TILE FIXING SKILLS: AN AUSTRALIAN APPROACH TO QUALITY CONTROL

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1. INTRODUCTION

In Australia, as in many countries, the Ceramic Tile Industry has been striving to expand the use of ceramic tiles. The quality of the product has been steadily improving and the areas of application enlarged. The average number of square metres of tiles going into new homes is rising. The industry has confidence in the future and this is reflected in the increasing amounts of money being invested in new plant and equipment. However, the industry's ability to take full advantage of this increasing demand is limited by there being sufficient skilled labour to fix the tiles in a competent manner.

In the last building boom in Australia, alternative and inferior products were used in place of ceramic tile because there were insufficient tile fixers to meet the demand. This shortfall of skilled labour saw tile fixing prices increase. This in turn attracted large numbers of under-skilled workers resulting in an increase in the number of sub-standard tile installations.

This paper aims to give some details of how a series of quality control mechanisms were introduced to increase the number of skilled operatives into the tile fixing workforce in the Australian State of New South Wales (NSW) since 1991.

Implementing quality control procedures into the ceramic tile manufacturing and distribution process is the responsibility of the management of the enterprise. Most manufacturers as good corporate citizens, support and observe national and international standards for product compliance.

However, ensuring quality of the installation of the product has proven to be much more difficult. Responsibility for controlling the installation requires the collaboration of tile and adhesive manufacturers, tile merchants, government bodies, building industry representatives, the unions and tile fixers.

This paper describes methods of improving the quality of tile fixing implemented in the largest Australian State which have been used to develop a vocational training framework for all seven Australian States. The process has also created some international interest.

2. THE PROBLEM

The need to reform the skills acquisition and verification process for tile fixers in Australia had been apparent for many years. The shortage of skilled labour was endemic and the problem had been manifesting itself in the usual ways. The number of complaints and the amount of litigation had been steadily rising. Problems reported to the state building industry consumer protection organisation about tile fixing were the highest for any trade on a pro-rata basis. Tile fixers represented 4% of the building industry workforce yet they generated 16% of the complaints *.

The price per square metre for fixing was seen by the building industry as disproportionately high and delays were being experienced in completing contracts on time. An increasing number of consumer complaints were ending up in the Courts, and this costly litigation added pressure for the development of an Australian Standard on Ceramic Tile Installation.

In 1990, New South Wales had an estimated 4000 tile fixers of whom approximately 500 were formally trained (1 in 8). The annual loss of tilers from the industry (retirement, change of occupation etc.) was estimated at 10% (approximately 400). The replacement rate of trained tilers was 50 per year or less than 2% of the total tilers. Of the other 350 entrants to the trade, it is estimated that less than 30 would have been immigrants with formal tile fixing experience. By far the largest number of new entrants (8 out of 10) were those who were being informally trained on the job, quite often by other under-skilled workers. Forecasts of labour requirements showed that N.S.W. would need 15,000 tile fixers by the year 2000; and the training systems were not even replacing those who were leaving the industry let alone catering for a 375% increase.

Much of the problem seemed to centre around the very limited formal methods of entry to the trade. There were only two methods, firstly a 4 year apprenticeship including 3 years part time college training resulting in a trade certificate. The other was an overseas qualifications review system that allowed for the assessment of immigrants with a view to granting trade status. These methods were failing to meet the demand and large numbers of persons drifted into the industry often gaining some kind of status through an essentially ineffectual quasi-government licensing system.The licensing system, introduced some 20 years ago, aimed to provide protection to householders from poor building practice. It involved compulsory insurance against poor management and poor workmanship of building contractors, as well as protection from the possibility of the builder going bankrupt. The licensing system was largely unsuccessful because it was not respected by the industry, was not supported by the public or enforced by the authorities. The value of the license was undermined by the fact it was easy to obtain and it gave no guarantee of the competence of the holder.

To increase the number of tile fixers in the workforce and at the same time ensure their standard of skill met the industry's minimum needs, three objectives were identified. Firstly to open up the access and entry points to the trade, secondly to implement skills identification methods to ensure new entrants had the necessary skills, and thirdly, all training initiatives needed to be formally accredited to ensure industry standards were maintained. The second objective, skills identification was chosen as the starting point. It is only when an accurate list of the skills needed by tile fixers to operate to the standard expected in industry is developed that quality control over the tile fixing process can be achieved.

