Wits

ENGINEERING ALUMNI

Tracer Study 2012

The Wits experience through the eyes of Wits Engineering Alumni: Educational experience, Learning climate, Institutional culture and Professional development

UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

Wits Engineering Alumnus

‘I did not struggle to get employment and I got the prestige in my workplace’

Wits Engineering Alumnus

‘My education has helped me have a good career. The University is still recognised internationally’

Wits Engineering Alumnus

‘Enabled me to get a good career start in SA, then in Europe’

Wits Engineering Alumnus

‘My Wits Education was fundamental to my career, Wits approach to learning helped me to adapt to any situation’

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Executive Summary

This study was conducted by the Strategic Planning Division's Institutional Research Unit in 2012, and presents engineering alumni's attitudes towards and satisfaction levels with the Wits experience in four selected areas: educational academic experience, learning climate, institutional culture and professional development. The study targeted the University of the Witwatersrand engineering alumni. The main research instrument was an online questionnaire comprising structured and unstructured questions. A total of 238 engineering alumni participated in this study. This forms a baseline study that provides an initial platform to alumni to contribute to the institutional and educational enhancement of Wits.

Some of the observations from the survey are listed below:

- 90% said Wits remains a University of first choice for many that seek an engineering qualification.
- The reputation of Wits as an Institution is a major draw card for studying engineering at Wits, followed by Wits' reputation in the engineering discipline.
- 90.8% of the sample felt that Wits treated its students with equally and fairly.
- A minor percentage of the alumni reported experiencing discrimination on racial, gender and sex basis.
- Over 90% felt that the Wits School of Engineering made them feel welcome and provided an atmosphere conducive to learning.
- Alumni were highly satisfied with the following key aspects of the Wits Education: course content, career preparedness, teaching model (staff, style, method and quality)
- The top three areas cited by the alumni as the best aspects of Wits Education were the calibre of lecturers, excellent career preparedness and the quality of the course content.
- 82.77% of the sample felt Wits adequately prepared them for their career in terms of language skills and report writing.
- About 89% of the sample who have encountered Wits graduates in their respective workplaces said the graduates were adequate.

Besides, the following areas need further review and assessment in line with the strategic objectives of the University:

- Additional non-academic support that is above and beyond the core of course teaching such as extra lessons from staff and career development. There is need to enhance career development as shown by a 44.9% dissatisfaction score in this research.
- There is need to develop the curriculum to include experimental work and social sciences courses. The latter, according to responses, could include project management, philosophy, law and industrial psychology.
- About 10.5% of the sample indicated they had experienced some form of discrimination.

Background of the Study

This Tracer Study of Wits Engineering Alumni is the third in a series of professions-focused studies conducted across four disciplines: Accounting, Law, Engineering and Medical Sciences. In educational research, a tracer study extends to surveying former students (alumni). The information gained from survey items is useful for the improvement of the institution and increasing its efficiency (Millington, n.d.).

Wits' professional development and academic programmes testify to the university's commitment towards producing graduates who can be world leaders in their respective fields of engagement. This also ties in well with the university's Vision 2022 of being among the top 100 university by year 2022.The top-ranked world-class universities recognise the benefits of alumni studies to institutional enhancement. The University of Oxford[1] conducts alumni surveys[2] to measure the effectiveness of university-run programmes (University of Oxford, 2012).[3]

The global best universities like Harvard and Stanford view alumni as key stakeholders, and hence invest in communicating and building strong relationships with them. To demonstrate this, for instance, the University of Indonesia established a Directorate of Alumni in 2007 to maintain the relationship between alumni and the institution.[4]

Assessing the outcomes of higher education institutional performance has numerous benefits for understanding and promoting alumni satisfaction (Hartman and Schmidt, 1995). A tracer study of engineering alumni is beneficial to both institutional improvement of Wits and attainment of *Vision 2022* strategic objectives. Alumni surveys provide higher education institutions with a useful tool for accountability, efficiency and alignment with public needs while ensuring that their education yields maximum economic and social benefits (Cabrera et al., 2003).

[1] *Ranked second in The Times Higher Education World University Rankings 2012–2013.*

[2] *The most recent survey was the 2012 University of Oxford Alumni Survey.*

[3] *https://www.alumni.ox.ac.uk/page.aspx?pid=563*

[4] *http://www.ui.ac.id/en/alumni/page/overview*

Review of Literature

The alumni survey is an effective assessment tool for engineering programmes (Puerzer and Rooney, 2002). Universities like New Mexico carried out a tracer survey on engineering alumni on in an attempt to determine if they were doing a good a job in preparing their graduates for success in the workplace (Riley et al., n.d.). In essence, this meant determining programme outcomes in conjunction with constituencies, and then measuring effectiveness in meeting these outcomes. Where gaps were identified in this assessment process, strategies and tactics were then designed and implemented to close the gaps. The study noted that the process and resulting feedback from constituent groups laid the foundation for a number of modifications in the content, design and delivery of the College's engineering programs. One type of constituent assessment used was the alumni survey.

Such studies have given rise to the restructuring of some engineering programmes. An example is a new undergraduate programme in the department of Mechanical Engineering and Applied Mechanics at the University of Michigan. The restructuring of the programme was initiated by a comprehensive review in 1992 that included surveys of alumni, students, and industrial representatives, as well as faculty assessment of current trends and future needs.

There have been a few surveys undertaken by higher education institutions of engineering alumni with the aim of assessing the quality of academic education as well as to garner views on their experiences (Reave 2004). The aim of the survey was to "examine initiatives that engineering schools are taking to improve communication instruction for their students, including required courses in technical communication, integrated instruction, elective courses, and engineering communication centres". These surveys have been used by Higher Education Institutions to assess the quality and suitability of engineering education. The University of Delaware conducted surveys of their engineering alumni to assess the impact of their undergraduate experience (Zydney, 2002).

Researchers identify alumni as an important stakeholder group that provides invaluable insights into the strengths and weaknesses of their educational experience (Stout et al., 2004). Successful higher education demands assessment, accountability, and market-driven research to fulfil defined extensive internal and external needs (Dellow and Romano, 2002).

Alumni surveys elicit individual reflections (since graduation) on the quality of educational experiences, unlike surveys of other cohorts such as undergraduates, dropouts or graduate students (Moden and Williford, 1988, quoted in Pike, 1993a). The role of alumni surveys in evaluating the quality and effectiveness of education programmes is particularly significant (Pike, 1990, quoted in Pike, 1993a) and are relied upon for this purpose (Pike, 1993a: 66).

Alumni research has been considered as the most productive field of assessment for linking accountability and improvement in higher education (Borden, 2005: 62). In educational research the tracer study is referred to as an alumni survey since its target group comprises former students and the information gained from survey items can be used by the graduates' alma mater and other education stakeholders for curriculum development and reform (Millington, n.d.).

Tracer studies have been conducted by educational institutions for decades (ibid.). The growth in the United States has been attributed a number of internal and external demands for assessment (Dellow and Romano, 2002). Alumni surveys have long been used as an effective evaluation tool as exemplified by Ohio University which used them as part of an ongoing programme of institutional evaluation and improvement (Moden and Williford, 1988, quoted in Pike 1993a).

This tracer study sought to evaluate aspects of the quality of Wits engineering education with the intention of flagging areas requiring improvement. Alumni surveys are used to reach key audiences to have a positive impact on the advancement of higher education institutions (Cabrera et al., 2005). This study was conducted with the intention of advancing Wits' strategic imperative of providing high-quality and internationally competitive engineering education founded on high academic standards.

Higher education institutions have long used alumni surveys to measure learning and development to assess their education programmes (Pike, 1993b: 23). Surveys of alumni perceptions are an important source of data concerning university outcomes (Vailga, 1982). Research suggests that dimensions of learning and development are related to each (Pike, 1993b: 23). The present study evaluated dimensions of learning and development through eliciting satisfaction levels and perceptions of key aspects of the teaching model and learning climate at Wits. The satisfaction level of a programme is congruent with the effectiveness of learning and development outcomes. In a report summarising United States national results for college student experience survey, Pike (1989) found that all five dimensions of reported learning and development were related to satisfaction.

Tracer studies also enable the evaluation of the results of the education and training provided by a particular institution, and examine and evaluate the current as well as future career and employment opportunities/prospects of graduates (Boaduo et al., 2009). The present study also profiled engineering alumni with respect to their personal, educational and career information.

Satisfaction with and perception of the quality of professional development rendered by Wits was also evaluated in the study. A 2009 study undertaken by Higher Education South Africa and the South African Qualifications Authority, which focused on the quality of graduates produced by public higher education institutions in South Africa, highlights that governments in many countries have initiatives focusing on higher education and employment in the workplace (Griesel and Parker, 2009). This is due to the mounting pressure on higher education from government and employers to produce graduates that are employable with the attributes, capabilities and dispositions to work successfully. Hence, assessment of the quality of education in ensuring solid career preparedness is an important focus in both the international and national context. For this reason this study also assessed the degree to which Wits education provided the necessary preparation for a successful engineering career. Alumni were also asked for their views on what they felt Wits graduates they have worked with might lack.

The learning climate and institutional culture are key components in providing a positive university experience and effective education. Higher education institutions must aspire to address and honour cultural diversity in teaching and learning to create an effective learning environment (Chan, 2004). The climate is a major contributor to the overall education benefits, thus its enhancement to benefit student learning is a central matter of concern for higher education institutions (Day, 2009: 9.1).

It has been argued that a learning climate cannot be planned and implemented in a mechanistic fashion but should be a site of nurturing, sensitivity, flexibility, adaptability, and responsiveness (ibid. 9.11). In 1999 the World Bank and UNESCO convened a Higher Education and Society conversation which brought together education experts from 13 countries to explore the future of higher education in the developing world. The task force noted that a well-qualified and highly motivated faculty [teaching staff] is critical to the quality of higher education institutions. Lecturers' consistent presence and availability to students and colleagues has an enormous influence in creating an atmosphere that encourages learning. Yet few institutions in developing countries enforce, or even have, strictures against moonlighting and excessive absenteeism. In many institutions, students face difficult conditions for study (ibid.). This survey also solicited responsiveness to the learning climate, specifically at the school/departmental level, as well as fairness and equality in the institutional culture.

Alumni research is most effective when rooted in a systematic and integrated approach to higher education assessment, which can be described as a culture of evidence that shows 'willingness not only to create measures and collect data on outcomes but also to use this information to redesign practices for improving quality' (National Center for Postsecondary Improvement, 2002). Alumni surveys can be used to help develop a more integrated and better-aligned assessment capacity (ibid. 71). Tracer study research emanates from a desire to improve the status quo, and hence provides recommendations for improvement (Cabrera et al., 2005).

Conceptual Framework of the Study

This study is premised on the conceptual assumption that there are four target-area determinants to assess satisfaction with the Wits experience and these are illustrated in Figure 1. The study argues that graduate experience depends on the quality of the Wits educational experience, educational experience (academic), learning climate (school/departmental), institutional culture (fairness and equality) and professional development (career). The research instrument was structured to take cognisance of this framework.

