Introduction:

My aim with this presentation is to:

- precis how surveyors are registered as mine surveyors in Queensland, Australia
- provide hyperlinks for those who would like to see the details of this process
- give the audience an opportunity to ask questions about specific items in our registration system, that they think, could be incorporated into an upgraded certification process in South Africa.

A précis of the process of the process to get registered in the state of Queensland, Australia:

The process to get registered as a mine surveyor in Queensland is as follows:

1. An applicant for registration in Queensland must have a degree in surveying before they can start the registration process. The University of Southern Queensland (USQ) has a versatile articulated system of education that allows surveyors to seamlessly upgrade their qualifications without having to repeat any subjects. (Refer to hyperlink I. below). A similar system has been proposed in South Africa by Dr Hennie Grobler: “An integrated approach towards a new suit of qualifications within the Mine Surveying industry.” A copy of this paper can be found at the end of my presentation.

2. Prior to, and during this process, training is provided for the applicant, the supervising surveyor and the Examiner. This training is supervised by a Training Advocate who is a full time employee of the Surveyors Board of Queensland (SBQ) and applicants can contact him at any time for advice.

3. All surveyors seeking registration must first get registered as a surveyor, and then continue on to get an endorsement in one, or all, of the following: Mining: Open Cut, Underground Coal and Underground Metalliferous (3 separate endorsements available); Cadastral; Engineering; and Hydrographic. The process of registration as a surveyor takes one year to complete then each subsequent endorsements take approximately a further one to two years to complete. It is necessary to be working in the type of surveying that you are seeking the endorsement for. This ensures that you are competent in that area of surveying.
4. The work carried out by the applicant must be supervised and signed off by their supervising registered surveyor.

5. Each endorsement has a framework of activities that must be done and this work must be documented as a Career Episode Report (CER). The CER must contain evidence that the work has been done: field notes, calculations, plans and reports. The CERs must be written in the first person: “I carried out, calculated, drew the plan, wrote the report etc.” Each CER is marked by an examiner and I believe the strength of our process is that it ensures that the applicant is competent and has proven his competence.

6. In the case of experienced mine surveyors with a survey degree there is an alternative to writing CERs. The experienced mine surveyor can apply to the SBQ to do an Oral Presentation directly to the SBQ. This may appear to be an easy way out but it is not as easy as it may sound. An applicant must be able to demonstrate verbally that he is capable of carrying out all of the surveying that is in the framework. If asked they must also be able to present hard evidence of surveys that they have personally carried out.

7. When the whole framework is finished by the applicant the Examiner will make a recommendation to the SBQ if they should go to the next step which is the completion of a Professional Assessment Project (PAP). A PAP must be approved by the SBQ and be of a complexity that proves that you have the overall competency required in the specific endorsement that you are seeking. An example of this for mining would be the overall survey control for an underground mine: connection to state grid, surface control via traversing and GPS, transfer of datum underground, traversing underground, Gyro checks, adjustment of control networks.

8. When the examiner recommends that the applicant has fulfilled all of the requirements of the framework and successfully completed his PAP the applicant will be required to take an oral exam which is organized by the SBQ. If necessary the SBQ will probe any areas that they think were weak in the presented CERs. If they are not satisfied with the oral results then they can advise the applicant to get further training or experience in specific areas. To progress from here towards registration it is only necessary for the applicant to work on the specific areas that the SBQ nominates.

9. Once a surveyor is registered with a specific endorsement then the surveyor can obtain other endorsements after they have gained experience in this new area. The process to gain more endorsements can take from 6 months to 2 years per endorsement depending upon the time it takes the surveyor to become competent in that new area.

