

Skills development in the Civil Consulting Industry: Knight Piésold's Candidacy Programme for Professional Registration

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ABSTRACT

A milestone achievement of any early engineering career is successful registration as a Professional Engineer (PrEng). Knight Piésold (Pty) Ltd, a civil engineering consultancy operating globally in the transportation, mining and water sectors, enables professional registration through its Candidacy Programme, which ensures both the required work experience and appropriate and targeted mentorship. This paper explores the roles and responsibilities of candidates, mentors, the final in-house reviewer as well as the supporting company framework involved in the successful execution of Knight Piésold's Candidacy Programme. The paper examines both the planning as well as implementation, detailing the role of the Human Resources and Finance departments, senior management and mentor-candidate relationships. It also explains the benefit that funding obtained from the Construction Education and Training Authority (CETA) brings to the programme. Focus is placed on the training of current candidates on the programme with respect to continual assessment, contact sessions and mentor reviews. The paper then reviews the role of the mentors and later highlights the continual involvement of all parties in preparing candidates. Since 2016, the programme has led to eight candidates obtaining their professional registration, with ten candidates currently in the process of obtaining their professional registration.

1. Introduction

The transition from a graduate to a Professional Engineer is based on the development of skills that rely on the ability to integrate technical knowledge with several other skills gained through experience. These include sound judgement, the ability to make ethical decisions, interpersonal skills as well as personal development. Candidate Engineers require adequate exposure to a variety of environments that ensure progressive levels of responsibility as they develop their competence as engineers. Thus, the need for a structured candidacy program which provides the necessary professional mentorship is essential to Candidate Engineer success. Training completed under a well-structured programme, such as Knight Piésold (Pty) Ltd's, streamlines the Engineering Council of South Africa (ECSA) registration process and thus encourages and helps prepare candidates to

register professionally in a reasonable timeframe whilst ensuring sound competence, ability and responsibility. It also affords senior staff the opportunity to provide support and insight in a structured manner to assist candidates to grow and develop in their careers, with registration as the final goal.

2. Institutional Framework

Knight Piésold utilises the value of mentorship as a tool to create development opportunities for candidates. A strong mentorship programme creates a supportive environment which encourages professional registration, further technical career development, business maturity and personal development, all of which align towards achieving business excellence. The firm has thus developed a formal and structured approach to mentoring which ultimately contributes to the development of better trained and engaged

employees. It also assists the firm in maintaining a highly qualified, experienced and stable workforce. Figure 1 illustrates the organisational structure of the Candidacy Programme.

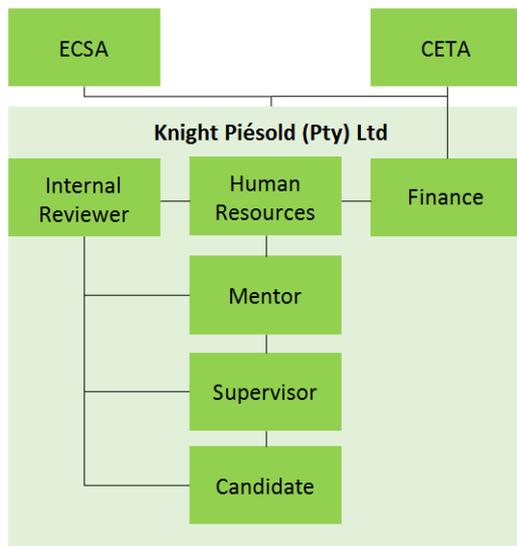


Figure 1: Organisational structure of the programme

3. Organisational Roles

3.1. CETA Funding

The Skills Development Levy (SDL) is an obligatory levy imposed on employers by SARS with the aim of promoting learning and development in South Africa (*South African Revenue Services (SARS), 2017*). A percentage of the levy goes to the National Skills Fund (NSF) and the various Sector Education and Training Authorities (SETA), of which Built Environment Professionals (BEP) firms belong to the Construction Education and Training Authority (CETA). The CETA allows BEP stakeholders to apply for discretionary grant funding to support the construction industry with its training and development objectives. This includes engineering candidacy programmes and bursaries. Employers, such as Knight Piésold, may submit a funding request for a 3-year candidacy funding grant for all candidates that possess a qualification from a recognised university or college. It is company

practice to apply for all candidates falling within the 3-year window to be funded, however due to budgetary constraints at the CETA not all are accepted.

