

# Student Perceptions of Postgraduate Supervision – A Case Study in Engineering

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## ABSTRACT

Postgraduate students reap academic rewards when a successful student-supervisor relationship exists. The purpose of this article is to investigate the perceptions of postgraduate engineering students with regard to the student-supervisor relationship in order to identify any misconceptions. A student perception/awareness model is presented, highlighting the cycle of how student perceptions may lead to student awareness with a number of benefits. A standardized role perception rating scale was used as the main data collection instrument. Results indicate that engineering students differ widely in their perceptions of the relationship with their supervisor, with more than 50% of students expressing misconceptions regarding the selection of a topic, scheduling contact time and structuring of the thesis. It is recommended to use this rating scale at the start of every supervision process in order to address any possible misconceptions of new postgraduate students that could hinder their academic success

## Keywords

student awareness, student-supervisor relationship, topic, thesis

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## Introduction

“The real voyage of discovery consists not in seeking new landscapes, but in having new eyes” [1]. These words indicate that certain types of research need not produce anything new, but can clearly present what has already been established from a different perspective. It is much like a diamond viewed from different angles. The diamond remains the same, but its beautiful facets differ from each point of view. Therefore, certain types of research may validate a technique, elaborate and enrich a theory's explanation, extend the boundaries of current theories or enhance specific principles.

This is in essence the primary objective of a master's degree; not in making a significant and original academic contribution to the existing body of scientific knowledge, but rather in validating, elaborating, extending or enhancing scientifically accepted techniques, theories or principles. It is noteworthy that, according to the revised Higher Education Qualifications Sub-Framework (HEQSF) in South Africa, the purpose of a master's degree is to educate and train researchers who *can* contribute to the development of knowledge at an advanced level so that they are prepared for advanced and specialised professional employment [2]. Yes, postgraduate students undertaking a professional master's degree must be trained in the language of scientific research to be able to eventually make a significant contribution at the doctoral level. A master's student must therefore demonstrate that he or she *can do research* according to globally acceptable scientific standards and procedures.

Many students experience difficulties with the transition into postgraduate study. Cluett and Skene [3] carried out a survey in which they established that 80% of students found their first year of postgraduate coursework study to be overwhelming. Other studies have shown that postgraduate

students report anxiety as a result of uncertainty about what is expected of them [4] and about how they will be assessed [5]. Postgraduate students have further reported experiencing a lack of support and understanding from their supervisors [6]. The research question therefore arises: “What are the perceptions of postgraduate engineering students regarding the student-supervisor relationship?” Serious misconceptions can lead to students not really knowing what is required of them, which could impact on their academic success.

The purpose of this article is to highlight these perceptions of engineering students by making use of a standardized role perception rating scale (RPRS). The difference between research in engineering and social sciences will firstly be contrasted, as this may contribute to different perceptions. The basic tasks and responsibilities of a supervisor and a postgraduate student are then discussed with the RPRS in mind. The methodology, results and conclusions follow.

## Research in engineering versus research in social sciences

Engineering research involves experimentation, usually featuring different equipment or software. It employs different terminology to research in social sciences and is generally absent of human feeling and emotion (see Table 1). Modern engineering research often requires designing and testing mathematical models of materials and systems, before working on the materials or systems themselves [7]. This brings to mind different sets of equipment, simulation software and laboratory work, which is required for many postgraduate students in engineering to complete their research. In fact, many bursary and grant applications that postgraduate students can apply for make provision for “project expenses” that can be used to purchase materials or equipment. This gives rise to problem-based learning or

project-based learning which is in essence what engineers do – identify a problem, seek and implement a viable solution, monitor the results and make appropriate recommendations [8].

