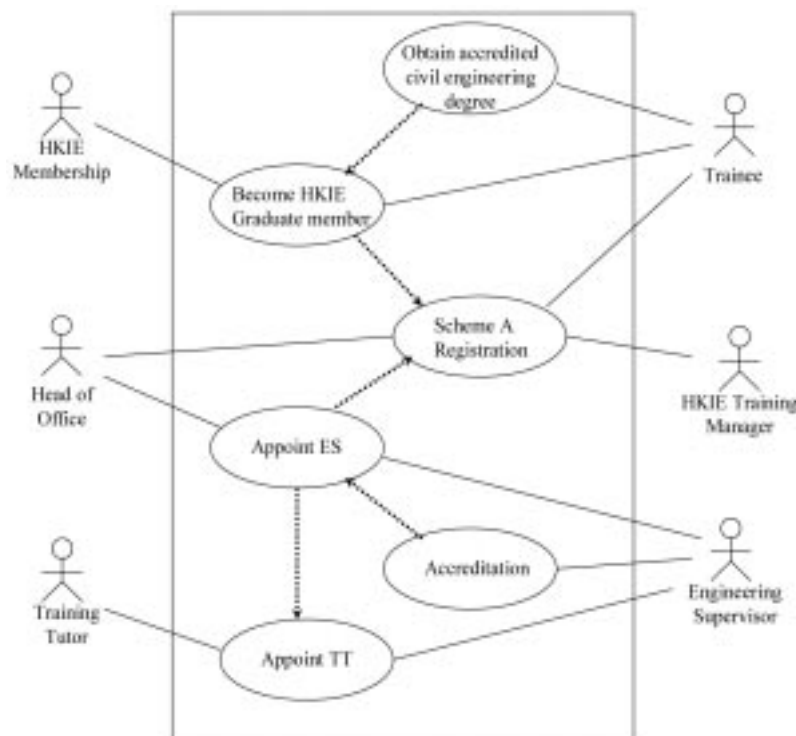


Fig. 2. Registration phase of HKIE Scheme 'A' training programme.

As mentioned, after obtaining an accredited degree, a graduate can join a company with a training programme that was endorsed by the HKIE as Graduate Training Scheme 'A' programme. He/she can then apply for registration through the company with the HKIE to start the Training Scheme. One pre-requisite for the graduate to join the Training Scheme is to become a Graduate member of HKIE. Through the Graduate membership, the trainee is well informed of the Institution's matters through its monthly journal 'Hong Kong Engineer' and has access to the Institution's information and activities such as technical meetings and visits.

The registration is in the standard form of a training agreement made between the trainee and the company, who is represented by the Head of Office. The training agreement, which also nominates an ES for the trainee, has to be approved by the HKIE. Such registration will be entertained only when the company has its training programme endorsed by the HKIE as an approved graduate training Scheme 'A' of that discipline, and have it renewed every three to five years. A company can have Training Scheme 'A' in several disciplines, but each has to be endorsed and renewed separately.

In applying for endorsement of a training scheme, a company has to demonstrate to HKIE that it has sufficient number of ESs of that discipline to supervise the number of trainees in the company. ESs are corporate members of the HKIE who are certified training supervisors through attending a specially designed half-day

workshop and passing a test. The HKIE limits the number of trainees per ES to twelve at any one time.

Once appointed by the company's Head of Office, the ES has the personal responsibility in ensuring that the trainee receives the agreed training within the training period. Quite often an ES has little personal interaction with the trainee at work because of his seniority. In which case the ES appoints a TT, who is normally the trainee's immediate senior, to assist him in the day-to-day supervision of the trainee. There is no special requirement for the TT except that he/she should have a technical background. The maximum number of trainees that a TT can supervise is four at any one time.

It may take more than a month to complete the whole registration process. This is particularly the case when the trainee needs to obtain the Graduate membership before the Training Scheme can be registered. However, the HKIE allows the Training Scheme to commence on the first day the trainee started his practical experience so long the registration process is completed within 6 months.

This registration phase is common to all disciplines.

#### Training phase

The training phase covers the whole three-year period of the Civil training scheme. The process is shown in Figure 3.

