

February 2018

Service Learning through Mentorship: Improving the Thinking Quality of Future Engineers

Gershan Barnard

University of Pretoria, South Africa

Follow this and additional works at: <https://opus.govst.edu/iujsl>



Part of the [Higher Education Commons](#), and the [Service Learning Commons](#)

Recommended Citation

Barnard, Gershan (2018) "Service Learning through Mentorship: Improving the Thinking Quality of Future Engineers," *The International Undergraduate Journal For Service-Learning, Leadership, and Social Change*: Vol. 7: Iss. 2, p. 9-15.

Available at: <https://opus.govst.edu/iujsl/vol7/iss2/4>

This Article is brought to you for free and open access by OPUS Open Portal to University Scholarship, Governors State University, University Park, Illinois. It has been accepted for inclusion in The International Undergraduate Journal For Service-Learning, Leadership, and Social Change by an authorized editor of OPUS Open Portal to University Scholarship. For more information, please contact opus@govst.edu.

Service Learning through Mentorship: Improving the Thinking Quality of Future Engineers

Erratum

A revised version of this article was posted February 27, 2018.

Service Learning through Mentorship: Improving the Thinking Quality of future Engineers

Introduction

The Engineering, Built Environment and Information Technology (EBIT) Faculty at the University of Pretoria¹ is offering a compulsory, open-ended and project-oriented module for all undergraduate students - this module makes excessive use of applied learning (practical application). The students receive a very basic set of instructions at the commencement of the academic year, which serves as a guideline some of these instructions include; not rendering a service related to this module in exchange for any amount of money, implying that any service rendered with the objective of being credited for this particular module, should be voluntary. Students also receive a small amount of money, to spend on their project.

At the end of the academic year, preferably the end of the project, students are required to give feedback in various ways; determined by the lecturer - these various forms of feedback include a PowerPoint presentation, a YouTube video, writing a report in the form of a wiki, and more.

The project done by the author of this article included teaming up with the STARS Mentorship programme. This is a programme started and headed by Dr Rina Wilken at the university; the aim of the project is to get senior students from all faculties, volunteering to mentor 1st year students. Meaning this article is about a group of 1st year engineering students being mentored by a senior engineering student. The objective of the author is to share some of the leadership aspects and thinking dynamics which were required to make this project a success.

The author was promoted from Mentor to that of Faculty Coordinator in the STARS Mentorship Programme; he was also awarded with two certificates and a medal for his contribution and insights regarding the subject and project at hand.

What is the STARS Mentorship Programme?

Potential 1st year mentees are recognized after having completed a *Student Academic Readiness Survey*² during orientation week, a survey drawn up by the Department of

Gershan Barnard is a third year Electrical Engineering Student at the University of Pretoria in South Africa. He plans to use his engineering knowledge to provide the infrastructure, which will enable local entrepreneurs to contribute to the economy by entering and participating in the FinTech(MicroFinance) & Manufacturing sector.

-9-

Journal for Service-Learning, Leadership, and Social Change Spring 2018

¹ From here on referred to as, the university

² This is where the name of the STARS Programme is deduced from

Education Innovation, at the university. 1st years can also volunteer to avail themselves as mentees at the commencement of every academic year. The mentorship programme has a set of objectives, which includes aiding the decrease in student drop-out rates, not just in the EBIT faculty, but in all the faculties.



What is the STARS Mentorship Programme?

Potential 1st year mentees are recognized after having completed a *Student Academic Readiness Survey*³ during orientation week, a survey drawn up by the Department of Education Innovation, at the university. 1st years can also volunteer to avail themselves as mentees at the commencement of every academic year. The mentorship programme has a set of objectives, which includes aiding the decrease in student drop-out rates, not just in the EBIT faculty, but in all the faculties.

Mentor meeting the mentees

Upon meeting my five mentees, Because they were studying to obtain the B.Eng. Degree, our first discussion involved me explaining to them what the B.Eng. qualification is, also how it's different from the other engineering qualifications e.g. B.Sc.(Eng) Bachelors of Science in Engineering, also the B.Tech.(Eng) Bachelors of Technology in Engineering. I deemed a conversation in this direction as vital between mentor and mentee.

Most students in engineering drop out during the first two years, because they went to university with a misguided assumption of what engineering is, also what subject content they'll be studying.

³ This is where the name of the STARS Programme is deduced from



The B.Eng. qualification is an academically rigorous qualification, meaning during your first two years as an engineering student⁴, you won't be building useful and cool things – infact you will be spending your time mastering the Mathematical and Engineering Sciences. This includes everything from Differential and Integral Calculus, Physics, Mechanics, Chemistry, Material Science to phenomena such as Thermodynamics and Magnetism.

