Proceedings of the

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Scholarship of Teaching and Learning (SoTL) in the South Conference

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Edited by Brenda Liebowitz

From the organising committee:

It is with great pleasure that I introduce these proceedings of the inaugural SoTL in the South conference. This represents an important milestone in the field of teaching and learning. This conference builds on the concerted attention paid to SoTL in the South, including the teaching and learning conferences that are held annually at many South African universities.

These proceedings contain 12 full research papers which underwent a rigorous double-blind review process (detailed on the next page). A wide variety of academic disciplines are represented, from economics to engineering, from architecture to medicine, and more. It has been very exciting and eye-opening to learn about SoTL problems and research approaches from this diverse group of authors. The proceedings lay testimony to the value of SoTL enquiry within the disciplines, and to the value of sharing insights and approaches across disciplines. Seeing SoTL as a common thread connecting and uniting various academic fields in the global South highlights the attention and care that academics pay to their teaching. It shows that they see teaching and research as worthy of scholarly inquiry, and that there are interesting teaching puzzles and solutions, as well as space for creativity.

A word of thanks to the members of the scientific committee, who agreed to participate in the review process, despite often extremely busy schedules. A particular word of thanks, however, goes to Johnson Carroll, who has put much effort, over many hours, into finalising this set of proceedings under time pressure, but always remaining good humoured.

Sincerely,

Professor Brenda Leibowitz (Editor and Chair)

On behalf of the organising committee:

Melanie Alexander; Johnson Carroll; Brenden Gray; Pia Lamberti; Bongani Mashaba; Tebogo Mokgokong; Puleng Motshoane; Kibbie Naidoo; Zachary Simpson; Precious Sipuka
CONFERENCE REVIEW PROCESS:

117 abstracts were submitted for the conference, of which 96 were invited to submit full papers for review and possible inclusion in the proceedings. An additional 8 were invited to present at the conference without a full paper submission.

30 full paper submissions were reviewed by two members of the technical committee detailed below. Reviews were double-blind: author information was removed from each paper, and the authors were likewise unaware of the reviewers’ identities. The reviewers were invited to rate the following characteristics of each paper:

- Originality and significance of the work;
- Relevance of the topic to this conference, including applicability to the global South;
- Research methodology and treatment;
- Clarity in writing, tables, and figures, and organization of the manuscript;
- Citations and references to other works, and compliance with template and style;

Reviewers also provided an overall evaluation of whether the paper should be accepted or not, as well as detailed comments to the authors explaining their evaluation and suggesting areas for improvement. The resulting reviews were ranked by reviewer score and evaluated by the organizing committee, and 12 of the full papers were accepted for inclusion in the proceedings following revision.

Technical committee:
Najma Agherdien (South African Institute for Distance Education)
Laura Arnold (Sol Plaatje University)
Debbie Blaine (Stellenbosch University)
Rhonda Breit (Aga Khan University)
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Eliciting Engineering Diploma Students’ Visualisation With Techno-Modelling Tasks

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Abstract
Engineering applications are affected by advancements in technologies. Therefore, teaching strategies should be aligned according to the practices endorsed by industry. While the use of computer algebra systems has been well received by South African engineering departments, the convenience of technology is no safeguard to better learning. Learning with a computer algebra system allows engineering diploma students to compare symbolic, numeric and graphical representations of a mathematical concept. This embodies a shift from a predominantly paper-and-pen environment to technology-rich activities with high demands on visualisation. Due to restricted visualisation exposure, students struggle to interpret computer generated graphs when first exposed to a computer algebra system. The purpose of the paper is to investigate the influence of techno-modelling tasks on the visualisation of engineering diploma students at a metropolitan university. An acclaimed advantage of a modelling approach is that students develop advanced levels of understanding. This is in line with engineering bodies who call for future engineers who will be expected to act independently and face novel problems where higher levels of cognitive thinking are expected.

The research adopted a qualitative exploratory design. Participants were two second year cohorts studying towards a National Diploma in Engineering at a South African university. One cohort followed the current approach but this was augmented with two mathematical modelling tasks for the other cohort. Content analysis was used to explore both cohorts’ electronic computer algebra system worksheets for meaningful responses to interpretive questions. Most students who completed the modelling tasks were able to interpret computer generated graphs meaningfully, unlike students who were not exposed to mathematical modelling. Our research concluded that modelling tasks could elicit visualisation processes that could not be traced in the work of students who followed only the current approach. Benefits resulting from techno-modelling tasks may inspire new opportunities for engineering diploma students to model the world in which they live, learn and eventually will work in.

INTRODUCTION
The emergence of computer technology has sparked renewed interest in differential equations (DEs) since the 80’s (Dubinsky & Tall, 1991). This prompted mathematics educators to explore computer algebra systems (CAS) which offer symbolic, numeric and graphic interfaces to solve DEs. CAS allow engineering diploma students to compare analytical and numerical solutions in order to validate qualitative approximations of DEs. Typically, CAS respond to syntax-specific inputs, thereupon suppresses all procedural processes and finally displays outputs in the form of tables and graphs which are instantaneously available to the programmer. Unlike in a paper-and-pen environment, the systematic step-by-step cognitive processes that would normally be followed, are outsourced to CAS. However, mathematical knowledge is constructed by integrating procedural and conceptual knowledge (Sharif-Rasslan, 2006, p. 328); “when concepts and procedures are not connected, students may generate answers but
not understand what they are doing”. This implicates a shift for students schooled predominantly in analytical procedures that focus mainly on paper-and-pen techniques. Yerushalmy (2005, p. 37) predicts “epistemo logical obstacles” as students require “changing lenses” to bridge the “cognitive discontinuity” caused by different tools, a new computer language and multiple representations (symbolic, numeric and graphic). These knowledge gaps are apparent when students at the University of Johannesburg (UJ) struggle to interpret computer generated graphs. When students acquire a preference for analytical procedures, they may become reluctant to visualise (Eisenberg & Dreyfus, 1991). In curricula that introduce new technologies, educators are challenged to re-think teaching and learning approaches. In turn, cognitive processes should be reconstructed to facilitate transitions (Yerushalmy, 2005).

Nardi (2014) argues for pedagogical approaches that afford students the power of visualisation as a means to establish visual evidence and to enact visualisation as proof for new insights. Students also need opportunities to articulate their thinking processes in linguistic form. To accomplish this, Nardi (2014, p. 217) recommends that lecturers reorganise “the content, the order of difficulty” and the “structure” of problems to cultivate visualisation in a technology-rich curriculum. Visualisation is imperative in a CAS environment where various representations must be interpreted. According to Duval (2014), visualisation is a cognitive process realised through visual reasoning – including the use of words – and the coordination of all possible representations of a concept. Natsheh and Karsenty (2014) associate visual reasoning with a deep understanding of concepts, particularly in word problems. Well placed visual clues can visually evoke real-life experiences (Figueiras & Arcavi, 2014) that may even suggest a solution strategy by way of mathematising a real world problem (Hershkowitz, Arcavi & Buckheimer, 2001). Prusak, Hershkowitz and Schwarz (2012) endorse activities that rely on intuition and visual reflections to progress to more formal argumentation. These are some of the strategies that can be employed to elicit visualisation. To further support students with the interpretation of CAS representations, Blomhøj and Kjeldsen (2013) use modelling tasks to situate DE in real world contexts. In techno-modelling tasks, cognitive processes involve the interpretation, meaning-making, argumentation, mathematisation, justification and contextualisation of real world problems. These modelling skills are desirable for future engineers who are expected to plan, monitor and critically evaluate processes (Soon et al., 2011). The question we ask is: What visualisation processes, elicited by techno-modelling tasks, can influence engineering diploma students’ interpretation of computer generated graphs?

**THEORETICAL PERSPECTIVES**

The demand for engineering students to display cutting-edge reasoning abilities while working collaboratively, has led to a recent initiative in engineering education called model-eliciting activities (Hamilton, Besterfield-Sacre, Olds & Siewiorek, 2010). Model-eliciting activities target real world contexts that students can easily relate to. Students work in small groups to translate a real world problem into a mathematical problem, a process called mathematisation. Activities should be designed to trace how students create, test, revise, validate, interpret and communicate mathematical models of real world phenomena (Gainsburg, 2013). Hamilton, Lesh, Lester and Brilleslyper (2008) report that model-eliciting activities are gaining traction as a teaching and learning approach in the engineering education-real world interface. A valuable objective is that model-eliciting activities serve as an assessment tool to investigate students’ developing understandings of a mathematical concept (Lesh & Caylor, 2007). Understanding begins as an intuition, caused by a sensation, that results in the formation of an object (Kant, 1964). Subsequently, a conception is formed based on a sensuous intuition. To grasp a phenomenon, an à priori conception conceived through an experience must already be
intuitively perceived in the mind. The interplay between cognition and intuition constitute all knowledge; intuitions may evolve into thoughts and thoughts become enriched by contents. Although intuitions have content, the mere conception of an object will not necessarily result in discursive activity. In particular, McDowell (2006, p. 315) describes visual intuition as the “thinking of an object” sparked by a visual perception. McDowell also maintains that experiences and intuitions are stimulated by a responsive awareness of surroundings and shaped by subsequent sensations. Burton (1999, p. 27) acknowledges intuition as one way in which mathematicians “come to know”. Promoting the role of subjective insights, Burton (1999) suggests that cognitive knowledge and intuitive insights should complement each other. Intuition can be used as a convincing argument in the absence of proof, but such argument is bound to remain lacking and experimental (Hersh, 1997). To solidify an intuition, mathematical analysis is warranted. Nardi (2014, p. 195) asserts that logical thinking requires a “fluent interplay between analytical rigour and (often visually based) intuitive insight”. Therefore, intuitions are an inherent and indispensable part of problem solving activities. Pedagogies should be designed to elicit the intuitions students bring to the classroom (Fischbein, 1987).

**DESIGN OF THE STUDY**

Inspired by Piaget’s philosophy of “continuous and cumulative” integration of new understandings into pre-existing notions, this study is approached from a constructivist paradigm (Riegler, 2012, p. 236). From this point of view, reality is constructed by students who actively participate in their own understandings. Lecturers must be cognisant of students’ pre-existing understandings so as to structure activities and objects that promote new knowledge (Duval, 2014).

This study adopts a qualitative exploratory design. To trace students’ visualisation and reasoning processes, qualitative content analysis was used. First cycle coding involved process coding (Saldaña, 2009) whereby new and emerging processes could be identified. Through second cycle coding, the number of process codes were condensed (Saldaña 2009) and an overall impression of tasks was obtained, thereby detecting possible latent meanings not initially obvious (Schreier, 2012).

The participants were the 2014 and 2015 cohorts of Engineering Mathematics 3 students studying towards a National Diploma in Engineering at UJ. The 2014 cohort (n = 65) followed the current teaching and learning approach; this approach was supplemented with two additional mathematical modelling tasks for the 2015 cohort (n = 80). Recent Mathematica test scores of the 2015 cohort were used to form 15 groups, each with five to six students with heterogeneous performances.

Engineering Mathematics 1 and Engineering Mathematics 2 are prerequisite first year modules to Engineering Mathematics 3, a second academic year module. The first year modules are presented in a traditional approach where students use non-programmable pocket calculators. UJ is one of only a handful of higher institutions in South Africa (SA) where second year engineering students learn to solve DEs numerically with CAS. The overarching aim of the research is to complement the use of CAS with model-eliciting practices; the related competencies of such an approach are highly acclaimed in the engineering industry worldwide (Hamilton et al., 2008).

The current approach to the teaching and learning of DEs is summarised in the first row of Table 1. Students learn to solve a given DE analytically, subject to specified initial conditions (IC). This is indicated in Table 1 as the first existing process (EP1). Students also learn to solve DEs numerically; this is done in a computer laboratory with the Mathematica software which is a type of CAS. Students design Mathematica codes from first principles by using the Euler,
Runge-Kutta order 2 (RK2) and Runge-Kutta order 4 (RK4) methods. This is the second existing process (EP2), facilitated by the current curricular approach. The CAS solutions to DEs can be represented as numerical tables (EP3) and computer generated graphs (EP4). Typically, students have to investigate the numerical tables and graphs they created in order to answer interpretive questions (EP5). Since DEs are models of real world phenomena, the interpretation of multiple representations (or solutions) is vital in understanding the real life context of the problem.

Computer laboratory sessions of 150 minutes each are scheduled once a week; students work independently at their own PC stations. The Mathematica software is freely available to all UJ students registered for Engineering Mathematics 3. This module is divided into a theory (70%) and Mathematica component (30%) with two separate examination papers of the same ratio.

Table 1. Existing processes in the current curriculum and visualisation processes elicited by techno-modelling tasks. Existing process (EP); New Process (NP).

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<td>Modelling Task 2 (2015)</td>
<td>Given: Real world narrative + DE</td>
<td>a) Derive IC from narrative (NP1), (NP2) b) Predict solution (NP1), (NP2) c) Solve analytically (EP1) d) Plot analytical solution (EP4) e) Compare b) with d) (NP3), (NP4) f) Solve with RK4 (EP2)</td>
<td>Table of numerical data (EP3)</td>
<td>CAS graphs (EP4)</td>
<td>Interpretive questions relating to real world narrative (EP5), (NP1), (NP5), (NP6)</td>
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A DE was given as an examination question to the 2014 cohort and duplicated for the 2015 cohort as the second of two modelling tasks. The 2014 examination question was set in accordance with the teaching and learning processes as explained above in the current approach (EP1 – EP4). An interpretive question assessed students’ understanding of the solution as represented by their analytical, numerical and graphical representations. The question posed was: *Is there a tollgate at the 50km mark, why do you say so?*

Cognisant of students’ apparent difficulties to interpret CAS tables and graphs, two modelling tasks were custom designed for the 2015 cohort to elicit new visualisation processes. In Task 1, groups had to model a DE from given real world data, validate the model and answer interpretational questions. This was students’ first experience with mathematical modelling. Task 2 was the same DE as the examination question used for the 2014 cohort. Following Nardi (2014), the question was re-structured as a modelling task and the order of difficulty was changed. Subtasks stimulated visual intuition and visual reasoning as proposed by Duval (2014). Task 2 introduced students to a real world narrative which describe the annual exodus of traffic over the Easter weekend to a place of worship in the Limpopo Province in SA. A diagram illustrated four tollgates that are distributed along a 105km stretch of the N1 national highway. The fist tollgate marks the start of the 105km distance. At the tollgates, the traffic flow becomes congested as cars pile up. The DE that models the traffic flow was given as

\[
\frac{dD}{dx} = \frac{350 \cos(2\sqrt{x+0.15})}{\sqrt{x+0.15}}
\]

where D indicates the density of vehicles and x the distance on the road.
The visualisation processes elicited in Task 2 are indicated in the second row of Table 1 as subtasks 2a – 2f. A distinction is made between existing processes (EP) – as facilitated in the current curriculum – and new processes elicited in Task 2 (NP). For example, in Task 2a, the initial condition had to be translated from the clue “assume that there are 945 vehicles at the first tollgate”. The real world setting of Task 2 was designed to elicit students’ intuitive understandings and inspire them to make connections with their own previous life experiences. Coincidently, Task 2 was completed shortly after Easter and as a result created a greater sense of reality. Also, the local setting of the task and its actuality contexts made it more accessible for students to relate to. Where the current curricular approach has only two parsimonious subtasks (a & b), the six subtasks 2a – 2f were designed to help detect new or emergent visualisation processes required for meaningful responses to the interpretive question: Is there a tollgate at the 50km mark, why do you say so? Hence, the same interpretive question was repeated in the 2014 examination and the 2015 modelling Task 2.