**Table 1:** Terminology used in engineering and social sciences research respectively

Engineering research	Social sciences research
Introduction and background - <i>Usually a brief history of the main concepts found in the title of the research.</i>	Introduction and background - <i>Usually a brief description of the dependent and the independent variables.</i>
<b>Problem statement</b> - <i>What is the exact problem that must be solved?</i>	<b>Research question</b> - <i>What question needs to be answered?</i>
<b>Research objectives</b> - <i>Specific tasks which are to be performed in the research.</i>	<b>Hypothesis</b> - <i>Possible answers to the research questions that must be rejected or supported.</i>
Research methodology - <i>Step by step procedure to solving the problem that must cover each of the objectives.</i>	Research methodology - <i>Research design, type of study, target population, sampling, statistics, data collection tools and ethics.</i>
Results - <i>Graphs and sketches obtained from physical measuring equipment / computer software.</i>	Results - <i>Tables and figures of quantitative or qualitative data, including stats results (e.g. from SPSS).</i>
Conclusions and recommendations - <i>Reviewing the problem and describing the solution and its results.</i>	Conclusions and recommendations - <i>Reviewing the hypothesis and linking the results to theoretical literature.</i>

Research in social sciences often includes terms which are completely unfamiliar to engineering researchers. In fact when one is standing on the outside of the social sciences, then social science terms are somewhat vague, abstract, pretentious or even meaningless [9]. These terms are often not used in engineering research, which focuses more on the problem, possible solutions and measured results. One key aspect of the social sciences is to “attempt to understand the actions and reactions of human beings in society through close investigation” [10]. Social science research often focuses on gaining an increased understanding of social phenomena and how and why people behave the way they do [11] and seldom involves electrical or mechanical equipment. Social sciences research often involves human feeling and emotion, something not always found in engineering research, which is mostly carried out on inanimate objects involving electrical and mechanical equipment (therefore mostly an objective point of view). This usually negates the need for ethical clearance, which would obviously be required in research relating to HIV/Aids in the social sciences. However, what should be the fundamental tasks of supervisors and students in all fields of research?

### Fundamental tasks and responsibilities of a supervisor and a student

The role of the supervisor is not to transmit knowledge but rather to function as someone with more general expertise and skills in the student’s topic area, *scaffolding* learning experiences of an increasingly complex nature [12]. This enables students to construct a higher level of knowledge on the subject, become an expert themselves on the topic of research. The RPRS used in this research is based on work done by Moses [13] and by Ryan and Whittle [14]. It is a useful standardized tool to obtain student perceptions of the student-supervisor relationship. The RPRS features three distinct sections, namely the “Topic” (or course of study – see Table 2), “Contact” (or level of involvement – see Table 3) and the “Thesis” (or written documentation for examination purposes – see Table 4). Each section features four statements with a numerical scale of 1 through 5. The first statement on the left puts the onus on the supervisor to perform certain tasks or responsibilities (numbers 1 and 2 are closest to the supervisor). The second statement on the right puts the onus on the student to perform the same stated task or responsibility (numbers 4 and 5 are closest to the student). The following literature survey attempts to provide reference, or acceptable, answers to the RPRS.

**Table 2:** Statements and suggested responses to the ‘Topic section’ based on published literature

Topic or course of study	1	2	3	4	5	Topic or course of study
It is a supervisor’s responsibility to select a promising topic				x		It is a student’s responsibility to select a promising topic
In the end, it is up to the supervisor to decide which theoretical frame of reference is most appropriate			x			A student has a right to choose a theoretical standpoint even if it conflicts with that of the supervisor
A supervisor should direct a student in the development of an appropriate program of research and study			x			A student should be able to work out a schedule and research program appropriate to his/her needs
A supervisor should ensure that a student has access to all necessary facilities		x				Ultimately, the student must find the necessary facilities to complete his/her research