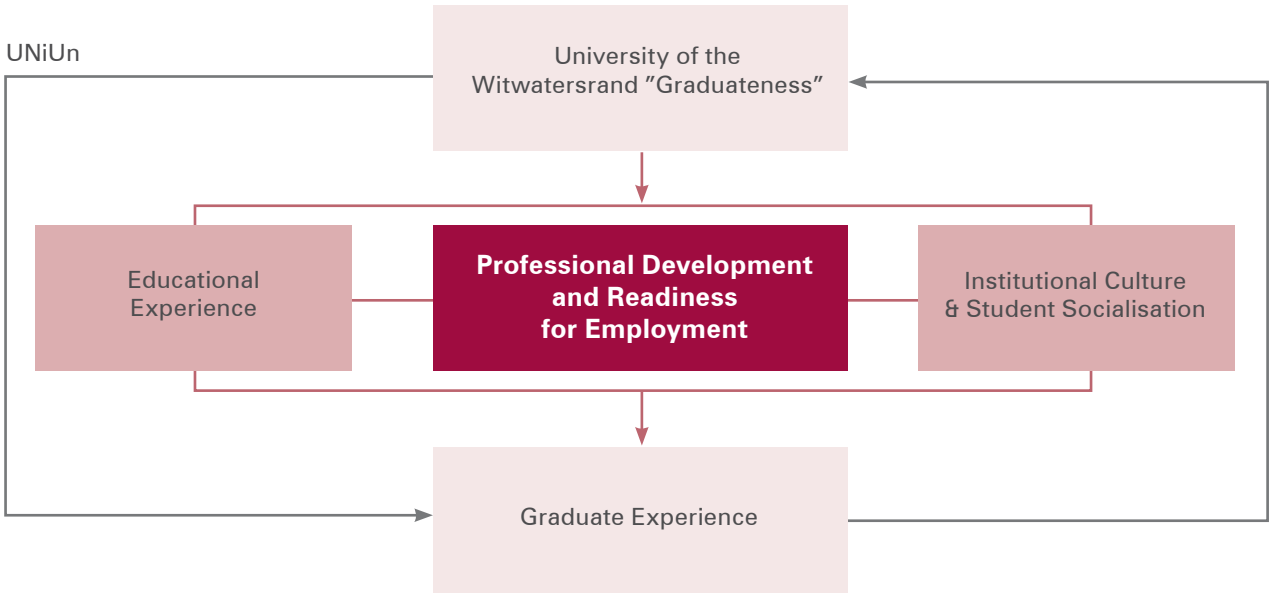

Figure 1: Conceptual Framework of the Wits experience
Adapted from Nhlanhla Cele, Postgraduate Student Experience Survey 2012

Educational experience: The satisfaction level of an academic programme is highly congruent with the effectiveness of programme outcomes. This component explored the satisfaction levels and ratings of the Wits academic experience specifically course content, teaching staff, teaching style, teaching methods, teaching quality and non-academic support as well as career prepardness and Wits career development. It also

solicits the best aspects of their Wits academic experience. Alumni perceptions and ratings of their academic education pose oppurtunities for institutional improvement. Literature suggests that Alumni feedback is an effective tool to assess the programme outcome and can be used as part of an ongoing programme of institutional evaluation and improvement.

Professional development: Alumni surveys gather individual reflections since graducation on the quality of education and career prepardness. This cohort have had the unique opportunity to test their Wits education against their career experience. The quality of Wits professional development was also evaluated in the study. The quality of graduates has been a pertinent issue for Governments and Higher Education Institutions and is this a key focus for this study. Wits commits to providing professional development of an exceptionally high standard. Issues of quality career prepardness and views on how Wits helped in career development is probed.

Instututional culture: Wits has enshrined the values of the South African Constitution in its institutional culture. Students should be treated fairly and equally at all times and not discriminated against on racial or gender grounds. An institutional culture of equality and fairness in a Higher Education institution is an important building block for an inclusive and positive environment. This component zones in on expereinces of discrimination as well as perceptions of equailty and fairness.

A conducive learning climate is key in fostering a positive Wits experience. Litarature highlights the importance of honouring cultural diversity in teaching and learning. The learning climate is a major contributor to the overall experience and student benefit. Literature shows that a learning climate should be a site of nurturing, sensitivity, flexibilty, adaptibility and responsiveness. Similarly previous studies highlight the importance of a well qialified and highly motivated faculty [teaching staff]. The learning environment can hinder or encourage learning for the students. This aspect explored issues of feeling welcomed and a conducive learning climate and views on the general atmosphere.

Graduateness: While it is a given that there is no consensus in defining *graduateness*, in this study it is defined to embrace all attributes stated above. Graduateness is not synonymous to exit level competences as defined in outcomes based education, but defines peculiarity and exceptional conditionality where graduates stand out from the pack by being able to live in the future world through current imagination as defined by Makhanya (UNISA, 2010). Graduateness is thus deeper than mastery of subject content and completion of the official curriculum prescribed for learning programmes or meeting basic requirements for professional practice. It is more than possession of field-specific knowledge; shared qualification level competences; and career specific skills. Graduateness embodies attributes that embrace social values, critical thinking skills, functional knowledge, reflective competencies, and an appreciation of diversity and life's complexities as the definitive qualities of a global civil society of the 21st century. This refers to a "high calibre graduate … who possesses, and perhaps even exceeds expectations with regards to the knowledge, skills and attributes needed to be successful in the workplace." (Raymond and McNabb, 1993)

Wits holds the view that graduates produced from this university need to exude particular distinct attributes that separate them from those produced in other South African universities. In the *Teaching and Learning Plan 2010-2014*, the university stated that *graduateness* at Wits means more than the ability to pass exams, and includes the development of values such as academic freedom; independent enquiry and trust; depth of knowledge and the value of critical thinking; breadth of knowledge; collegiality; international comparability; social responsiveness; commitment to community service; social inclusivity and intellectual integrity (Wits, 2005).

As often articulated in literature that *graduateness* is a state and extent of graduate readiness expressed through the combination of the following five broad characteristics:

- sound grounding in specialized knowledge domains and the agility to adapt to generic contexts
- the ability to be resilient and caring members of a global civil society
- the ability to think critically and innovatively
- an awareness of their own development needs and future challenges

As reflected in the Wits Vision 2022 Strategic Framework, Wits wishes to produce 'global citizen' graduates which exude the following attributes:

- a rich and in-depth knowledge of specialist knowledge areas
- intellectual integrity, a strong sense of professional ethics and public good values
- command high level problem solving and critical thinking skills
- have good communication social and business communication skills
- poses functional knowledge across a broad range of disciplines
- have understanding of life's complexities and ambiguities as well as a high level ability to work within these circumstances
- continuous development of cognitive skills through life-long learning
- command transferable skills and functional knowledge for purposes of different employment opportunities
- outstanding interpersonal skills and an ability to appreciate and embrace diversity
- an ability to bring about innovation and constructive change in their professions and in civil society
- leadership skills and an ability to mentor others
- broader understanding of human rights, social justice and environmental sustainability imperatives
- a strong sense of civic and social responsibility
- a distinct ability to think independently and imagine the future as underpinned by a sense of public good and values of global citizenship

Research Methodology

This research is both qualitative and quantitative in nature. The study used an open survey, with no target response rate. The survey consisted of a single internet questionnaire completed by each participant. This was considered to be the most appropriate and feasible method for collecting data on a large scale. All respondents were kept anonymous. A total of 238 Wits engineering alumni participated in the study.

The survey was sent to all engineering alumni registered with the Alumni Relations database. The researcher gathered 4 357 alumni e-mails of which 312 bounced back. The survey was therefore successfully sent to 4 045 alumni.

The methodology embedded five key features; questions were designed to elicit the following information:

1. Educational experiences
2. Institutional culture experiences
3. Professional development experiences

AIMS OF TRACER STUDY

This tracer study aims to establish an institutional understanding of the experiences and satisfaction levels of engineering alumni with the intention of enhancing the Wits experience. The three target areas of focus are:

1. Wits educational experience
2. Wits institutional culture
3. Wits professional development[5]

The study operated within the context of Wits' commitment towards pursuing intellectual elitism as an approach that will nurture world leaders in their respective fields, and graduates through professional development and educational programmes that compete with the best in the world in tandem with Wits' intentions of being one of the 'leading research-intensive university, firmly embedded in the top 100 world universities by 2022' (Wits Vision 2022: 5). The University further aspires to be an institution built on principles of intellectual excellence, committed to providing high-quality, internationally competitive education founded on high academic standards, cutting-edge research, public engagement and productive partnership with leading institutions throughout the world (ibid.).

[5] *This study understands 'professional development' as skills and knowledge attained for both personal development and career advancement.*

In line with the target areas listed above, the study operated within four primary research questions:

1. What are the alumni's satisfaction levels and views with regard to the Wits educational experience?
2. What are the alumni's satisfaction levels and views regarding the Wits learning climate?
3. What are the alumni's satisfaction levels and views with regard to the Wits institutional culture?
4. What are the alumni's satisfaction levels and views with regard to the Wits professional development?

QUESTIONNAIRE DESIGN

The questionnaire consisted of open-ended and closed-ended questions. Most questions were framed as closed-ended questions. At the end of the main sections respondents were invited to make -further comments if they so wished and, where possible, recommendations that would help enhance the Wits experience. The questionnaire was designed to be completed in 20 minutes and consideration was given to the inclusion of questions relating to the importance of the objectives of the study. Initial drafts of the questionnaire were piloted to identify any ambiguities and areas that needed to be clarified.

The satisfaction data used in the study was derived from questions concerning ratings of educational and professional development experiences. These questions requested respondents to rate the quality of aspects of their academic experience on the basis of statements offered. Response options were 'strongly agree', 'agree', 'disagree' and 'strongly disagree'.

Best practices in the design of alumni surveys suggest collaboration among key internal stakeholders such as deans, institutional research and public affairs (Pollick, 1995; Pendel, 1985; Fisher, 1988). The Dean of the Faculty of Engineering and the Built Environment, Professor Beatrys Lacquet was consulted for input into the development of the survey. Her input assisted in developing the discipline-specific sections of the questionnaire. Professor Lacquet was asked the following questions:

- Are there any specific questions that you would like alumni to be asked?
- Does your School have a marketing strategy that market Wits as a first choice for potential engineering students?
- Does the Faculty have any mechanisms in place to engage with its alumni (e.g. events, newsletters, etc.)?
- What achievements contribute to being regarded as a successful engineer?

The questionnaire underwent an internal evaluation process, input and approval through structures within Wits (Wits Alumni Relations Office, Engineering and Strategic Planning Division).

POPULATION & SAMPLE DESIGN

The survey targeted engineering alumni from the University of the Witwatersrand across all years of graduation. It has been noted that when a number of decades of graduates are covered by an alumni survey it results in a very large number of observations and the ability to examine trends over time in education and career histories (Eesely, 2002). Confidentiality is an issue of both legal and professional importance (Melchori, 1988) hence safeguards were put in place to ensure the individual identities of the respondents were protected and kept anonymous.