Industry standard skills or competencies need to be written and verified in the workplace against the best industry practices before they can be accepted.

Once the industry accepts the skills or competencies profile, training objectives can be written and tile fixer training courses designed.

To bring about the necessary reforms a project team was established with representatives of all the relevant sectors of the industry. Their work is the basis of the model described below.

3. THE MODEL

For almost a decade the national government had been gradually introducing reforms aimed at changing the way work was organised to make Australia more efficient and internationally competitive. At the centre of this effort was a restructuring of industrial awards that would improve the career paths of workers and allow them to operate outside their narrow traditional areas of work. Pay rises were being linked to productivity increases and there was a push towards training for a multi-skilled workforce.

This national agenda for change supported the project team's effort to increase the entry points to the tile fixing trade.

An accurate skills list, tied to the industry's standards would allow for Recognition of Prior Learning (R.P.L.) to be implemented. This meant that a person's skills could be measured and credit given for the skills demonstrated no matter how or where those skills were acquired. In one stroke the large numbers of partially skilled operatives would be able to gain formal credit for skills possessed. If an individual showed a shortage of skill in a particular area, top up training could be organised to ensure that the industry's standards would be observed.

The six steps in establishing a quality control regime for tile fixing were:

(a) Forming the Framework
(b) Establishing the Competencies
(c) Linking the Competencies to Industry Standards
(d) Developing Quality Control Mechanisms
(e) Implementation
(f) Review

Each step requires the following tasks to be achieved:

(a) FORMING THE FRAMEWORK

- setting the aims
- identifying the stakeholders
- gaining support and funding
- creating a project team
- setting objectives and creating a plan
- researching the area

(b) ESTABLISHING THE COMPETENCIES

- Choosing the method for establishing the competencies
- Implementing the «Collaborative Workplace Identification of Competency» (CWIC) Process
- Choosing the industry representatives
- Running the CWIC Process
- Follow up
- Confirming the skills are the minimum required for trade status
- Establishing Frequency, Complexity, Importance
- The advanced skills required for best industry practice
- Industry verification of the competency profile

(c) LINKING THE COMPETENCIES TO INDUSTRY STANDARDS

- The players involved in standards
- Builders, consumers, merchants, regulators, manufacturers, tiling contractors, supervisors, unions
- Which standards to use
- National and International standards, regulations, local accepted practice, common sense
- Confirmation of standards by meetings, postal distribution, publications
- Examples of Industry Skill Standards

(d) THE QUALITY CONTROL MECHANISMS

- The Industry Skill Standards can be used for
- Recognition of Prior Learning ... the ultimate goal.
- Certification
- Licensing assessments
- The design, evaluation and accreditation of training curricula
- Matching skill levels with pay rates (award rates)
- Supervision
- Dispute resolution and consumer protection
- The positive effects of self regulation, and awareness and promotion of industry backed standards
- Articulation of training into further education

(e) IMPLEMENTATION

(i) Recognition of Prior Learning (R.P.L.)

- Designing an assessment event that recognises prior learning, meets Industry's minimum standard, allows certification and meets licensing requirements
- Training of assessors
- Top up training, - when, where, how
- Appeals mechanisms
- Documentation
- Management
- Industry backing, publicity and enforcement methods

(ii) Implementation through the power of a strong Industry Body

- Self regulation
- Promotion
- Influencing associated bodies

(f) REVIEW

- Evaluation and modification techniques
- Validation
- Promotion and enforcement

4. THREE KEY STEPS

This section of this paper addresses in some detail the three critical steps of:

(a) Establishing the competencies
(b) Linking the competencies to industry standards
(c) the Implementation of RPL

4.1. ESTABLISHING THE COMPETENCIES

There are numerous processes available to researchers that can be used to establish the skills required in any particular vocation or occupational area. They include; work observation, peer description, task analysis, time and motion study and the DACUM processes.