**Table 3:** Statements and suggested responses to the ‘Contact section’ based on published literature

Contact or involvement	1	2	3	4	5	Contact or involvement
Supervisor-student relationships are purely professional and personal relationships should not develop		x				Close personal relationships are essential for successful supervision
A supervisor should initiate frequent meetings with a student				x		A student should initiate meetings
A supervisor should check constantly that a student is on track and working consistently			x			Students should work independently and not have to account for how they spend their time
A supervisor should terminate the candidature if she/he thinks a student will not succeed			x			A supervisor should support the student regardless of his/her opinion of the student’s capability

The start of the student-supervisor relationship would involve selecting a topic which falls within the expertise of the supervisor, and which is of interest to the student. *Students should identify the topic* and undertake preliminary reading of related material [15]. A supervisor of postgraduate students facilitates a student’s journey to becoming a scholar [16]. Therefore, the supervisor draws on his or her research experience and guides or directs the student towards a specific path or in a particular direction which will lead to scientifically acceptable results. In order to achieve this, the supervisor is required, among other things, to direct the research, motivate students and *serve as a sounding board* and mentor [17]. Phillips and Pugh [18]

do, however, state that research students have to take responsibility for managing their own learning. Chin *et al.*[19] further state that a good supervisor will ensure that adequate resources are available for the student to utilise.

The student-supervisor relationship is a professional relationship[20] assumed to be conducive to creating a positive learning environment, which in turn is understood to promote professional confidence [21]. It is imperative that, within this positive learning environment, research students must keep in touch with their supervisors through regular meetings [18]. Furthermore, postgraduate students should have a sense of urgency, being diligent, conscientious and hardworking [22]. Chin *et al.* [19] indicate that supervisor's should commit to the student's research project, supervising students according to their individual abilities.

**Table 4:** Statements and suggested responses to the 'Thesis section' based on published literature

The thesis	1	2	3	4	5	The thesis
A supervisor should ensure that the thesis is finished not much later than the minimum period		x				As long as a student works steadily she/he can take as long as she/he needs to finish the work
A supervisor has direct responsibility for the methodology and content of the thesis		x				A student has total responsibility for ensuring that the methodology and content are appropriate to the discipline
A supervisor should assist in the actual writing of the thesis if the student has difficulties, and should ensure that the presentation is flawless					x	A student must take full responsibility for presentation of the thesis, including grammar and spelling
A supervisor should insist on seeing drafts of every section of the thesis in order to review them in a timely fashion			x			It is up to a student to ask for constructive criticism from a supervisor

Students cannot be allowed to take as long as they need to finish the work, as they must be held responsible to complete their studies within a scheduled time[19]. This calls on supervisors to keep an eye on the progress of the thesis, requesting regular submissions from their students. Supervisors should regularly provide critical feedback on students' written work, which is an essential element in the student's intellectual development [22-23]. The role of the supervisor in assisting students in choosing a methodology is similar to that of a mentor or coach [24]. It is a process of discussion, directing students to various readings and courses of study, further joint exploration and dynamic decision-making. The content of the thesis still needs to meet the requirements of the traditional thesis, and this is determined by the supervisor in discussion with the student [25]. Although the amount of contact between the student and supervisors can vary dramatically, it is largely via this route that the student is given guidance, especially on thesis content, organisation and timescale[26]. Supervisors should also comment regularly on the drafts of the thesis, certifying that the thesis is at an examinable standard, is properly presented and conforms to university requirements. Moreover, students should also place great importance on regular submission of written work before meeting with their supervisors [23]. This regular submission of work is essential so that writing problems can be recognised and addressed.

The foregoing literature was balanced with each of the sections in the RPRS, which results in an average score of 12 per section. Scores below 12 would tend to lean towards the supervisor as the main contributor, while scores above 12 tend to point to the student as the main catalyst in the research process.