If the proposal is approved, the funding provided from CETA is used to fund the mentorship time of candidates over a 3-year period, thus allowing mentors and candidates mentorship, training and other contact time, and therefore cost to be recorded against an internal project. A budget is then approved annually for the implementation of the programme and the firm invoices the CETA quarterly for items including mentorship time, administration costs, training and development costs and ECSA registration costs. Funds are therefore not directly paid to each candidate but rather claimed from CETA under the line items stated above. The finance received from CETA accelerates the Candidacy Programme as the funds received make billable mentorship possible. Any candidates not receiving CETA grants are then funded internally through similar processes to those described above, without candidates being aware who is or isn't funded by the CETA.

3.2. ECSA

The Engineering Profession Act, 2000 (No. 46 of 2000) requires engineering practitioners to be evaluated and registered by ECSA before they can be responsible for engineering projects (Lawless, 2013). ECSA sets the standards and outcomes required for professional registration.

3.2.1. Commitment and Undertaking

A Commitment and Undertaking (C&U) is an agreement between the employer (in this case Knight Piésold) and ECSA, in which the employer commits to train engineering candidates to the standard that is required for registration.

The C&U offers the following benefits:

- By training candidates in a structured manner, with the 11 outcomes in mind, employers will develop competent engineers to expand their team of professionals. Candidates will generally attain the level of competence required in a shorter time than their peers who are not trained in this manner;
- Well-constructed training and commitment reduces the possibility of development gaps or shortfalls;
- Employers assure candidates that the firm is committed to quality training. This assists employers in recruiting and retaining candidates of a high calibre;
- Management and mentors are added to the ECSA database and are informed of changes in the registration process; and
- ECSA assessors and reviewers are assured that candidates have been through a structured process, overseen by mentors who understand what is required and who are actively involved in developing engineers. Thus, applications should theoretically be easier to assess.
(Engineering Council of South Africa (ECSA), n.d.)

3.3. Human Resources Department

The involvement of the Human Resources Department (HR) is vital to the success of the Candidacy Programme. HR is directly involved and acts as both a regulatory and support body which oversees the entire candidacy process ensuring that:

- Candidates have a clearly defined training programme offering broad yet sufficiently detailed work variety, in place;
- Candidates submit quarterly reports on time;
- The quarterly reports submitted are of an adequate standard and are in the correct format as required by ECSA;

- Mentors and candidates are encouraged to meet frequently but no less than once a quarter. HR assesses the suitability of the candidate/mentor combination and determines whether a change in mentor is required to ensure progress;
- Candidates are exposed to all or most phases of the project cycle. Site and design experience are mandatory;
- Candidates receive appropriate and accredited in-house and external training as and when required, aligned with the “Work Place Skills Plan”;
- Mentors are well-informed, committed and registered with ECSA under Knight Piésold’s C&U Agreement;
- The available funding from CETA is obtained; and
- Feedback is provided both internally to senior management of the firm, and externally to CETA and ECSA.

3.4. Finance Department

Knight Piésold has made internal provision to ensure that all candidates currently on the CETA fund are able to book billable hours when working on the candidacy programme. This encourages both candidates and mentors to spend sufficient time on the programme, which ultimately benefits the candidate. The firm also allocates a budget for training, development and mentorship time to accommodate candidates that are not funded by CETA and to compliment candidates that are currently funded by CETA allowing for additional training.

3.5. The Role of Mentors/Supervisors

Mentors ensure that candidates receive the required experience to achieve competence in all the ECSA outcomes with increasing levels of responsibility until the candidate is prepared for professional registration. It is an on-going relationship which is reinforced by regular

formal and informal contact sessions concluding with quarterly reporting.