The trainee shall be receiving his training through practical office-based and site-based work as arranged by the company. He/she has to

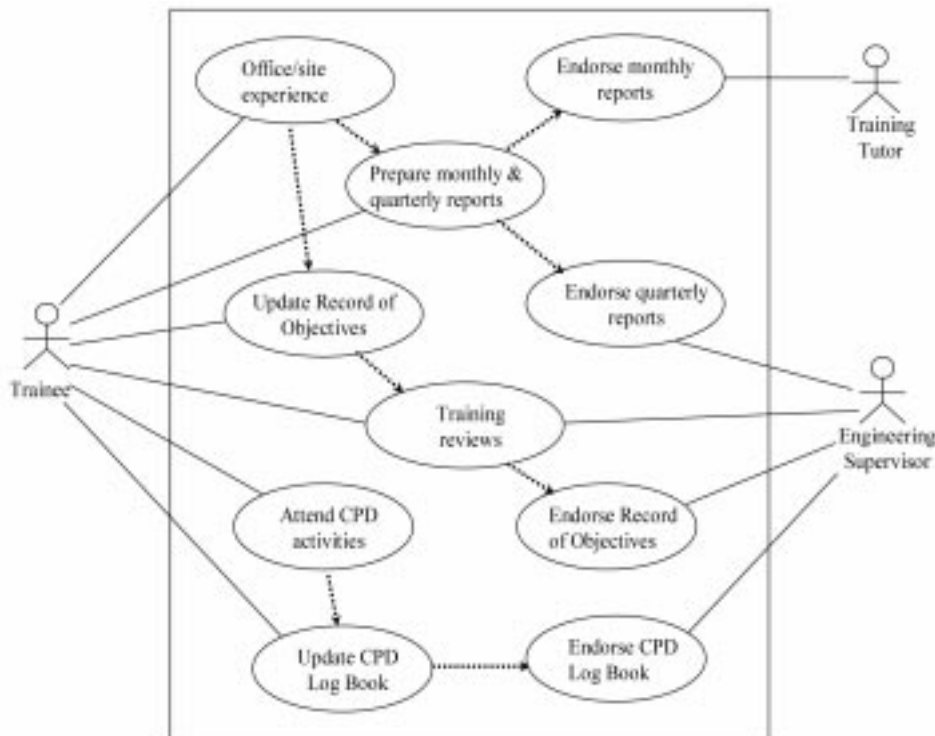


Fig. 3. Training phase of HKIE Scheme 'A' training programme.

prepare monthly reports and have them endorsed by his/her TT. He/she also has to update the book of 'Record of objectives' whenever he/she feels that certain training objective has already been met. He/she shall also be involving in CPD activities in parallel with the daily work and record them into the CPD Log Book.

Every quarter, he/she has to prepare the quarterly report and submit it to the ES for comment and endorsement. The report submission is a good chance to communicate and evaluate with the ES on the training content and progress. The ES may also conduct Training Reviews with the trainee at suitable intervals to go through the set of training objectives, and endorse the ones the trainee has already achieved.

The ES shall also endorse those CPD activities as recorded on the CPD Log Book. The activities are endorsable when they are relevant to the training and are of reasonable duration. Normally, the trainee would consult the ES if he/she is uncertain of the suitability of a CPD activity before participating.

- b) attended and recorded the required CPD activities and have them endorsed by the ES; and
- c) in his/her opinion all training objectives contained in the book of 'Record of objectives' were met.

The ES shall then arrange a final training review with the trainee, during which the ES will make sure that each and every training objective were met by the trainee and initialed by him. Once the ES and the Head of Office signed-off and submitted the Training Report to HKIE, the training relationship between the company and the trainee terminates. HKIE shall then arrange the issue of Training Certificate to the trainee.

If however the trainee cannot complete his/her Training Scheme on time, an application of extension in the Training Scheme, together with valid reasons, has to be submitted to HKIE for approval. Once approved, the trainee has to complete the training by the newly agreed completion date, unless another application of training extension is approved by the HKIE.

#### Completion phase

At the end of the three-year period, the Training Scheme enters its completion phase. Details of the process are presented in the following Figure 4.