My argument here is, Engineering is presented to students as the discipline where you will be taught how to design and build, equipping you with the skillset, enabling you to contribute to our technological inheritances. This is partially true, in the sense that you first have to master the very basic laws of nature and mathematical theorems etc. before you can talk about designing and building.

Changing the Mentality of the 1st Year Engineering Mentees

I was amazed when during my first year; some of my peers told me about the displeasure they experienced from doing Physics and Chemistry. After further interrogation, I noted that they say this because they lack insight. They had no enthusiasm in their approach toward some of the modules because they didn't fully understand why they had to study some of the modules.

During my term as mentor, I made this my objective; to rectify and challenge the misguided conclusions my mentees might have regarding the engineering craft. I did this by explaining to them the following:

-11-

Journal for Service-Learning, Leadership, and Social Change Spring 2018

⁴ The assumption here is that the student is on the four-year programme

The overall objective of studying and obtaining a B.Eng. qualification is for you to have some form of mastery regarding a design technique known as ‘synthesis’⁵, this is different from studying to obtain a B.Sc.(Eng) where the objective is to focus on what is known as ‘analysis’, I won’t refer to the B.Tech(qualification)⁶.

The thinking required in Physics is a way of enabling the student how to argue from what is known as first principles⁷. However students aren’t aware of this, mainly because they are being taught about Projectile Motion, Friction and Gravity etc.

My argument is that they fail to recognize the underlying objective, by objective; I’m referring to the type of thinking skill required.

The late Dr Myles Munroe is famous for saying, “where purpose is unknown, abuse⁸ is inevitable”, at a later stage normally during third-year students then only develop the sense of appreciation for the fundamental laws they were being taught during the first two years of their engineering studies, because this is where they really get to apply the knowledge they’ve been acquiring within an engineering context.

As wonderful as this might seem, by this time a lot of engineering students have already dropped-out. Here is where mentorship plays an important role, because as a mentor you get to explain to your mentees why starting out by mastering the fundamentals of the natural, applied sciences and mathematics is so vital. It’s very frustrating doing something and not fully understanding why what you’re required to do is necessary.

What does the answer mean?

It is common knowledge that people from various backgrounds tend to disagree a lot about a lot this is due to various reasons. However the reason I will exploit, to help justify the case I’m trying to make is that; people have different reasoning capabilities, mainly because they have different mental faculties.

By this I mean that some people are abstract thinkers⁹, others are categorical¹⁰, procedural¹¹ or conceptual thinkers¹² etc. I always encouraged my mentees to become conceptual thinkers, by redundantly asking themselves after every calculation, what does the answer mean?

While starting out, you won’t always be able to answer this question, due to the academic pressure, however; if you’re serious about the answer - you will start to develop a richer

-12-

Journal for Service-Learning, Leadership, and Social Change Spring 2018

⁵ The synthesis and analysis variation in qualification emphasis is found in the Stellenbosch University, Engineering Faculty, Survival Guide, 2011 edition

⁶ The B.Tech(Eng) qualification offered by Universities of Technology in South Africa is (at the time of writing this article) being phased out

⁷ The process of breaking down a problem, analyse it using the very basic laws to better understand it as a whole

⁸ A composition of two-words abnormal and use, implying something is being used in a way not originally intended

⁹ Who can overlap ideas which are seemingly incompatible with each other

¹⁰ Who think in a very stereotypical fashion

¹¹ Who cram information in a specific and set sequence

¹² Who can formulate a clear picture or process for the formation of a very detail-oriented idea

experience and a deeper appreciation for your pursuit of obtaining an engineering qualification. This type of thinking is one of the many reasons why some students end up doing post-grad studies.

The keyword is Insight

The arguments I'm making might seem quite common and logical to a student who's been studying engineering for a while, or who has had various conversations with those more knowledgeable and experienced. Simply meaning; they like me, have some sort of insight into engineering and some of the realm of possibilities you are able of penetrating into – provided that you have these insights. My point however is that those who have these insights should become mentors to share these insights with those not privileged enough to have been exposed to them. Many students are frustrated and lack enthusiasm, because they lack perspective (insight). In the book, *Man's Search for Meaning*¹³ the author mentions that, suffering is inevitable, nonetheless you should find the things worth suffering for.

Having these little insights, not only gives you perspective – they also give you a greater sense of confidence. In simple terms, having an insight into why you have to study something like Chemistry to understand it, and not just to pass it enables you to form a conviction which will allow you to enjoy and perhaps even thrive under the academic pressure. As opposed to just copying assignments from your peers, always complaining and being miserable from the academic demands.

This impartation and sharing of insights, through the on-going process of mentorship, has a profound impact on the thinking trajectory and quality of future engineers. I was fortunate enough to see a mentee accept and embracing failure, because they were driven by an insight (knowing what's at the end of the rainbow). I explained to the mentee the importance(advantages) of having to re-do a module, and not fearing failure – but to interpret failure as a feedback mechanism, indicating to you which aspects concerning your approach needs to be adjusted.