More in depth information can be found at Surveyors Board of Queensland’s (SBQ) website:

This website is an excellent tool to explain the present process for registration in Queensland: http://sbq.com.au/member/

The following are areas that could be relevant for South Africa:


K. Full Time and External Surveying Courses at the University of Southern Queensland in Australia: [http://www.usq.edu.au/study/degrees/engineering/surveying](http://www.usq.edu.au/study/degrees/engineering/surveying)

**Conclusion:**

My idea was in the first section to present a précis of the overall system. The second section should help people navigate the SBQ website to find specific data relating to getting registered as a mine surveyor in Queensland. I have tried to steer away from putting my own slant on what works well and what could be improved either in Australia and or South Africa. I am hoping that my presentation will be a catalyst for your questions today and for future discussions about upgrading the South African certificate of competency. I am happy to take questions or comments from the audience.
An integrated approach towards a new suite of qualifications within the Mine Surveying industry

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Submitted to SASEE 10 April 2015

Abstract:

In response to the Higher Education Qualification Framework (HEQF) it was required to determine if a truly articulated qualification model can be developed and implemented within the constraints of the HEQF for the South African Mine Survey profession?. It would be necessary for the developed model to include persons within the Chamber of Mines framework of industrial qualifications. An interpretivist, constructivist Epistemology using Ethnography as a method was used to address the research question (Baillie & Douglas, 2014). Personal and participant observations of work practice formalized through discussions at a number of Industry liaison meetings were used to identify the research question and proposed solutions. The heuristic interventions suggested have been developed within the unique context of the complexity of the South African mining environment.

The new suite of qualifications has been designed in such a manner that all accommodates persons that have obtained a Grade 12 will be able to register for recognized qualifications leading up to a Bachelors degree and from there, up to a Doctor of Philosophy degree. In the old order of qualifications, surveyors could register as candidates to the Chamber of Mines examinations and be awarded three levels of certificates based on these examinations. These examinations have no official SAQA or NQF recognition and therefore prevent “owners” of such qualifications to use them as entrance into the traditional higher education stream. The newly introduced suite of qualifications aims to improve this shortcoming by introducing certificates recognized by the HEQF that can articulate into mainstream higher education qualifications as well as providing for mine surveyors with existing qualifications A new Bachelor degree of Mine Surveying has been designed to replace the current National diploma and an Honours degree will replace the current professional qualification of the Bachelor of Technology degree. For post-graduate studies, Master’s and PhD
degree programmes are already available. This paper will outline the historical background of the current qualifications and discuss the advantages that a complete and articulated suite of qualifications will provide all mine surveyors in future.

Introduction

The Higher Education Qualification Framework Act has provided an opportunity to educational institutions and professional bodies to rethink the articulation of qualifications leading to a Mine Surveyor registering with the South African Council for Professional and Technical Surveyors (The South African Council for Professional and Technical Surveyors, 2014) (PLATO). Mine Surveyors in South Africa have three routes available to obtain qualifications that may culminate in being accepted as a candidate to the “licence to practice” examinations held by the Directorate of Mineral Resources (DMR). The routes are referred to in the mining industry as the “practical”-, “part-time”- and “full-time” route (Grobler, 2014) These routes are administrated respectively by the Chamber of Mines (The South African Chamber of Mines, 2014) and Universities. The final qualification, the Mine Survey Government Certificate of Competency1 (MSGCC), is administered by the Department of Mineral Resources (DMR) (The Department of Mineral Resources, 2014)

The research question that needs to be addressed by this paper is: “Can a truly articulated qualification model be developed and implemented within the constraints of the HEQF for the South African Mine Survey profession?” In this framework it is also required to answer the following question: “How will this model address persons within the Chamber of Mines framework of industrial qualifications?”

The design and development of an intervention in the form of a consolidated educational model will ensure articulation between qualifications for South African Mine Surveyors within the Higher Education Qualification Framework. Borrowing from Plomp and Nieveen (Plomp & Nieveen, 2007), it can be postulated that the design of the research is utility orientated as the merit of the design will be measured by its practicality for Mine surveyors in the context of future education within the profession. An interpretivist, constructivist Epistemology using Ethnography as a method was used to address the research question (Baillie & Douglas, 2014). Personal and participant observations of work practice formalized through discussions at a number of Industry liaison meetings were used to identify the research question and proposed solutions. The heuristic interventions suggested have been developed within the unique context of the complexity of the South African mining environment.