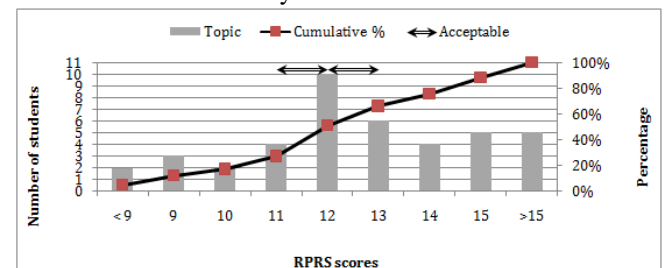
## Research methodology of this study

This research uses a time lag study (10-year period between 2011 and 2021) with descriptive statistics involving quantitative analysis of the collected data. The target population is limited to postgraduate engineering students who first registered for a Master's degree in Engineering (n = 41) and who had contact with the researcher. This contact was established by means of a research methodology course offered by the researcher or as part of a student-supervisor relationship that was eventually initiated. Descriptive statistics, involving a histogram and cumulative percentages, are used to determine the differences in responses to the RPRS. Descriptive statistics, rather than inferential statistics, was used as the collected data (quantitative in nature comprising numerical values) was only interpreted with regard to the specified target population.

Students chose which statement they thought to be more correct on the RPRS by simply ticking the relevant block with a numerical value attached to it. A statement specific score of 3 would indicate that the student thought the student and supervisor should equally share a specific task or responsibility. An average score of 10 or lower per section would indicate that the student felt the supervisor is more responsible for that section, while an average score of 14 or higher would mean the student is regarded as more responsible. Generally, scores between 11 and 13 would be preferable, as both parties play a specific role in each of these sections.

## Results and discussions

Over the 10-year period, 17% of the students scored the 'Topic section' at 10 points or lower, with approximately 34% of students scoring it 14 points or higher (see Figure 3). This indicates that approximately 49% of these students already have an acceptable viewpoint with regard to the 'Topic section', realising that they should select a topic, decide with their supervisor on the scientific framework and programme of study and not be responsible for gaining access to all the necessary facilities / laboratories.



**Figure 1:** Student perceptions scores with regard to the "Topic"

Figure 4 highlights the responses of postgraduate students with regard to the level of involvement or the "Contact" 17% of the students scored 10 points or lower, indicating that they felt that the supervisor should be responsible for initiating frequent meetings, checking constantly that the student is on track and that the supervisor should terminate the relationship if he or she feels that the student is not on

track. However, approximately 37% of the students scored 14 points or more, revealing their perception to be totally different. Only 46% of the students expressed acceptable viewpoints.

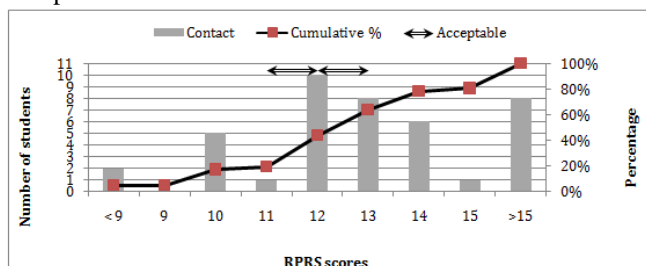


Figure 2: Student perceptions with regard to "Contact"

Results relating to student perceptions of the "Thesis" are shown in Figure 5. 20% of the students scored 10 points or lower, indicating that they felt that the supervisor should take responsibility for seeing to it that the thesis is finished on time, that the supervisor has direct responsibility for the methodology and content and that the supervisor assists in the actual writing of the thesis. On the other hand, 39% of the postgraduate students scored 14 points or higher, revealing a totally different perception. Only 41% of the students expressed acceptable viewpoints.