At a special meeting of carefully selected industry specialists and tile fixing trades persons four steps were followed.

i Identifying the problems created by poor workmanship
ii Identifying the outcomes of best workmanship and best practice
iii. Collaboratively deciding the minimum skills required of a competent tile fixer using a computer program to provide feedback as the meeting progressed
iv The validation of the list of competencies by the meeting participants on the job. This involved the CWIC Profiles being discussed on building sites to verify their accuracy.

The process adopted had several distinct advantages. It was capable of gathering a large quantity of accurate data that could be verified quickly and easily, and would withstand the close scrutiny of an industry breaking new ground in many areas of the national reform agenda. The process allowed several tasks to be completed simultaneously including; gaining wide and reputable input, acceptance of the aims and objectives of the project, clarification of personal statements, and the reaching of a consensus position on the skills to be included and excluded. The importance, complexity and frequency of use of particular skills could be established and the co-operative group dynamics established by the process would assist with future work. The process developed a team approach to solving the problem of establishing workplace standards and best industry practices.

One of the unique aspects of the CWIC Process that proved to be critical in gaining such an excellent result was the use of a computer based program that allowed each member to leave at the end of the day with a print out of the agreed outcomes. This enabled the highly motivated participants to be involved with ongoing and immediate discussions back in their workplaces.

In brief, the process involved gathering together in a suitable environment, a group of industry experts representing the various sectors within the tile fixing community (commercial, industrial, domestic, renovation, specialists etc.) All had to be currently practising tile fixers or direct supervisors of fixers.

Over the period of a working day the group, with help from a facilitator, clarified the aims and objectives of the meeting and set about defining the skills used by tile fixers in their various sectors. Common general areas of skill were identified and specific skills were added in a linear sequence to the general skills. Each specific skill was discussed to ensure it was essential that it be held by a person if they were to gain status as a newly qualified but inexperienced trades person. The completed draft skills profile was then marked to indicate the importance, complexity and frequency of use of each skill. This would be a guide to people who develop training curricula.

Over the next 3 to 4 weeks amendments were made as further analysis and communication took place between the participants and the facilitator. All the participants were informed of any changes by fax on a weekly basis. The final document was signed off when all participants were satisfied that the competencies were best industry practice and those that had to be demonstrated by persons seeking trades persons status as tile fixers. The final profile is Attachment 1.

It is important to point out that the skills list in Attachment 1 reflects the current practices and needs of the industry in N.S.W. Tile fixing professionals in other countries may find skills they see as important, missing, as they will also probably find some skills listed that they think irrelevant at the trades person level.

It is important for people who wish to develop a skills profile not to just adapt the Australian profile. They should start afresh and develop their own with input from local industry. This not only allows for local conditions to be taken into account, but it also helps create the essential feeling of ownership required to ensure local acceptance of the outcomes.

One of the major strengths of this profile is that the industry in N.S.W. supports the trade skills as accurate and believes that it represents the minimum skill level required of a trades person in our industry. They have a feeling of ownership of the contents and this means they can go into any forum and clearly articulate the standards and skills required by the industry.

It will be noticed that the number 3 appears in a box beside each skill in the CWIC Profile. This relates to the worker being able to perform the task satisfactorily without assistance or supervision. This number represents the minimum skill level required for gaining trade status, of being able to perform at the minimum workplace standard expected by our tile industry. (see the reverse side of Attachment 1 for further explanation)

The final competency profile is not a training course but it is the key document around which tile fixer training courses or modules should be framed. With the assistance of the Australian Committee on Training Curriculum (ACTC.) the profile was arranged in a way that complied with the national format and it thus became the draft framework for the national Australian curriculum. (See Attachment 2.)

Many skills were identified by the skills profiling panel that would be needed by experienced tradespeople, these skills have become the framework for post basic trade skills as set out in Attachment 2.

4.2. LINKING THE COMPETENCIES TO INDUSTRY STANDARDS

When discussing how workplace reforms can be achieved it is essential to not only establish exactly what skills are required by operatives in the field, but to also determine to what standard those skills must be able to be demonstrated.

While setting the standards for the skills list was expected to be difficult, it turned out to be much easier than expected because the standards were simply the reasonable, common sense level of practice and finish that needed to be achieved to meet with the industry's approval.