The proposed new suite of qualifications will allow the introduction of a new certificate, diploma and Bachelors Degree, with recognized NQF levels. The entry level Certificates and diploma will provide

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1 A legal requirement by the Mines Health and Safety Act for appointment as the responsible Mine Surveyor
the opportunity to obtain entrance into a higher education institution, and articulate between qualifications. The suggestions outlined in this paper may be of benefit to professions that have a similar structure of industry examinations and qualifications with student entry point challenges.

Mining Surveying and Mining Engineering courses have the privilege of close co-operation between educational institutions, state and the mining industry. Industry demands that students from these courses must be multi-skilled individuals with excellent “core-skills” who are able to “do the job” immediately after graduating. The reality is that for a student to become competent in the practical aspects of the job, it requires more practical exposure over a longer period of time, experienced in a safe, controlled manner; with reduced risk should things not go according to plan. This requires a significant investment of time and patience from the education provider, the mentor and the student.

Tertiary model

The original intent of the introduction of a tertiary Mine Surveying qualification offered since 1926 was to improve the academic foundation of Mine Surveyors before attempting the GCC. From the original mining courses presented at this time, the Universities of the Witwatersrand and Johannesburg can trace their roots. Before the consolidation of the University of Johannesburg and the Technikon Witwatersrand, mining courses were presented at the Technikon of the Witwatersrand in the format of a “sandwich course” presented in the evenings. Students attending this course were full-time mine employees attending the course in their own time. This model is well-respected in industry and has been the foundation of the development of the current diploma and degree structure of mining courses in South Africa. The shortfall of the vocationally orientated Chamber of mines Certificates is that the qualifications are not recognized within the tertiary environment preventing the articulation of qualification routes for mine surveyors.

The National Diploma was offered in 1976 for the first time. It was originally intended to be a 4 year qualification and was offered until 1983. After 1983 the duration of the course was reduced to 3 years and was offered as a full time course at the Technikon of the Witwatersrand. Alternatively the National diploma as the qualification was now known as could be done through correspondence with the Technikon of South Africa (TSA), that later became the University of South Africa (UNISA). The National Diploma consisted of 18 months (3 semesters) of Academic course work and 18 months (3 semesters) of Practical exposure on a mine. By 2003 the National Diploma changed in curriculum to two years of academic course work (4 semesters) and one year of practical exposure. At the moment the National Diploma provides the only route to the Bachelors Degree.

The National Higher Diploma was introduced by the Technikon of the Witwatersrand in 1986. This qualification added on the 3 year National Diploma followed by a further 1 year broken down into a single semester of academic course work and a further semester of practical training in industry. The format of the NHD changed in 2003 to one year of full-time study at Technikon of the
Witwatersrand. The Technikon of South Africa (TSA) offered the National Higher diploma for approximately two years.

**Degree Courses.** The University of the Witwatersrand offered the B.Sc. Mine Surveying degree from 1982. The course had a limited number of students attending and was discontinued in 1988. In the year 2007 the first Bachelor of Technology: Mineral Resource Management was offered by the University of Johannesburg that incorporated the Technikon of the Witwatersrand. This degree course is recognized by PLATO as a professional degree. The minimum entry requirement to this qualification is a National Diploma.

**Advanced diploma courses.** The **Graduate Diploma of Engineering** was offered by the University of the Witwatersrand and provides a route to be accepted into the Masters - and Doctor’s degrees offered by this institution. Candidates that have obtained the National Diploma and the GCC or the NHD and the GCC can obtain access to this qualification. A diploma in Advanced mine Valuation is still offered by WITS.