Cultural differences

It was on a Wednesday, around 12:30 while walking to class. I bumped into one of my mentees. I greeted him with a great amount of enthusiasm – after exchanging a few words, I realized that something was bothering him. Upon further interrogation, he came forward asking me a question. Before further discussing the conversation, allow me to give some background.

During the 2016 Academic year, I did an online pilot-module, Coordinated by Prof Christi van der Westhuizen. I encouraged my mentees to also do the module during the 2017 academic year. This particular mentee registered for the online pilot-module. The module is called UP 3D¹⁴; it's a module which deals with 'Non-discrimination and Critical Diversity'. Because of the social inequalities along with the cultural (racial) differences amongst South

¹³ The author is Viktor Frankl

¹⁴ Doing Difference Differently (UP 3D)

Africans. It's common sense why doing this module is so important, this module enable students to engage with some of these very complicated social-dynamics in a very thoughtful way.

My mentee went ahead and asked me, why is it that he doesn't have white friends? This was an obvious question; given the fact that we're at a University where majority of the student population is white South Africans. I'm assuming he started thinking in this direction because of the UP 3D module.

I'm a South African, coloured male, he's a young black South African male asking me this question. I'm mentioning this conversation because I never realized that as mentors. At some point we will have to deal with cultural and racial differences. This is something I personally haven't previously put much thought into.

I answered by stating that friendships are based on commonalities¹⁵. I gave an example by explaining to him the differences in class (social status). I further explained that when a white person is going to have lunch, they are most likely to buy lunch at a shop on campus you would deem as expensive. If you were to buy lunch, you'd probably go off-campus to go look for a cheap place to buy food. Also when a white-student complains in the morning, they would most likely complain about not finding parking. You would most likely complain about the taxi being late. Meaning if the two of you go into a pity-party, you can't really sympathize with each other¹⁶. Your inability to relate to each other' daily struggles only further discourages the idea of becoming or being friends, other than mere school buddies.

I agree this is not the most accurate reason, however he got the point I was trying to convey. The other point I'm trying to also point out – is the underlying complexity which involves the topic of race. Luckily the university is offering this UP 3D course, to get students to start applying their minds to these and other controversial and sensitive issues.

Leadership and disagreements

The most memorable conversation I remember having with my mentees, was where I was explaining to them the importance of having to surround yourself with people who tend to disagree with you¹⁷. We formulate ideas in our head; the more we think about those ideas, the more those ideas seem sensible to us, meaning that we grow attached to them and suffer from a strong need to defend those ideas.

Quality thinking is when you present your ideas and allow unbiased and qualified people to add and subtract from your idea, meaning that you detach yourself from the idea, allowing those who are qualified to critique it in such a way that it's rate of maturity increases.

Surrounding myself with people who have a greater tendency of disagreeing with me, made

-14-

Journal for Service-Learning, Leadership, and Social Change Spring 2018

¹⁵ The sharing of common attributes

¹⁶ My assumption here is that all white people are well-off and that all black people are disadvantaged; this is an untrue-assumption purely used for illustration purposes

¹⁷ It's vital that these people qualify to disagree with you; they should also do so in an unbiased way

me realize the importance of properly packaging and presenting my ideas¹⁸ - Also the skill of being able to zoom out, have an objective overview to recognize when my ideas are worth fighting for etc. This is vital, because I as well as my mentees will spend a great amount of time, working in a group or team. Meaning, various ideas will be bounced around a lot, so having a sense of how to navigate yourself through disagreements (the battle-of-ideas) is important.

The Final Word

When Dr Rina Wilken¹⁹ asked me why I decided to become a mentor, I explained to her that I'm a firm believer of social responsibility. I support the idea of giving back to the community. The University of Pretoria has tens of thousands of students doing community-based projects in one form or another every week. As students, the idea of social responsibility is instilled into our day-to-day activities. I have been part of other initiatives also; mentorship became my favourite because of a Michelangelo quote²⁰.

Mentorship enables me to have a direct impact on the quality of thinking of the next generation of engineers. Two of my five mentees have signed up to become mentors, carrying on the tradition. I measured the success of my term as a mentor, by the thinking quality of my mentees. The more accurate their description and expectation for the future is as engineers, the more at ease I am with the quality of service I was fortunate enough to render to them. I will continue viewing myself as a humble servant of the engineering craft.

-15-

Journal for Service-Learning, Leadership, and Social Change Spring 2018

¹⁸ This includes, recognizing the right timing to present your idea

¹⁹ Head of the STARS Mentorship Programme

²⁰ "For I know that the creator will go, so to escape death, I bind a piece of my soul to my work"