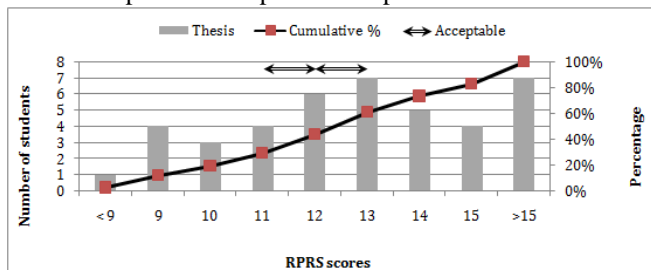


Figure 3: Student perceptions with regard to the "Thesis"

It is evident that more than 50% of these students expressed misconceptions with regard to the student-supervisor relationship. Totally different perceptions regarding the "Topic" was found, with 49% of students expressing the correct perception that students should identify the topic and undertake preliminary reading of related material. Results with regard to "Contact" revealed that 46% of the students had the correct perception of the student-supervisor relationship. It is here that postgraduate students have to take responsibility for managing their own learning, keeping in touch with their supervisors through regular meetings [18]. Results regarding the "Thesis" indicated that 41% of the students had the correct perception of the student-supervisor relationship. This requires postgraduate students to be diligent, conscientious and hardworking, having a sense of urgency [22], while the supervisor is required to direct the research [17] which would include the methodology and content.

It does seem that more students have an acceptable viewpoint of the "Topic" as compared to the "Thesis", as the percentage of students who expressed an acceptable viewpoint fell from 49% to 41%. This may be related back to previous literature that indicates that postgraduate students report anxiety as a result of uncertainty about what is expected of them in their postgraduate studies[4] and

about how they will be assessed [5]. The topic, or proposal or protocol, is merely the start of the postgraduate journey and can be readily discerned as many research methodology courses include a learning outcome that requires students to develop a complete proposal. However, the thesis journey is completed different, with its structure and format being dictated by individual supervisors. In fact, variation in format between theses from the same department may vary substantially [27].

## Conclusions

The purpose of this article was to highlight the perceptions of postgraduate engineering students regarding the student-supervisor relationship. Literature relating to the differences in research between engineering and social sciences was highlighted, along with a student perception/awareness model listing the benefits that are derived from correcting misconceptions. 49% of students expressed an acceptable viewpoint with regard to the "Topic", 46% with regard to the "Contact" and 41% with regard to the "Thesis" sections of the RPRS.

This study was limited to only engineering students who had contact with the researcher over a 10-year period. Extending the research to include a larger sample size may help to enable the generalizability of the results. However, these results do indicate that new postgraduate students need guidance and support so as to adapt more easily and readily to the student-supervisor relationship.

A wide range of perceptions exist among new postgraduate engineering students – some are misconceptions, and some are acceptable perceptions. The onus must fall on the supervisor to determine and rectify any misconceptions that exist with each and every student under his or her supervision. Using the RPRS at the start of a supervision process can go a far way in helping to resolve and misconceptions, thereby helping to enhance the student-supervisor relationship, making it a thrill, rather than a spill, resulting in a successful voyage of discovery for all

## References

- [1] S. SooHoo and C. Strople, "Politics, Pragmatics, and Passion: Three Markers on the Teacher Research Journey," *scholarlypartnershipsedu*, vol. 1, p. 4, (2006).
- [2] Republic of South Africa. (2013, 12 June). The Higher Education Qualifications Sub-Framework, HIGHER EDUCATION ACT, 1997 (Act No. 101 of 1997), Government Gazette No.36003. Available: <http://www.dhet.gov.za/Documents/Legislation/>
- [3] L. Cluett and J. Skene, "Improving the Postgraduate Coursework Student