A supervisor is responsible for providing day-to-day work activities and is project dependent. Supervisors ensure that the candidates receive work activities that are aligned with the appropriate responsibility level and required outcomes outlined in the candidate's training plan.

The mentor and supervisor are usually the same individual. This is project dependent as the assigned mentor may not be directly involved in the project that the candidate is working on, or directly involved with the candidate. Another instance is when a candidate is sent to site, working under a supervisor, whilst his/her mentor is still office based.

If the mentor and supervisor differ, both parties agree on the required objectives for the candidate and the training continues with constant communication between mentor, supervisor and candidate ensuring consistency with planned objectives.

Knight Piésold assists with training mentors and supervisors, which enables them to be suitably equipped to fulfil their commitment to candidates and the programme.

Professionally registered mentors guide the development of candidates. The mentor has several duties which include:

- Planning and programming suitable work activities to ensure that a candidate develops toward the relevant competency standard for registration;
- Ensuring that the candidate improves their engineering judgement by exposing them to tasks with increasing responsibility in terms of identifying problems, providing solutions, determining potential impacts, providing mitigation measures and

considering ethical issues; each of which promote candidate accountability;

- Reviewing and signing quarterly reports to determine whether objectives are being met in terms of achieving the required outcomes at an appropriate level of responsibility. Where deficiencies are noted, the mentor and candidate implement mitigation measures to revert to the original plan;
- Checking progress against the candidate's training plan. The mentor ensures that work activities correlate with the objectives set in the agreed timeframes;
- Determining whether there are any gaps in a candidate's experience and identifying ways to provide the required experience; and
- Deciding when the candidate is ready to register, and assisting with the ECSA application process.
(Engineering Council of South Africa (ECSA), n.d.)

3.6. The Role of Candidates

The candidate is the most important role player in the entire programme, since it is the amount of effort that the candidate puts into the programme that determines the candidate's success. The candidate's responsibilities include:

- Ensuring that the training received aligns with his/her objectives;
- Identifying which day-to-day tasks correlate with the relevant outcomes and his/her level of responsibility;
- Preparing quarterly Training and Experience Reports (TERs), indicating work experience in the previous quarter;
- Arranging quarterly meetings with his/her mentor and being prepared to discuss training needs and/or any other requirements to achieve ECSA outcomes;

- Maintaining their portfolio of evidence which includes all their TERs and a record of all Initial Professional Development activities (i.e. certificates of attendance for courses, conferences, seminars and workshops); and
- Completing all the necessary forms and reports required for submitting their application for professional registration with ECSA.
(Lawless, 2013)

3.7. Reviewers

Knight Piésold is represented on the ECSA panel of reviewers and is in the process of obtaining further review panel representation. Candidates meet with the reviewer to discuss any uncertainties they may have regarding their ECSA application. The reviewer provides insight into the type of questions the panel is likely to ask based on the reports presented by the candidate. The reviewer acts in a neutral capacity to instil objectivity whilst applying ECSA procedure.

The feedback given by the reviewer is a valuable part of the programme that reduces the chances of applications being rejected due to inadequate reporting of the candidate's experience.

4. Implementation

In all stages of the programme and at a maximum timeframe of three months, formal records of development are kept enabling assessment of the suitability of training on the candidate's development.

4.1. Structure of the Programme

All candidates are required to be registered as Candidate Engineers with ECSA. Knight Piésold then appoints a mentor to each candidate to oversee their development. All mentors within the firm are registered mentors with ECSA and ideally work with the candidate on a regular

basis. Candidates may also choose their preferred mentor within the firm or externally. This approach often further improves an existing good working relationship between mentors and candidates. If an ECSA registered mentor is not available, an appropriate coach is selected, and a senior mentor is appointed to advise and formally sign off. Candidate training includes day-to-day work activities as well as external training (Knight Piésold (Pty) Ltd, 2015).

4.2. Training Programme Meeting

A successful mentorship programme requires clearly defined goals, therefore the formal process commences with a Training Programme planning meeting where goals are discussed and agreed between the coach and the candidate. This sets out a structured development programme for the year and assists candidates in mapping out their career paths and short- to medium-term goals. It also helps candidates and mentors to identify areas where additional training may be required.