Subtask 2b was designed in line with arguments offered by Nardi (2014). Students had to predict the solution which stimulated visual reasoning (NP1) and new insights into the tollgate phenomenon. Students were encouraged to either draw a picture or explain their understandings in words, thus eliciting intuitive insight (NP2). Students were compelled to interpret the narrative prior to extensive mathematical analysis and not only in retrospect. In Task 2e, students were prompted to inter-connect representations to justify solutions (NP3) by merging analytical analysis and intuitive insights (NP4). This subtask facilitated an activity where students could justify or critique their initial understandings as analytical evidence started to shape formal understandings. The interpretive question required students to articulate their thinking (NP5) and visual reasoning (NP1) by presenting their results in writing. As such, this question 1) promoted deep mathematical thinking; 2) required students to align their understandings with the real world scenario (NP6) in order to give viable reasons for answers and 3) prompted extrapolations and inferences about future events.

RESULTS AND DISCUSSION
This paper reports on the analyses of a DE that was solved by both the 2014 and 2015 cohorts, albeit with different approaches as described earlier. Firstly, an account is given of some responses given by the 2014 cohort and secondly, we analyse some of the cumulative visual processes used by the 2015 cohort. This was not an attempt to rate the two approaches, but rather to comment on students’ responses to an interpretative question that recounts their visual reasoning (Duval, 2014; Noss & Hoyles, 1995) and visual intuition (Nardi, 2014).

2014 Cohort
Examination scripts of the 2014 cohort were analysed for meaningful responses to the interpretive question: Is there a tollgate at the 50km mark, why do you say so? Figure 1 reflects the graphs of three students (labelled A, B and C), accompanied by their corresponding written responses to this question. Although the graphs generated by students A and B were correct, their responses were incongruous. The reader will note that the first tollgate is graphically situated at $x = 0$ when there is $D = 945$ vehicles; this reflects the given initial condition (IC). Therefore, a correct interpretation of the graph at $x = 50km$ would confirm another tollgate since the number of vehicles is again at a maximum, meaning traffic slows down to stop at the tollgate. The responses from students A and B illustrate the concern raised by Sharif-Rasslan (2006) that the ability to create a graph with technology does not guarantee that it will be correctly interpreted. The student in frame C confused the initial condition ($x = 0$, then $D = 945$) with the distance of the toll road (105km) since the graph starts on the vertical axis at $D = 105$ instead of $D = 945$. Consequently, the sinusoidal graph created by student C reflects mostly a negative amount of vehicles; this discrepancy seemingly went unnoticed.
Also, it seems this student’s written response vaguely raises the notion of a local maximum, but with an unrealistic explanation that the slope of the tangent line in the point $x = 50$ is zero. This answer would therefore be irreconcilable within the contexts of the tollgate problem.

![Figure 1. Three students’ examination solution curves and responses to the question: Is there a tollgate at the 50km mark, why?](image)

Only four of the 65 students (6%) could generate a correct graph and answer this interpretive question insightfully. The inconsistencies in the responses of students A and B can likely be ascribed to a lack of visualisation and understanding of the functional behaviour at a maximum turning point (Rasmussen, 2001). Then again, students still had to visually ‘translate’ the variables embedded in the tollgate context in order to interpret the graph meaningfully (Soon et al., 2011). This is clearly the case when student C failed to distinguish between the distance of the toll road (105 km) and the number of cars at the first tollgate (945). On the other hand,

because the constructionist aspect is missing, there is no opportunity for the learner to construct his/her own, personal images and the networks of connection between them. There is only the possibility of making sense of scientific concepts from ‘the top down’ rather than building them up from the spontaneous concepts of the learner (Noss & Hoyles, 1995, p. 199).

In response to this critique, the next section explores how new cumulative visual processes (Fischbein, 1999) were developed by the 2015 cohort who completed the same tollgate problem but as a modelling task.

**2015 Cohort**

This analysis will be limited to three unusual visual strategies that were identified from the worksheets of the 2015 cohort. As in the case of the 2014 cohort, content analysis was used to focus on students’ visualisation processes in order to answer the question: *Is there a tollgate at the 50km mark, why do you say so?*

**Visual Strategy 1: Visually-induced mathematisation**

In an attempt to understand the real world contexts of the tollgate problem, Group 13 avoided the given symbolic DE at first. Instead, they opted to translate the tollgate phenomenon in qualitative terms. Their response to Task 2b states: ‘The number of cars passing the tollgates is very high and the number of cars along the road is very low, this means that the number of cars along the N1 fluctuate from one point to another’. These students appropriated their everyday knowledge and experiences of how traffic is dispersed along a toll road. This fluctuating behaviour between a high and low number of vehicles cemented their intuitive understanding. Once the analytical solution was identified as a sinusoidal graph in Task 2c, students could compare the characteristics of this graph with their initial prediction from Task 2b. In Task 2e, they defended their intuitive understandings as these were now informed by discursive mathematical analysis: ‘The predicted and analytical solutions are the same, because
of the sine function which indicate the fluctuation properties. Hereby, they validated their intuition with analytical evidence. This is supported by Burton’s (1999) belief that cognitive knowledge, complemented by intuitive insights, can enhance understandings of a concept.

In modelling terms, the process of mathematising a word problem usually involves the formation of a symbolic model as a truthful representation of how a function or data behaves (Yerushalmy, 1997). Instead, the traffic flow narrative was mathematised in qualitative terms like ‘very high’, ‘very low’ and ‘fluctuate’. This group’s mathematisation of the tollgate problem was therefore visually-induced and supported by their own lived reality of the tollgate phenomenon. In Kantian terms, besides the visual objects formulated through students’ intuitions, the conception of objects were at the foundation of their empirical cognition. Subsequently, Group 13 endorsed the qualitative properties of the solution to justify in their own, non-technical language that: “Yes, there is a tollgate [at the 50km mark], the number of cars at a tollgate is very high due to the traffic stop”. These students’ visual mathematisation enabled them to initiate understandings about the tollgate phenomenon which in turn, facilitated the articulation of their meanings into natural language (Kidman & Nason, 2000).

Group 3 also opted to avoid the symbolic clue (DE) at first. Their prediction of the solution (Task 2b) was that ‘the traffic congestion changes. As soon as the cars reach a tollgate, the traffic congestion increases, else after the tollgate, the traffic congestion decreases’. Intuitively, these students mathematised the narrative qualitatively by using the attributes ‘increase’, ‘decrease’ and ‘change’ in traffic congestion. This intuition anchored their argument in Task 2e that the analytical solution concurs with their prediction: ‘It is inline and agrees since a sinusoidal graph increases and decreases’. Consequently, they endorsed a tollgate at the 50km mark, recording the exact number of vehicles as read off from their numerical table to support the ‘high traffic congestion’ at the tollgate that results in ‘no traffic flow’.

Visual Strategy 2: Formation of a primitive visual aide memoire

A primitive visual image was coined by Group 11 in Task 2b. Symbolically, they oversimplified the given DE and anticipated a primordial solution \( D = \sin 2x + c \). Inspired by this primitive equation, they invented a visual strategy (Hershkowitz et al., 2001) as seen in Figure 2. The qualitative behaviour of this primitive solution curve became their ‘standard’ and was used as a visual aide memoire to cross-refer back and forth in subsequent subtasks. This relates to Presmeg (2014, p. 213) who regards a visual image or diagram to function as the “bearer of abstract information”.

\[
\frac{dD}{dx} = A \cos 2x \\
D = \sin 2x + c \\
D = 350 \sin (2 \sqrt{x + 0.15}) + 700
\]

\[\text{Analytical solution}\]

**Figure 2.** Primitive solution curve \( D = \sin 2x + c \) as a blueprint visual strategy.

In Task 2c, they obtained the analytical solution and concluded in Task 2e that their prediction still holds: ‘We expected to see a sinusoidal curve as the traffic congestion fluctuates between max and minimum values. It is as we predicted’. Their solution process was initiated by a symbolic expression, translated into a primitive visual image and subsequent processes were cross-validated using this image. As a result, Group 11 confidently established that there is a tollgate at the 50km mark.
Visual Strategy 3: Trade-off between visual intuition and analytical rigour

We now report on some inconsistencies detected in the work of Group 1 and Group 9. Both groups neglected to 1) predict the solution (Task 2b), 2) solve and plot the DE analytically (Task 2c & 2d) and 3) compare the predicted solution with the analytical solution (Task 2e). Instead, they went straight on to solve the given DE (Task 2f), thereby reverting to the current, parsimonious curricular approach. These were also the only two groups who miss-translated the initial condition and generated graphs similar to Figure 1C. Tasks 2b, 2c, 2d and 2e were designed to elicit intuitive connections with the real world problem and to mathematise contexts. Although Group 9 interpreted the maxima as tollgates, these students did not see it opportune to reject their graphical solution based on the negative minima (see Figure 1C). Arguably, both groups lacked an à priori conception where thoughts were not connected to content (Kant, 1964). These students did not contextualise the tollgate phenomenon in real world terms as they were only focused on ‘treating’ the DE rigorously. In the absence of intuitive connections with the real world problem, even rigorous analytical procedures could not guarantee the meaningful interpretation of graphs (Duval, 2014). In hindsight, an additional question referring to the minima could have alerted students to such inconsistencies.

Although Group 15 predicted an (unrealistic) exponential solution in Task 2b, this intuitive conception did not compromise their ensuing mathematical understandings. For these students, the intuition was short-lived. Once they solved the DE analytically, they counter-argued (Task 2e) in favour of a sinusoidal solution: ‘We regarded only one part of the cosine curve’ by visually inspecting ‘limited x values’. Regardless of a false start, a visual intuition afforded these students the opportunity to construct their own, personal images and understandings through a bottom-up discovery process (Noss & Hoyles, 1995). Two more groups had to revise their intuitive predictions in the face of contradictory analytical evidence. As such, these intuitions and experiences were not in vain. It facilitated and initiated the shaping of understandings that could later be weighed against formal arguments arising from discursive mathematical activities (McDowell, 2006). It can therefore be argued that even ‘false’ intuitions were content-laden and could enrich the visual sense-making of solutions to the tollgate problem. All three these latter groups could, in spite of unrealistic predictions, gather convincing evidence that a tollgate exists at the 50km mark.

Overall, it was surprising that only four groups approached Task 2 by inspecting the given DE analytically; this being the dominant approach in the current curriculum. Yet, visual processes could be traced: ‘from the [given differential] equation, we can see that we will end up having a sinusoidal graph because we have Cos at the right hand side of the equation’ (Group 14, Task 2b). However, this intuitive symbolic conception (Kant, 1964) instantly turned visual (Task 2b cont.): ‘From the [sine] graph we can also detect a maximum and minimum point’. Later-on, the analytical solution would justify their visual intuition: ‘This graph shows that as the vehicles approach the tollgate, the number of vehicles get bigger at the tollgate and when they pass the tollgate, the number of vehicles drops until the next tollgate is approached’. A balanced consistency between intuition and analytical proof (Nardi, 2014) anchored this group’s conviction of a tollgate at the 50km mark: ‘The number of vehicles is at a maximum meaning that there is a tollgate that holds the traffic flow’. Apart from Group 1, all other groups could interpret their solution curves meaningfully and hence confirm a tollgate at the 50km mark.

CODA

The research question is: What visualisation processes, elicited by techno-modelling tasks, can influence engineering diploma students’ interpretation of computer generated graphs? We custom-designed a real world application of the familiar sine graph such that students could
relate in a novel way to characteristics like maxima and minima. Even though this paper focused only on one task, new processes, afforded by synchronised sub-tasks, could be traced in the worksheets of most groups. As such, this task provided a fresh interpretation of traffic flow and congestion, a concept that students could intuitively understand, even prior to formal mathematical investigation. Predominantly, bottom-up processes emerged where the given DE was not intuitively appropriated as expected. The mathematisation of the tollgate narrative was not symbolically driven, but visually induced. Arguments were intuitively motivated in qualitative terms like ‘high’, ‘low’, ‘fluctuate’, ‘increase’ and ‘decrease’; evidence of visual reasoning evoked by personal experiences. These visio-linguistic clues were subsequently used to control and endorse solutions but also, to interpret solutions meaningfully in the tollgate contexts. Accordingly, where subtasks that elicited visual reasoning and visual intuition were omitted, the interpretation of graphs was incoherent. An unusual visualisation process was also developed that played a mnemonic role in shaping a new visual strategy. The key contribution of this study is to illustrate how a model-eliciting task can prompt students to step into their own world and source everyday knowledge that can enhance their interpretation of computer generated graphs. We see potential to advance the appropriateness of DEs in engineering courses at South African universities by eliciting students’ personal experiences and visual intuitions through modelling tasks. We suggest that model-eliciting activities be an integral part of a more enterprising portfolio of pedagogies for future engineers of the 21st century.

REFERENCES


A Possible SoTL Lens for Illuminating the Role of Reflective Tasks in Changing Academic Staff Perceptions And Practices in Teaching

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Abstract
This conceptual paper navigates debates about the nature of SoTL through an exploration of a social justice informed approach whose aim is to achieve participatory parity for staff engaged in this type of professional development activity. Drawing from elements of approaches routed in transformative and critical theory, a possible way of inquiring into reflective tasks and their relationship to teaching practice through a SoTL lens is suggested.

INTRODUCTION
The authors of this article felt that it was important to make an inquiry into the sources of Scholarship of Teaching and learning (SoTL) and the debates surrounding its theory and practice prior to an examination of its adoption and manifestation using reflective tasks. There are questions surrounding inquiry into SoTL that need to be cleared up before one can comfortably make decisions around using a ‘SoTL lens’ or a ‘SoTL approach’. Is SoTL a legitimate field of inquiry? If so, what characterises this field? And how does this shape an inquiry related to SoTL-related professional development? What is the best way of inquiring into reflective tasks and their relationship to teaching practice through a ‘SoTL lens’?

Our view is that an understanding of the phenomena being investigated is required before examining empirical evidence for its manifestation in practice. In our case, this involves the use of reflective tasks in a SoTL-related programme. We have selected a one way of plotting a course through these territories by first navigating debates about the nature of SoTL and then trying to conceptualise a possible way of inquiring into reflective tasks and their relationship to teaching practice using a SoTL lens. The navigation makes no claim for comprehensive coverage but is an articulation of both authors’ thoughts around the role of reflective tasks in influencing academic staff perceptions and practices in university teaching.