- Experience: Barriers and the Role of Institution.," presented at the Proceedings of the AUQF 2006: Quality outcomes and Diversity., Perth, Australia, (2006).
- [4] . Tobbell, et al., "Exploring Transition to Postgraduate study: Shifting Identities in Interaction with Communities, Practice and Participation.," Educational Research Journal, vol. 36, pp. 261-278, (2010).
- [5] J. Malfroy, "Doctoral supervision, workplace research and changing pedagogic practices," Higher Education Research and Development, vol. 24, pp. 165-178, (2005).
- [6] I. Mohammad, "Importance of Supervisory in Educational Progress of PhD Students," Journal of Humanities Insights, vol. 1, pp. 73-85, (2017).
- [7] D. Shteinman, "Post-truth and the virtues of reality," Quadrant, vol. 63, pp. 67-73, (2019).
- [8] A. J. Swart, "Using problem-based learning to stimulate entrepreneurial awareness among senior African undergraduate students," EJMSTE, Eurasia Journal of Mathematics, Science and Technology Education, vol. 10, pp. 125-134, (2014).
- [9] Z. O'Leary, The social science jargon buster: the key terms you need to know. London: SAGE Publications Limited, (2007).
- [10] A. Harrison, et al., "Social media use in academic libraries: A phenomenological study," The journal of academic librarianship, vol. 43, pp. 248-256, (2017).
- [11] T. Gopal, "Health systems in the news: The influence of media representations on health system functioning in the Western Cape health system," Master of Public Health, Faculty of Health Sciences, 2018.
- [12] D. Sze. (2008, 21 August). Effective Student centred PhD Supervision from a Social Constructivist Viewpoint. Available: [http://www.itl.usyd.edu.au/supervision/old\\_site/casestudies/files/sze.pdf](http://www.itl.usyd.edu.au/supervision/old_site/casestudies/files/sze.pdf)
- [13] I. Moses, Supervising postgraduates. Kensington: Higher Education Research and Development Society of Australia, (1985).
- [14] Y. Ryan and J. Whittle, "Adapted the original Moses schema," presented at the Workshop in the Third Conference on Postgraduate Supervision, Gold Coast, Australia, (1997).
- [15] N. Abiddin, et al., "Research Student Supervision: An Approach to Good Supervisory Practice," The Open Education Journal, vol. 2, pp. 11-16, (2009).
- [16] R. Mudaly, "Gazing Inward: Teaching in the Postgraduate Milieu," Alternation, vol. 19, pp. 38-56, (2012).
- [17] T. Gatfield, "An Investigation into PhD Supervisory Management Styles: Development of a Dynamic Conceptual Model and its Managerial Implications," Journal of Higher Education Policy and Management, vol. 27, pp. 311-325, (2005).
- [18] E. M. Phillips and D. S. Pugh, How to get a Ph.D - a handbook for students and their supervisors. Buckingham: Open University Press, (2000).
- [19] C. M. M. Chin, et al., "Developing a Project Management Methodology for Use in Doctoral Research Projects," Journal of Institutional Research South East Asia, vol. 9, p. 5, (2011).
- [20] C. Halse, "Becoming a supervisor: the impact of doctoral supervision on supervisors' learning," Studies in Higher Education, vol. 36, pp. 557-570, 2014/02/25 (2011).
- [21] K. Holland, et al., "The sources of professional confidence in occupational therapy students," South African Journal of Occupational Therapy, vol. 42, pp. 19-25, (2013).
- [22] A. Hussain, "Supervision and evaluation of research projects of graduate students - Realities and requirements," Journal of quality & technology management, vol. 7, pp. 123-136, (2011).

- [23] R. H. Spear, Supervision of research students: responding to student expectations. Canberra: The Australian National University, (2000).
- [24] C. Seibold, et al., "The supervisor-student relationship in developing methodology," *Nurse researcher*, vol. 14, pp. 39-52, (2007).
- [25] G. Lee, et al., "Roses and thorns: authorship and the PhD by publication," *Journal of clinical nursing*, vol. 22, pp. 299-300, (2013).
- [26] R. Sahoo and A. M. Mazid, "Effective supervision of postgraduate engineering students at Central Queensland University," presented at the Industrial Technology, 2009. ICIT 2009. IEEE International Conference., Gippsland, Australia, (2009).
- [27] A. J. Swart, "An Analysis of Master Dissertations: A Case Study of Central University of Technology, South Africa," *AJLAIS, African Journal of Library, Archives and Information Sciences*, vol. 28, pp. 211-223, (2018).