The task of setting the standards was simplified by the recent release of the Australian Standard on the Installation of Ceramic Tiles (AS 3958-1991). This standard reflected the agreed best practice under Australian conditions, and incorporated up to date data from international Codes of Practice.

AS 3958 became the main reference for setting the standards of competence and was particularly useful with its definitions such as..... «tiling should be flat and true to within a tolerance of + or - 4 mm in 2 m from the required plane» and «make the corners of all tiles flush ... within the tolerance of the tile.»

Another particularly useful document was the «National Competency Standards - Policy and Guidelines» published by the peak training body the National Training Board.2 Their publications helped address the following two questions:

How high should the level of competence be set ?

As the standard would be used to measure the skill level of new entrants to the industry, it was important to set the standard at the minimum level that still assured competence. It had to be at the level of a competent newly qualified tile fixer and not that of a fixer who was widely experienced. After all, we wanted as many people in the industry as possible, provided they could fix tiles to the standard required in industry. An unrealistically high standard would be counter productive.

How detailed should the competency statement be?

It can be argued that the more detailed the specification of the standard the less chance for error. However, very involved specifications tend to be long and inflexible, and they have less chance of being followed. The Australian Standard had the detail, we needed only short clear statements outlining what had to be demonstrated, under what conditions and to what criteria.

While standards are critical in the assessment of performance they are only one of a comprehensive set of measures to ensure high quality outcomes in the assessment and training process. The training of assessors and the design of assessment tasks are also very important.

The general outline of how the competency standards were to be set was discussed and ratified at a meeting of industry representatives called to assist with the design of a tile fixer licensing test (including R.P.L.). The detailed National Competency Standards for Wall & Floor Tiling were written by experienced teachers of Tile Fixing with assistance from National and State curriculum development officers.

4. 3 IMPLEMENTING "RECOGNITION OF PRIOR LEARNING"(R.P.L.)

Recognition of Prior Learning is sometimes known as Assessment of Prior Learning or the Recognition of Current Competencies and has been developed in Europe, the USA and Australia recently to bring about efficiencies in the placing of people in employment or training by giving them formal credit for informally acquired skills and knowledge.

The mainstay of R.P.L. is that it doesn't matter where or how a person developed a skill, if they can demonstrate they have that skill, they should be given credit for it.

This approach suits the building industry very well as it has many people without formal training but with significant skills and knowledge. As the various sectors of the industry expand and contract, and technology and materials change, many building and construction workers move into new fields as the opportunities arise. The R.P.L. process allows for such workers wishing to become tile fixers, to have their level of skill tested against the industry's standards, and to gain formal credit for the skills demonstrated.

The challenge was now to develop an assessment procedure that would recognise prior learning, meet the industry's minimum standards, allow for certification, meet licensing requirements and diagnose areas of skill shortage in an individual so that top up training could be arranged. The major steps in implementing R.P.L. are listed in this paper in section 3 (e), what will now be explored is the method of designing the assessment procedure.

Once the skills are known, and the standard to which they have to be demonstrated has been set, the designing of the assessment should once again involve the major stakeholders in the industry.

The target group for assessment will be mostly current or ex-building workers. Their level of formal education will vary but in many cases it will be quite low. The cosmopolitan nature of the Australian population also means that many applicants will not have English as their first language. Therefore any assessment should have a minimum of reading and writing involved. In fact it is much better to have a skill actually demonstrated than described. With this in mind the assessment event was designed to have as many as possible of the competencies tested in a practical way. However this produced a test that would take some 3 days and this was opposed on many grounds including cost.To overcome this difficulty it was decided to run the assessment as a «power» test. This had a number of tiling tasks designed so an assessor could allow an applicant to proceed to the next task as soon as it was clear the applicant was competent in the task being currently attempted. This allowed for a much larger range of tasks to be undertaken all in an 8 hour assessment.

Of course there were some aspects of competence that could not be included in the assessment tasks. The tiling of a very large floor for example could not be assessed practically because of time, space and material constraints. Nor could large scale set-outs or the testing of a person's knowledge of tile types and characteristics, surface preparation, expansion joint placement, adhesive use, etc.