The context of this discussion is a South African comprehensive university environment where the article authors work. There are three types of universities in South Africa: traditional universities which offer theoretically-oriented university degrees, universities of technology which offer vocational oriented diplomas and degrees; and comprehensive universities which offer a combination of both types of qualifications. Each South African university type has different demands, suggesting a need to pay attention how each institutional type can “impact on teaching and learning and on efforts to enhance both areas” (Boughey, 2011, p.1). However, there are challenges common to South African higher education. It is a context where there is a growing need to widen access to higher education and increasing student numbers, but limited resources to support staff and student development adequately. The recent student demands for relevant, de-colonialised curricular add to the complexity of the total picture. Sadly, it is also a context where there is still inequality and a lack of transformation in the way the social, economic, and cultural resources are distributed in higher education (Cooper, 2015; Leibowitz Bozalek, 2015). Soudien (2011, p.15) argues that the reason transformation is not effective is due to a “a relative neglect of questions of epistemology and forms of knowledge that fall outside the mainstream Western model”. Could the same apply to SoTL?
Very few academic staff have been formally prepared to teach in university settings and struggle to meet the demands of being or becoming professional scholars or educators in a rapidly changing environment. The current structures the different institutions provide limited opportunities for staff development in relation to teaching and learning. Although several South African universities have set up centres of teaching and learning to encourage systematic and scholarly approaches to the improvement of teaching and learning, these approaches tend to be generic, and are not necessarily designed to respond to the different needs of academics who identify themselves as either primarily researchers, primarily educators or a combination of the two.

One of the reasons the SoTL certificate programme at this university was set up was to address some of these challenges. The programme (see figure 1) is an unaccredited programme consisting of 10 topics, although these have been reduced to nine in the past year. The facilitators on the course are academic developers working in the university teaching and learning centre.

![Figure 1. A SoTL Certificate Programme](image)

The certificate is part of a group of formal professional development programmes at the institution designed to enhance the provision, management and evaluation of teaching and student learning driven by an emphasis on comprehending and improving students’ learning experiences (Brew, 2007). New academics complete an Induction programme after which they can enrol in the SoTL certificate. The SoTL certificate is purportedly grounded in a SoTL philosophy. It is designed to be completed in one year but academics can complete it in two years. The aim of the certificate is to contribute to the development of the participant disciplinary teaching knowledge and teaching competencies as part of their professional development.

“Reflection has been identified as a key process in the scholarship of teaching and learning” (Kreber, 2006, p.90). Jack (Mezirow, 1991) identification of three reflective categories of content, process and premise provide a structure for designing, implementing evaluating interventions which involve reflection on practice. Content reflection asks questions about the practice itself, what the problem is and what needs to be done. Process reflection asks questions
on the processes or on how one can determine that one is effective in the practice. Premise reflection asks questions based on reflection, on why one chooses certain ways of responding to a problem and whether there are other alternatives (Mezirow, 1991; Grace, Pilkington, Rush, Tomkinson, Willis, Evans, & Wareham, 2006).

A reflective approach has been adopted to assist certificate participants to engage with current theories and reflect on their teaching in a structured environment given the constraints of time, resources, and the different disciplinary and institutional demands. Topic facilitators offer activities to support a three-hour face-to-face contact session. As far as possible, the set of reflective tasks seek to respond to the conditions that the academics experience during their actual teaching. Facilitators introduce each task, provide opportunities for participants to work individually and collaboratively with other participants. Participants prepare a reflective essay related to each task. All the essays for all the topics are then compiled into a participant portfolio of evidence. There are several challenges. Currently each facilitator uses their own approach. The lack of clarity of a visible underpinning SoTL philosophy makes it difficult to determine if the reflective tasks contribute to changed teaching practice. It is difficult to ascertain that this certificate is the best vehicle for advancing professionalism in an academic environment.

In the remaining sections, we briefly navigate debates about the nature of SoTL through an exploration of a social justice informed approach whose aim is to achieve participatory parity for staff engaged in this type of professional development activity. Drawing from elements of approaches routed in transformative and critical theory, a possible way of inquiring into reflective tasks and their relationship to teaching practice through a SoTL lens is suggested.

**SOTL DEBATES**

The recurring debates around the lack of clarity around a definition of SoTL signposts a phenomenon whose establishment is still a site of contention (Manarin & Abrahamson, 2016; Kreber, 2015). There does not seem to be agreement about how constitutive learning areas in SoTL should be investigated (Shulman, 2000; Hutchings, 2000; McKinney, 2007), and what values underlying its practices should be promoted. In their recent exploration of how practitioner SoTL experiences could work to enable or disable academic identity and knowing, Manarin & Abrahamson (2016) refer to the “troublesome nature of SoTL” (p.1). Their study revealed that while “participants valued SoTL cognitively and affectively, they also identified competing values both in terms of disciplinary practices and institutional demands” (Manarin Abrahamson, 2016, p.1). The “debates about what SoTL is ultimately for, what its nature is,” (Kreber, 2015, p. 101) are not yet resolved.

There seems to be a tension between a need to promote SoTL as a legitimate research field on one hand, while endorsing it as a vehicle or framework for improving teaching and learning practice, on the other hand. Unlike other established disciplines (or research fields with accompanying practices), SoTL has yet to enunciate a concretisation either: of ways of inquiring into its different areas; or its development into a multi-disciplinary field of research and practice targeting a unifying object of inquiry.

In a small way, this could contribute to an enhancement of that concretisation by asking questions about SoTL before examining its materialisation. It is an extension of Kreber’s contribution to the debate of theorising of SoTL using “MacIntyre’s framework of practices” (Kreber 2015, p.99). This is scrutinized with notions of participatory parity used in Leibowitz Bozalek’s (2015) advancement of Nancy Fraser’s instantiation of a theory of social justice. Reflective tasks are the conduits through which the questions are interrogated.
SoTL beginnings

Originally Boyer (1990) referred to four forms of scholarship: scholarship of discovery; scholarship of integration; scholarship of application; and scholarship of teaching. Later, the term ‘and learning’ was added to teaching because, as (Kreber 2015, p. 100 asserts) “…there is an understanding, shared by many, that the scholarship of teaching would miss its mark if its purpose were not to support the learning (and, we might add, the development) of students”.

The emergence of a movement advocating that some effort be devoted to formal inquiry into teaching and learning can be traced back to the establishment of the American Carnegie Foundation for the advancement of teaching in 1905 (Parker, 2003). Early SoTL luminaries sought for ways of elevating disciplinary teaching to counter the dominance of research over teaching in universities by promoting the development of more activities on teaching discernible as ‘scholarship’. Boyer, a former president of the Carnegie Foundation, argued for a broader and more dynamic understanding of scholarship embracing the entire scope of academic work.

According to Boyer (1990, p. 16):

…scholarship means engaging in original research. But the work of a scholar also means stepping back from one’s investigation, looking for connections, building bridges between theory and practice, and communicating one’s knowledge effectively to students… [and where] . . . good teaching means that faculty, as scholars, are also learners.

Boyer “… placed emphasis on the scholarliness inherent in good teaching” (Leibowitz & Bozalek, 2015, p.2). He advocated for re-considering an inclusive view of what it meant to be a scholar, and the need for scholars to acquire, process, generate and share knowledge and competencies, through “research, through synthesis, through practice and through teaching” (Boyer 1990, p. 24).

Lee Shulman, another former Carnegie Foundation President and Professor at Stanford who argued for a more serious investment in the scholarship of teaching suggested three broad rationales for why universities should invest in SoTL: Professionalism, Pragmatism, and Policy (Shulman, 2000, p.49):

- Professionalism refers to the inherent obligations and opportunities associated with becoming a professional scholar or educator
- Pragmatism refers to the activities needed to ensure that one’s work as an educator is constantly improving and meeting its objectives and its responsibilities to students.
- Policy refers to the capacity to respond to the legitimate questions of legislatures, boards, and the increasingly robust demands of a developing market for higher education

Even after two decades, these rationales are still relevant today, especially in an era where there is a need for institutions to provide evidence of a commitment to the development of quality teaching and learning, despite decreasing resources.

Shulman (2000) underscored adopting a view of teaching as a profession built on a knowledge base subjected to “systematic reflective analysis” (p. 50) in each discipline. He made a distinction between scholarly teaching and the scholarship of teaching. Scholarly teaching “models the methods and values of a field” (Shulman, 2000, p.50). Scholarly teachers read and apply literature about teaching, student learning, assessment, and curriculum design. They reflect on their teaching practices; try out new ideas and discuss their teaching practices with others. Through these processes, they gain knowledge about effective ways of teaching, and ways of making the learning materials accessible and meaningful to students in their prospective disciplines.
However,

we … develop a scholarship of teaching when our work as teachers becomes public, peer-reviewed and critiqued … it is exchanged with members of our professional communities so they, in turn, can build on our work”. Shulman (2000, p 49).

In subsequent efforts and activities, American SoTL advocates continued to produce work reflecting on disciplinary teaching practices and contributing to teaching innovations. Several journals dedicated to the SoTL have also been developed to support its growth.

EXPLORING SoTL PERSPECTIVES

Although there are multiple understandings of SoTL, there is general agreement that Boyer’s work forms an early conceptual platform for further development. There are two main perspectives emanating for the literature consulted: a perspective of SoTL as a field of inquiry and a perspective of SoTL as a tool for enhancing the professionalisation of teaching and learning.

SoTL as a field of inquiry

SoTL as a field surpasses good and scholarly teaching. Academics involved in SoTL frame questions that they systematically investigate in relation to their teaching and their students’ learning’ (Brew 2006; Liebowits & Bozalek, 2015). Kreber (2015) argues that SoTL should not only be viewed as formal inquiry into teaching and learning but should involve inquiry and commitment at a deeper level. To Kreber, SoTL involves:

…”critical reflective inquiry, into teaching and learning, … is encouraged through critical dialogue and debate and in community with others. … includes asking meaningful and often difficult questions about what teaching and learning in higher education are for, what role teaching plays in our academic and perhaps personal lives, and what we consider to be significant learning on the part of students (Kreber, 2015, p. 110)

The overall intention of SoTL is thus to improve student learning and enhance educational quality.

SoTL viewed through the lens of transformational learning theory,

…”widens the perspective on the SoTL to include critical reflection and critical questioning of not only individual’s practice, but also the context within which teaching takes place…. assumptions, beliefs, norms and values of the discipline, the institution, the community and the state are directly and critically questioned. Such an approach has the potential to yield a deep shift in perspective on teaching and learning at both an individual and a social level” (Cranton, 2010, p. 76).

SoTL also involves a critical reflection on the kinds of research undertaken (Leibowitz and Bozalek, 2015).

The challenge with SoTL is that it can be “conducted by specialists and non-specialists alike” (Leibowitz & Bozalek, 2015, p.2. The field has not yet been able to amass a stable group of scholars identifiable as SoTL theorists to propel SoTL philosophies and approaches forward. According to (Fanghanel, Pritchard & Wisker, 2016), SoTL work lacks rigor. In addition, disciplinary units limit capacity building in SoTL as they are the custodians and arbitrators of what counts as knowledge in university teaching contexts.

SoTL as a tool for enhancing the professionalisation of teaching and learning

Fanghanel, Pritchard & Wisker’s (2016) review also uncovered a new SoTL perspective showing a move away from the initial focus on individual practices to more strategic
institutional and national policy foci designed to establish excellence frameworks. Related to these excellence frameworks is the idea of enhancing professionalism by creating CoPs of reflective practitioners who document their work in reflective portfolios, conduct and share their work other academics.

Most SoTL approaches are designed to raise the status of university teaching. In one category of approaches, “the emphasis is on using each disciplines’ academic procedures and conventions to establish parity between pedagogic and academic research” (Parker, 2003, p. 140). Other approaches involve the creation of a “parallel and equally valued track for pedagogic scholarship alongside disciplinary research” (Parker, 2003, p. 142). (McKinney, 2007, p. 9) asserts that each academic has two disciplines, their own discipline and a second discipline – a “knowledge base on teaching and learning” in which expertise is developed. In the other category, SoTL is tightly woven with teaching and excellence promotion (Fanghanel, Pritchard & Wisker, 2016).

The uptake of SoTL in universities is still a very slow process. Up till now, SoTL has been mostly pieced together as a North American phenomenon although there have been attempts to re-frame it in other contexts such as the United Kingdom, Europe, South East Asia, and South Africa. To many academics, “the term SoTL itself may be alien and so may present individuals with troublesome understandings about their own practice” (Manarin & Abrahamson, 2016, p.1).

In a much earlier account Parker (2003) criticized SoTL promoters on their failure “to outline ways of thinking that would bring teaching and learning back into harmony and mutuality” (p. 142). Parker (2003) was not convinced that the regulated and professional pedagogic scholarship being encouraged in institutions was the way to go, and rather advocated for the development of:

“… scholars equally and simultaneously passionate and thoughtful about their research and their teaching, such that each feed the other; who are equally reflective, imaginative and scholarly about their work, whether it be designing a curriculum or assessment strategy, or writing a paper for an academic or a pedagogic conference” (p. 143).

Leibowitz & Bozalek (2015) argue that the path taken towards SoTL inquiry has largely been instrumentalist avoiding a critical and transformative or social justice orientation. Our stance is that in the South African context, we still need to delve deeper into what the nature of SoTL is if we are to make any useful and meaningful adaptations of SoTL in our contexts.

A FRAMEWORK FOR EXPLORING SO TL PHENOMENA
We have briefly explored the ideological underpinnings of SoTL as constructed by a few researchers. We now need a framework to explore what the socially constructed realities of SoTL practitioners should look like. What methods would be appropriate for exploring SoTL? Which analytical structure is suitable for SoTL exploration?

What methods would be appropriate for exploring SoTL?
Our assumption is that SoTL practitioners organise their lives around value-laden realities unique to themselves. These are the values we seek to identify in the methodologies that will be used to explore the role reflective tasks play in influencing teaching practice. The expected SoTL certificate participants are academics at various stages of their careers with a mixture of teaching-focused and research focused roles. Questions that the researchers would be interested in examining include descriptions of academic identities, participant understanding of SoTL, their work and values in relationship to SoTL, and their experiences of the reflective tasks in
the SoTL programme. The designed research questions should probe personal, social, disciplinary, and institutional support/obstacles to SoTL adoption.

**What analytical structure is suitable for SoTL exploration?**

The most important reason for engaging in the scholarship of teaching and learning should be the professional role and responsibility of ensuring that our students succeed in their studies and development. Shulman’s (2000 p.2) outline of the professional responsibilities as scholars still makes sense today:

As scholars, we take on the obligation to add to the core of understanding, scepticism, method and critique that defines our fields and their ever-changing borders. We also assume the responsibility for passing on what we learn to discern and act, through teaching, social action, and through exchanging our insights with fellow professionals. Indeed, the core values of professional communities revolve around the expectation that we do not keep secrets, whether of discovery or of grounded doubt. We are expected to share our knowledge by making it public, whether via publication, correspondence, opportunities, and identity.

But is this the understanding all SoTL practitioners carry? Conducting research around participant perspectives and identifying the categories of values they subscribe to, could assist the researchers with establishing if these values align with an identified SoTL philosophy (or range of philosophies).