4.3. Coach/Candidate Contact Log

A contact log is kept by the candidate, which documents details of meetings held between coach and candidate. Formal meetings are held between coach and candidate every quarter to monitor the progress of the candidate and to ensure that the objectives set at the last meeting are achieved. Individual progress reviews are undertaken by the coach on a quarterly basis, including notes on progress of the candidate against individual development plans set, details of job assignments, departments worked in and activities undertaken. Frequent informal meetings are encouraged as these offer immediate responses and guidance on a current and topical issue or work task. The informal meeting approach strengthens the working relationship between mentor and candidate and offers the candidate an opportunity to

present and communicate on a technical level. Mentors play an integral role in determining the candidate's readiness for registration.

4.4. Training Experience Report (TER)

Training Experience Reports (TER) are records of the candidate's experience and illustrate the progress in development and responsibility, with the ultimate realisation that the candidate can work independently and take full responsibility for their work. Each candidate is required to complete a quarterly report in the required ECSA TER format, explaining work experience gained in the past quarter, degree of responsibility and ECSA outcomes achieved. This report is first reviewed by the candidate's allocated mentor and is then sent to Human Resources for a final review, who then provide feedback to the candidate. The quarterly reports submitted form a critical part of the programme as they ultimately form part of the candidate's application to ECSA for professional registration. Upon application for professional registration, candidates use the quarterly reports to compile their TERs and engineering report for submission. This streamlines the application process for the candidate.

4.5. Professional Review

After a period of at least three years, or once the required experience has been gained, the candidate prepares for their Professional Review (PR), with the guidance of their mentor.

5. Experience of the Programme

The experiences of mentors and candidates are provided below to provide actual insight into the programme. The experience of the junior engineer illustrates the early stages of the programme whilst the experience of the civil engineer describes the entirety of the programme. Mentors provide a further understanding of the programme in terms of

how to manage junior staff at different stages of their development and the approaches required to customise the progression of each individual candidate.

5.1. Mentees

5.1.1. Junior Engineer - Neelam Parbhoo, BScEng, MSc (part time), 1-year experience

The candidate, Neelam Parbhoo, received a bursary from Knight Piésold in her third year of study at the University of the Witwatersrand, and completed her tertiary studies in December 2016. The candidate began her working career in Knight Piésold's Transportation Section, based in the Structures Department, in February 2017 and is currently in her second year of the candidacy programme. The Head of Structures, Graham Jennings, is Neelam's mentor.

Neelam was not fully conversant with the ECSA registration process and requirements prior to her employment at Knight Piésold. In her first month at the firm, the registration process and Candidacy Programme were fully explained and a mentor assigned. She noted that majority of her peers did not receive the same guidance information from their respective employers, and were not provided with a formalised approach to mentorship offering direct company involvement and interest in the candidate's development.

The first part of the programme assisted Neelam to map out her career goals, which involved development as a structural engineer focusing on civil structures. In the past year, Neelam has been exposed to several large-scale transportation projects and has gained a significant amount of knowledge and skills in bridge engineering.

The submission of quarterly reports forms part of a portfolio of evidence to be submitted once she has developed her engineering

competence to register professionally. Neelam has found this useful as she is required to document the work completed at regular intervals. The feedback received from Human Resources has also guided her, ensuring that reporting is completed in accordance with the required ECSA standards from an early stage. This keeps data fresh or current and ensures information is not forgotten or poorly reported at a later stage.

Neelam has also found the mentor/mentee contact sessions to be useful as she is able to obtain feedback regarding her work and progress from her mentor and able to plan work activities for the months to follow.

Experience that Neelam has gained since graduating is considered beyond a typical graduate's experience. Neelam is completing her 2nd year of employment and is envisaged to apply for professional registration late 2020.

5.1.2. Civil Engineer - Prinaven Gounden, BScEng, 5 years' experience

Prinaven received a bursary from Knight Piésold in his third year of study at the University of the Witwatersrand. Prinaven completed his tertiary studies in December 2012 and commenced employment in Knight Piésold's Transportation Section, Roads Department, in January 2013.