The format adopted involved;

i) a power test of critical competencies which would highlight areas of skill shortage in a minimum time
ii) an oral theory test with the assistance of an interpreter if required (approximately 1 hour)
iii) an interview and inspection of portfolio related to the history and experience of the applicant

This system of assessment was trialed in May 1992 and came into full operation in October of the same year. It became the licensing requirement in N.S.W. for new entrants to the trade who had not undergone formal technical education in tile fixing. A copy of the practical assessment is Attachment 3. The contents of the oral theory assessment have not been included because of confidentiality **.

5. REVIEW OF RESULTS AND REFLECTIONS

Since the process of reforming tile fixer training commenced over 3 years ago many positive outcomes have been achieved. Tile merchants, builders and consumers are benefiting from a more skilled tile fixing workforce, and the industry is gaining more control over the quality of the increasing number of new entrants to the trade;

The tile industry has:

i) a definitive list of competencies required by tile fixers to gain trade status, this has been instrumental in clarifying exactly what was required by the industry
ii) standards in various forms right down to very specific assessment criteria for each competency:

- these have been used in the draft National Curriculum for Tile Fixer Training
- they also set the framework for the accreditation of all tile fixer training courses

iii) a comprehensive assessment event for determining the skills possessed by individuals that is based on R.P.L. and allows for a range of outcomes including;

- the creation of a new avenue of entry to the trade
- the granting of a trade license

- the identification of an individual's training needs
- the ability to provide top up training to ensure industry standards are maintained

We have an ever increasing number of tile merchants, builders and consumers insisting on a tile fixer's licence being produced before work commences. This has led to an increased awareness of the skills involved in tiling, and is improving the image of tile fixing in the building industry and the wider community.

The net result of these achievements is that the number of skilled tile fixers in the industry is increasing and the underskilled new entrants are being identified and trained to the industry's standard. Underskilled operators already in the industry will be facing increasing competition, and as they leave they are now much more likely to be replaced by a competent person. The quality of tile installation is starting to rise and this is expected to continue over a period of years as the impact of the reforms become more entrenched.

Better tile installation means less complaints and less litigation. The profile of the tile industry, and of tile fixers has been raised by the process of reform. This benefits all those in any way involved in the design, selection, manufacture, import, sale or installation of ceramic tiles and tiling system components. The whole industry is gaining the benefit.

But, there are still some areas that are incomplete or that have not been able to be taken to their full potential. For instance the delays in the national award restructuring process has slowed the multi-skilling and cross credit transfer possibilities of the reforms. This in turn has slowed the introduction of the new competency based curriculum in TAFE. Improved career paths for building workers that were an integral part of the national plan are yet to emerge. The industry however, has little control over the pace of the national industry restructuring agenda.

In relationship to the model outlined in this paper, most of the industry's objectives have been reached. However, the great potential for the reforms to benefit the industry nationally has not been fully realised. For instance, the licensing assessment that involves «Recognition of Prior Learning» in N.S.W. has not yet been taken up in other States. Not all of the states are licensing tile fixers. No national program to promote the benefits of the reforms to consumers and the industry has taken place. A great marketing opportunity is being missed. This is in part due to there being no National Tile Association in Australia. No organisation that is truly representative of merchants, manufacturers, and fixers. Such a body would be in a position to promote ceramic tiles nationally in a co-ordinated manner. It could oversee the introduction of quality control measures. It could arbitrate over complaints and regulate its members. It could maximise the benefits of these reforms and it would also have a powerful voice on broader economic and industrial issues. The industry should begin to act on this.

The essential ingredients.

The success of implementing these quality control mechanisms into the tile fixing process can be put down to a few key ingredients, if these ingredients are present then success is more or less assured. They are;

- the involvement of as broad a cross section of the industry as possible
- the backing of key individuals that are respected in the industry
- actual tile fixers involved in developing the competency profile
- the will to act on, and enforce the outcomes
- the engagement of a respected and neutral co-ordinator
- the necessary financial support
- the development of the feeling of «ownership» of the outcomes by the local industry

Although in Australia the National and State Governments played significant roles in the reform process, the system can be adapted to operate on a «tile industry only» basis, or even an «enterprise» basis. There is no reason an industry or a group of companies could not independently bring about their own testing, training and accreditation system if a broad industry or Government backed system is unavailable.