QUESTIONNAIRE DELIVERY

Data collection was undertaken during the period of July–August 2012. The information provided by respondents was collated and used in this study. All Wits engineering alumni with an e-mail address on the Wits Alumni Relations database were invited to participate in the survey through an e-mail invitation. There was no face–to-face contact with respondents.

The main drawback of mail surveys is low response rates, but Stevenson, Walleri and Japely (1985) recommend using multiple follow-up mailing to non-respondents to bolster response rates (Cabrera et al., 2005). After the survey was e-mailed to alumni, various steps were taken to promote it. Details of the survey were posted on the Alumni Relations LinkedIn account, which has 4 805 members, twitter account and website. The survey was also mentioned in *TheEdge* newsletter (for Wits alumni) and the Wits news e-letter. A follow-up e-mail was sent to alumni a week before the closing date to persuade them to participate in the survey.

LIMITATIONS

Low response rates have been noted as a drawback in conducting alumni surveys (Eesley, 2012). The Wits Alumni Relations office has reported that approximately 5% of alumni e-mailed by Wits University access their e-mails. This affected the response rate of the study. However the sample size was sufficient to conduct a strategic assessment within the remit of the study.

PROFILING OF ALUMNI

The first section of the study provides personal, educational and career profiles of the participants in the survey.

PERSONAL PROFILE

The personal profile covers details of gender, age, country of origin, country of residence and year of graduation.

a) Gender

The sample was dominated by males (89%), and only 9% were females.[6] Engineering has been widely considered a male-dominated discipline. Historically Wits has provided vast opportunities for males. These results reflect this inherent gender imbalance. Although only 9% (22 female engineering alumni) of the sample were female, this was sufficient to provide valuable input into the study.

b) Country of Origin

The results summarised in Table 1 below reveal that 77.7% of participants originated from South Africa. The rest of the respondents represent other African countries, Europe, Australasia, Middle East, Asia and North America.

[6] *2 % did not answer this question.*

Currently 69.7% of the sample lives in South Africa while 29.4% lives abroad. This is illustrated in Table 2 below.

	Count	%
Botswana	1	0.4%
Britain	1	0.4%
Bulgaria	1	0.4%
Cyprus	1	0.4%
Democratic Republic of the Congo	1	0.4%
England	5	2.1%
Germany	3	1.3%
Greece	2	0.8%
Israel	1	0.4%
Malawi	1	0.4%
Namibia	2	0.8%
Netherlands	2	0.8%
New Zealand	1	0.4%
Norway	1	0.4%
Portugal	1	0.4%
Scotland	1	0.4%
South Africa	185	77.7%
Sweden	1	0.4%
Taiwan	1	0.4%
Tanzania	1	0.4%
The Netherlands	1	0.4%
Turkey	4	1.7%
United Kingdom	7	2.9%
USA	1	0.4%
Zambia	1	0.4%
Zimbabwe	4	1.7%
(blank)	6	2.5%
	238	**100.0%**

Table 1: Country of Origin

c) Country Currently Living in

	Count	%
Outside South Africa	70	29.4%
South Africa	166	69.7%
(blank)	2	0.8%
	238	**100.0%**

Table 2: Country of Residence

d) Year of Graduation

As the study used an open survey with no specific target year, it was important to determine years of graduation by decade. Table 3 below shows the results, indicating that just over half of the respondents graduated in the past 20 years (137 respondents). Just under a half of the sample graduated before the 1990s (127 respondents).

<= 1969		1970 – 1979		1980 - 1989		1990 - 1999		2000 - 2012	
1943	1	1970	2	1980	5	1990	5	2000	8
1948	1	1971	2	1981	3	1991	4	2001	3
1949	2	1972	3	1982	3	1992	6	2002	7
1951	1	1973	3	1983	8	1993	6	2003	4
1952	1	1974	7	1984	5	1994	4	2004	4
1953	1	1975	3	1985	11	1995	7	2005	3
1954	1	1976	8	1986	3	1996	8	2006	5
1955	3	1977	1	1987	7	1997	6	2007	4
1956	1	1978	2	1988	2	1998	2	2008	10
1957	2	1979	1	1989	7	1999	5	2009	7
1959	2							2010	12
1960	1							2011	12
1961	2							2012	5
1962	2								
1963	2								
1964	1								
1965	1								
1966	3								
1967	5								
1968	3								
1969	5								
41		**32**		**54**		**53**		**84**	

Table 3: Year of Graduation

e) Participants Age

Figure 2 illustrates the age breakdown of the sample and shows that most of the sample were over the age of 40 (63.9%), followed by the 35–39 age group and 25–29 years each constituting 10.1% of the sample. A smaller number fell within the age group 30–34 years (8.4%) and 21–24 years (6.3%), and less than 1% was below the age of 21 (0.4%).[7] These results show that the sample had fair representation across age categories.

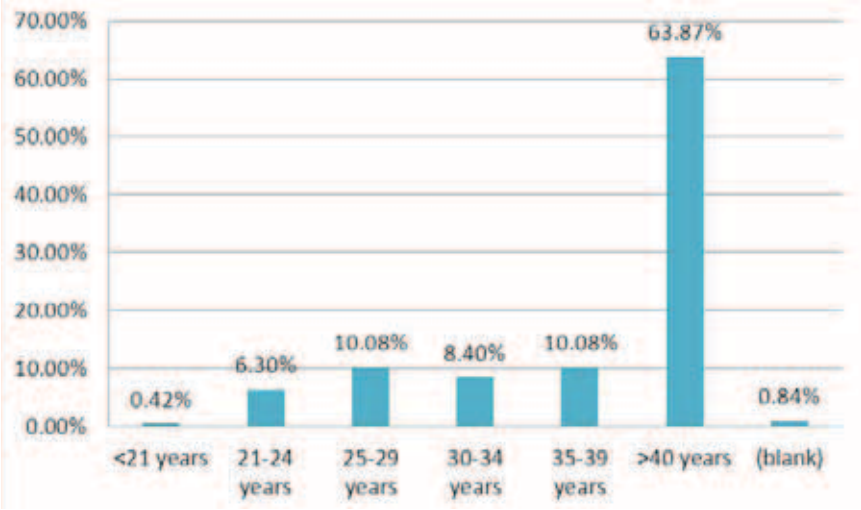

Figure 2: Participant Age Categories

The sample therefore constituted a good balance between recent graduates (past 20 years) and older graduates (pre-1994).

[7] *0.8 % did not answer this question.*

Educational Profile

This section discusses the educational profile of the sample: their host school/ department as a student at Wits, as well as their qualification/s.

HOST SCHOOL/DEPARTMENT

The Wits Faculty of Engineering and the Built Environment offers a range of qualifications. Respondents were asked to indicate their host school or department. Figure 3 shows that the respondents constituted a representative sample across the different types of engineering qualifications offered by Wits.

Results reveal that electrical and information engineers (23.9%) and mechanical, industrial and aeronautical engineers (23.5%) were most represented. These were followed by chemical and metallurgical engineering (18.9%), civil and environmental engineering (18.5%), and mining engineering (12.2%). Architecture and planning graduates composed 0.4% of the sample while 1.8% selected the 'other' option.[8]

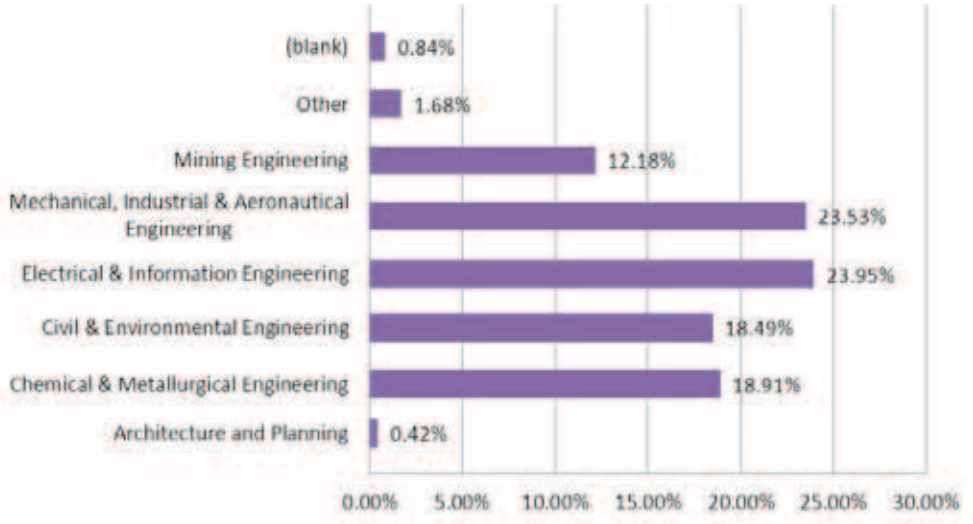

Figure 3: School or Department of Affiliation

The sample was not dominated by a specific type or types of engineering, and provided a wide diversity of representativeness for the study.

[8] *0.8 % did not answer this question.*

EDUCATION LEVEL

Most of the sample qualified with a BSc in their field of specialisation, for example, mining or electrical engineering. A few had an MSc (Master of Science in Engineering) or a PhD (Doctor of Engineering).

CAREER PROFILE

The study profiled respondents according to their career: current level, sector employed, current employer, executive employment, company ownership, registration with the Engineering Council and/or a voluntary association, economic status, and, lastly, details of special achievements.

Level of Career

Engineering alumni were asked to indicate their current level of career, and were give the options of Engineer, General Management, Technical Management and 'other'.[9] Table 4 presents the results, showing that the sample constituted fair representation across each level of the engineering career. Engineers comprised 23.5% of the sample, 28.3% were working in general management and 20.2% in technical management.

	Count	%
Engineer	56	23.5%
General Management	67	28.2%
Technical Management	48	20.2%
Other	53	22.3%
(blank)	14	5.9%
	238	**100.0%**

Table 4: Current level of career

EMPLOYMENT BY SECTOR

Table 5 below reveals that just under half of alumni were employed in the corporate sector (42.69%), 25.2% selected the 'other' option, and 11.8% were entrepreneurs.