The trainee can ask for training completion when he/she:

- a) completed all monthly and quarterly training reports and have them commented and endorsed by the TT and ES respectively;

#### AN OVERVIEW OF OTHER COMPARABLE CIVIL TRAINING SCHEMES

Some civil engineering training schemes of similar nature are outlined here for comparison. They include the ones administered by the Institution of Civil Engineers, the Institution of Structural Engineers, the Institution of Engineers Ireland, Engineers Australia, and the Institution of Professional Engineers of New Zealand. All these programmes

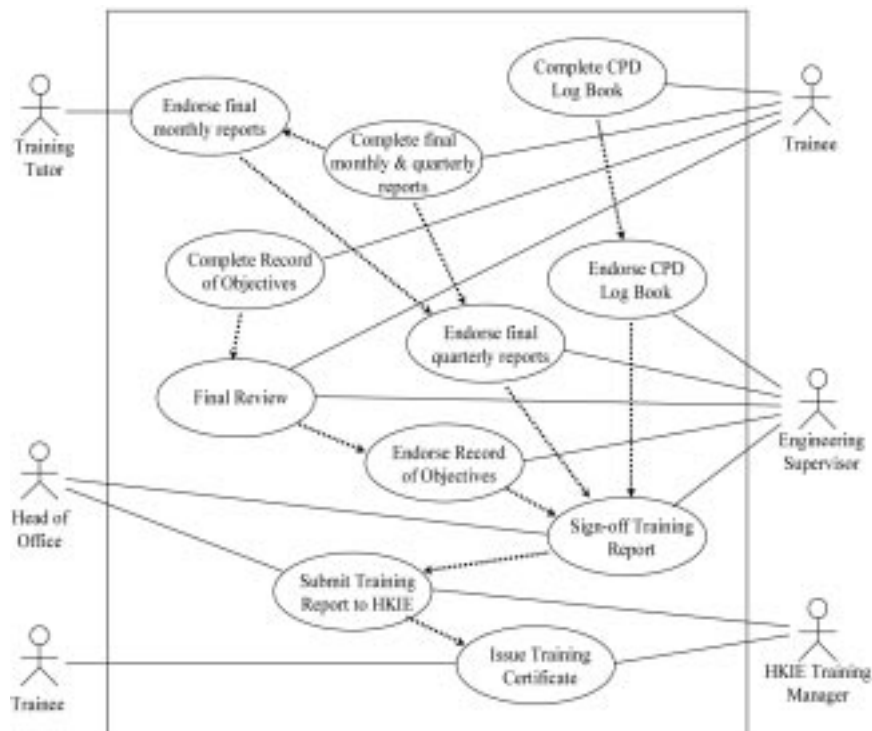


Fig. 4. Completion phase of HKIE scheme 'A' training programme.

and schemes require the trainees to have a university degree under the Washington Accord, or an equivalent academic qualification, recognized by the respective institutions as satisfying the academic requirements for professional qualification. In this respect, they are considered to be comparable training schemes.

*The Institution of Civil Engineers (ICE) Company Approved Training Scheme*

In UK, the acquisition and development of skills of an engineer in the period between graduation from an accredited degree programme and professionally qualified as chartered engineer is referred to as Initial Professional Development (IPD) [6]. The IPD can be in the form of supervised training under agreement, private mentoring by an experienced engineer or acquisition of adequate relevant practical experience.

For the case of ICE, the supervised training can be done through a training agreement between a company and a trainee who is a Graduate member of the ICE [7]. Under the agreement, the trainee will be trained through practical experience under the supervision of the company's Supervising Civil Engineer (SCE) or his/her Delegated Engineer (DE) in which all 23 pre-defined core objectives [8] and several company-specified training objectives are met. The core objectives are having similar coverage as the common core objectives and core objectives of the HKIE Scheme A (Civil).

Throughout the training period, the trainee has to produce quarterly reports and demonstrates the commitment to CPD activities through the use of Development Action Plan (DAP) and Personal Development Record (PDR). A minimum of five days in CPD activities per year should be presented. The DAP and PDR, together with the quarterly reports and record of objectives, are the formal record of the supervised training. They will be referred to during the Chartered Professional Review (CPR) in assessing whether a candidate has already possessed the qualities to be qualified as an ICE corporate member.

The normal period of training is about 3 years, but the actual period depends on how fast all the training objectives are met. When the trainee is ready, and with a minimum accumulation of 15 CPD days, the SCE will have a Training Review (TR) with the trainee to see whether all the training objectives are met and the training records properly documented. Training certification can be processed if the TR is successful.

Not every company can provide supervised training through training agreement. ICE only recognize training agreements made by companies with ICE-endorsed Company Approved Training Scheme managed by ICE-approved SCE.

If a graduate is unable to train under recognized training agreement, then he/she can seek the commitment of an experienced civil engineer, who is normally an ICE corporate member, as his/her mentor to guide him/her personally until

the training objectives are met. Engineers trained in this manner have to pass a career appraisal before allowing to proceed to CPR.