The broader challenge.

It is difficult to say exactly how much poor tile installation practices cost the industry, and no doubt the figure would vary from country to country. However, there is a general consensus that it is far greater than the cost of problems caused by poor selection or design, and it completely overwhelms the problems caused by the tile itself. «Installation» not only generates the largest number of problems it is also the area that is most difficult to control. The cost in litigation, repairs and lost business is astronomical and I believe that countries all over the world are experiencing similar problems.

In Australia, the tile and adhesive manufacturers often become involved in disputes over tiling failures. It is unusual for the tile or the adhesive to have been the problem, yet time and again the manufacturers with their financial reserves, and their good name at stake, contribute to rectification. In this way they are already paying for rectification of sub-standard fixing, and they lose again if these problems lead to the choice of finishes other than tiles. If controls over the quality of the tile fixing process can be developed and implemented, then long term benefits to the manufacturers are assured.

The Australian experience has been largely successful with greater rewards coming as the quality control mechanisms bite. It's certainly not perfect, it's not the only way controls can be applied, but it is a lot better than pouring millions of dollars into the pockets of insurance companies and lawyers to defend ourselves against the problems created by an underskilled tile fixing workforce.

With «Recognition of Prior Learning», an accurate list of competencies, and the real commitment of the industry, the international accreditation of tile fixers is not outside the realms of possibility. Sharing knowledge and experience on accreditation and training of tile fixers on an international basis is good for everybody's business. Consequently, we look forward to futher opportunities to exchange information and to increased international dialogue.

Acknowledgments.

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* Building Services Corporation of New South Wales. Annual report. 1990. Sydney.

** National Training Board Ltd. «National Competency Standards - Policy and Guidelines» Canberra. Second Edition. October. 1993.

CWIC PROFILE

Competencies that a tiler must demonstrate to gain Trade Status.