Prinaven was mentored and supervised by four senior registered staff members over the course of his five years on the programme. A transition period from one mentor/supervisor to another was necessary to accommodate adaptation to changes in working environments regarding staff relocating to different (often remote) sites and restructuring of members in project teams. Ensuring that the candidate had a close working relationship with his mentor was an essential component of the programme. It ensured that training outcomes were achieved in a given and agreed upon period while providing an adequate level

of support for Prinaven to gain experience with increasing levels of responsibility.

During the first 14 months on the programme, Prinaven was mentored under close supervision and given the opportunity to work on both water and transportation projects. The exposure to different fields of engineering provided him with a valuable understanding of how to work towards design solutions as a member of different teams, thereby broadening his technical horizon and gaining more exposure to the industry.

The next training period spanning 24 months, focused on construction monitoring on road projects. Prinaven worked with reduced supervision from his new supervisor and gained practical experience in the construction and maintenance of roads. With reduced supervision, the candidate was able to develop the ability to exercise sound judgement and take responsibility for decisions made. Prinaven contributed to the administration of contracts which developed his ability to manage engineering activities including their associated impacts regarding social, environmental and cultural aspects.

On completion of his practical site experience, it was identified that Prinaven required further professional development by increasing his responsibility regarding engineering problem solving and managing of activities. The candidate was then placed in a design team with limited support from his supervisor where he supervised junior team members. After working for 25 months on several road projects in the design office, it was clear that Prinaven was ready for registration.

Whilst preparing his submission Prinaven was given support by senior staff regarding the content, style and structure of the relevant reports. The compilation of TERs and the engineering report was more readily achievable since quarterly reports were done continuously since graduation. The candidate simply summarised his TERs over the course of his career in appropriate intervals according to

the nature of experience in each period as required by ECSA. Since the in-house reviewer is accustomed to assessing several ECSA submissions, he assisted in proof reading the Prinaven's submission and provided valuable objective feedback in terms of suggestions to improve the content and readability of the report. The candidate also set up a mock presentation with the reviewer prior to his final presentation in preparation for the final interview.

The flexible structure of the programme allowed Prinaven to move from one supervisor/mentor to another as his needs changed. The implementation of mandatory quarterly mentor/mentee contact sessions which include ECSA TERs streamlined his professional development. Regular contact sessions allowed for planning and prioritising of work activities allowing him to achieve all the necessary ECSA outcomes at the required level of responsibility within desired timelines.

Spanning the course of his professional development Prinaven attended several accredited in-house and external training sessions to improve his technical knowledge. The "Work Place Skills Plan" is implemented by the HR department with support from the technical sections and encourages improvement of staff capabilities by approving and insisting on attendance at accredited courses, seminars and conferences. Prinaven was given a unique opportunity to attend a 26-day training course at the *Indian Academy of Highway Engineers in India* during January 2018, which broadened his understanding of the engineering industry as he was exposed to international standards and design techniques.

Prinaven received support from his colleagues to grow professionally outside of the company by joining voluntary associations such as the Consulting Engineers South Africa (CESA) Young Professionals Forum (YPF) committee. This support from within and outside of the Candidacy Programme encourages self-growth

and improves the networking capabilities of the candidate.

Prinaven submitted his application for registration as professional engineer in early April 2018 and at the time of writing this paper is awaiting positive feedback from ECSA.

5.2. Mentors

5.2.1. Mentor - Alan Main, Section Manager – Transportation, PrEng PrCM REng, BScEng, 20 years' experience

Alan's road to registration was guided by Mr Peter Hurry PrEng, an experienced and practical roads engineer. Invaluable guidance was gained largely through exposure to increasingly complex design and construction scenarios and through knowledge sharing.

Since obtaining professional registration, Alan's commitment to preparing and guiding peers and juniors alike for registration has become a fundamental part of his daily duties. He is driven to ensure that all junior engineers complete the registration process with the support of their employer. To date, Alan has been instrumental in mentoring numerous internally and externally employed candidates through to registration, and is currently mentor to four of Knight Piésold's aspiring engineers.