Leibowitz & Bozalek’s (2015) interpretation of a social justice informed approach presents a possible way of critically analysing how academic engagement in the SoTL develops to support participant growth as scholars. To them, a social justice informed approach should be distinguished from the implementation of a socially just pedagogy. In a socially just pedagogy, all learners “have equitable opportunities to learn” … [with] … “equal resources for learning” (Moje, 2007, p.3). A social justice informed approach goes beyond an equitable distribution of, and access to resources. It provides opportunities for meaningful participation and “possibilities for transformation” (Moje, 2007, p.4) for all learners, and for disrupting the social and political milieu in which teaching and learning transactions take place. A social justice approach makes sense in South Africa, where few examinations of professional development experiences of marginalized individuals occur, especially women and black academics (Naicker, 2013; Ramohai, 2014). Suggestions of how to counteract these destructive practices are limited.

Nancy Fraser’s, 2008 social political view of a three-dimensional social justice framework focusing on participatory parity useful for analysing forms of professional development, especially in an era when South African institutions are trying to transform. The framework uses three dimensions to categorise sources of disparity from a cultural-economic-political perspective:

- Recognition/misrecognition refers to cultural values and to the promotion or prevention of equal respect to all regardless of race, gender (etc.). Our task is to identify those education issues of recognition which impact on how practitioners can participate as equals;
- Redistribution/maldistribution refers to economic structures related to the distribution of material goods (wealth, income, labour, educational capital) and mechanisms that control or deny access these resources. Problems related to class structures could impact participation in higher education because of flaws in redistribution control of resources; and
- Representation/misrepresentation refers to a political dimension that relates to issues of inclusion and exclusion. Problems occur when participants are not given opportunities
to participate as equals with others in social interactions because of the unfairness in patterns of representation.

All three requirements are necessary for participatory parity and none alone is sufficient (see Figure 2).

![Figure 2. Nancy Fraser’s Three-dimensional social justice framework](image)

Generally, there are two ways of correcting these social injustices: through affirmative action by reappraising the devalued group characteristics without restructuring the underlying differentiations; or through transformative action by deconstructing and disrupting the underlying differentiations so that the whole group including the disrespected groups. They would change everyone’s sense of self.

In exploring the notion of participation parity, Leibowitz & Bozalek’s (2015), illustrated how participants responded in three research-based professional development interventions implemented collaboratively across different universities. The first was an action research based short course for academics; the second was an inter-institutional course facilitated by educators from four universities in the Western Cape; and the third was a collaborative, six year-long research-project undertaken by 18 academic developers at eight institutions. In all three instances, there were demonstrations of a lack of participation parity and ultimately forms of social (in)justice within and across institutions. What stood out for us was reference to the fact that denial to “social arrangements and opportunities to access educational theory” … “within research collaboration” (Leibowitz & Bozalek’s 2015 p. 10) was construed as a matter of social (in)justice. It raises questions around power and access to knowledge or education capital in academic social settings. Nevertheless, the yardstick of participatory parity is a worthwhile and objective to have in an inquiry of this kind.

To theorise and deepen an understanding of SoTL, Kreber (2015) proposes that one constructs the activity of the SoTL using criteria suggested by McIntyre. The first requirement is that a clear purpose is established. We propose that the purpose not be defined in terms of the programme but also in terms of its value to the institution, centre, at a social and personal level. Kreber’s (2015) definition (cited in McIntyre’s 2007) states that:

> any coherent and complex form of socially established cooperative human activity through which goods internal to that form of activity are realised during trying to achieve those standards of excellence which are appropriate to, and partially definitive of, that form of activity, with the result that human powers to achieve excellence, and human conceptions of the ends and goods involved, are systematically extended. (p.102)

There are four criteria that need to be adhered to, the practice:
should be a community-based activity
should be related to some worthy construct of internal goods
should be realised through virtues related to standards of excellence
should involve a transformation process leading to a realisation of the internal goods.

Kreber argues that the practice be underpinned by the moral virtues of justice, courage, truthfulness, phronesis and authenticity. By providing evidence of the cooccurrence of all four criteria Kreber (2015) can convince readers that SoTL is indeed a practice.

**WHAT IS THE BEST WAY OF INQUIRING INTO REFLECTIVE TASKS AND THEIR RELATIONSHIP TO TEACHING PRACTICE THROUGH A ‘SO TL LENS’?**

The initial conception of reflection or reflective thinking came from (Dewey) more than eighty years ago when he defined reflection or reflective thinking as “active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusion to which it tends. (1933, p. 9). During reflective thinking one is usually faced with a practical problem that cannot be easily resolved in practice. Loughran (2002) contends that “…what the problem is, the way it is framed and reframed, is an important aspect of understanding the nature of reflection” (p. 33). Mezirow (1990) emphasises the importance of carefully considering what one is reflecting on - content, process, or premise. According to (Núñez, Solano, González-Pienda & Rosário, 2006) reflecting is a vital activity for professional and personal development since it leads the teacher to simultaneous processes of self-recognition and self-evaluation which when addressed, lead to improved practice. The extended contemplation on problematic aspects of practice is regarded ‘reflective practice’. In the SoTL, reflective practice helps the practitioner “make new sense of situations of uncertainty or uniqueness” that they might experience (Schön, 1983, p. 61).

**Reflective tasks**
The reflective task is either one activity or a cycle of activities that incorporates a core reflective process in relation to specific aspects of the practice. In the SoTL context these could include aspects of curriculum design, assessment or basic teaching and learning strategies. The task should have an area of focus. Directed reflective processes are designed to effectively result in desired outcomes within a specific context in relation to social and personal conditions. According to Grace et al, 2006, p. 24,

…factors that support personal engagement, the wider context and the intended outcomes are appropriately aligned with each other, and designed to support the core reflective process, ensuring that this core process is both targeted and sustained, and at the appropriate depth.

Reflective processes should always be supported by appropriate pedagogic considerations.

**Reflective task affordances**
In the 1970s, American psychologist James Gibson initiated the use of the term ‘affordance’. “‘Affordance’ refers to the perceived and actual properties of a thing, primarily those functional properties that determine just how the thing could possibly be used” (Norman 1988 cited in (Kaptelinin, 2014, p. 6). Although originally the construct was developed to support the ecological theory of visual perception of physical objects, the term has been used in other areas such as the conceptualisation and design of technological artefacts in Human-Computer Interaction (HCI). Our contention is that we could also use the term ‘affordance’ to think about objects of educational or social inquiry such as reflective tasks. That way, the social object of
inquiry can be described, examined, and evaluated according to how it provides opportunities for meaningful action.

Our contention is that one requires some knowledge and a level of discernment about the object and the context in which one operates to recognise and use an object’s affordance meaningfully. There are other factors such as one’s perception of a value-laden relation between the object and the world. For example, a staff member whose office is situated on the second floor of a building is fortunate to have a tree outside their window. The tree provides a shade for the staff member so that s/he is not constantly working under the sun’s glare. The tree affords a level of protection from the sun to the staff member. A potential intruder walking outside could have a different perception. S/he could see the same tree as a way of getting into the building undetected. The tree affords a mechanism for getting into the building for the intruder, (an unprincipled motive). The tree could also provide a way for staff getting out of the building in the case of fire. In this example, the tree has the two affordances: provision of protection and provision of access to the building. The intruder and the staff member would have different perceptions of the value of the same object.

In the same way, the usefulness of the reflective tasks in a setting such as a SoTL certificate course would best be determined by a description and analysis of what both the researchers and participants think, and the decisions they make around the usefulness of these reflective tasks. These decisions are shaped by the knowledge, experiences, contexts, as well as values held by both parties (researchers and participants).

The researchers take the view that the reflective tasks are tools used for directing the reflection and helping each practitioner refine their ability to apply appropriate solutions to teaching and learning challenges. The assumption here is that a seasoned SoTL practitioner has the requisite knowledge, is dispositionally attuned, and has good comportment when facing teaching and learning related challenges. The experienced practitioner’s ability to discriminate and experience affordances offered by each situation and to respond to them intuitively is heightened with reflection, exposure, and experience.

In the university, professional development context in which this exploration is set, the expectation is that a successful SoTL participant would have developed the ability to discriminate and identify the affordances of each reflective task and grown in their ability to perceive the reflective task affordances of the programme in its entirety. A SoTL-informed professional development programme should provide opportunities for the practitioner to reflect on current practice critically with peers and facilitators. The professional development programme should offer a safe ground for this type of learning and experimenting.

**CONCLUSION**

This paper proposes a possible way of inquiring into reflective tasks and their relationship to teaching practice through a SoTL lens. The focus is on understanding and working with the reflective task affordances in the context of a SoTL programme. The directed planned action (or purpose) of the SoTL certificate programme is to support participants in improving their teaching and learning practice initially, and becoming scholars of teaching and learning eventually. Kreber’s (2015) norms of a practice using criteria suggested by McIntyre provide a framework for ascertaining the programme aligns with SoTL principles of good practice. Leibowitz & Bozalek’s (2015) outline of a social justice informed approach using Nancy Drew’s idea of participation parity, provides for the authors, a mechanism of critically analysing academic engagement in the SoTL training, the links to actual practice and possible mechanism for ensuring the required participant growth as scholars.
The authors aim to use the developed framework in an analysis of participant views and perceptions of reflective tasks in a SoTL certificate programme. The findings will inform a re-examination and reconceptualization of the approaches used in our educational development unit and planning for future professional development activities for academic staff. The authors agree with Manarin & Abrahamson, (2016) in pronouncing that “SoTL may act as a prism, making already existing contradictions in higher education more visible” (p. 4).

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Comparative Learning Challenges Experienced by Students in Universities of Developing Nations in Sub-Saharan Africa

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Abstract
The study investigated the learning challenges experienced by undergraduate university students in South Africa and Nigeria. Survey design was employed for the study. The population of the study were undergraduate students of two selected universities in South Africa and Nigeria. 2335 randomly selected undergraduates formed the sample of the study. The outcome of the study shows that six common learning challenges: cognitive learning challenges, easy loss of concentration, previous learning experiences, distance, student-lecturer relationship as well as policy making and implementation are experienced by undergraduate students in the two universities. Based on the findings, the study recommends that participatory learning which helps to build the capability of students be encouraged, and an alliance be formed between the universities and transport companies to enable students overcome challenges faced due to distance. Moreover, good student-lecturer relationship which will help motivate and boost the self-esteem students be encouraged, while the policies that will motivate and enhance students learning abilities be made and implemented.

INTRODUCTION
The demand for university education in the 21st century is fast increasing in different parts of the world (Okoro and Okoro, 2014). This is applicable to countries within the sub-Saharan African region as well. This high demand has led to low quality output in university education in the African region (Adeyemi, 2001). According to Akoojee and Nkomo (2008) who describe the low quality of education as participatory access, it is predominant in black dominated African universities. Meanwhile, Yesufu (1973) had earlier opined that the search for tertiary education in the early 1990s in the African continent lead African nations into holding several conferences which sprung up different institutions of higher learning including universities in different African nations. Aina (1994) added that workshops were help towards ensuring quality in the type of education offered in African universities. However, in recent times, African universities seem to lack the necessary quality and this has led to brain drain in the continent (Dimkpa, 2011). However, Harvey and Green 1993 in Akoojee and Nkomo (2008) identify four ways by which quality in the educational system must be viewed in order to aid the realization of access with success. These views are:

- Quality as perfection or exceptional: this means that standard must be considered in every academic endeavour. The level of quality in any institution of learning must be of quality standard. In other words, it must meet global acceptance though it remains in local demand and usage. The quality of education in a given field and institution in Africa is expected to meet an acceptable global standard in the same field in other institutions in other parts of the world.
- Quality for and of purpose: in this case, the purpose for any academic related activity must be of high quality. The moment institutions fail to transfer knowledge to students;
they have perpetrated a form of malpractice (Hunt and Grant, 2013). Transfer of knowledge entails quality; hence, institutions are expected to perform the purpose for their establishment with quality.

- Quality as value for money: institutions must have justification for any economical demand made. In other words, institutions of learning must ensure that the right services are adequately provided. Thus institutions must endeavor to provide good services that will worth the money expended.

- Quality as transformation: in this regard, education must be considered as a tool for transformation. This implies that institutions must not underestimate the reason for their existence, rather must consider their existence as vital and important for meaningful transformation.

According to Abrantes, Seabra, & Lages (2007), Akoojee and Nkomo (2008) and Okoro & Okoro (2014) lack of quality education in institutions of higher learning has been reduced to learning challenges among students. Moreover, Macgregor (2007) and International Organization for Migration (2014) explain that the result of the learning challenges remain high rate of drop-outs from institutions of learning.

Several factors have been attributed as the causes of learning challenges which have led African universities and nations to their current position of increased brain drain. Some of the causes of learning challenges according to Leibowitz & Bozalek (2014) include: appointment and recruitment of members of staff, population of students, availability of ICT and social infrastructures, poor staff welfare, insecurity, language of instruction, orientation, cultural diversity, student unrest, socio-economic status of students among others. Hence, this paper seeks to investigate the learning challenges hindering university students from performing excellently in African universities though African students in diaspora tend to be celebrated based on their academic excellence and prowess. These challenges seem to have positioned African nations and the African continent in a backward and dependent situation, making it impossible for them to lead and fully control their affairs.

STATEMENT OF THE PROBLEM
University education in the African continent is expected to be a problem solving venture. In the 1990s, African universities were of great values and aimed at providing solutions to problems experienced by different African nations and sectors of the economy. However, university education seems to have failed in performing its primary function. Rather, it turns out graduate to the society annually without adequately equipping them to be useful to both themselves and the society. Participatory access has become a common trend in African universities within the continent though huge amount of money is budgeted and expended on education annually. Thus, this study is basically focused on identifying the learning challenges hindering university students in African universities from performing as it is expected and consequently contributing positively to the growth and development of African nations.

Research question
The research questions for this study are:

1. What are the common learning challenges experienced by undergraduate university students in South Africa and Nigeria?
2. What are the causes of the identified learning challenges experienced by undergraduate university students in South Africa and Nigeria?
Research objectives
The research objectives of the study are:

1. To explore the common learning challenges experienced by undergraduate university students in South Africa and Nigeria?
2. To investigate the causes of the identified learning challenges experienced by undergraduate university students in South Africa and Nigeria.

METHODOLOGY
The study adopted survey research design. Kumar (2014) and Creswell (2014) view survey research as an approach to retrieve data based on representative sample which enhances generalization to a specific population. The study population were undergraduate students in two selected universities in South African and Nigeria. The population of two thousand, three hundred and thirty five (2335) randomly selected third year undergraduate students in two selected universities in South Africa and Nigeria formed the participants of the study. Out of this sample population, 1224 respondents were from a South African based university, while 1111 respondents were from a Nigerian based university. A 4 point Likert scale questionnaire was used for data collection. The questionnaire was designed using the rating scale of Strongly Agree (4 points), Agree (3 points), Disagree (2 points) and Strongly Disagree (1 point). The sample population are represented in Table 1

Table 1. List of respondents.