	Count	%
Corporate	102	42.9%
Entrepreneur	28	11.8%
Government	18	7.6%
NGO	4	1.7%
Other	60	25.2%
(blank)	26	10.9%
	238	**100.0%**

Table 5: Sector of Employment

[9] *5.9 % of the sample did not answer this question.*

Smaller numbers of alumni worked for government (7.6%) and non-governmental organisations (NGOs) (1.7%).[10]

EMPLOYMENT

The following list represents some of the companies at which participants in the survey are employed:

- Nedbank
- Government – environmental impact management
- The World Bank
- Peregrine Holdings Limited
- Namibian Ports Authority
- Arup
- Hermann Hess Consult (associate)
- Airlines Association of Southern Africa
- Zamin Resources
- Schroders Investment Management
- Turnstar Systems
- Tyco
- Holley and Associates (Pty) Ltd
- a Canadian mining company
- LB Engineers
- Government of Alberta, Canada
- Barloworld
- Telkom SA
- Colorado School of Mines
- ABC Engineers African Bank
- AEL Mining Services
- Airlines Association of Southern Africa
- AngloGold Ashanti
- Arcelor Mittal
- Areva Resources Namibia
- Coca Cola Fortune
- Colorado School of Mines
- De Beers
- Denel
- Eskom
- Exxaro
- Impala Platinum
- Johannesburg Roads Agency
- Manchester Metropolitan University, UK
- KEO/Qatar Foundation
- North American Stainless
- Queensland University of Technology
- Rural Industries Promotions Company (Botswana)
- SGS Germany GmbH
- SAP America
- Shinagawa Refractories Australasia NZ Ltd
- SLR Consulting (Africa)

[10] *10.9% did not answer this question.*

EXECUTIVE EMPLOYMENT

The results in this area, (illustrated in Figure 4) demonstrate that 31.1% of the sample has experienced employment at the executive level.

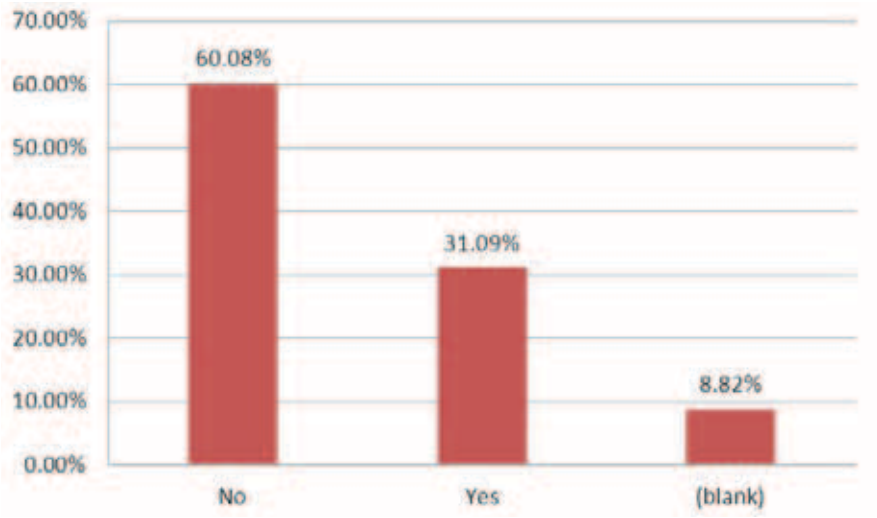

Figure 4: Percentage Employed at Executive Level in Organisation

The results of deeper probing to determine details of the executive employment are shown in Table 6. Results indicate that 44.6% of the respondents have been or are currently employed as chief executive officers (CEOs), 9.5% as chief technology officers (CTOs), and 4.1% as chief information officers (CIOs). A large number of respondents selected the 'Other' option.

	Count	%
Chief Executive Officer (CEO)	33	44.6%
Chief Information Officer (CIO)	3	4.1%
Chief Technology Officer (CTO)	7	9.5%
Other	31	41.9%
	74	**100.0%**

Table 6: Breakdown – Executive Position

Own Company

Most engineering alumni have not started their own companies (74.4%); 23.5% have.[11]

	Count	%
No	177	74.4%
Yes	56	23.5%
(blank)	5	2.1%
	238	**100.0%**

Table 7: Own Company

[11] *2.1% did not answer this question.*

ENGINEERING COUNCIL

Just under half of the sample (41.2%) indicated they were registered with the Engineering Council and 54.2% selected 'No'.

	Count	%
No	129	54.2%
Yes	98	41.2%
(blank)	11	4.6%
	238	**100.0%**

Table 8: Registered with the Engineering Council

VOLUNTARY ASSOCIATION

51.3% of the sample indicated that they belonged to a voluntary association while 42.4% did not.

	Count	%
No	101	42.4%
Yes	122	51.3%
(blank)	15	6.3%
	238	**100.0%**

Table 9: Belong to a Voluntary Association

ECONOMIC STATUS

Figure 5 below shows the sample breakdown by economic status: specifically, current gross monthly income. About a quarter of the sample (21%) did not answer this question. The results reveal that most of the alumni earn in the R51 000–R100 000 income bracket (21%), followed by R31 000–R50 000 (15.5%), R101 000–R500 000 (15.5%) and R10 000–R30 000 (8.4%). Smaller percentages of the sample earn in the higher income brackets of over R1 million (6.3%), R701 000–R1 million (3.4%) and R501 000–R700 000 (3.4%). The graph doesn't make sense at all. Is the income per month or annum?

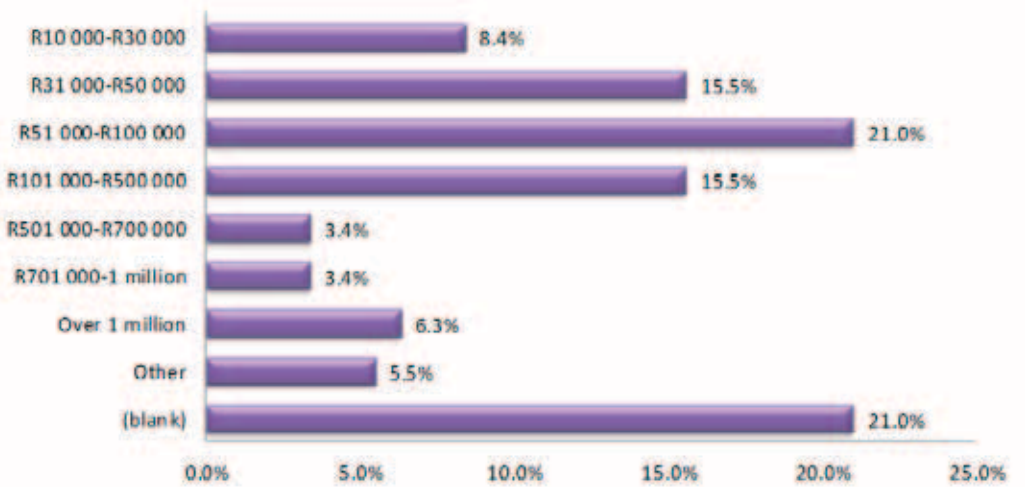

Figure 5: Current Gross Monthly Income

SPECIAL ACHIEVEMENTS

The engineering alumni were asked about their special achievements such as awards received those from voluntary associations, designer awards and national awards, as well as honorary doctorates etc. Figure 6 below shows that 9.2% of the sample has been honoured in this way.

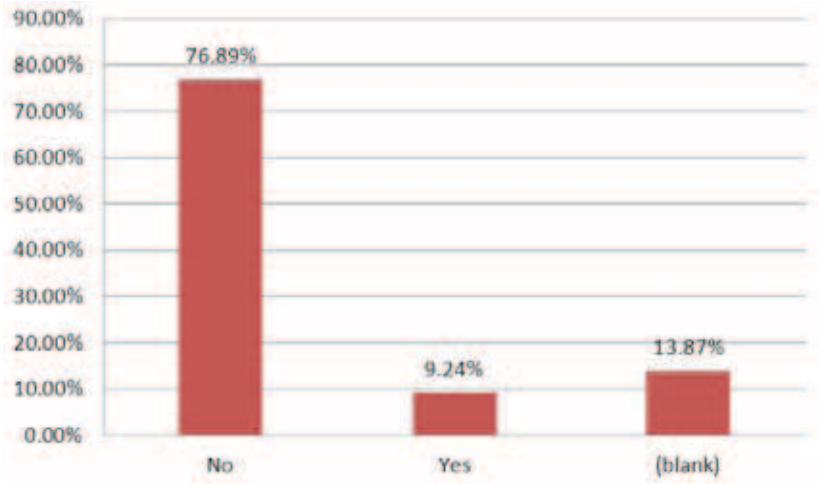

Figure 6: Awards (Voluntary Associations, Professional, National and Honorary PhDs)

Educational Experience

As the academic component of the Wits experience is a key focus of the study, the alumni were asked about their satisfaction levels and views of their Wits academic education.

CHOICE OF UNIVERSITY AS A STUDY OPTION

Almost nine out of ten (89.9%) respondents chose Wits as their first option institution to study at, while the rest (9.2%) did not.[12] The sample was asked about their choice of Wits as a preferred option. Table 10 shows these results. 26.1% said their choice of Wits as a first option was informed by the institution's overall reputation. This was followed by reputation in the field of engineering (22.7%). The location of Wits (16.8%) and the availability of funding to study at Wits (10.1 %) also played a big role in influencing students' choice of Wits as a first option to obtain their education.

	Count	%
Funding was available to me to study at this particular institution	24	10.1%
Graduates from this institution have good career and employment prospects	7	2.9%
Had no choice because the University I wanted did not accept my application	1	0.4%
It was recommended to me	5	2.1%
It was the only institution offering this programme	16	6.7%
My high school/teachers/employer advised or encouraged me to enrol here	3	1.3%
The cost of the programme compared with other institutions	2	0.8%
The institution's reputation in my chosen subject area	54	22.7%
The location of the institution	40	16.8%
The overall reputation of the institution	62	26.1%
The reputation of the department	11	4.6%
Other	11	4.6%
(blank)	2	0.8%
	238	**100.0%**

Table 10: Why did you choose Wits to complete a qualification?

[12] *0.8% did not answer this question.*

From the above it can be concluded that the reputation of Wits and the engineering discipline at Wits are the main reasons most of the alumni chose the university as the most desirable place to study.

SATISFACTION WITH EDUCATIONAL COMPONENTS

A high-quality academic education is imperative to a positive and fruitful Wits experience. Hence the sample's satisfaction levels with the critical components of the Wits education were probed. Results are depicted in Figure 7 below.