**The Chamber of Mines (Vocational) model**

This suite of qualifications is normally used by full-time mine employees studying in their own time to obtain a Chamber of Mines (COM) certificates. The current COM certificates were introduced in 1976 in order to create consistency in the different “in-house” certificates offered by the different mining houses. The COM qualifications have a well-defined curriculum in Mine Surveying and Mine Valuation. These examinations were administered by the University of South Africa (UNISA), but will be phased out by 2018. The reason for the phasing out of these qualifications were not circulated in industry, it is commonly assumed that the decision was based on financial and administrative factors. Until the point when they will be phased out, three levels of Chamber of Mines Certificates exist:

1. Basic Survey certificate
2. Elementary Survey - and Sampling certificates
3. Advanced Survey - and Valuation certificates

This decision by the Chamber of Mines created the impetus to relook at the qualification models. The main strength of the model is that persons following this route could “earn as they learn” and benefit from actual work experience and as a result has earned great respect and stature within industry. The advantage to employers of this group of qualifications is the standardization of knowledge and quality control, coupled with the fact that the person can be productive on site while completing the qualification. It is a widely held opinion in industry that persons with COM qualifications are employed by preference as a result of the “hands-on” experience of persons with these qualifications. What is less commonly recognized is that these persons are normally employed in the mining environment, while studying part-time, making the learning experience directly applicable to the work performed by the student. The benefit of this model cannot be replicated.

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2 The Council of Professional and Technical Surveyors of South Africa
The Government Certificate of Competency is a legal requirement defined by the MHSA\(^3\) in order for a surveyor to practice as the responsible Mine Surveyor on a mine (DMR, 2011). The GCC was first introduced in 1905. In an analysis made by Grobler in 2011 it was found that 150 certificates were issued in 17 years up to 2011 that equates to ± 9 GCC's per year. Compared to the current attrition rate of approximately 3 certificated persons per year, leaves a very small number of certificated surveyors for the expanding mining industry. To date approximately 2100 certificates have been issued. The examination has always been seen as difficult examination to pass, with a 6% pass rate noted in 1964, (Morton, 1964) and in a study completed in 2014, the pass rate was still at that level (Grobler, 2014) Morton noted in his article that “…candidates ill-prepared for examination…” and that the “…standard of mathematics among candidates very low…”. As a result of these observations and pressure from industry, the National diploma for Technicians was first introduced.

The Mine Qualifications Authority (MQA) in conjunction with the Directorate of Mineral Resources requested an investigation into the poor pass rates of candidates to the Government Certificate of Competency: Mine Surveying (GCC) examinations in 2013. In order to evaluate the examination process permission was obtained from the Directorate of Mineral Resources to view examination papers and scripts. From the information obtained from these evaluations it was concluded that most candidates to the examination are indeed still inadequately prepared for the examination. The average pass rate per examination of approximately 19% with an average mark for the examinations evaluated of 30.5%. (Grobler, 2014) Meyer in an analysis of results in 1964 found that an average of 4 attempts per subject had to be made in order to pass one subject and that the “ratio of certificates issued to Mine Overseers, Mine Managers and Mine Surveyors “…is roughly 5:2:1”. (Meyer, 1964)

Identified Shortcomings
The COM qualifications, although well respected by industry carried insufficient credit and no NQF level correlation. A common occurrence is that persons with these qualifications at some stage in their careers wish to improve their formal qualifications, but inadequate recognition can be given to these qualifications.

\(^3\) Mine Health and Safety Act, Chapter 17
The Integrated model provided the opportunity to motivate for a new registration model for mine surveyors with PLATO and allows the opportunity to convert the current Chamber of Mines qualifications into recognized NQF level qualifications. The new model will allow for a full suite of qualifications, including two Certificates, a two-year Diploma, a Bachelors degree and Honours degree feeding into the normal post graduate qualifications. The Government Certificate of Competency will remain unchanged and will still be the final “license of practice” administered by the DMR. The different qualifications will be recognized by PLATO for registration as Technician, Technologist and Professional Mine Surveyor.

Entry requirements

In the new suite of qualifications WIL will no longer form part of any of the qualifications. It has been proven that industry experience provides students with a critical understanding of the terminology and spatial understanding of the mining environment.