<table>
<thead>
<tr>
<th>Gender</th>
<th>South African Based University</th>
<th>Nigeria Based University</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency (N=1224)</td>
<td>Percent</td>
</tr>
<tr>
<td>Male</td>
<td>617</td>
<td>50.4</td>
</tr>
<tr>
<td>Female</td>
<td>607</td>
<td>49.6</td>
</tr>
</tbody>
</table>

RESULT
The results of the study are presented below based on the items retrieved from the questionnaire which was designed using the research questions:

Research question 1
Respondents’ views to whether students struggle trying to understand new concepts

Table 2. Respondents’ views on cognitive learning challenge

<table>
<thead>
<tr>
<th>Statement: I struggle trying to understand new concepts</th>
<th>South African Based University</th>
<th>Nigeria Based University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>33</td>
<td>2.7</td>
</tr>
<tr>
<td>Disagree</td>
<td>250</td>
<td>20.4</td>
</tr>
<tr>
<td>Agree</td>
<td>753</td>
<td>61.5</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>188</td>
<td>15.4</td>
</tr>
<tr>
<td>Total</td>
<td>1224</td>
<td>100</td>
</tr>
</tbody>
</table>

From Table 2, it was discovered that about 77% (61.5 + 15.4) of the respondents from South Africa believed that students struggle trying to understand new concepts while about 23% (2.7
+ 20.4) of the South African respondents did not believe so. Meanwhile, about 89% (59.9 + 29.5) of the Nigerian respondents are of the opinion that students struggle trying to understand new concepts and about 11% (0.5 + 10.2) did not believe that students struggle trying to understand new concepts. Generally, it can be observed that majority of the respondents from the two countries agreed/strongly agreed that students struggle trying to understand new concepts. A total of 1934 out of 2335 total respondents translating to 82.8% affirmed that students struggle trying to understand new concepts. Hence, it can be upheld that students from the two countries struggle trying to understand new concepts. This finding corroborates the work of Akoojee and Nkomo (2008) who opine that cognitive learning challenge is a major experience of students in black dominated institutions.

**Easy loss of Concentration due to socio-economic background**

**Table 3.** Respondents’ views on easy loss of concentration

<table>
<thead>
<tr>
<th>Statement: I easily lose concentration when teaching is on or when reading</th>
<th>South African Based University</th>
<th>Nigeria Based University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>71</td>
<td>5.8</td>
</tr>
<tr>
<td>Disagree</td>
<td>440</td>
<td>35.9</td>
</tr>
<tr>
<td>Agree</td>
<td>555</td>
<td>45.3</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>158</td>
<td>12.9</td>
</tr>
<tr>
<td>Total</td>
<td>1224</td>
<td>100</td>
</tr>
</tbody>
</table>

From the Table 3, it can be deduced that 58.2% (45.3 + 12.9) of the respondents from South Africa opined that students easily lose concentration when teaching is on or when they are reading while about 42% (5.8 + 35.9) of the South African respondents disapproved the belief. However, 78% (47.6 + 30.4) of the Nigerian respondents are of the opinion that students easily lose concentration when teaching iskizitoasdlf:ksdsflkj on or when they are reading and about 22% (5.1 + 16.8) did not believe that students easily lose concentration when teaching is on or when they are reading. Generally, it can be observed that majority of the respondents from the two countries agreed/strongly agreed that students easily lose concentration when teaching is on or when they are reading. Hence, it can be concluded that students easily lose concentration when teaching is on or when they are reading. From the work of Okioga (2013) and the finding of this study, it can be deduced that the socio-economic background of students makes them lose concentration and that influences their (students) learning abilities.

**Students’ Education Background and Learning Challenges**

**Table 4.** Respondents’ views on lack of good foundation in the choice of course of students constitute learning challenge

<table>
<thead>
<tr>
<th>Statement: My lack of good foundation in my choice of course constitutes learning challenge for me</th>
<th>South African Based University</th>
<th>Nigeria Based University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response</td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>52</td>
<td>4.2</td>
</tr>
<tr>
<td>Disagree</td>
<td>162</td>
<td>13.2</td>
</tr>
<tr>
<td>Agree</td>
<td>561</td>
<td>45.8</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>449</td>
<td>36.7</td>
</tr>
<tr>
<td>Total</td>
<td>1224</td>
<td>100</td>
</tr>
</tbody>
</table>
The results from the Table 4 revealed that about 83% of the South African respondents acceded that lack of good foundation in the choice of course of students constitute learning challenges and about 17% of the respondents disagreed. Meanwhile, 89.7% of the Nigerian respondents are of the opinion that lack of good foundation in the choice of course of students constitute learning challenges and about 10% did not believe that lack of good foundation in the choice of course of students constitute learning challenges. In general, it can be inferred that majority of the respondents (85.9%) from the two countries are in agreement that lack of good foundation in the choice of course of students constitute learning challenges. The finding corroborates with the works of Sife, Lwoga & Sanga (2007) and Souriyavongsa, Rany, Abidin, & Mei (2013) who opine that the previous knowledge of students contribute to their abilities to learn new concepts. According to them, previous knowledge is important in ensuring that new ideas are learnt.

Student-lecturer relationship and learning challenges

Table 5. Respondents’ views on whether students’ relationship with their lecturers influence their ability to learn

<table>
<thead>
<tr>
<th>Statement: My relationship with lecturers influences my learning ability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Response</strong></td>
</tr>
<tr>
<td>Response</td>
</tr>
<tr>
<td>Strongly Disagree</td>
</tr>
<tr>
<td>Disagree</td>
</tr>
<tr>
<td>Agree</td>
</tr>
<tr>
<td>Strongly Agree</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

The results from the Table 5 showed that about 72% of the South African respondents concurred that students’ relationship with their lecturers influence their ability to learn while about 28% of the respondents did not concur. Also, 86.6% of the Nigerian respondents did go along with the view that students’ relationship with their lecturers influenced their ability to learn and just 13.4% of them did not believe that students’ relationship with their lecturers influenced their ability to learn. Generally speaking, the views of the respondents in the two countries considered in the study regarding whether students’ relationship with their lecturers influence their ability to learn are similar. The finding corroborates the finding of the works of Gallagher (2013) and Kaufman et al. (2016) who aver that poor student-lecturer relationship constitutes learning challenges experienced by students. Findings also show that this challenge can be minimized in environments where the student-lecturer ratio is manageable, compared to situations where students are overpopulated and only very few students can have good access to the available lecturers. On the contrary, Baumeister et al. (2003) had earlier opine that it is the self-confidence of students and relationship with peers that determine the extent to which they will experience learning challenges. It is however believed that students who lack self-confidence will yet encounter learning challenges though they have good relationship with their lecturers. Consequently, Shore (2016) avers that lecturers are to help students build self-confidence as they relate.
Distance and Learning Challenges

**Table 6. Respondents’ views on learning challenge due to distance to campus**

<table>
<thead>
<tr>
<th>Response</th>
<th>South African Based University</th>
<th>Nigeria Based University</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>167</td>
<td>13.6</td>
</tr>
<tr>
<td>Disagree</td>
<td>58</td>
<td>4.7</td>
</tr>
<tr>
<td>Agree</td>
<td>427</td>
<td>34.9</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>572</td>
<td>46.7</td>
</tr>
<tr>
<td>Total</td>
<td>1224</td>
<td>100</td>
</tr>
</tbody>
</table>

From the table 6, it can be stated that 81.6% of the respondents from South Africa are of the view that distance to campus make students to absent themselves from lectures while about 18% held contrary view. However, about 67% of the Nigerian respondents are of the opinion that distance to campus make students to absent themselves from lectures and the remaining 33% did not believe that distance to campus make students to absent themselves from lectures. The finding concurs with the finding of Piccoli, Ahmad, & Ives (2001) who avers that learning from a distance constitutes learning challenge. However, Jaggers (2014) states that learning from a distance through the use of social media and internet is less problematic in this regard. Surmise to state that learning from a distance through internet holds its own challenges whereas learning face-to-face from a distance holds a different challenge. Hence, the application of personal resilience theory as opined by Southwick et al (2014) becomes necessary.

Policies and Learning Challenges

**Table 7. Respondents’ views on policies constituting learning challenges among undergraduates**

<table>
<thead>
<tr>
<th>Response</th>
<th>South African Based University</th>
<th>Nigeria Based University</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percent</td>
</tr>
<tr>
<td>Strongly Disagree</td>
<td>287</td>
<td>23.4</td>
</tr>
<tr>
<td>Disagree</td>
<td>292</td>
<td>23.9</td>
</tr>
<tr>
<td>Agree</td>
<td>304</td>
<td>24.8</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>341</td>
<td>27.9</td>
</tr>
<tr>
<td>Total</td>
<td>1224</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 7 reveals that majority of the South African respondents (52.7%) agree that government and institutional policies constitute learning challenges, however, 43.7% disagree that policies constitute learning challenges for the. Moreover, majority of the Nigerian respondents (60.1%) agree that government and institutional policies constitute learning challenges, while 39.9% disagree. This is corroborated by the work of Tomlinson (2014) and Budginaitė, Siarova, Sternadé, Mackonytė, & Spurga (2016) who opine that education policies need to cater for students in order for them to succeed and fully develop their potentials. Suffice to state that non alignment of institutional policies with government policies as well as adoption and implementation of non-student centred policies has the potency to hamper the learning abilities of undergraduate university students. Hence, government policies and institutional policies should be in alliance, made and implemented in accordance with the need of students to enhance the success of students.
Pair-Wise Comparisons Between South Africa and Nigeria for Each of the Factors

To carry out the pair-wise comparisons of the respondents views on each of the factors between South African and Nigerian respondents, Mann-Whitney U-statistic was employed. This statistic is a nonparametric counterpart of the usual two-sample t-test. The use of two-sample t-test parse is not valid because the data collected for this study are on ordinal scale and the two-sample t-test requires at least, interval scale of measurement.

Table 8. Respondents’ views on policies constituting learning challenges among undergraduates

<table>
<thead>
<tr>
<th>SN</th>
<th>Statement</th>
<th>Country</th>
<th>N</th>
<th>Mean Rank</th>
<th>Sum of Ranks</th>
<th>Test Statistic</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Students are familiar with the educational policies of the Nation</td>
<td>SA</td>
<td>1224</td>
<td>1106.58</td>
<td>1354457</td>
<td>604757</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NG</td>
<td>1111</td>
<td>1235.66</td>
<td>1372823</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2335</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Knowledge of policies on education has helped students</td>
<td>SA</td>
<td>1224</td>
<td>1061.12</td>
<td>1298807.5</td>
<td>549107.5</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NG</td>
<td>1111</td>
<td>1285.75</td>
<td>1428472.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2335</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The policies of the institution align with the national policy on education</td>
<td>SA</td>
<td>1224</td>
<td>1066.44</td>
<td>1305327</td>
<td>555627</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NG</td>
<td>1111</td>
<td>1279.89</td>
<td>1421953</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2335</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Students are aware of the policies of the institution</td>
<td>SA</td>
<td>1224</td>
<td>955.92</td>
<td>1170046</td>
<td>420346</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NG</td>
<td>1111</td>
<td>1401.65</td>
<td>1557234</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2335</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The policies of the institution are favourable to the students.</td>
<td>SA</td>
<td>1224</td>
<td>1131.45</td>
<td>1384891</td>
<td>635191</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NG</td>
<td>1111</td>
<td>1208.27</td>
<td>1342389</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>2335</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

From the Table 8, it can be deduced that responses from the two countries on each of the statements are significantly different since the P-value in all the five statements in the Table are less than the significance level (0.05). Hence, it can be concluded that respondents’ views on understanding of policies from the two countries are statistically different.

What are the causes of the identified learning challenges experienced by undergraduate university students in South Africa and Nigeria?

Table 9 (on the following page) revealed that the causes of learning challenges experienced by students include: students’ family socio-economic background, personal study habits, class size, poor time management, structure of lecture time-table, social activities cum social media and campus religious activities.
Table 9. Respondents’ views on policies constituting learning challenges among undergraduates

<table>
<thead>
<tr>
<th>Statement</th>
<th>Country</th>
<th>SA</th>
<th>A</th>
<th>D</th>
<th>SD</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>My family’s socio-economic background affects my learning abilities.</td>
<td>SA</td>
<td>N</td>
<td>445</td>
<td>514</td>
<td>179</td>
<td>86</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>36</td>
<td>42</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Nig</td>
<td>N</td>
<td>398</td>
<td>441</td>
<td>187</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>36</td>
<td>40</td>
<td>17</td>
<td>7</td>
</tr>
<tr>
<td>I experience learning challenges because of my personal study habit.</td>
<td>SA</td>
<td>N</td>
<td>352</td>
<td>417</td>
<td>232</td>
<td>223</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>29</td>
<td>34</td>
<td>19</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>Nig</td>
<td>N</td>
<td>324</td>
<td>356</td>
<td>302</td>
<td>129</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>29</td>
<td>32</td>
<td>27</td>
<td>12</td>
</tr>
<tr>
<td>Class size/population causes learning challenges for me.</td>
<td>SA</td>
<td>N</td>
<td>432</td>
<td>589</td>
<td>119</td>
<td>84</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>35</td>
<td>48</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Nig</td>
<td>N</td>
<td>368</td>
<td>428</td>
<td>212</td>
<td>103</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>33</td>
<td>39</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>My inability to manage time properly causes learning challenges for me.</td>
<td>SA</td>
<td>N</td>
<td>349</td>
<td>512</td>
<td>126</td>
<td>237</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>29</td>
<td>42</td>
<td>10</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Nig</td>
<td>N</td>
<td>322</td>
<td>423</td>
<td>238</td>
<td>128</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>29</td>
<td>38</td>
<td>21</td>
<td>12</td>
</tr>
<tr>
<td>The structure of the lecture time-table causes learning challenges for me.</td>
<td>SA</td>
<td>N</td>
<td>447</td>
<td>386</td>
<td>186</td>
<td>205</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>37</td>
<td>32</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Nig</td>
<td>N</td>
<td>397</td>
<td>385</td>
<td>213</td>
<td>116</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>36</td>
<td>35</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td>Social activities and social media are the causes of learning challenges for me.</td>
<td>SA</td>
<td>N</td>
<td>398</td>
<td>569</td>
<td>148</td>
<td>109</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>33</td>
<td>46</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Nig</td>
<td>N</td>
<td>334</td>
<td>458</td>
<td>121</td>
<td>198</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>30</td>
<td>41</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>My involvement in religious activities on campus contributes to the causes of my learning challenges.</td>
<td>SA</td>
<td>N</td>
<td>125</td>
<td>132</td>
<td>429</td>
<td>538</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>10</td>
<td>11</td>
<td>35</td>
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Students’ Family Socio-economic Background
The result shows that family socio-economic background of students is a cause of learning challenges experienced by students. For instance, 78% (36 +42) of the South African respondents agree that their family socio-economic background causes learning challenges for them, though 22% (15 + 7) disagree. Similarly, 76% (36 + 40) of the Nigerian respondents agree that their learning challenges are caused by their family socio-economic background. However, 24% (17+7) disagree. This corroborates the work of Leibowitz and Bozalek (2014) who opine that poor family socio-economic background causes loss of concentration for students. Surmise to state that students’ family socio-economic background causes learning challenges for students.