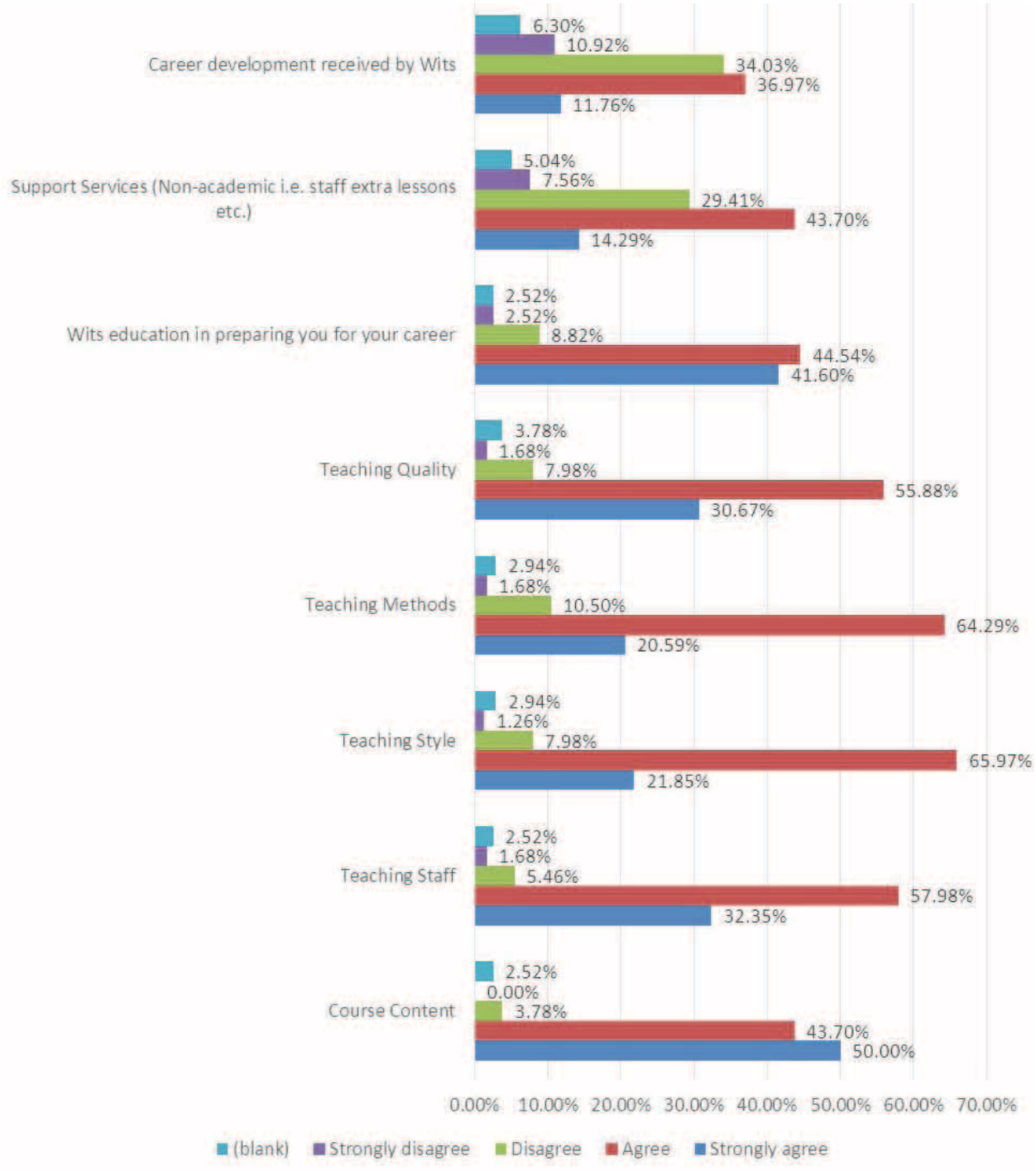

Figure 7: Satisfaction with Quality of Education received from Wits

Course content: A large majority (93.7%) of the sample indicated they were satisfied with the engineering course content; half the sample felt strongly satisfied.

Teaching staff: The bulk of respondents (90.4%) were satisfied with the teaching staff with almost a third (32.4%) indicated strong satisfaction.

Teaching style: A considerable number of engineering alumni (87.8%) were satisfied with the teaching style used while 9.3% were dissatisfied.

Teaching methods: Most of respondents showed positive satisfaction levels with teaching methods (84.9%); of these, 20.6% were strongly satisfied. Only 4.6% were dissatisfied with this aspect of the education they received at Wits.

Teaching quality: 86.6% of alumni were satisfied with the quality of teaching they received; 9.7% were dissatisfied.

Wits education in preparing for career: Just below half of the sample (46.1%) agreed that their Wits education had prepared them for a career in engineering. An additional 41.6% strongly agreed while 11.3% of respondents were dissatisfied with this component of the Wits education.

Non-academic support services: 58% of the sample was satisfied with non-academic support received from Wits. 37% indicated negative satisfaction levels and this suggests that this is an area of the Wits education that can be considerably improved.

Career development received: 48.8% of engineering alumni were satisfied with the career development offered by Wits. A substantial number (44.9%) of the alumni were dissatisfied. We can conclude that the University's approach to career development for engineering students has created significant levels of dissatisfaction.

Overall, alumni were highly satisfied with most aspects of the Wits academic educational experience and, in particular, with course content and teaching staff, which scored satisfaction ratings of more than 90%. Strong satisfaction was also shown for teaching style, teaching methods, teaching quality and career preparedness, each receiving satisfaction ratings of more than 80%. Non-academic support services showed room for enhancement with a 37% dissatisfaction rating. Similarly, career development received at Wits showed a high 44.9% dissatisfaction score.

BEST ASPECTS OF WITS EDUCATION

The engineering alumni surveyed were asked to comment on what they felt was the best aspect of their Wits education. The top three aspects cited were teaching staff/ lecturers, excellent career preparedness for a successful engineering career, and the quality of the course content. Selected comments are presented below.

Teaching Staff

- Being taught by world experts in various fields
- Considerate staff
- Experienced lecturers
- Free thinking and the ability of lecturers to accept new ideas
- General support from the teaching staff and willingness to help all the time
- Good, and well-respected academic staff, good research programmes
- Lecturers who fostered a passion for their subject
- The mentorship and support received were outstanding
- Top professors and lecturers with international reputation in my chosen fields

Career Preparedness

- Basics in Maths, Physics and Chemistry were well covered in the early years. This enabled me to be constructively involved in problems covering different disciplines in my professional career'
- Broad base of understanding which till today creates a strong foundation for any design requirements'
- Certainly prepared me for a technological career'
- Gave me the opportunity to acquire the knowledge and capability to make my career what it is'
- Good base, taught to be independent, think, analyse and solve problems
- I didn't realise it at the time, but the curriculum certainly did enhance my ability to establish and successfully run a business
- I felt that it provided a good basis for my career to develop from
- Quality of education and relevance to career

Course Content

- 'High quality of education'
- 'Breadth and depth of subject matter'
- 'Broad exposure to all aspects of my chosen discipline and a solid grounding in methodology rather than just facts'
- 'Broad insights into electrical engineering subjects'
- 'Course content and teaching style/quality'
- 'Course content was well developed'
- 'Good practical information, excellent networking within the courses'
- 'In my years at Wits the engineering curriculum was solid and rigorous, and the bar was set high for passing grades. A-grades were scarce, and hard-earned. I have never felt lacking in my engineering education, and have always had a strong platform for continuing learning and education'
- 'My engineering education was very solid. We had some excellent lecturers who taught us and were clear in their expectations. There was little to no hand-holding, i.e. it was up to us to meet the set targets. (This is a long time ago!)'
- 'The course was excellent and taught me to be inquiring and to find information & knowledge when necessary'
- 'Being taught to solve problems and work logically, as well as being personally responsible for myself and for managing my time/priorities. Superb technical training'
- 'High standards and focus on independent thought and problem solving'
- 'It taught me to think in an analytical way'
- 'Strong focus on research, project work and thinking skills'

Other comments had to do with the reputation of Wits: 'Getting a reputable degree'; 'I enjoyed Wits, and the education I received was on par with top-ranking institutions'; and 'Wits reputation bases on success of previous graduates in the world of work'.

IDEAL COMBINATION COURSE

The sample was requested to indicate their ideal combination course, and were required to select either 'less' or 'more' for theory, experimental work and, lastly, social sciences courses. Results shown in Table 11 suggest that a substantial proportion of the sample (69.3%) was of the view that the engineering course should include more experimental work while 8.8% said that there should be less. 65.1% thought more social sciences courses would be beneficial while 18.1% of the sample opposed this view. And 31.9% of the respondents sought less theory, while 36.6% thought more theory was needed for an ideal course.

	(blank)	Less	More
Theory	31.5%	31.9%	36.6%
Experimental work	21.8%	8.8%	**69.3%**
Social sciences courses (philosophy, project management, law, industrial psychology etc.)	16.8%	18.1%	**65.1%**

Table 11: Ideal combination course

Therefore, for an ideal combination course, a significant number of the alumni (more than 60% each) would have liked more experimental work and social sciences courses. The latter could include project management, philosophy, law and industrial psychology, to name but a few possibilities.

LEARNING CLIMATE

The learning environment and its enhancement to benefit student learning is a central matter of concern for higher education institutions (Day, 2009: 9.1). A welcoming and conducive environment for learning is a key component of the quality experience of a higher education institution. This section gauges views and concerns about the atmosphere of the engineering learning environment.

ATMOSPHERE OF THE SCHOOL/DEPARTMENT

Table 12 presents the attitudes of engineering alumni towards the atmosphere of the school/department, specifically, whether they had felt welcomed or not.

	Count	%
No	15	6.3%
Yes	217	91.2%
(blank)	6	2.5%
	238	**100.0%**

Table 12: Felt welcome in the School/Department

As can be seen in Table 12, the majority of the sample (91.2%) felt welcomed by the school/department, and 6.3% indicated they did not. This is a positive indication that the Wits Engineering Department has provided a conducive learning climate over several decades.

The general atmosphere of the school/department was described by engineering alumni by way of qualitative descriptions. The majority of the responses were positive in nature, and a few were negative.

Some positive descriptions of the respondents' school/department:

- Challenging but fun
- Close knit and professional industry experts
- Collaborative

- Collegial with a demanding standard
- Competent and friendly
- Conducive to learning
- Dedicated
- Energetic, multi-cultural, professional
- Dynamic
- Intellectually and socially vibrant
- Encouraging
- Excellent emphasis on the academic goals
- Friendly and inspirational
- The atmosphere was good for learning and the staff encourages students to work hard
- Welcoming
- Professional, purposeful and organised
- Reputable and helpful
- Simple, welcoming to all even for poor students like me. All students were into real learning and I felt good to be a Witsie

Some negative comments:

- I felt tolerated but not welcome
- Unfriendly
- A bit dull, educationally orientated
- Aloof at times, helpful sometimes
- Anti-social
- Arms-length
- Depressive
- Disinterested
- Business-like

The sample was further asked to describe the atmosphere of the learning environment. Overall the responses were positive. Positive descriptions of the learning environment included:

- Acceptable
- Appropriate
- Demanding and maintaining high world-class standards
- Authentic
- Awesome
- Enlightening, calm & conducive to learning
- Challenging
- Comfortable
- Collaborative
- Competitive
- Conducive to learning
- Demanding
- Difficult
- Fairly welcoming and conducive to learning
- Friendly and serious
- Good, supportive
- Highly intelligent
- Inclusive
- Intense
- Dynamic, eager
- Effective
- Encouraging
- Excellent and life-changing
- Engaging and it stretched us as students
- Relaxed but committed
- Professional and well structured

- Principled
- Supportive
- Welcoming warm atmosphere
- Very personal attention given

Negative comments were:

- Tense
- Dull
- Not supportive

Institutional Culture

Given its critical importance to effective education, the study also solicited responses to the fairness and equality of the institution, with special focus on whether students felt that they were treated fairly and on an equal basis.

FAIRNESS AND EQUALITY

Figure 8 below summarises engineering alumni views on whether Wits treated its students fairly and equitably. The majority of respondents (90.8%) felt that Wits adhered to this requirement.