*The Institution of Structural Engineers (IStructE) Individually Managed IPD*

IStructE used to have a time-serving system in its training scheme in that the training is completed by a fixed period of practical experience in design office and construction site. However, the system has changed for graduates to start their training from September 1999 onwards. Since then, IStructE adopts the same IPD philosophy commonly adopted in UK, emphasizing the essence on the successful acquisition and development of specialist knowledge and skills necessary to practice as a structural engineer rather than the training duration.

IStructE does not endorse training schemes offered by companies, but lists out the requirements for the trainees to run their own training programme called Individually Managed IPD [9]. Under the training programme, a trainee has to identify his/her own mentor who normally is a corporate member of IStructE to guide him/her through the training. The training programme normally takes at least three to four years to complete depending on the progress of the trainee to meet all the training objectives. There are only 13 core objectives to meet, including:

- a) knowledge of IStructE and involvement in its affairs;
- b) ability to demonstrate effective communication and interpersonal skills;
- c) ability to produce viable structural solutions, within the scope of a design brief, taking account of structural stability, durability, aesthetics and cost;
- d) ability to carry out analysis and design of structural forms;
- e) ability to specify and coordinate the use of materials;
- f) knowledge of relevant environmental and sustainability issues and legislation;
- g) experience in construction techniques
- h) experience in management skills for programming and control;
- i) appreciation of the law and statutory legislation;
- j) knowledge of health and safety requirements and legislation;
- k) appreciation of commercial and financial constraints;
- l) knowledge of procurement routes and forms of contract; and
- m) knowledge of quality systems.

Although these objectives have some emphasis on the structural engineering skills and are fewer in number than those of the HKIE Scheme A (Civil) and the ICE Company Approved Training Scheme, they in essence cover most of the key aspects of training objectives of the other two

training schemes. In fact, completion of either of these two other training schemes is recognized by IStructE as alternative to completion of the Individually Managed IPD through the Accredited Training Scheme route.

The meeting of core objectives is recorded in IPD report forms. The final IPD report forms, DAP and PDR are the formal training records. The trainee has to demonstrate a commitment in CPD activities although there is no minimum CPD days specified. Once the set of training record is complete and the Final IPD report forms signed by the mentor, the training is deemed complete and the trainee can sit for IStructE's professional review interview when attainment of each of the 13 core objectives will be assessed. Only those who passed all the 13 core objectives can proceed to the Chartered Membership Examination.

*The Institution of Engineers Ireland (IEI)  
Graduate Training Programme/Initial Professional  
Development (IPD)*

For IEI, the Graduate Training Programme is analogous to, and as abstract as, IPD. Much emphasis is on the acquisition of required competencies rather than prescriptive procedural requirements since IEI reckons that there are many different ways to develop the competencies. The five required competencies [10] to be met by a trainee before he/she can achieve chartered title are:

- a) use a combination of general and specialist engineering knowledge and understanding to optimize the application of existing and emerging technology;
- b) apply appropriate theoretical and practical methods to the analysis and solution of engineering problems;
- c) provide technical, commercial and managerial leadership;
- d) use effective, communication and interpersonal skills; and
- e) make a personal commitment to abide by the appropriate code of professional conduct, recognizing obligations to Society, the profession and the environment

These can be attained by undertaking off-the-job studying or attending conferences/courses, and transfer the knowledge so acquired to the workplace for practice. IEI requires a minimum of five days of formal and targeted CPD activity per year for each engineer, including graduates. It recommends training courses in each of the following subject areas:

- a) project management
- b) financial awareness
- c) managerial leadership
- d) personal development/communication skills
- e) legislation
- f) quality
- g) IT skills.

The minimum duration of the Graduate Training Programme is four years. An internal mentor, who is a chartered engineer, is assigned by the employer to supervise the training of a trainee. An account of all actions, activities and the respective outcomes, together with a detailed log of formal and targeted CPD activities are kept by the trainee as training records. The records have no specific format although there is a template provided by IEI.

IEI accredits engineering employers that have excellent CPD systems and maintains a register called 'IEI CPD Registered Training Provider', but companies not on the register may also run the Graduate Training Programme.

*Engineers Australia  
Professional Development Program (PDP)*

PDP [11] is a systematic programme developed by Engineers Australia (formerly known as the Institution of Engineers, Australia). Only organizations with PDP endorsed by Engineers Australia can run the programme.

A mentor, who is an engineer preferably chartered, shall be appointed by the organization to be responsible for the training programme of a trainee. A supervisor, who is usually the trainee's immediate senior, shall also be appointed for day-to-day supervision of the trainee. Engineers Australia conducts PDP workshops for both mentors and supervisors.