Personal study habits
Result revealed that study habits of students causes learning challenges for students. 63% (29 + 34) of the South African respondents agree that their study habit causes learning challenges for them, while 37 (19+18) disagree. 61% (29+32) of the Nigerian respondents also agree that study habit is one of the causes of their learning challenges, though 39% (27+12) disagree. This agrees with the work of Asikhia (2010) who avers that poor study habits of students contributes to their academic failure.
Class size
Result revealed that the class size with regards to the population causes learning challenges for students. While, 83% (35+48) of the South African respondents agree that the class size in terms of student population causes learning challenges, 17% (10+7) disagree. Moreover, 72% (33+39) of the Nigerian respondents agree that class size causes learning challenges for them. However, 28% (19+9) of the Nigerian respondents disagree. This supports the finding of the work of Chingos and Whitchurst (2011) who state that huge class size constitutes challenges for students to learn effectively. Surmise to state that learning challenges are partly caused by the study habits of students.

Poor time management
The result also shows that poor time management causes learning challenges for students. From the total sampled population in the selected South African institution, 71% (29+42) agree that their inability to manage their time properly causes learning challenges for them, while 29% (10+19) disagree that poor time management causes learning challenges for them. Similarly, from the Nigerian respondents, while 67% (29+38) agree that poor time management causes learning challenges for them 33% (21+12) disagree. This concurs to the work of Lahmers and Zulauf (2000) who state that improper management of time by students causes learning challenges that can lead to poor academic performace for the students. This implies that poor time management causes learning challenges for students.

Structure of lecture time-table
The result shows that the structure of lecture time-table causes learning challenges for students. For instance, while 69% (37+32) of the South African respondents agree that the structure of their lecture time-table causes learning challenges for them, 31% (15+16) disagree. Similarly, 71% (36+35) of the Nigerian respondents agree that the structure of their lecture time-table causes learning challenges, while 29% (19+10) disagree. This consents with the work of Bourdillon and storey (2013) who consider the structuring of lecture time-table as very important and can enhance the learning abilities of students. Thus, it implies that the way and manner lecture time-tables are structured can hamper the learning abilities of students.

DISCUSSION OF FINDINGS
The findings of the study shows that university students in South Africa and Nigeria undergo similar challenges such as cognitive challenge (inability to comprehend easily), lack of concentration or quick loss of concentration, poor high school experience, poor lecturer-student relationship, distance between institution and home as well as poor policy making and knowledge of the policies.

Cognitive challenge is a common trend across the global world. According to Fook and Sidhu (2015), it is visible among American students as well. However, with quality put in place students can overcome such challenges (Akoojee and Nkomo, 2008).

Also, lack of concentration is another challenge experienced by African students. Meanwhile, according to Caldeira, Arria, O’Grady, Vincent, and Wish, (2008) and Reid (2016) wherever concentration is easily loss during teaching and learning period, adequate learning will not be achieved. Thus, African students may be considered as struggling to learn due to quick loss of concentration.

In addition, faulty background affects African students. Sife et al (2007) opine that the previous learning experiences of students influence their current performance. Students who are exposed to quality high school education have the tendencies of outshining their counterparts. Surmise
to state that poor education background of students affect and sometimes constitute part of the challenges experienced by university students.

Also, lecturer-student relationship determines the level of performance put up by students. Good lecturer-student relationship influences good behavior and result from the students. This corroborates the finding of Gallagher (2013) and Tucker (2016). They opine that lecturers who maintain good relationship with their students easily influence their students to succeed.

Distance from home also affects the learning abilities of university students in African universities. Students, who live far from campus, tend to go through greater stress compared to their counterparts who live near. This corroborates the work of Wexler (2016) who opine that distance between the residence of students and their campus constitutes more learning challenges than educational policies. Students go through series of challenges before arriving for lectures and that affects their level of comprehension that moment and sometimes for the whole day.

Policies of institutions and government have influence on the learning abilities of students. Besides, students sometimes fail to comprehend some of the policies thereby depriving them of certain benefits. Policy making, implementation and comprehension influence activities around the campus and this also affects the learning abilities of student (Okebukola, 2002).

**RECOMMENDATIONS**

From the finding of the study, the following recommendations are made:

- Special attention should be given to the quality of education offered to students in sub-Saharan African universities. This will enhance the learning abilities of students and promote academic success.
- Collaborative effort be made by stakeholders in higher education. This implies that the government, parents of students, alumni of institutions, and administrative staff among others should ensure the provision of the necessary facilities such as residences, lecture halls, libraries, and laboratories, among others which will promote teaching and learning activities in universities across the nations.
- The government and other stakeholders in education should support students through awards of bursary, scholarship and other financial grant that can enable students focus in achieving their academic goals.
- University should partner with establishments to ensure sponsorship for students as well as provide avenues for adequate industrial trainings and practices.
- Proper and regular orientation should be given to students to help them adjust and acclimatize to life on campus. In other words, orientation should not be a once off activity every session, it should be a periodic activity which will be aimed at supporting better integration and academic performance of students.
- Proper monitoring should be given to lecturers and administrative members of staff, in order to ensure efficiency and effectiveness. This implies that monitoring teams should be created and empowered to monitor the efficiency and effectiveness of lecturers as well as administrative staff members. This will help put the administrative staff members and lecturers on check, thereby promoting good practices both in teaching and administrative activities and in turn ensure success for students.
- To help improve the understanding of new concepts by students and the pedagogic skill of lecturers, more training will be needed. This will help ensure better presentation and discussions of subject matters by the lecturers. By so doing, the learning abilities of students will be improved.
• Policies should be made to enhance quality and productive teaching and learning activities. Hence, university members of staff and students should be represented when national education policies are made. Similarly, academic and non-academic members of staff, as well as students should be represented when university policies are formulated.

• Students should be made to familiarize themselves with the policies and ensure that they maximize the provision of the policies.

CONCLUSION
This study investigated the learning challenges experienced by university students; the types and effects. The variations on how it occurs in South African and Nigerian universities were investigated. It was revealed that policies, facilities, family and peers contribute to the learning challenges experienced by university students in the selected sub-Saharan African universities. Hence, several recommendations were made to help reduce the identified challenges. Surmise to state that all stakeholders in education have different roles to play and should ensure that they play their different roles in order to reduce learning challenges to the lowest minimum.

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The Development of Identity as an Educator in a Group of Health Science Professionals During a Postgraduate Health Science Education Programme: A Qualitative Study

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Abstract

Background: An increasing number of interventions have been reported over the last ten years in the area of faculty development. We define faculty development as a planned series of activities aimed at preparing individuals for their teaching role. In 2014 we commenced a postgraduate diploma in health science education in a Faculty of Health Sciences in South Africa. The purpose of this study was to obtain perceptions from the first group of participants about the programme.

Methods: The qualitative paradigm was chosen for this study and two focus groups were conducted with a total of ten participants. The focus groups were audio-taped and transcribed verbatim and the transcripts were analysed using the conventional content analysis approach. Although participants were not explicitly asked about their identity as educators, the initial analysis of data revealed this notion worthy of exploration and a secondary analysis was performed.

Findings: Themes extracted from the data revealed a narrative progression of identity development. Participants in the course began the process as “outsiders” to the health education discourse, despite all having experience of teaching within their own professional disciplines. Over time, many participants acknowledged a changed self-view, transforming from the “all-knowing” health care professional to the educator who facilitates learning for diverse student populations. This identity as a health science educator was reinforced within the group, but participants had difficulty in evincing it in their work environments and the wider health-practice community. By the end of the course the group had recognised the development of a community of practice which encouraged their further development as health science educators, however there was acknowledgement that they had become blended practitioners, straddling both professional and academic areas and had not relinquished their entrance identities.

Conclusion: Faculty development initiatives can alter the meaning and purpose that participants have in their professional work, contributing to development of another identity as a health science educator.

INTRODUCTION

In a ten year update of a systematic review Steinert et al., (2016) report that not only has the field of faculty development grown substantially but that formal activities such as longitudinal programmes seem to be the most commonly offered. Further, longitudinal programmes appear to yield outcomes that go beyond teaching effectiveness, to include leadership and scholarship. The authors also noted that the programmes led to the building of communities of practice, both in the participants and in the workplace.
We define faculty development as a planned series of activities aimed at preparing individuals for their teaching role. In 2014 we commenced a postgraduate diploma in health science education in a Faculty of Health Sciences in South Africa. The programme consists of four modules – theories of teaching and learning, teaching methods in the health sciences, assessment and curriculum design in the health sciences. Each module commences with a reading list that is sent to participants approximately six weeks before a contact week. After the contact week, 3-4 short assignments are given and a final assignment forms the final examination. The contact week provides opportunity for the group to interact with one another, engage in conversation with lecturers and colleagues about the material being covered and share ideas and experiences from the workplace. Participants have come from a range of disciplines in the health sciences from emergency care to psychiatry and scientists and all had experience of teaching within their own professional disciplines. Efforts have been made to encourage interaction between participants outside of the formal teaching times, by providing tea and coffee throughout the day. It was noted by the teachers that as the group became more familiar with one another they organised a system of taking turns to provide biscuits, muffins and other snacks for the formal tea breaks. It was during these breaks that they shared information about themselves, their teaching and their experiences of the course.

Gee (2001) refers to identity as being a certain “kind of person” in a specific context (p99). This implies that everyone has multiple identities. The identity that is observed by others is influenced by the context and the performance of the individual in that context. He acknowledges that each individual has a certain “core identity” that is more dominant and may hold more uniformly across contexts. Monrouxe (2010) stresses the importance of a “professional demeanour” in medicine that contributes towards others having confidence in the individual’s abilities. She notes that having the necessary knowledge and skills, does not ensure a professional identity. She further notes that identities are not static, rather they are constructed and co-constructed through language, artefacts and power relations. These constructs emphasise the social nature of identity. Roberts (2000) notes the oppressed group behavior which nurses often demonstrate. She states that this behavior has implications for nursing and that a more positive professional identity can lead to greater unity and purpose. Noting that nurses all have an identity prior to entering the profession, the development of a professional identity is influenced by the power structure, personal experiences and the socialization process inherent in the nursing profession. Consistent with the views expressed by Roberts (2000) are those reported by ten Hoeve et al (2013) who state that nurses develop their professional identity from their public image, work environment, work values, education and traditional social and cultural values.

Sethi et al (2017) acknowledge the demands being placed on medical educators to obtain an education for their educational role and question the tension that this creates. In their qualitative study they found that a tension existed for participants between their education and clinical roles and that they feared losing their clinical role identity if they chose to become full time educators. In addition, they found difficulty in balancing their multiple roles as clinician and educator and this influenced their work-life balance. Furthermore the educator role was perceived to be less valued than other roles within the clinical specialities. These findings are worthy of note as they may negatively impact the development of an educator identity. Smith and Boyd (2012) conducted a survey amongst nurses, midwives and other allied health disciplines who had between one and five years’ experience in higher education. While respondents enjoyed their new role, they also described a difficulty in maintaining a work-life balance and tended to hold on strongly to their clinical practitioner role. There was a sense of ‘becoming’ and academic – an identity not yet fully formed.
The purpose of this study was to obtain perceptions from the first group of participants about the programme.

**METHODS**

The qualitative paradigm was chosen for this study and two focus groups were conducted with a total of ten participants, three of whom were male. All were more than 30 years of age and had varying years of teaching experience. They represented the following disciplines: medicine, psychiatry, emergency medical services, anaesthesia, physiology, physiotherapy and radiological dentistry. The focus groups were facilitated by persons who had not taught in the diploma. Ethical clearance was obtained from the Human Research Ethics Committee of the Faculty (Clearance certificate no: M160404). They lasted approximately 60 minutes each. The discussions were guided by the following questions: 1) Please describe your experiences of being a student in the postgrad diploma in HSE. 2) What do you perceive as the benefits of having done this course of study? 3) Was there anything that you would have liked covered in the course, that wasn’t; have you since detected anything that you wished had been included? 4) What difference has this course made to your own teaching and leadership in education? Please give examples (eg through mentoring colleagues, curriculum choices and assessment practices).

The focus groups were audio-taped and transcribed verbatim and the transcripts were analysed following the eight steps described by Tesch (Cresswell 2014). The transcriptions were read by all the authors independently; the underlying meanings were then discussed and grouped according to similarity of meaning and finally allocated to themes. Although participants were not explicitly asked about their identity as educators, the initial analysis of data revealed this notion worthy of exploration and a secondary analysis was performed. MAXQDA version 12 was used to manage the data analysis process.

**FINDINGS**

The overarching theme was that of identity development as a health science educator.

Sub-themes extracted from the data revealed a narrative progression of identity development. In the sub-theme ‘common purpose’, participants began the process as “outsiders” to the health education discourse. Over time this progressed to a stage where ‘comfort zones’ were challenged and finally a stage of recognition of themselves in a ‘community of practice’.

**Common purpose**

Evidence of feeling an “outsider” was described by one participant as follows:

“Initially, uhm, (I was) quite anxious, and I suppose, (experienced) performance anxiety in that, previously, I thought I was above average in terms of being a student, and then once I enrolled on the course I received the reading materials. In fact, I felt quite lost in terms of the volume and the new concepts. But not only that, in listening to colleagues, a lot of them seemed quite educated in terms of the language that was being used. (But later) also in chatting with some colleagues I found that (they felt the same way).” (F1P5)

This sense of feeling lost was described by another participant as follows:

“I mean at first it felt like being immersed in a whole new university of language but within the first day or two, contact sessions worked.” (F2P7)

Another added:

“I remember spending hours reading those articles and looking up every third word trying to figure out what the article was trying to tell us.” (F2P6)
The value of being in and learning from others in a multi-disciplinary group was described by one participant as follows:

“I think a lot of (what) I really enjoyed (was) the experience of being in a multidisciplinary group and having opinions and (hearing) perspectives from different people, from different fields but all having common experience of trying to be educators. … It was a new course, people were so excited in the material and I think that did carry through, that no one sat out on things, or did not want to participate. The other big thing was that it is really a wide range, here we have got people from an incredibly broad range, not only in terms of experience, but in terms of where they are coming from, what they (have) got access to at the moment, the kind of students that they got,… I think a lot of it has to do with this feeling that you are not alone, that you might feel that you are fighting an uphill battle.” (F1P3)

Recognising their common purpose and sharing feelings of being lost and “outsiders” allowed participants to start their journey towards developing a new identity.

**Comfort zones**

Over time, many participants acknowledged a changed self-view, transforming from the “all-knowing” health care professional to the educator who facilitates learning for diverse student populations. This change was realized after comfort zones had been challenged – for some quite significantly.