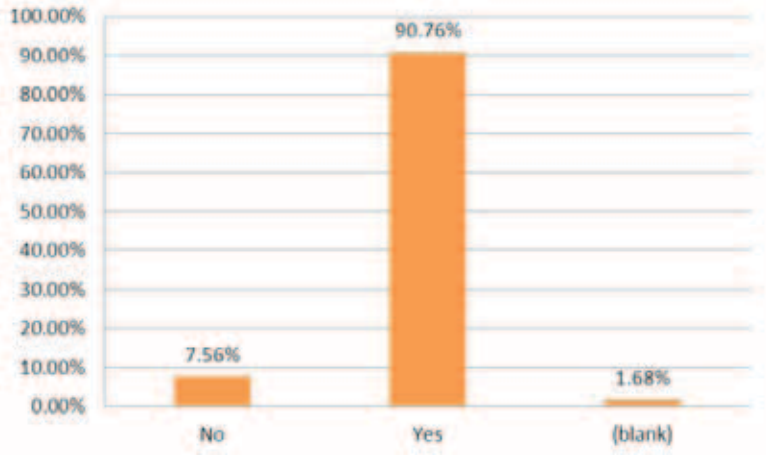

Figure 8: Perceptions about Wits and promotion of Fairness and Equality

Respondents were further asked if they had experienced any form of discrimination; 10.5% said 'yes' and 88.2% said 'no'.[13] Table 13 shows the results of further probing on the issue to determine the kind of discrimination experienced by those who had answered 'yes'. Most selected 'racial' (60%), followed by 'other' (24%), and gender (8%).

[13] *1.3% did not answer this question.*

	Count	%
Gender	2	8.0%
Racial	15	60.0%
Other	6	24.0%
(blank)	2	8.0%
	25	**100.0%**

Table 13: Kind of Discrimination Experienced

Respondents were furthermore asked to describe the incident of discrimination. Closer examination of these results shows that most incidents were of the general racial discrimination experienced under apartheid. One respondent mentioned dissatisfaction about University policy with regard to re-marking of papers. And another mentioned religious discrimination, in that exams were scheduled on religious holidays. Another felt he or she was ostracised because of failing the programme.

Academic discrimination and anti-Semitism were mentioned, as well as cultural discrimination with regard to lecturers not understanding students with a different cultural background.

PROFESSIONAL DEVELOPMENT

Respondents' satisfaction with, and perceptions of the quality of professional development rendered by Wits was also evaluated in the study, as were their views on Wits graduates as global citizens.

CAREER PREPAREDNESS

The sample was asked to elaborate on their views of career preparedness, in the form of qualitative comments on how their Wits qualification helped in their career.

Thematic analysis of these responses showed that the top three leading reasons for satisfaction in this respect were career advancement (fast-tracking of career), being given a solid foundation and being given the necessary skills for a successful engineering career. The excellent reputation of Wits and its engineering degree also featured strongly. Some comments are stated below.

Career advancement

- Boosted my career internationally
- Did not struggle to get employment and I got the prestige in my workplace
- Easier career progression
- Enabled career as Full Professor and Vice-President at a US university
- Enabled me to get a good career start in SA, then in Europe
- Fast-tracked career growth
- Fundamental to my career, Wits approach to learning helped me to adapt to any situation
- I got promoted quicker
- I managed to obtain employment in the UK and Australia
- It has given me a competitive advantage – the edge!
- Opened up doors by teaching me problem-solving methodologies
- Outstandingly. Went on to Harvard Business School

Solid foundation

- Provided a thorough grounding and preparation for my career
- Gave me a solid engineering background and good work ethic
- It positioned me ideally to deal with the many challenges I have faced and feel that the degree has equipped me to be adaptable
- Gave me a good grounding in logical thinking and analysis
- Gave me the foundation skills and competencies to adapt to challenging work environments
- Good analytical/scientific skills background
- Good science background and curriculum makes one to survive in all environments
- I have a solid foundation for aeronautics. I can provide feasible inputs to design problems in a team of highly experienced engineers
- I have used virtually every aspect of my undergraduate studies
- Taught me how to think critically and how to solve problems that I have

Reputation

- A Wits degree was always a good recommendation
- Acceptance of high-quality postgraduate degree
- Comparable to German engineering university, readily accepted in job market
- Wits degree has good reputation and skills were relevant

Figure 9 below indicates that 82.77% of the sample felt that they were adequately prepared for their career in terms of language skills and report writing. However, that 15.9% of respondents felt that were not adequately prepared reveals an area with room for improvement.

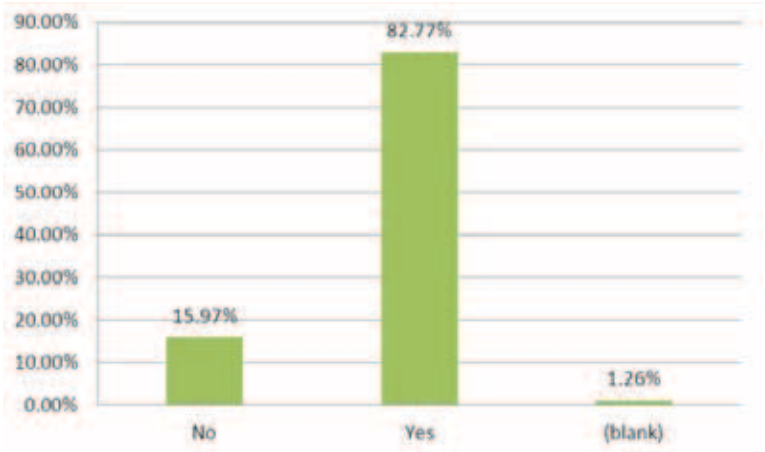

Figure 9: Development of Communication and Language Skills

ADEQUACY OF WITS GRADUATES

Engineering alumni were asked their views about the competency of Wits graduates they had encountered in the workplace. Results show that 89% indicated they felt that the Wits graduates they have worked with were adequate while 11% disagreed. Only 149 respondents of the sample answered this question as it catered specifically for those with managerial experience.

They were further asked what they felt Wits graduates lacked. Many responses discussed specific skills such as communication and presentation as well as practical skills. Some of the responses are listed below.

- All graduates lack basic maths and science skills
- Ability to evaluate the relevance of results obtained from computations on the computer
- All graduates merely lack exposure to reality. Wits graduates are no exception
- Application of theoretical knowledge. Ambitious but sometimes lack the knowledge to achieve objectives
- Career preparation, interview preparation, poor quality of candidates in terms of academic capabilities
- Communication skills
- Engineering graduates lack a grasp of accounting and economics and of managerial skills
- English writing and communication skills. Grammar
- Entrepreneurship skills
- In some cases, people and leadership skills, but this comes with practical workplace experience anyway
- Interpersonal skills – communication skills
- Language skills
- Managerial skills and people management
- Mostly social skills
- Practical experience and basic report-writing skills
- Practical skills
- Practical knowledge and economics'
- Presentation skills and recent graduates sometimes lack some soft skills like how to dress for work etc.'
- The ability to apply in practice, what they studied and learned at University'
- Presentation skills not up to par'
- Support structure at Wits to help them post qualification'
- Self-confidence'
- With regards to engineering: practical usefulness straight after graduation. Wits graduates are actually more geared up for going into research. Perhaps this is intentional. But a practical training at undergraduate level especially as to the intricacies of how to work as a consulting engineer can go a long way'

WITS PRODUCING GLOBAL CITIZENS

Wits commits to producing graduates for global society as well as attracting international students. This section engages with these concepts.

About 8% of the sample have emigrated from South Africa since graduation and hence qualify as Wits global citizens. Table 1 showed that 77.7% of the sample originated from South Africa and currently 69.7% live in South Africa.

CURRENTLY LIVING OUTSIDE SOUTH AFRICA

The 70 engineering alumni (Table 2) who indicated they live outside South Africa were further asked about their country of residence.

	Count	%
Australia	15	21.4%
Botswana	1	1.4%
Canada	5	7.1%
Cyprus	1	1.4%
England	1	1.4%
France	1	1.4%
Germany	1	1.4%
Namibia	3	4.3%
Netherlands	1	1.4%
New Zealand	1	1.4%
Norway	1	1.4%
Portugal	1	1.4%
Qatar	2	2.9%
Saudi Arabia	1	1.4%
Blank	3	4.3%
Spain	1	1.4%
Switzerland	2	2.9%
Tanzania	1	1.4%
Turkey	1	1.4%
UAE	1	1.4%
United Kingdom	13	18.6%
United States of America	13	18.6%
	70	**100.0%**

Table 14: Country outside South Africa Breakdown

Table 14 shows that 21.4% of the sample currently lives in Australia, followed by the United Kingdom (18.6%) and United States (18.6%). In addition, 7.1% live in Canada, followed by 4.3% in Namibia and 2.9% each in Switzerland and Qatar.

Recommendations

Alumni research has been argued to be the most productive assessment technique for higher education improvement and is frequently used by the alma mater concerned for reform. This study is a step towards using alumni surveys as an ongoing programme for institutional evaluation and improvement. However, alumni research is most effective when it is used as a culture of evidence that not only collects data outcomes, but goes a step further to improve quality by making recommendations for improvement. This section discusses the recommendations given by the sample group of engineering alumni.

This tracer study primarily aimed to establish an institutional understanding of the experiences and satisfaction levels of engineering alumni, with the intention of enhancing the Wits experience. Within this key aim the study also requested alumni to provide recommendations to enhance the experience. This section presents these recommendations. Few participants gave recommendations concerning improvement of the Learning climate specifically at the School/Departmental level. Most recommendations concerned the educational experience, institutional culture and professional development.

The alumni who participated in this study were also probed as to their openness to getting involved with University activities such as mentorship and capacity building. The results can be seen in Figure 10 below. More than a third (36.1%) indicated they were not open to involvement in University activities. For those who were open to doing so, the specific areas in which they were open to getting involved with Wits were: 36.3% in mentorship, 24.4% with enhancing the reputation of Wits, 15.5% in curriculum development, 12.2% in capacity building, and 10.1% in donating money.

The 36.1% who said they were not open to getting involved with University activities were asked to provide a reason for their answer. Results indicate that this was largely due to them living outside South Africa, being on retirement, and having other commitments, busy schedules or no time and money to invest in Wits. One respondent said he/she was ‘disappointed in downgrade of Wits due among other things to lowering of standards’. Others commented: ‘I think Wits is sliding at the moment’; ‘not much connection now with Wits’; ‘I support too many charities already’; and ‘paid enough school fees, do not believe the money will directly benefit students’.

Educational experiences (Academic)

Firstly, engineering alumni were asked to red-flag areas that they felt needed improvement in the education offered by Wits. Most responses highlighted course content/curriculum, career preparedness and the teaching model as areas of concern.