Although it is unclear how industry experience can be made a part of entry requirements, it is recognized that prospective students should ideally complete an exposure year or “apprenticeship”. Such an exposure year will evaluate the medical and psychological suitability of candidates to the mining environment. By the time such a student commences studies, the language of mining and culture has been made familiar to them easing them into the academic environment. This form of apprenticeship is still seen as the ideal way of affording a student the correct exposure to the work environment. Students straight from school suffer a very distinct disadvantage to these industry students. Over the last three years it has been observed that certain companies are now reverting back to some form of exposure year or cadet mining program (Lloyd & Roos, 2015)

The Certificates (NQF Level 2 to 5)

The HEQF in its current form makes provision for a Higher Certificate qualification. This qualification can be used to facilitate the transition between school and the mining environment while providing the student with a NQF recognized qualification. The traditional “Vocational route” of the Chamber of Mines system of certificates will be phased by 2018. (IMSSA, 2015) Students who could not obtain University admission can follow this route to eventually obtain admission into the degree or diploma course. The certificate will provide persons with a recognized NQF level qualification with which they can exit into the working environment.

A complication with these qualifications occurred when after an accreditation visit by PLATO in 2014, it was recommended to UNISA to veer away from original proposal of using the Higher and Advanced certificates as a replacement for the COM certificates, in preference of a two year diploma. This recommendation created a gap in the articulation process as it does not provide for persons that cannot gain entrance to the two year diploma or persons who may not be suitable to complete the two-year diploma. In response it was resolved that the MQA be requested to consider

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4 A one year vocational qualification of 120 credits at NQF level 5 with “Primarily vocational or industry specific and provides basic introductory knowledge”

5 Mines Qualification Authority
the creation of a QCTO\textsuperscript{6} Level 5 qualification to fill the COM certificate gap (IMSSA, 2015) The NQF level 2 to 4 qualifications not addressed by the HEQF are being finalized and will take the form of an Elementary Certificate in Mine Surveying. The NQF4 certificate will be a combination of the current Chamber of Mines Basic Survey and Sampling certificates. In addition, a Level 4 QCTO Drafting / GIS qualification to replace the COM draughting certificate is to be considered.

The QCTO Level 5 qualification or Higher Certificate is designed for persons entering the Mining Industry and Survey Profession for the first time with a National Senior Certificate (English Language, Mathematics and Science) or a person who has obtained an QCTO Elementary Survey Certificate who wish to further improve their technical skills and obtain a basic level of Higher Education Knowledge in order to access a tertiary education at some stage. The certificate is intended to replace the Chamber of Mines Elementary Survey and Valuation Certificates, and will include Mathematics, Physics, GIS, Draughting, Information Technology and a portfolio of evidence. Accumulated credits may be presented for admission to the Diploma.

The Advanced Certificate: Mine Surveying\textsuperscript{7} was designed to be a vocational qualification of 120 credits NQF level 6, one year qualification, combining the elements of the Advanced Chamber of Mines Survey and Valuation certificates into the qualification. This qualification was designed for persons who have successfully completed a Higher Certificate (Mine Surveying) The certificate is intended as a combination of the Advanced Chamber of Mines certificates. Although the course have been designed and approved, this qualification will on recommendation of PLATO not form part of the new suite of qualifications, mainly due to resource constraints.

The Diploma was originally intended and currently offered to be a tertiary qualification of 360 credits at NQF level 6, including a minimum of 60 credits on NQF7 level. The question was asked “is it worth the effort?” as both the Diploma and Degree is a three year qualification but the Degree is at a NQF level 7. With the recent change in the HEQF the two-year diploma of 240 credits provided an avenue to convert the current three year diploma into a two year diploma, excluding the year of WIL. The content of the diploma will be extensively reworked and updated to reflect the current requirements from industry. This diploma will be offered by UNISA as a distance learning option.

Post Graduate diploma qualifications in Mineral Valuation and related disciplines are offered by WITS University.