The PDP requires the trainees to attain the required work-related competencies through supervised job experience. The required competencies include three core competencies plus two elective competencies. The three core competencies are:

- a) engineering practice;
- b) engineering planning and design; and
- c) self-management in the engineering workplace;

while the two elective competencies can be selected from ten specified electives as follows:

- a) engineering business management OR
- b) engineering project management;
- c) engineering operations;
- d) materials/components/systems;
- e) environmental management OR
- f) investigation and reporting;
- g) research & development & commercialization;
- h) source and estimate materials;
- i) change and technical development;
- j) technical sales and promotion.

The attainment of the required competencies is recorded in Career Episode Reports (CERs) prepared by the trainee and submitted to his/her supervisor for verification. The verified CER shall then be submitted to an accredited assessor of Engineers Australia for competency compliance checking. The process repeats until all the required competencies can be recorded as acquired. There is no specific number of CERs required. Normally a fresh graduate needs about ten to twelve CERs to demonstrate sufficiency in attaining the competen-



cies, while more experienced engineers engaged in PDPs may only need five to six. All CERs shall then be compiled into an Engineering Practice Report as part of the application for professional interview which as the final assessment of his/her claimed competencies. There is no time limit for completing a PDP, but it normally takes three to four years.

There is no specific requirement for CPD activities under PDP.

*The Institution of Professional Engineers of New Zealand (IPENZ)*

*Competency Development Program*

As the name of the programme suggests, the Competency Development Program emphasize the development of competency of engineering graduates at their profession formation stage. Only those employers accredited by IPENZ can run the programme. Accreditation of employers can be considered if they can demonstrate that their trainees are given reasonable support and guidance [12] in developing the competencies expected of competent engineering practitioners, including those in skills, knowledge and personal qualities.

The development of competencies of a trainee is by means of supervised on-the-job training and CPD activities. For on-the-job training, each trainee will be guided by a company-appointed mentor, who is a member of IPENZ or the member of another recognized institution of equivalent membership grade. IPENZ expected that the mentor would meet with his/her trainee at least once every three months to review the training progress and to provide suitable guidance. All interactions with the mentor are recorded into a Mentoring Log by the trainee. In addition, IPENZ requires the trainee to submit verified competency development records to its National Office at least once a year.

CPD activities are considered as an important portion of the training programme. IPENZ requires trainees to involve in a minimum of 50 hours CPD activities per year, and the quality of the CPD activities in the form of courses, conferences or programmes are assured through IPENZ accreditation of these activities and their providers.

After about four to five years of mentoring employment and the required competencies reasonably developed, the trainee will undergo an IPENZ competency assessment to become IPENZ's professional member if successful.

*Summary*

The characteristics of the training programmes outlined above, alongside with those of HKIE Training Scheme 'A' (Civil), are summarized in Table 1 for ease of comparison.

The characteristics can be summarized as follows:

- a) Engineers trained under any of the above training schemes or programmes required an

accredited academic degree or equivalent academic qualification under Washington Accord to start the formal training, although some practical experience obtained in sandwich programmes before graduation may be counted.

- b) Similar to HKIE Scheme 'A' (Civil), the duration of all the above training schemes are not absolute and are based upon the competence achievement of the trainees though normally the trainees need to have at least four years practical experience under the supervision of qualified engineers before they are professionally qualified.
- c) Except for IStructE and IEI, training programmes of all other institutions can be run by endorsed or approved employers, as in the case of HKIE Scheme 'A' (Civil).
- d) Similar to HKIE Scheme 'A' (Civil), most training schemes specified a list of training objectives or competencies for the trainees to achieve within the training period. IEI specified the list of topics of formal CPD courses to attend instead. IPENZ does not specify the list of mandatory competencies, but accredits employers who have established system of supporting trainees to achieve competencies expected of competent engineering practitioners.
- e) Except for Engineers Australia who has no specific requirement for CPD activities, all other institutions including HKIE specified the demonstration of commitment to CPD activities, quite often with a yearly minimum. IEI and IPENZ also accredit courses and their providers to ensure the quality of CPD activities.
- f) Training of each and every trainee of all training schemes are traceable through training records in different forms of training reports normally done quarterly and/or annually. Only HKIE requires monthly training reports as well.