General Areas	Competencies										
Assess the job/ site - tile type, surfaces and materials.	Assess walls and floors for condition to receive tiles. 3	Assess suitability of tile to situation. 3	Choose appropriate surface preparation technique. 3	Assess suction of surfaces for receiving mortar and adhesive. 3	Assess site for hygiene related coving or other special finishes. 3	Assess the need to protect PC items. 3	Assess the access to the job - lighting, power required and security. 3	Specify completion of other trades before tiling commences. e.g. waterproofing 3			
Measure up and cost a tiling job.	Measure up for tiling. 3	Take measurements off a scale drawing. 3	Interpret a table of specifications for a job. 3	Visualise the finished job. 3	Calculate square and irregular areas. 3	Allow for wastage. 3	Calculate the quantity of tiles for a given pattern 3	Write an order for tiles, fixing materials, grout and fittings. 3	Calculate the quantity of coving, expansion joints and special fittings / fixtures. 3	Cost labour, materials and overheads. 3	
Set out a tiling job.	Obtain agreement from the customer/builder re levels, materials, finishes and accessories. 3	Check levels and finishing heights to specification. 3	Check tiles for tolerance, size and characteristics and determine joint size. 3	Set heights of finishes to fittings and fixtures. Check with wall set out. 3	Check the walls for plumb and straightness. 3	Select horizontal starting point. 3	Strike level lines into correct place 3	Select vertical starting point. 3	Select a starting point for patterns and for wall/floor alignments. 3	Position expansion joints to Australian Standard. 3	Set out for special finishes. e.g. coves, beads and feature tiles. 3
Brick up baths, nibs and hobs.	Set out for vents, weep holes. 3	Check and adjust level of bath. 3	Mix up appropriate mortar for bricks. 3	Lay bricks to baths nibs and hobs. 3	Check and fit waterproofing in wet areas. 3						
Prepare wall/ floor to ensure bonding to surfaces.	Identify preparations that can be used on substrates/ backgrounds. 3	Using hand and power tools prepare walls and floors to receive mortar. 3	Using chemicals prepare walls and floors to receive mortar. 3	Use scratch coats and separating layers as required or as specified. 3	Prepare wall / floor to receive adhesives. 3						
Cut Tiles	Cut tiles to set out lines without jagged or flaked edges. 3	Make straight cut by hand or machine to a tolerance of + or - 1mm. 3	Cut a recess by hand or machine to a tolerance of + or - 1mm. 3	Cut a hole in a tile by hand or machine to a tolerance of + or - 1mm. 3	Set out and cut a simple curve. e.g. a curved step. 3	Jolly edge a tile to form a mitre so that biscuit is not exposed at the joint. 3	Cut any commonly manufactured tile or natural stone tile e.g slate, marble granite. 3	Cut all joint lines straight and even in width with due allowance for the tolerance of the tile. 3	Examine, sort and prepare tiles prior to fixing. 3		
Fix wall tiles	Set supports and screed sticks. 3	Prepare tiles for fixing. Soak and drain tiles if necessary. 3	Set pad tiles to true alignment 3	Fully bed wall tiles into correct position. 3	Check horizontal joint for straightness after 1 - 3 courses. 3	Check tile edges and surface alignment as work progresses. 3	Show even margins around openings frames and fittings where possible. 3	Cut and fix bottom course to rake if required. e.g. coving. 3	Fix splayed, manufactured, formed coves if required. 3	Prepare tiles to receive grout. 3	Grout in to specification. Allow appropriate drying time prior to grouting. Polish off. 3
Lay floor tiles	Check room for square and floor levels. Install membranes and reinforcing if required. 3	Clean floor of contaminants and all waste surface residues. 3	Prepare a cement mortar to the appropriate consistency. 3	Slurry floor to achieve bonding. 3	Screed cement mortar to finishes and falls. 3	Apply a bonding coat between floor and tile. 3	Lay first tiles to set out using straight edge and/or line. 3	Lay floor and cut into all fixtures and walls. 3	Beat floor tiles into the bedding and adjust the joints. 3	Grout in to specification. 3	Wash off leaving floor and internal corners clean. Final beat and adjust. 3
Select appropriate adhesive and fix tiles	Assess climatic conditions to suit the extent of the application. 3	Match adhesive with tile type and background. 3	Ensure both tile and background are free of contaminants. 3	Mix and apply adhesive to manufacturer's specifications. 3	Fix tiles to specifications. 3	Clean joints and surfaces prior to adhesive setting. 3	Grout in to manufacturer's specifications. 3	Polish off finished tilework. 3			
Repair and replace tiles	Remove damaged tile after removing grout starting from the centre. 3	Remove bedding materials to allow new tiles to finish flush. 3	Match up existing tilework. 3	Protect PC items and tilework from damage. 3							
Tile treads, risers, steps & thresholds	Set out steps for uniform rise and going and for appearance. 3	Fix supports for risers. 3	Fix riser tiles to true alignment. 3	Fix treads, infills and thresholds. 3	Fix tiles to simple curves. e.g. curved steps. 3						
Fix slate, marble,and granite tiles	Identify qualities and characteristics of natural stones. 3	Sort to thickness and colour. 3	Prepare slate for fixing by dusting or washing. 3	Lay slate using an appropriate system. 3	Grout and clean slate. 3	Clean and seal slate when thoroughly dry. 3	Fix marble and granite tiles to specification. 3	Hand polish marble edges. 3	Machine polish granite edges. 3		
Fix vertical mosaics	Render surfaces to receive mosaic. 3	Pre-grout sheets if appropriate. 3	Fix both paper faced and mesh backed mosaics to background. 3	Grout and finish mosaics. 3	Mix and apply waterproof render to wet areas. 3						

ACTC Project (for discussion only)

These Skills have been identified as the standard skills used by workers in the Wall and Floor Tiling skill areas