Alan's approach to mentoring a candidate through to registration is based on honesty, commitment from mentors and candidates, structured employer support and most importantly, continuous learning and development through encouraging candidates to question before and during implementation. Prior to joining Knight Piésold, this was a formidable task and difficult to manage efficiently. The Candidacy Programme assigns responsibility through accountability to mentors, candidates and the firm, thereby affording candidates the best opportunity to develop into engineers with solid foundations and to achieve registration.

From a mentoring perspective, Alan has found that the programme simplifies the registration process as it assists with the optimal selection of mentor/candidate combinations; defines structured training frameworks specific to each of his mentees taking cognisance of their strengths as well as areas requiring further growth. Through imposing milestone reports formalising ECSA-defined outcomes, ensures timeframes are realistic and achieved. Alan has found that the process is certainly easier for all parties when using a well-structured and familiar Candidacy Programme.

As a Section Manager, Knight Piésold's Candidacy Programme is a useful tool for tracking staff training and development needs. The reporting structure affords the manager the ability to easily track candidate progress and needs whilst monitoring the level of mentoring and guidance of the respective mentors. Furthermore, reassignment of candidates to other supervisors or mentors can be easily programmed to make sure candidates obtain a broad range of engineering exposure within their desired specialities.

Irrespective of employer or chosen discipline within civil engineering, a well-balanced and structured training plan combined with active employer support is of utmost importance to obtain proper engineering development to prepare candidates for registration and subsequently develop into leaders within their fields.

5.2.2. Mentor - Graham Jennings, Head of Structures, PrEng MEng, 20 years' experience

Graham developed his engineering skills with the assistance of an experienced PrEng, Mr Gerrit Visser, and within a company with an ECSA Commitment and Undertaking.

The crucial difference between Graham's skills development and that of Knight Piésold is the emphasis on the structured company approach. The training plan, three month reporting periods with confirmed meetings, as well as the allowance for specific training costing, enables a culture that emphasizes skills development.

This means that candidates are valued and wish to develop their skills further, as tangible results are confirmed in writing at regular intervals.

The advantage that Graham has found as a mentor is that any deficiencies in training can be rectified immediately, with further training requirements clearly stipulated.

6. Results and Challenges

6.1. Results

There are currently 20 mentors and 41 candidates on Knight Piésold's Candidacy Programme. Since inception, the programme has allowed eight candidates to obtain their professional registration. Currently there are two candidates who have successfully applied to ECSA in 2018 and eight candidates who are in the process of preparing their professional registration application. Figures 2 to 4 show the distribution of Knight Piésold candidates according to years of experience and gender. Proof that the Candidacy Programme has been successful is evident in the number of professional registrations obtained.

Experience of Candidates

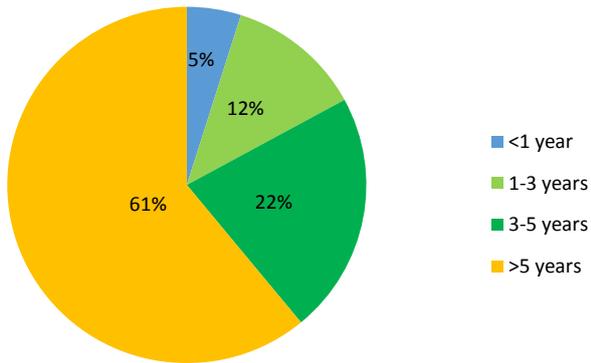


Figure 2: Experience of Candidates

Figure 2 illustrates that there are candidates at various stages of professional development within the programme. A large portion of candidates have more than five years exposure with almost half of these candidates currently at professional registration stage as shown in Figure 3.