Bachelor of Mine Surveying Degree will replace the current National Diploma and Bachelor of Technology degree. It was recommended after an industry liaison meeting that the diploma will no longer be offered by UJ with a shift in focus to the professional degree. The Bachelor Degree is designed for persons entering the Mining Industry with an NQF level 4 Mathematics and Science or for persons with a Higher Certificate. The new degree will share common areas with other surveying degrees (PLATO) and a common first year with Mining Engineering (BET) degree. PLATO will

\textsuperscript{6} Quality Council for Trades and Occupations

\textsuperscript{7} “Primarily vocational or industry specific and provides students with a sound knowledge base in a particular field”
recognize the degree at Technologist level register as Mine Surveyor. According to the HEQF, a degree will be required as a pre-requisite if student wishes to continue post-graduate type studies.

The Bachelor of Mine Surveying: Honours Degree will aim to equip persons to undertake research and set industrial standards in both Underground and Surface mining operations. The three year Bachelor degree plus one year honours degree will be recognized by PLATO as a Professional Degree and in combination with a Survey Certificate of Competency will allow a graduate to be appointed as responsible mine surveyor on a mine.

The suite of qualifications is summarized in Figure 1.

Based on the model above entry candidates can be guided to the correct level of qualification using the diagram, source (Grobler, 2012) modified according to resolutions (IMSSA, 2015)
Will Articulation truly be possible?

Referring to the current qualification model with the option between the vocational and tertiary route, it is not unusual for persons with a COM qualification or the GCC to realize somewhere along their career path that the qualifications they have earned are not considered to be sufficient within the corporate hierarchy to be appointed to a senior position. For such a person to continue with their tertiary qualifications requires a strenuous RPL application which can only be considered for the GCC. Persons with only a Chamber of mines Qualification will not get any credit except in the case of the advanced Surveying Certificate which may be recognized as a credit for the WIL portion of the diploma.

A suggested Second level qualification model

In order to register as a Professional Mine Surveyor, the graduate surveyor must complete a prescribed number of years working in industry and write an examination set by the Professional body. The entry requirement for the GCC examinations is a “letter of sobriety” and either a ETQA Level 5 Certificate or a Diploma plus at least 3 Years practical experience in mine surveying in the mining industry of which 1 year which must be in the underground workings of a mine. An Australian model that offers a good combination of training includes Career Episode Reports (CER) (Surveyors Board Queensland, 2014). The Queensland model requires a surveyor who wishes to apply for a mining endorsement regulated by the Surveyor’s Act, Section 39 of 2003, is required to complete an Activity Planning Sheet for each section of mine Surveying applied for, including opencut, underground coal and underground metalliferous. (Survey Board Queensland, 2014)

The process of improving the quality of the fundamental knowledge of candidates have been addressed by the replacement of Chamber of Mines Qualifications with a formalized educational structure of the Higher Certificate and two year diploma which will replace the advanced COM certificates. Due to the perceived lack of Work Integrated Learning within the new qualification framework it will be necessary to incorporate a comprehensive practical training component to the on campus curriculum culminating in a project. This will not be sufficient to ensure the competency of graduates. It will be necessary to ensure that all graduates undergo a “Graduate in training” period, a longer training period including more detailed work to compensate for lack of WIL at the tertiary institutions. Such a period of “Graduate in training” should ideally include a period of 6 months during which the candidate should be seconded to the DMR in order to work under direct supervision of a DMR inspector in order to understand the requirements of the DMR and the
practical application thereof in the mining industry. This model is successfully utilized in Germany where “Markscheide (Bergbau)” candidates must spend time in the government department in order to form an understanding of the workings of the mining regulatory requirements before becoming eligible to write the qualifying examinations.

Currently a new format of providing a portfolio of evidence related to actual work experience is being investigated. The strategy of this period of post-graduate work integrated learning will be that the candidate will have gained experience in all aspects of the examination syllabus. The completion of a trial survey which at this stage may be completed after the candidate has successfully completed all examinations will become part of the pre-requisites for candidacy. It is hoped that this exposure will improve the quality of the knowledge candidates through experience.