Mod 1	**Building & Construction Industry Induction (120 Hrs)**	
1.1	Background to the Industry	4
1.2	Communication skills	20
1.3	OH&S general	16
1.4	Workplace structure • site organisation • management • unions	4
1.5	Numeracy skills	8
1.6	First Aid	8
1.7	Basic ladders & scaffolding	8
1.8	Safe handling of power tools	16
1.9	Fixing devices	4
1.10	Building & construction • Drawing interpretation • Structures • Materials • Environmental controls	32
Mod 2	**Preparation of Backgrounds & Materials (50 Hrs)**	
2.1	Substrates • types • bonding problems	6
2.2	Mechanical preparation of surfaces • manual • power tools	10
2.3	Chemical preparation of surfaces	4
2.4	Mortar - types, mixing uses	8
2.5	Scratch coats and separating layers	8
2.6	Protection of PC items	4
2.7	Tile types and properties	10
Mod 3	**Basic Wall Tiling with Mortar (120 Hrs)**	
3.1	Hand cutting of tiles	8
3.2	Tools & material use and storage (levelling, wall tiles)	8
3.3	Basic setting out skills	12
3.4	Mortar fixing of wall tiles • fixing tile accessories and fittings • variations on thickbed tiling (dry, dip, soak) • tiling returns, reveals, soffits and sills	28
3.5	Matching up to existing tilework	8
3.6	Repairs to tilework	2
3.7	Grouts and grouting	6
3.8	Mortar trades trowel skills	8
3.9	Bricking-up & tiling bath fronts, hobs & nib walls	40
Mod 4	**Basic Floor Tiling with Mortar (80 Hrs)**	
4.1	Tools & material use and storage	6
4.2	Basic setting our of floor tiles (including patterns)	10
4.3	Nosing & edge finishes	6
4.4	Setting of screeds	22
4.5	Laying of floor tiles	20
4.6	Advanced cutting of tiles	4
4.7	Control joints	12
Mod 5	**Fixing Tiles with Adhesive (60 Hrs)**	
5.1	Preparing surfaces to receive adhesive	2
5.2	Fixing of lining boards	10
5.3	Adhesives, types & limitations	20
5.4	Fixing wall tiles with adhesive	8
5.5	Fixing floor tiles with adhesive	8
5.6	Tiling over timber frame floors	12
Mod 6	**Commercial Tiling (60 Hrs)**	
6.1	Cove tiling, manufactures, and formed	24
6.2	Epoxy fixing & grouting types, hazards	6
6.3	Tiling square columns	22
6.4	Advanced setting out, whole room alignments	4
6.5	Control joints	4
Mod 7	**Vertical Mosaic (20 Hrs)**	
7.1	Rendering and set out	14
7.2	Paper faced mosaic (with mortar & adhesive)	4
7.3	Mesh backed mosaic (with adhesive)	2
Mod 8	**Waterproofing (40 Hrs)**	
8.1	Waterproof mortars and membranes	24
8.2	Wet area waterproofing	16
Mod 9	**Basic Curved Work (40 Hrs)**	
9.1	Curved walls	20
9.2	Curved returns (including intro to arches)	20
Mod 10	**Tiling Steps (40 Hrs)**	
10.1	Steps, risers and thresholds	
10.2	Stringers	
Mod 11	**Marble, Slate & Granite Tiling (40 Hrs)**	
11.1	Materials, cutting and edge polishing	32
11.2	Fixing techniques	8

Post Basic Trade Skills

Mod 12	**Domestic Pools and Spas (40 Hrs)**	
12.1	Materials	
12.2	Set outs	
Mod 13	**Restoration & Heritage Tiling (40 Hrs)**	
13.1	History & designs	
13.2	Materials	
13.3	Tesselated tiling	
Mod 14	**Public Pools (80 Hrs)**	
14.1	Materials	
14.2	Scum gutters	
14.3	International compliance	
Mod 15	**Advanced Curved Work (40 Hrs)**	
15.1	Arches	
15.2	Circular columns	
Mod 16	**Brick Paving (40 Hrs)**	
16.1	Sub-grade and sub-base preparation	
16.2	Materials and equipment	
16.3	Setting out	
Mod 17	**Mosaic Murals (200 Hrs)**	
17.1	Materials	
17.2	Design	
17.3	Execution	
17.4	Installation	
Mod 18	**Staircases (40 Hrs)**	
18.1	Stairs	
18.2	Staircase Dados	

ANEXO 3