Candidates with >5 years experience

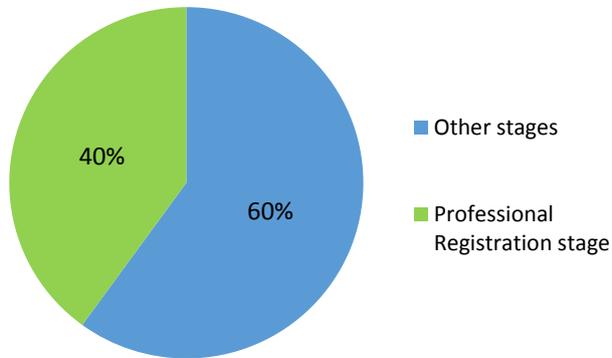


Figure 3: Candidates with more than 5 years' experience

Gender Distribution of Candidates

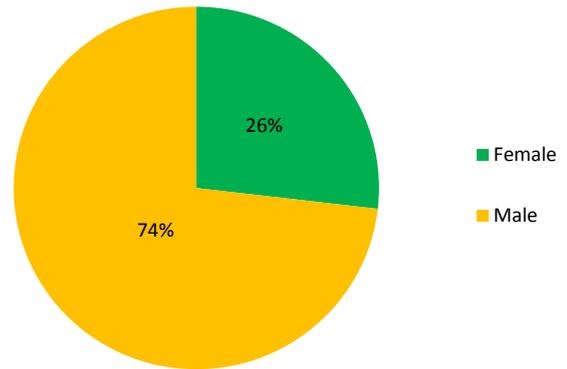


Figure 4: Gender Distribution

Traditionally the civil engineering industry has been male-dominated with very few females following this vocation. Over the past two decades or so, this tendency has waned, resulting in more females pursuing engineering.

Figure 4 above confirms Knight Piésold's commitment to providing equal opportunities to females.

6.2. Challenges

Candidates typically find it challenging to find time to complete quarterly reports whilst still completing daily work activities and tasks, as project work takes precedence;

- The CETA programme funds candidates for a maximum of three years. After the 3-year period, candidates are no longer funded by CETA possibly resulting in reluctance from mentors and candidates alike to spend adequate time on the Candidacy Programme as this time is then considered non-billable. This does however encourage candidates to register soonest;
- The candidate needs to ensure that quality quarterly reports are submitted since these determine the nature of future responsibilities and training activities. Candidates who delay or miss submissions

make it difficult for the mentor and HR to determine actual progress;

- During periods of tight deadlines and project obligations, there may be a tendency to temporarily stop or reduce input into achieving the goals set out in the Candidacy Programme; and
- Available projects and project phases determine exposure to required ECSA outcomes which may delay registration.

7. Registration period

The experience period prior to registration varies between candidates, with most candidates applying for registration after a period of five to six years. This differs from the minimum experience requirement set out by ECSA of three years for several reasons, some of which are described below:

- Despite efforts made by Knight Piésold to ensure that staff obtain the necessary experience in the shortest time possible, experience gained is largely project and time dependent. It is thus difficult for a candidate to obtain experience and achieve all 11 outcomes in such a short space of time;
- Several candidates were previously employed at other BEP firms that did not have a structured candidacy programme. This often lengthens the experience period prior to registration; and
- The decision to register is one that the candidate must feel confident about. Many candidates do not feel that they have obtained enough experience after a period of three years to take on the responsibility that comes with being a registered Professional Engineer.

8. The future and beyond

Whereas Knight Piésold's Candidacy Programme is aimed squarely at preparing

young engineers and technicians for professional registration, training and development beyond registration is already forming part of the focus for the next chapter in Knight Piésold's skills development and capacity building initiatives.

9. Conclusion

The combination of a strong institutional framework; a proven track record, committed mentors and candidates with support from management, and collaborative perseverance, are key factors in the success of Knight Piésold's Candidacy Programme. The programme allows the firm to capitalize on its greatest resource, its employees, resulting in a workforce which is better trained and engaged bringing about sustained growth and profitability for both employees and the firm, which is paramount to business excellence. Employees are attracted to Knight Piésold due to its emphasis on mentoring being the underlying manner with which the firm operates. This transfer of skills and knowledge at all levels is essential to the growth and sustainability of the engineering industry both locally in South Africa and abroad.

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