“It was a complete mind shift, everything before that I felt very responsible for that happened, and that I have to kind of control everything that happens in the classroom, but after the programme I realised that a lot of, the stuff that happens with adult learners, kind of needs to be there, the learning needs to belong to them and they need to be responsible with lot of stuff that happens. So my approach to the learner, my approach to the teaching changed.” (F2P1)

In particular, they reflected on their own experiences as a student and how they enjoyed being challenged by the collaborative and interactive nature of their learning opportunities.

“This was the first time that I have done a sort of an adult course; everything else was - this is the curriculum learn it; ask questions, and this is right or wrong, so it’s the first time that I was exposed to - I am allowed to have an opinion, I can express that opinion, discuss the opinion with other students. It challenged my comfort zone; I am more used to knowing that this is the book and studying it, almost, uhm, I am not used to thinking, now I actually think!” (F1P1)

This experience was supported by another participant who said;

“I also experienced it; because you are so used to this didactic approach. This is it, write it down. I really enjoyed the opportunity to be able to, basically have arguments with people in a constructive manner, and come to conclusions.” (F1P2)

Comfort zones were not only challenged in the classroom. During the contact week in the module on teaching methods, participants were allocated to various teaching sessions taking place on a particular morning. Every effort was made to ensure that participants who predominantly used one particular teaching method were exposed to something very different, eg those who used the lecture method were sent to observe a bedside teaching session. One participant described this experience as follows:

“One of our tasks uhm, where we were taken out of our comfort zone, in terms of the department that we are in, and then we had to go to another different, sort of, for example, basic science and then go to clinical setting and that really was a big exposure because we find that we tend to live in our own silos within our area of specialisation and not interact with other departments, so that was almost like breaking a barrier, now I saw that as another opportunity and (got) the feel of actually what happens in different departments.” (F1P5)

**Community of Practice**

By the end of the course the group had recognised the development of a community of practice which encouraged their further development as health science educators, however there was
acknowledgement that they had become blended practitioners, straddling both professional and academic areas and had not relinquished their entrance identities.

“One of the big things that, I suppose doing any courses (what it) gives you is the authority that once you actually passed, to say you have to listen to my opinion because I have done this and someone said I am good enough.” (F1P6)

“It gives you credibility, and it gives weight to your argument, because you got this qualification now behind your name.” (F1P4)

“(When planning a teaching session, I ask myself) what are the students going to benefit from this, are they going to benefit from this, and then also after I was reflecting and like… having colleagues in the building that did the same(course), we can reflect together and say, I did this, I didn’t know how to end the session, how do we do that?” (F2P8)

While the identity as a health educator was reinforced within the group, participants had difficulty in evincing it in their work environments and the wider health-practice community.

“It is a bit of a double edged sword, because, I have found it in some papers that I have been sent to review for example, I can see that this question is a problem, this question is a problem; with the paper as a whole because, they are not representative of the entire syllabus that have been taught and so on and so forth and when one gives feedback to people who do not come from that background, sometimes they take offence to this, regardless of what your qualification in the field may be. There are a lot of people with an unwillingness to change, which actually makes it quite frustrating when you can see where the problems are and they don’t listen.” (F1P2)

This comment was supported by a participant in the second focus group who described trying to share his new knowledge with a group of postgraduate teachers and was told “we don’t know what you are talking about.” (F2P10)

**DISCUSSION**

This finding in our study of the development of an identity as a health science educator surprised us. Perhaps it shouldn’t have because in becoming a community of practice there was a clear linkage to Lave and Wenger’s three stages of development (1991). Participants described their common purpose and mutual engagement in wanting to know more about being an educator in the health sciences. As they got to know one another better they recognised their joint enterprise and learnt from what others were doing and finally came to share a repertoire of knowledge.

Gee (2001) suggests four types of identities - nature identity, institutional identity, discourse identity and affinity identity. He states that each individual has a “core identity” that describes who that person is across a variety of contexts. Gee describes affinity identity as one shared in an affinity group – in this case other health science educators. He stresses the point that these four identities are not separate from one another but rather interact in complex ways (Gee, 2001). In relation to the participants in this study, they all have health professional identities and identities as researchers amongst others. It may be argued that in the health sciences the development of a professional identity is more overt than is that of developing an identity as an educator. Students in the health sciences begin to identify with their chosen profession when they wear white coats, drape stethoscopes around their necks and wear uniforms that identify a particular profession. These identities (as clinicians or health care practitioners) are strongly established and it is interesting that whilst a new identity strand can be interwoven within the “new teacher” persona, the professional identification with health science practices is maintained (Smith & Boyd, 2012). The development of an identity as an educator seems to be related to the development of a particular discourse or language. Stone and her colleagues (2002) note that the formation of alternate self-conceptualisation relies on “feeling part of a select community” through using the “jargon” of the new social group. The collegiality of being
recognized as having and using specialized knowledge (over and above the established health science professional identity) distinguishes our diplomates from their workplace peers.

Luehmann (2007) makes several points about identity. She contends that identity is a socially constituted meaning that one is recognised by self and others as a certain type of person because of the interactions one has with others. Furthermore, identity is dynamic – it is constantly being formed and reformed and through a number of interrelated ways one becomes recognized as a certain type of person. Lastly, “identity is constituted in interpretations and narrations of experience” (p. 827). She then goes on to define a “teacher professional identity” as being recognized by self or others as a certain type of teacher (p. 827). Borrowing from Gee’s work she says that this becomes recognizable through discourse. One of our participants articulated this well when he commented on his change of teaching approach following the course: “I think the big change is also just taking it from a lecturer centred approach to a student centred and….it is actually about the people who are learning and not what I want to get across to them” (F2P1).

Monrouxe (2010) stresses the point that identity is not something one has or does not have, but is developed through what one does. Writing from a perspective of medical professionalism she argues that a professional demeanour is important for others to have confidence in the individual’s abilities. She notes that the concept of identity, though well developed in the social sciences, has not received much attention in medical education. This may have implications for medical education and the broader field of health sciences education, if teachers do not have identities as educators. This may be reflected in the statement made by one of our participants – “This was the first time that I have done a sort of an adult course; everything else was - this is the curriculum learn it; ask questions, and this is right or wrong, so it’s the first time that I was exposed to - I am allowed to have an opinion.”(F1P2) Recognising that we all have multiple identities, Monrouxe (2010) states that how one manages one’s identities has “profound implications” for how we teach students. How one manages these complex identities in teaching may go on to have implications for patient care. While this statement cannot be supported or refuted by our findings, our experiences as health science professionals and educators would support this in that we know that students often model themselves on their teachers. Perhaps we do not consider how often in any one day we change our identities and the implications that this may have on our teaching.

Sfard and Prusak (2005) suggest that identity development is fostered through communication with others. While we did not get participants at any time during the course to tell their stories as teachers or to draw their stories, all contact sessions were interactive. The interaction between teacher and student and between students resulted in stories being told spontaneously. The climate in the sessions allowed for participants to ask questions and to say if something was not understood and often others would say what they thought was meant without the teacher having to give the answer. This free and open communication may well have contributed to identity development. Lief et al (2012) also comment on the importance of discourse used in a programme and suggest that programme developers should be “…thoughtful and purposeful about the use and introduction of discourse throughout the curriculum” (p. e214). This thought is consistent with Monrouxe’s (2010) concept of linguistic rituals which includes our language choices.

In a study undertaken in Canada, where Lieff et al (2012) analysed 129 reflection papers of participants in an Education Scholars Program, three themes and ten sub-themes were identified. Several of the concepts in their sub-themes are consistent with our study – improved confidence as a teacher, a reassessment of their educational approaches, the formation of new connections with others and a development of a discourse that enabled them to interact with a
broader educational community. Likewise participants described their experiences of being viewed as more capable than other colleagues, but did not appear to express the negative aspect which our participants did of others not being willing to heed their advice or listen to their comments. It is interesting that although our participants had developed their own personal identity as educators and felt comfortable about expressing their viewpoints within the community of practice of the course, their colleagues seemed unable to discern the authority of this new identity, and were generally dismissive of their contributions. This is in contrast to Butcher and Stoncel’s (2012) findings that their successful candidates in the postgraduate certificate programme were treated with more respect by their departmental colleagues and led to candidates developing a definite influence in teaching policies in their respective departments.

The concept of identity is a complex one of interrelationships in the field of health science education. The multifaceted individual multiple identities of teachers / educators, the identities of students at various stages of professional development and the institution’s identity all come into play and interact on a daily basis and the question may be asked how all this influences teaching, learning and the broader field of health science education.

LIMITATIONS
A limitation of this study is that only ten participants engaged in the focus groups. This may mean that those who viewed the experience in a more positive light engaged in the process. However, the discussions were as lively as what had been experienced by the teachers in the classroom. The study also only reflects the experiences of the first cohort to complete the diploma and successive cohorts may report different experiences.

CONCLUSION
Faculty development initiatives can alter the meaning and purpose that participants have in their professional work, contributing to development of another identity as health care educator. This is a construct that is dependent on acquisition of a new discourse, as well as affirmation by and participation in a supportive socialization environment, a community of practice. The implications for training of healthcare educators are that participants should be afforded the opportunity for realistic reflection and reinforcement of practices within the context of the course, so that the “new” identity as an educator can become sufficiently internalized to guide future practice.

REFERENCES


The Effects of STAD on the Researcher’s Praxis as a Technology Teacher: A Case of a Researcher.

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Abstract
The researcher explored student teams’ achievement divisions (STAD) as a method of teaching and learning technique in Technology classroom. This paper sort to investigate the effects of STAD on the researcher’s praxis. As a learner-centred cooperative learning teaching method, STAD is underpinned by constructivist perspective on learning and Vygotsky’s social cognitive theory. Social constructivism posits that knowledge of what is comprehended is derived from the communities of understanding rather than operating in isolation (Cottone, 2007; Sohel, 2010). Hence the researcher attests that the contributions of peer educators through critical assessment of lessons presentations were a fundamental practice for teacher development.

The researcher employed STAD in Technology classroom to explore how this method of teaching could assist the researcher to reach out to struggling and low achieving learners. Moreover, the researcher also found it as an opportunity to investigate on how STAD could effect change on the teacher’s practice. Therefore, regarding the inquiry on the teacher’s overall practice, the study would also be guided by theories on teacher as researcher as well as professional development theories.

Professional development proponents contend that development takes place on various platforms including research. Moreover, professional development in classroom affects learners positively especially when a teaching is done in a setting that allows immediate implementation (Mizell, 2010).

This study employed qualitative methods of collecting and analyzing data to achieve the objectives of the inquiry. Ten peer educators observed the class proceedings and completed the observation schedules and the researcher also used a reflective journal to record daily happenings. The findings thereof proved to enhance educator’s lesson preparation, accessibility to learners and confidence in lesson delivery.

INTRODUCTION
As a long serving Technology teacher, one tends to become comfortable with what he or she is doing in the classroom as long the majority of learners are passing the subject from one grade to the other. Dwelling in a comfort zone for some time could instil fear of exploring new avenues (Mizell, 2010) in terms of using variety of researched teaching methods in the classroom to observe what kind of end products one may achieve. According to Guskey and Yoon (2009), majority of teachers that were trained in researched instructional method claimed to have yielded positive results regarding improvement of learners’ performance and professional development. Hence, the researcher embarked on this study to explore the phenomenon of using researched teaching method and find out if the results would adjudicate differently or in favour of the above assertions.
Although Mizell (2010), Ono and Ferreira (2010) are unanimous that teacher professional development could be achieved through short seminars, courses, informal and formal learning, (Guskey & Yoon, 2009) added that on-site continuity of these programmes is a vital vehicle for meaningful professional development. That could inculcate attributes such as good planning and preparation, managing a class well, good professional conduct and engaging learners during contact sessions according to (Danielson, 2013; OECD, 2009; Mishra & Koehler, 2006). It is therefore important that these trainings are based on research findings to effectively respond to the expected professional reinforcement (Broad & Evans 2006) and teachers should not only settle for certificates of attendance (Avalos, 2011) but rather investigate further the efficiency of what they have learned in their world of practice.

The researcher is of the belief that a teacher should always be concerned with the method of curriculum delivery he or she is using. Whether they bear expected outcomes in terms of learners’ success and teacher’s professional development. Stremmel (2007) attests that teachers do self-study aiming to effect positive change on self, colleagues, learners and curriculum development. The researcher then did self-introspection on his teaching method that it could only for his comfort, irrespective of what learners’ experiences are regarding his teaching method. Therefore, one should not overlook if students feel that his teaching method does not meet their learning needs, and therefore struggle pertaining to understanding of his respective subject(s). Especially in most South African Public Schools where teacher learner ratio in classrooms is 40 or more learners to 1 teacher. It is therefore advisable for a teacher to do research and investigate various teaching methods that could enable him or her to reach out to individual learners in the classroom. Moreover, Mizell (2010) further states that effective professional development equip teachers with understanding of how to effect positive change among learners.

**Problem statement**

The researcher was concerned with the poor quality of results that learners are producing termly and during examinations. Although majority of Technology learners were passing the subjects according to the Department of Basic Education requirements. National Policy pertaining to the programme and promotion requirements of the NCS suggests 1 pass above 50%, 5 passes at 40-49%, 2 passes at 30-39% and 1 fail (DBE, 2013). According to the researcher’s perception, learners at high school level are prepared for higher education where pass mark is 50% and above. Therefore, the he aimed at improving his professional praxis in a way that would enable him to transform learners’ mind-set pertaining to their academic performance.

Furthermore, there are mandatory subjects that learners have to pass for progression to the next grade such as Maths, Home Language and First-Additional Language (DBE, 2013) and Technology is not one of them. By adopting new ways of teaching in Technology, the researcher believed it would refine his praxis to get through to the learners.

Although this is not in the scope of this paper, the researcher came to the realisation by informally interviewing learners, that they only do what is acceptable to the policy, their parents or to themselves as individuals. Also through observing learners’ performance scores the researcher learned that majority of learners in Technology class are passing the subject but with scores below 50%.

Therefore, the researcher sort ways of enhancing his practice in order to be capacitated to revolutionize learners that are satisfied with mediocre performance and those that are struggling - using the minority efficacious learners. Then he investigated collaborative teaching methods and found out that cooperative learning has a teaching method called Student Teams Achievement Divisions (STAD) that could be easily understood by 13-15 year olds. The
researcher explored the use of STAD as a teaching method and a learning technique in his Grade 8 Technology classes because of its simplicity to employ with younger learners.

**Research question**

How would STAD effect the researcher’s praxis in Technology classroom where STAD is employed as a teaching method?

**Research objectives**

- To determine the professional development effects of STAD on the researcher.
- To investigate ways in which STAD would assist the researcher to extend help to struggling and low achieving learners.

**THEORETICAL UNDERPINNING**

Constructivism as a teaching and learning paradigm draws from various theories (Palmer, 2005; Powell & Kalina, 2009) that are predominantly concerned with learning such as Vygotsky’s Zone of proximal development and Piaget’s Cognitive development. These infused theories are unanimous with learners being challenged by teachers to utilise their existing knowledge for the purpose of constructing new knowledge (Amineh & Asl, 2015). Furthermore, classroom environment should also permit learners to be active participants in teams of learning where they scrutinize their current knowledge among themselves and drawing from the more knowledgeable other when such need arises (Pouliot, 2007).