Most of comments were about *course content (curriculum)*. Alumni flagged areas of weakness in the engineering curriculum such as verbal/written communication; updates of global best practice; improving economic and financial education; a more practical curriculum that is sensitive to industry trends; including business skills; focusing on international trends; focusing on project management; and including humanities:

- Regular update on the global best practices in each area of study'
- Adopt and develop curriculum to industry trends
- All undergraduate engineering courses must also include mathematical statistics. Bulk of post graduate work involves analysing data to take informed decisions
- Verbal/written communication is important in business today. Economics/ accounts also NB. These courses should be done with the relevant departments at Wits. And not by the faculty
- Would have been good to include business skills and accounting and maybe basic legal and company tax
- Curriculum needs to be more practical
- Too rigid. Engineering did not allow much opportunity to include other subjects in the curriculum such as the Arts, or Business
- Economics and commercial aspects in engineering
- Finance/economics should be included in engineering curriculum
- Focus on international trends, involve the industry, all too often academic staff do not know what is going on in the industry they teach
- Focus on project management, teamwork, and practical aspects of engineering
- I thought the curriculum was good. Compared to other engineers I have worked with, I have a strong grounding in engineering principles and I understand the requirement to work hard. There could have been more case study examples within my education as often it was only theory which did not help with seeing the applicability of the degree
- I would have loved to have had field trips to see the technology employed in my field
- The curriculum should be structured around skills development/ conceptual learning
- The curriculum needs to be tailored to what business needs. There was no course that prepared me for the real world
- The course was very scientific whereas my peers who graduated from other institutions with the same degree had a more practical approach to their learning. As such it took me a few years to become useful in engineering. Include more [of the] practical side of engineering in the course
- The curriculum must always be aligned to the demands of industry
- Include business training for private practice
- Increase humanities within engineering
- Industrial engineering degree too technical. Less emphasis should be placed on mechanical engineering courses
- More content on human resource management
- More practical integration with the learning through getting involved in actual design and construction projects to better understand the theory
- More relevant exposure for engineering students to the business aspects (similar to the MBA programme), namely, finance, human resources, marketing, strategic planning, financial modelling, commercial and legal issues, etc.
- The curriculum was far too narrow, with far too few choices. There were absolutely no Humanities or Social Science courses and the offerings in Electrical Engineering were slim
- The engineering degree was first-rate in academic content, but there was little content relating to business management, such as finance

Other recommendations were also discussed by alumni, such as extra lessons. One respondent said: 'I think the area of extra lessons in engineering can be looked at. Some students, like me, came from villages with no knowledge of what a microprocessor was or how to use a computer, for example. Also technical report-writing techniques

for engineering students.' Another suggested putting support systems in place 'to aid those who struggle with certain aspects of the engineering degree' and mentioned 'optional extra classes in graphics and CAD classes'. Other recommendations included:

- Increased tutoring
- Go see how it's done in Australia
- More direct partnerships with industry, such that when you leave tertiary into the industry you can hit the ground running

Elements of the *teaching model* were also mentioned, specifically:

- Higher quality staff; more international professors
- Managerial and [staff] interaction [with] students. Too many staff were not open for approach regarding major subjects
- Quality, attitudes, teaching methods of lecturing staff need to be improved

Alumni were also asked to provide recommendations to enhance the Wits experience. Most recommendations were about the engineering *course content (curriculum)*, followed by the teaching model.

The sample put forward substantial recommendations on course content (curriculum). These included more visits to sites; instituting a personnel management course; benchmarking against international trends; including project management in the curriculum; a closer relationship with industry; compulsory field trips; and inviting experienced engineers to interface with students. Comments pertaining to the course content were:

- In my field of study I would have liked a lot more on examples and actual visits to sites employing the technology
- Introduce a personnel management course in all professional courses. Enhance managerial skills without losing focus on core business
- It is essential the School benchmarks itself with international trends, consequently focusing courses on the future technology. Mining graduates are not generally accepted in the industry, consequently many are lost to the industry
- Introduce project management as a core skill. Improve project report-writing core elements
- More visits to engineering environments, i.e. industry
- A better understanding of project management and the practical application of what has been learnt would also help
- A course outline indicating the important modules to be covered within the year so that students know what is expected from them and that there is no gap in the taught subjects – to ease the flow from one year to the next, also an evaluation of understanding by end of year from the students as feedback to the lecturer
- Academic study rather than outcomes-based qualifications
- Closer relationship with industry
- Compulsory field trips – More projects with a practical component
- Experienced mining engineers need to interface with undergrads to discuss their expectations and realistic behavioural objectives
- Give students more exposure to the "real world" demands
- Have lecturers and demonstrators spend some time pointing out to students how they could and should utilise what they are learning in practical situations that they are likely to deal with in a working environment
- More real world experience vs academic only
- Training in leadership and the management of people
- Once a week course which simulates the working environment to a certain extent
- Preparation for the market place
- Provide links to professionals in the field, integrate more practicals into degree

Recommendations for the *teaching model* focused on the more frequent use of guest lecturers and lecturers from industry, for lecturers to learn coaching skills and employment of international lecturers. Comments included the following:

- I would suggest monitors or tutors who make a point of discussing a student's progress or performance at regular intervals – such as at Cambridge
- The experience would be improved if certain lecturers adopted less aggressive and malicious attitudes towards students. Swifter release of exam results
- Improve teaching quality – give lecturers some mandatory teaching/ coaching skills
- Invite guest lecturers on a regular basis
- Lecturers from industry
- Offer sabbatical teaching/research opportunities to top academics from US and Europe. This will boost credibility for the University on a global basis

Institutional culture (Fairness)

In addition, alumni were asked to provide recommendation/s to enhance the Wits institutional culture. Some notable recommendations were:

- Remove all types of covert/overt discrimination through policies and awareness programmes for both students and lecturers
- Cultural diversity understanding
- Do not compromise on standards for social/political reasons
- Empower lecturers on issues of discrimination. Also provide a forum where these issues can be discussed openly and recorded
- Encourage students to mix with other races
- Must make the place more friendly so that learning may be fun for everyone
- Diversity management course for lecturers

Professional development (Career)

Some alumni felt that more attention should have been given to career preparedness, specifically, better understanding of work and the industry environment and preparation with regard to how to apply their studies to the work environment.

- Although it was not my experience, the majority of my class mates experienced difficulty finding how to associate what had been studied and learned during their studies, with what was being experienced in their working environment. Perhaps some attention should be paid to pointing out how what is being studied can be utilised in a work environment'
- Better understanding of work/industry environment
- Bigger focus on vacation work
- Practicals – work experience

Other aspects red-flagged included administration, better-resourced labs, practical experience, and industry interaction:

- Administration
- Better-resourced labs with more demonstrators and tutor. Streamlined application, admission, fees and finance processes. This is a major weakness
- Ensure students have enough practical experience before they graduate
- More industry visits and hands-on experience
- More practical exposure needs to be added as it helps to prepare the mind-set for what is to come
- There is a need for strong interaction between students and industry across different areas of specialisation

Conclusion

The study aimed to establish an institutional understanding of how engineering alumni experienced and rated the University of the Witwatersrand experience.

Educational experience (Academic)

- About 89.9% of the sample chose Wits as their first option to study. The reputation of Wits and the engineering discipline at Wits are the leading reasons for Wits being chosen to study engineering.
- Overall, alumni indicated high satisfaction levels with aspects of the Wits academic educational experience. In particular course content and teaching staff both which scored above 90%. Strong satisfaction was also shown with teaching style, teaching methods, teaching quality and career preparedness, each having satisfaction levels above 80%. The alumni suggested that non-academic support services need enhancement with a 37% dissatisfaction rating. Career development received at Wits received a 44.9% dissatisfaction score.
- Alumni felt that the top three aspects of the Wits experience involved the teaching staff/lecturer, excellent preparedness for a successful engineering career, and the quality of the course content.
- Significant sections of the sample (over 60% each) would have liked more experimental work and social sciences courses, such as project management, philosophy, law and industrial psychology, for their ideal combination course.
- Engineering alumni red-flagged course content/curriculum, career preparedness and the teaching model as areas that needed improvement.
- The engineering course content (curriculum) and the teaching model were most frequently mentioned as areas of improvement in order to enhance the Wits experience.
- Non-academic support services and the career development received by students at Wits showed room for enhancement.
- Based on areas of weakness flagged about course content, it is recommended these issues be given more substantial attention, for example some put forward:

  - More verbal and written communication skills
  - Incorporate updates of global best practice
  - Improve the financial and economic education
  - A more practical curriculum is needed that is sensitive to industry trends
  - Include business skills
  - Focus on international trends and involve the industry
  - Focus on project management
  - Include humanities
  - Include mathematical statistics in all undergraduate engineering courses
  - The curriculum needs to be more practical

- Include the economics and commercial aspects in engineering
- Focus on project management, teamwork and practical aspects of engineering
- Incorporate more case study examples
- Compulsory field trips.
- It was said by one respondent that no course prepared them for the real world hence the curriculum should be tailored to what business needs.
- It was reported that the Wits course adopted a scientific approach and as a result it took years to become useful in engineering, hence a more practical approach would have been useful.
- More content on human resource management.
- Inviting experienced engineers to interface with students

- The following recommendations are put forward based on Alumni feedback regarding the teaching model:

  - More international Professors
  - The more frequent use of guest lecturers
  - Lecturers mandatory teaching and coaching skills
  - Monitors and tutors should discuss student's progress or performance at regular intervals, as at Cambridge.
  - Increased tutoring
  - Incorporate technical report writing skills
  - Extra lessons for students that came from villages, for example, on how to use a computer and other key aspects.
  - Swifter release of exam results
  - Higher quality teaching staff
  - The quality, attitudes, teaching methods of lecturing staff need to be improved

Professional development (Career)

- Alumni felt that their Wits qualification helped in their careers mainly with career advancement (fast-tracking of career) and having been given a solid foundation and the necessary skills for a successful engineering career, as well as the excellent reputation of Wits and its engineering qualification.
- The majority (82.77%) of the sample felt that they were adequately prepared for their careers in terms of language and report writing skills.
- Engineering alumni were asked their views about the competency of Wits graduates they had encountered in the workplace. 149 respondents answered this question. Results show that 89% of the respondents felt that the Wits graduates they have worked with were adequately trained and 11% believed otherwise. The feedback given about views on what Wits graduates lacked requires further consideration, for example, the lack of basic maths and science skills as well as communication and presentation skills
- Based on the feedback of respondents about the need to give greater attention to career preparedness, the following recommendations are put forward:
- Provide a better understanding of work and the industry environment.
- Better preparation of how to apply studies to the work environment.
- Greater focus on vacation work.

Learning Climate (School/Departmental)

- The majority of the sample (91.2%) felt welcomed by the school/department.
- The general atmosphere of the school/department and learning climate were positive in nature, with a few negative aspects being flagged. These negative comments require deeper examination as feedback indicated that some felt tolerated but not welcomed, the atmosphere was unfriendly and aloof at times.
- The atmosphere of the learning environment was described in mostly positive sentiments such as 'acceptable' and 'authentic' and 'conducive to learning'. The negative comments should be addressed to ensure betterment of the learning environment.