#### **HOW IS THE CIVIL TRAINING SCHEME POSITIONED AMONGST OTHER TRAINING SCHEMES**

Traditionally, the HKIE considers its training schemes, including the civil engineering scheme, as the most important tool in developing an engineering graduate to become a professional engineer. Internationally, the HKIE positions itself as a qualifying body that could command a high level of recognition in terms of its academic and professional qualifications. To this end, the HKIE sets standards that are sometimes higher than normal when the objectives in this positioning are to ensure that the HKIE maintains and enjoys all international recognition that can be achieved. Currently, the HKIE is a signatory to the Washington Accord, Sydney Accord, Engineers

Table 1: Comparison of Civil Engineering Graduate Training Programmes

Organization Name	Programme Name	Need endorsed/ approved company	Average Training Duration	Objectives to be Achieved	Record of Training	CPD	Supervisor	Training Certification
HKIE	Engineering Graduate Training Scheme 'A' (Civil)	Yes	Normally 3 years but can be extended	* 11 common core objectives * 20 core objectives * Approved specific objectives set by endorsed company	* Monthly and Quarterly Reports in Graduate Training Log Book * Record of Objectives * CPD Log Book	* Min of 7.5 days (45 hours) per year until end of programme	* Engineering Supervisor (ES), accredited MHKIE * Training Tutor	* all training objectives were met and endorsed by ES * all monthly and quarterly training reports completed * adequate CPD recorded in CPD Log Book
ICE	Company Approved Training Scheme	Yes	Normally 3 years	* 23 core objectives * Appropriate Specific objectives to a minimum standard	* Quarterly Reports * Record of Objectives * Development Action Plan * Personal Development Record	* Min average of 5 days per year, at least 15 days before Training Review (TR)	* Supervising Civil Engineer (SCE), MICE * Delegated Engineer	* SCE agreed that all objectives were met * TR successful
IStructE	Individually Managed IPD	Not particularly mentioned	3-4 years	* 13 core objectives	* Record of Core Objectives * Development Action Plan * Personal Development Record	* reasonable amount	* Mentor, MStructE or equivalent	Not mentioned
IEI	Graduate Training Programme/IPD	Not particularly mentioned	Min 4 years	* 5 Competencies * Relevant company and discipline specific training	* Record of all actions, activities and the respective outcomes * CPD record	* 5 days per year * Relevant courses in each of the required subject areas	* Company-assigned internal mentor who is a Chartered Engineer	Not mentioned
Engineers Australia	Professional Development Program (PDP)	Yes	3-4 years	* 5 Competencies, including 3 core plus 2 Electives	* 10-12 Career Episode Reports (CERs) for young engineers * Less half of CERs for more experienced engineers * compile all CERs as the Engineering Practice Report at the end of training	Not mentioned	* Mentor, who is an engineer preferably Chartered * Immediate senior as supervisor * Accredited Assessors (External)	Not mentioned
IPENZ	Competency Development Program	Yes	4-5 years	* Approved requirement set by endorsed employer	* Verified Competency Development Records * Mentoring log	* Min 50 hours per year	* Mentor, MIPENZ or equivalent	Not mentioned

Mobility Forum and Engineering Technologists Mobility Forum, and represents the Government of the Hong Kong Special Administration Region in the APEC Engineer. This positioning also to a very great extent affects its civil engineering scheme. The HKIE demands very stringent quality assurance in assessing a company, checking of compliance of training objectives not only by ES but also by secretariat staff, compliance of specific CPD requirements that are not demanded by some other training schemes. The HKIE tries its best to achieve the highest standards by taking all possible measures in enhancing the quality of its training programme.

Currently the HKIE training programme is recognized by ICE and IStructE as equivalent to their training schemes.

Engineers undergone Scheme A and subsequent qualification through professional assessment can easily get mutual recognition with UK institutions and included in FEANI register as EurIng. Once recognized as a professional civil engineer in a EU country, then under European Community Directive 89/48/EEC, the engineer can move freely and practice within the community subject to certain requirements to be met in some countries.

This also applies to Engineers Australia, IEI and IPENZ in which all of them have mutual recognition with the HKIE. The engineers produced under the HKIE are also eligible to become EMF Engineers and APEC Engineers.

## CONCLUSION

All the relevant training schemes under this study make use of competence approach as the basis in assessing the outcomes of trainees in their completion of the training programmes. Their implementations are diversified as different methods are used in achieving the level of competence required though all of them are highly regarded in international arenas. The HKIE tries to introduce all practicable measures in ensuring the outcomes required though it may involve a high level of resources involved.

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