**Suggestions for the Licence to practice**

One of the main criticisms of the GCC examination throughput rate is the inadequate preparation of the candidates. Preparation and experience has to be linked. Competency cannot be expected if the candidate has not been exposed or experienced a specific survey problem and have a grasp of how to apply the techniques to different types of problems. Preparation does not just require practice to make it perfect, but requires correct practice in order to be perfect. Willows-Munroe remarked on this aspect as far back as 1948 “…the theory of surveying can be learnt, but the art can only be acquired by long and patient experience,…success is usually associated more with training and judgement of the surveyor than theoretical knowledge,…” (Willows-Munro, 1948)

Regardless of the structure decided upon, the co-operation and transparency between the DMR and Education providers needs be improved further. It has been proposed that DMR officials examine or moderate the examinations set by educational institutions to ensure that the outcomes of these qualifications meet the academic outcomes required by the DMR for the GCC. In such a case it would be possible for the DMR to dictate the content, standards and outcomes of all academic qualifications. (Grobler, 2014)

Competence should be the culmination of Qualifications, Skills, Knowledge and Experience (Survey Board Queensland, 2014). The knowledge component is tested well by the GCC examination process, but does not prove competence. It is therefore recommended that the competence aspects of the GCC be separated from the knowledge component which can be better examined and evaluated in the formalized education structures that exist and improving the competence evaluation component that have direct impact on safety and Health to the DMR structures.

**Conclusion: Will the new suite of qualifications promote a streamlined process of qualifications?**

According to Nieveen the requirements of a quality intervention should be validity, practicality and effectiveness. These requirements are based on state of the art knowledge (relevance). Interventions will be considered as practical by users if they find the intervention useable and
compatible with the intent of the intervention. And lastly the desired outcomes of the intervention must be met. (Nieveen, 1999) Applying the criteria outlined by Nieveen (Nieveen, 1999), a tabulation of the intervention of designing a new suite of qualifications can be made to evaluate the quality of the intervention.

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Remarks</th>
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<tbody>
<tr>
<td><strong>Relevance</strong></td>
<td>A new suite of qualifications to address all entry levels of aspirant mine surveyors have become necessary to address the requirements of the HEQC and the changes in policy regarding the Chamber of mines qualifications. The mining industry requires an effective and timeous intervention to address these issues.</td>
</tr>
<tr>
<td><strong>Consistency</strong></td>
<td>A full range of qualifications have been designed to address persons from an NQF4 level through to NQF level 7. With this process it will be possible for a person with a less than ideal grade 12 certificate to obtain the correct combination of qualifications to obtain a professional degree and ultimately be accepted as a candidate to the GCC examinations.</td>
</tr>
<tr>
<td><strong>Practicality</strong></td>
<td>The incorporation of the Chamber of Mines qualifications into an NQF level framework presents the opportunity for surveyors to use the certificate(s) obtained to articulate into higher education when required. The new three year Bachelor degree will replace the current National diploma and the Honours degree will provide the four year Professional degree required for registration as a Professional Mine Surveyor. The Government Certificate of Competency will remain the “license to practice” for Mine Surveyors that wish to take the legal responsibility for the surveying operations on a mine. The new suite of qualifications will require an investigation into the exemptions from certain subjects granted to candidates that have obtained the new range of qualifications. A more robust approach to second level qualification will ensure that the candidate receives the correct amount of practical experience to underpin the theoretical knowledge obtained through a combination of the qualifications discussed.</td>
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<tr>
<td><strong>Effectiveness</strong></td>
<td>The effectiveness of the new suite will have to be evaluated, but the suggested combination of Qualifications, Skills, Knowledge and Experience should ensure a better avenue towards the ultimate competence of mine surveyors.</td>
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</table>

The HEQF has provided the ideal opportunity to relook at the suite of qualifications for Mine Surveyors. The combination of certificates, diplomas and degrees now provide a choice of qualification routes for all levels of Mine Surveyors and allows for exit and re-entry depending on the needs of the surveyor. These qualifications can be used to articulate between qualifications and ultimately lead to candidacy to the GCC examinations.
Bibliography