Institutional culture (Fairness and Equality)

- The majority of respondents (90.8%) felt that Wits treated its students with fairness and equality.
- About 10.5% of the sample said they had experienced discrimination at Wits. Caution should be exercised to guard against academic and cultural discrimination.
- Alumni provided the following recommendations that could improve the Wits institutional culture which requires further consideration:

  - Remove all types of covert and overt discrimination through polices and awareness programmes for both students and lecturers.
  - Promote cultural understanding.
  - Do not compromise on standards for social and political reasons.
  - Empower lecturers on issues of discrimination and provide a forum where these issues can be discussed openly and recorded.
  - Encourage students to mix with other races.
  - Develop a diversity management course for lecturers.

Higher education institutions that engage in relationship management with their alumni may expect long-term relationships and higher levels of support and loyalty from them, and overall can better withstand the cyclical nature of aggressive challenges and environmental change (Harrison et al., 1995). Understanding and promoting alumni satisfaction provides numerous benefits in assessing the outcomes of higher education institutional performance programmes (Hartman and Schmidt, 1995).

In their recommendations for enhancing the Wits experience, several respondents mentioned the importance of alumni to current students. Comments included:

- Continue with initiatives that encourage interaction between alumni and current students
- Engage with its alumni in the ICT industry more frequently
- I think that a study-group promotion would increase the understanding value as well future co-operation between former students to enhance the University
- Mentorship programmes to help students to cope with the demands of the degree

Wits therefore needs to develop a high-level relationship-management strategy for alumni to cultivate long-term relationships and loyal alumni to enhance the University as an institution, and the overall Wits experience for current students. This study is a starting point in giving alumni a platform to provide input into the attainment of the strategic imperatives and enhancement of the experience offered by the University.

References

Aldridge, Susan and Jennifer Rowley (1998). 'Measuring customer satisfaction in higher education'. *Quality Assurance in Education Aldridge* 6(4). 197–204.

Bell, M.L. and W.C. Emery (1971). 'The faltering marketing concept'. *Journal of Marketing* (October). 37–42.

Boaduo, N.A-P., J. Mensah and S.M.B. Babitseng (2009). 'Tracer study as a paradigm for the enhancement of quality course programmes development in higher education institutions in South Africa'. Paper presented at the Educational Colloquium, University of North West, Potchefstroom, South Africa, 20–21 August 2009.

Borden, Victor (2005). 'New directions for institutional research'. *Alumni Research in the United States and Europe* 126.

Bruggink, T.H. and S. Kamran (1995) 'An econometric model of alumni giving: a case study for a liberal arts college'. *American Economist* 39(2). 53–60.Cabrera, Alberto, David Weerts and Bradford Zulick. (2003) 'Alumni survey: Three conceptualizations to alumni research'. Available online at: http://www.education.umd.edu/EDHI/about/faculty_pages/cabrera/Three%20conceptualizations%20to%20alumni%20survey-v2.pdf [Last accessed 20.11.13]

Cabrera, A.F., D.J. Weerts and B.J. Zulick (2005). 'Making an impact with alumni surveys'. In D.J. Weerts and J. Vidal, J (eds). *Enhancing Alumni Research: European and American Perspectives*. New Directions for Institutional Research No 126. San Francisco: Jossey-Bass.

Centre for Education Policy Development (CEPD). Centre for Education Policy Development (CEPD). http://www.cepd.org.za/

Chan, Elsie. (2004). 'Embracing cultural diversity and enhancing students' learning environment'. Faculty of Human and Social Development. University of Victoria. http://www.cdtl.nus.edu.sg/link/nov2004/le.htm

Condon, Neil, Matthew Stern and Sarah Truen (2009). 'Professional services in South Africa: Accounting, engineering and law'. Development Network Africa. 25 January. http://www.dnaeconomics.com/assets/Usegareth/SA_Professional_Services.pdf

Contemporary American Society (2010). 'Chapter 10: Thinking about fairness and inequality'. Available online at: http://www.ssc.wisc.edu/~wright/ContemporaryAmericanSociety/Chapter%2010%20--%20inequality%20and%20fairness%20--%20Norton%20August.pdf [Last accessed 20.11.13]

Day, Kate (2009). 'Creating and sustaining effective learning environments'. *All Ireland Journal of Teaching and Learning in Higher Education Institutions* 1(1). University of Edinburgh.

Dellow, A.D. and Romano R.M. (2002). 'Editor's Choice: Measuring outcomes: Is the first-time cohort appropriate for the community college?' *Community College Review* 30 (2). 42–54.

Eesley, Charles E. (2012). 'Discussion of alumni surveys, their use and limitations existing Alumni Survey Datasets'. Alumni surveys as a data collection methodology. Available online at: http://tubagus.staf.narotama.ac.id/files/2012/03/Alumni-surveys-as-a-data-collection-methodology.pdf [Last accessed 20.11.13]

Fisher, M.B. 1988. 'Surveying your alumni'. In G.S. Melchiori (ed). *Alumni Research: Methods and Applications*. New Directions for Institutional Research No 60. San Francisco: Jossey-Bass. 25–39.

Griesel, Hanlie and Ben Parker (2009). 'Graduate attributes: A baseline study on South African graduates from the perspective of employers'. January. © Higher Education South Africa and the South African Qualifications Authority, 2008. Available online at: http://www.saqa.org.za/docs/pubs/general/graduate_attributes.pdf [last accessed 20.11.13]

Group of Eight Australia (2012). 'The importance of international education for Australia'. Available online at: http://www.go8.edu.au/university-staff/agreements/the-importance-of-international-education-for-australia [last accessed 20.11.13]

Hagne, P. (2002) *Market Research: A Guide to Planning, Methodology and Evaluation*. 3rd ed. United Kingdom: Kogan Page Limited.180–181.

Harrison, W.B., S.K. Mitchell and S.P. Peterson. (1995) 'Alumni donations and colleges' developmental expenditures: Does spending matter?'. *The American Journal of Economics and Sociology* 54(4). 397–409.

Hartman, David E. and Sandra L. Schmidt (1995). 'Understanding student/alumni satisfaction from a consumer's perspective: The effects of institutional performance and outcome'. *Research In Higher Education* 36(2).

Hiemstra, R. (ed.) (1991). *Creating Environments for Effective Adult Learning*. San Francisco: Jossey-Bass. http://www-distance.syr.edu/leindex.html

Kumar, V., K.N. Lemon and A. Parasuramen (2006). 'Managing customers for value'. J*ournal of Service Research* 9(2). 87–94.

Machingambi, Severino. (2011). 'Is access to higher education a sufficient condition for social equity in South Africa? A critical analysis'. *Access and Equity in Higher Education South Africa*. Walter Sisulu University.

Mael, F. and B.E. Ashforth (1992). 'Alumni and their alma mater: A partial test of the reformulated model of organizational identification'. *Journal of Organizational Behavior* 13(2). 103–123.

Melchori, G.S. (1988). *Alumni Research: Methods and Applications*. New Directions for Institutional Research No 60. San Francisco: Jossey-Bass Publishers.

Millington, Claire (n.d). 'The use of tracer studies for enhancing relevance and marketability in online and distance education'. Barbados Community College. Retrieved 1 October 2012. Available online at: http://wikieducator.org/images/e/e1/PID_424.pdf [last accessed 20.11.13]

National Center for Postsecondary Improvement (2002). 'Beyond dead reckoning: Research priorities for redirecting American higher education'. Stanford Institute for Higher Education Research. Available online at: http://www.stanford.edu/group/ncpi/documents/pdfs/beyond_dead_reckoning.pdf [Last accessed 20.11.13]

Pendel. M. (1985). 'Beyond Gallup'. *Currents* 11(8). 40–42.

Pike, Gary (1989). 'The performance satisfaction relationship revisited: specification and testing a structural model'. Paper presented at the annual meeting of the American Educational Research Association, San Francisco.

Pike, Gary (1993a). 'The relationship between alumni satisfaction and work experiences'. University of Missouri-Columbia. *Research in Higher Education* 35 (1) 1994.

Pike, Gary (1993b). 'The relationship between perceived learning and satisfaction with college: An alternative view'. *Research in Higher Education* 34(1).

Pollick, A.M. (1995). 'Survey Sence'. *CASE Currents* 21(7). 50–54.

Puerzer, Richard J. Puerzer and David M. Rooney (2002). 'The alumni survey as an effective assessment tool for small engineering programs'. *Journal of Engineering Education* 91(1), January. 109–116.

Reave, Laura. "Technical Communication Instruction in Engineering Schools A Survey of Top-Ranked US and Canadian Programs." *Journal of Business and Technical Communication* 18.4 (2004): 452-490.

Puerzer, Richardx J., and David M. Rooney. "The alumni survey as an effective assessment tool for small engineering programs." J*ournal of Engineering Education* 91.1 (2002): 109-116.

Zydney, Andrew L., et al. "Impact of undergraduate research experience in engineering." Journal of Engineering Education 91.2 (2002): 151-157.

Republic of South Africa (1996). Constitution of the Republic of South Africa Act No 108 of 1996. http://www.info.gov.za/documents/constitution/1996/a108-96.pdf

Riley, Linda Ann, Paul M. Furth and John T. Zelmer. (n.d.) 'Assessing our engineering alumni: Determinants of success in the workplace'. New Mexico State University .

Scott, P. (1995). *The Meanings of Mass Higher Education*. Buckingham: Open University Press.

StatsSA (2011). Mid-year population estimates 2011. Available online at: http://www.statssa.gov.za/publications/P0302/P03022011.pdf [last accessed 20.11.13]

Stevenson, M., R.D. Walleri, and S.M. Japely (1988). 'Designing follow-up studies of graduates and former students'. In P.T. Ewell (ed). *Assessing Educational Outcomes* 47. San Francisco: Jossey-Bass. 81–93.

Svensson, G. and G. Wood (2007). 'Are university students really customers? When illusion may lead to delusion for all'. I*nternational Journal of Education Management* 21. 17–18.

The Task Force on Higher Education and Society (1999). 'Higher education in developing countries: Peril and promise'. Available online at: http://www.tfhe.net/report/Chapter1.htm [last accessed 20.11.13]

UN-Habitat (2010). *State of the World's Cities 2010/2011*. Bridging the Urban Divide. Nairobi. http://www-distance.syr.edu/leindex.html

Vailga, M.J. (1982). 'Structuring the perceived outcomes of higher education'. Paper presented at the annual forum of the Association for Institutional Research, Minneapolis.

Wits Facts and Figures 2011/2012 brochure.

Wits (n.d.). Internationalisation Policy. Johannesburg. Wits (2010a). *Wits Vision 2013*.

Wits (2010b). *Wits Vision 2022*.

Wits (2012). Wits Facts and Figures 2011/2012. Brochure.[14]

[14] Data are extracted from the University's Business Intelligence Data Warehouse and they reflect the annual Higher Education Management Information System (HEMIS) student, staff and research data submitted to the Department of Higher Education and Training. The 2011 and 2012 data are preliminary HEMIS figures.

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