Moreover, constructivism views teachers as facilitators that engage learners by stimulating their learning process, not sole emitter of knowledge from knowledgeable to the unenlightened or empty vessels. Thus, a constructivist teacher is interactive (Amineh & Asl, 2015) and create classroom setting that provokes learners to implement their prior knowledge to develop new competencies.

**Contextualising the inquiry**

The study was done in 2 Grade 8 Technology classes where STAD was used as a teaching method and a learning technique. STAD is a cooperative learning method that was developed by Robert Slavin and his colleagues at the University of Hopkins in the USA about 40 years ago. Moreover, Slavin (1977) indicated the main aim of STAD and other team learning techniques is to enhance academic feat and interpersonal and intercultural skills (Coffey, 2008; Masoabi, 2015). Furthermore, STAD could be defined in terms of its five essential components. Firstly, the researcher placed learners into heterogeneous groups of four to five members. He determined the heterogeneity using varied academic abilities, and race or ethnic groups only. Secondly, the researcher presented a lesson by introducing a topic and explaining new concepts that arose in the presentation. Thirdly, the researcher then handed out the worksheets to be done by learners in their STAD groups. While teams are busy on the worksheets, the researcher was moving from table to table to further clarify parts of subject matter that learners may be battling with. During the fourth stage, the researcher administered class test which was done by individual members of the groups without helping each other in order to assess individual comprehension of the work. Lastly, the researcher combined the individual scores to determine group scores (Tarim & Akdeniz, 2007; Van Wyk, 2010; Nejadghanbar & Mohammedpour, 2012; Van Wyk, 2012). These teams worked together for a period of five months with minor changes in some of the groups. Thus, the third and fourth terms’ work was done in this fashion.

**Technology**

The definition of Technology as a school subject evolved from the use of basic handicraft skills, materials and tools to produce artefacts to meet the needs for human survival (Koehler and
Mishra, 2005). Now, according to the South African Department of Basic Education (DBE) (2012), Technology is “the use of knowledge, skills, values and resources to meet people’s needs and wants by developing practical solutions to problems, taking social and environmental factors into consideration”.

Therefore according to the researcher, Technology as a school subject requires learners to be taught technological concepts, content knowledge, skills and values that would empower them to tackle authentic problems. Moreover, learners need not only to memorize the acquired content materials, but be able to use it appropriately to resolve societal problems, employing correct skills and values of Technology (Milne & Edwards, 2013; Masoabi, 2015). The above definition is illustrated in the diagram below.

![Technology Education Structure](image)

**Figure 1.** Technology Education Structure (Masoabi, 2015)

**RESEARCH METHODOLOGY**

This study is guided by constructivism as research paradigm, since it employs inductive methods of collecting and analysing data for the purpose of creating meaning to the phenomena and constructing knowledge thereof (Mack, 2010; McGregor & Murnane, 2011). Therefore, the researcher strives to comprehend, decipher and unfold colleagues and his experiences, of the Technology classroom where STAD has been used as a teaching method and a learning technique.

The study is qualitative in nature, where the researcher, observing colleagues and learners were active participants as the field work took place in the researcher’s Technology classes. The researcher observed to remain subjective and critically examined his role throughout the inquiry as directed by ethnographic and phenomenological designs principles and values (McMillan & Schumacher, 2010). However, with the understanding that as an active participant, interpretation of the knowledge construction may not be free from subjectivity.

**Research design**

Interpretive bricolage states that there are various perspectives generated from different interpretations of research participants, therefore, a researcher could not single out one description of the phenomenon to be the ultimate correct depiction (Denzin and Lincoln, 1999; Masoabi, 2015). Based on the above contention, the study further employed methodological bricolage by using various data collection tools and participants in order to increase the
credibility of the findings. Therefore, tools such as reflective journal and peer teacher observation schedules (Venegas & Huerta, 2010) were used for generating data.

Case study as the research design
This study employed a single case study design as guided by the constructivist paradigm. The inquiry tried to holistically understand the in-depth effects of STAD on the teacher’s praxis. Moreover, case study is defined as an empirical inquiry that seeks to explain the participants and their everyday life setting or social context in-depth (Andrade, 2009; McMillan and Schumacher, 2010).

The study was done in a public school in the city of Bloemfontein in an opulent suburb. It is a well-resourced and multi-cultural boys-only combined school where the researcher was a teacher. The researcher implemented STAD in two Grade 8 classes that consisted of 30 learners per class, for a period of about five months. Learners in these classes were heterogeneously grouped into teams of four and five members around a table. The heterogeneity was determined in terms of varied achievement levels and race or culture.

Sampling
This enquiry employed site selection strategy that would in turn provide convenient sampling as the investigation was done at the school where the researcher was a teacher, in his Technology classes. The reason for opting for site selection is because this study explored the effects of STAD on the researcher’s praxis in the subject he teaches.

Presentation of the Results
The process of collecting data began at the start of school term 3 to end of term 4 just before the end of year examinations. Data from the reflective journal generated the following analytical categories: lesson planning, class presentations, time management and class control and discipline.

Lesson planning assisted the researcher to make particular pre-instruction decisions such as the amount of content would be suitable per contact session – and also how to arrange the subject matter chronologically from the work that learners would easily understand to more complex content. The researcher furthermore, prepared exercises that required learners to implement their prior knowledge and acquired knowledge to develop their understanding while tackling more complex activities – as a way to facilitate individual construction of knowledge.

Reflections on class presentations revealed that when the teacher is prepared for the lesson, he is confident during the content delivery and was able to assess learners’ prior knowledge at the beginning of the lesson. Through his probes during the content presentations, the teacher was able to derive a prognosis of the state of the class understanding on the work, and implemented diagnostic measures effectively when deemed necessary. Due to thorough preparation, the researcher was able to utilise time effectively and wisely eluding unnecessary disruptions by learners.

Regarding time management, the researcher comprehended that creating time to attend each learner in the classroom to assist, encourage him and or affirm his effort, boosts learner’s commitment to given work. Also the researcher was able to remedy unproductive situations in the groups such as diversion from the work at hand during groups’ discussions by inspiring them to ensure progress on their assigned task.

Appropriate classroom control and discipline were attained by setting routines that taught learners proper manners of entering a classroom and settling down. Also for ensuring effective classroom deportment, the researcher began to monitor the movement of learners from different
subjects to Technology classroom. The researcher further zoomed into external factors that may lead to ill-disciplined classroom situation, during lesson preparations. Therefore, time wasting behaviours were eliminated automatically by setting principles depicting expectations of the teacher in Technology classroom. In the classroom, the researcher was constantly moving from group to group, and this as well played a vital role in keeping learners focused on their tasks.

Data from peer observers where pseudonyms have been used, were categorised into three main topics of inquiry: *method of teaching, knowledge of the subject matter and classroom management*. From each topic of inquiry, there were few themes and sub-themes that emanated thereof.

Within method of teaching as a topic of inquiry the researcher opted for themes such as *teacher interaction with learners and teacher responses to learners’ probes* that are relevant to the scope of this paper. Peer observers’ remarks below, germane to the researcher’s interaction with learners delineate keeping a lesson alive, question and answer, moving from group to group and guiding learners.

- Mrs Gomez: “The teacher encourages responses from learners by asking questions; as he revised previous learning material. The responses were plotted as summary on a whiteboard”.
- Mrs Blitz: “He introduced the task and then went from group to group. He took the role of a facilitator and seriously ensured the boys understand their task”.
- Ms Robinson: “The teacher is always asking questions and building upon the learners answers. He is guiding them to the correct answers or to certain ideas”.
- Mr De Venter: “Very good, the lesson is kept lively by question and answer method, leading the learners to develop their knowledge about packaging”.
- Mr Martins: “Very good, constantly moving around to answer and discuss questions”.

In apropos of the researcher’s response to learners’ probes, the peer observers indicated that the researcher was able to guide learners by directing individual questions to the whole class. This strategy opened discussions that assisted learners to arrive at the appropriate conclusions by themselves, therefore owning the knowledge.

- Ms Matthews: “He responded straight away and in a manner that answered learners’ questions without doing it for them – guided them to find answers themselves”.
- Mr Martins: “Teacher answers and expands on questions asked by individuals”.
- Mr Barnard: “He responds well and gives guidance in his responses to help learners achieve the outcomes”.

With reference to the researcher’s knowledge of subject matter, some of the collaborator observers articulated their view points based on the learners’ performance after explanations by the researcher and the content of the work sheets.

- Mrs Gomez: “I observed the theoretical part of a Design Process. On investigating the learners’ drawings they appeared to be of good quality, neatly and meticulously drawn. The designers appeared to have taken ownership of their products by reflecting on them in discussion”.


Ms Robinson: “The introduction was very good – the learners were involved and started the lesson with a solid background to the topic. The worksheet required learners to use various skills such as prior knowledge, methods of deduction, decision making, making considerations and conclusions and using opinions correctly”.

Ms Matthews: “The activities or worksheets covered lower-order, middle-order and higher-order questions”.

The fellow observers further alluded on the confidence of the researcher that showed thorough preparation before presentations, the use of correct terminology and various resources, as well as giving clear instructions to learners.

Mrs Crouch: “He has good insight into his subject. He could comfortably answer questions and correct pupils’ ideas”.

Mr Martins: “Teacher is well prepared and confident with the subject”.

Ms Matthews: “Excellent; he uses correct terminology and links knowledge with everyday examples”.

Ms Robinson: “He was very well prepared, worksheets were ready and information was ready on the board – obviously knew exactly what he wanted to achieve with the lesson”.

Ms Logan: “Instructions were written out clearly on the board – a continuation of a previous lesson”.

Mr Barnard: “He was well prepared and used resources such as worksheets, whiteboard and textbooks”.

Moreover, the peer observers mentioned that the researcher used base-line assessment at the beginning of the lesson and employed different techniques to explain operational terms.

Mrs Gomez: “The introduction composed of revision of the previous lesson that was summarised in point form in one colour on the whiteboard”.

Mr Barnard: “He uses the whiteboard to summarise suitable class responses”.

Ms Robinson: “He is very good and allows learners to give their inputs. He explains certain concepts personally to groups so that they can engage in further discussions”.

Ms Matthews: “The teacher used examples, to explain concepts and he also used drawings”.

Mrs Crouch: “He started with a quick introduction; he revised previous lessons with a question and answer method. He used drawn pictures to support new content. He gave class work to reinforce new content – with time limit”.

Also the researcher is said to have created an environment that allowed learners to be free-spirited.

Mrs Crouch “Learners responded quickly to probes, and many asked questions to gain further knowledge. Lesson caught learners’ attention and many of their questions went deeper into the topic”.
Ms Robinson “They responded well and felt free to respond without fear of being wrong. Many hands went up at a time”.

Mr de Venter “Learners listened very carefully to what the teacher is saying and follow up by asking questions, which lead to more discussions”.

Regarding classroom management as topic of inquiry the observing colleagues pointed out the class routine, classroom atmosphere and constant movement of the researcher.

Ms Logan: “They entered class in a relaxed manner and were orderly”.

Mrs Blitz: “They entered the classroom in a relaxed manner but weren’t really noisy. It was organised in that they knew their places, sat down and were ready for the lesson. They were in a routine”.

Mrs Johnson: “Classroom has a positive atmosphere and appears to be tension free”.

Mr de Venter: “A relaxed atmosphere – a perfect climate for teaching”.

Mrs Crouch: “He is very aware of the individual pupils needs and picks up their actions quickly; often reminds them of the correct behaviour by moving around from table to table – creates in itself good control”.

Ms Matthews: “The teacher interacted with learners throughout the lesson and at whole-class, group and individual levels in a friendly, yet respectful manner”.

Pertaining to time keeping, which was a prominent aspect alluded to under classroom management and discipline - the peer observers indicated that learners were not mainly focusing on their watches to meet the set time frames, were rather directing their attention to making adequate progress.

Mrs Gomez “The teacher set a time ultimatum for the group discussion. I did not observe anybody tracking the time within their groups”.

Mr Barnard “They were not overly focused on the time restraint but adequate progress was observed without stress due to time limit”.

Ms Matthews “The teacher continually reminded the groups of the time they had left and also set the time frames before they started”.

Ms Robinson “The task was set for thirty minutes; however some of the groups were only completing the first few questions. Time frame could be extended for this activity”.

The time aspect was solely dependent on the researcher to constantly make groups aware to improve or accelerate their progress on the given task. Therefore the researcher was able to track groups and individuals that are battling to complete the task and offer his support.

Mr De Venter “The whole lesson was organised in such a way that enough time was available for discussions”.

Moreover, lesson planning sufficed to maintain good time management between the various sections of the lesson.

**ANALYSIS OF THE FINDINGS**

During the early days of the inquiry, when reflecting on previous lessons the researcher came to realization that his lessons had a lot of content that required a prolonged teacher presentation
and less learner activity. After reflecting, the researcher turned the planning around to allow more time for group interactions and teacher learner interaction (Amineh & Asl, 2015) as knowledge construction process requires ample time. Group activities were structured in a way that would prompt the formation of knowledge among the learners.

Due to good preparation, the lessons were presented with confidence, probing learners to be actively involved and be assisted to take charge of their learning process. Pre-instructional decisions (Johnson, Johnson & Smith, 2004) help the teacher to carefully monitor learners as they gradually develop own understanding of the subject matter. Preparing enough content allots the teacher to thoroughly explain the subject matter so that learners are highly participative in their group tasks.

Knowledge processing takes time as mentioned above, so the researcher managed his time by allocating session for learners to ask him questions which were reflected to the whole class. This was also a way of assessing the state of the class (Ugwuegbulam & Nwebo, 2014) pertaining to comprehension of the work in order to do remedial session before continuing to the next section. Thus, learners were afforded the opportunity to be in control of their learning, and group activities were redesigned to be shorter inspiring learners to complete their task. Furthermore, time for group discussions was also ample to allow appropriate information processing (Berry, 2008).

Regarding class control and discipline, the researcher kept on referring to cooperative learning values and principles of group processing such as time on task and silent voices (Johnson & Johnson, 2009) that he taught learners, and were also visible on classroom walls. Moreover, the researcher had a set routine at the beginning of each contact session that helped with smooth entrance into the classroom and short period of settling down (Ono & Ferreira, 2010) for the lesson to commence in time. Furthermore, by looking into external factors that may contribute to wastage of time, the researcher closely monitored in between periods time (OECD, 2009) and set maximum time learners could take from one classroom to Technology classroom. In the classroom, the researcher interacted with various groups as he moved around (Gilakjani, Leong & Ismail, 2013) to assess learners’ progress in formulating their knowledge on the given task.

Analysis of peer-observers’ results alluded on the researcher as a constructivist teacher to be moving from group to group evaluating each discussion team’s comprehension of the work (Gilakjani, Leong & Ismail, 2013) to avoid ‘free rider’ effect among the team mates (Slavin, 1995; Hertz-Lazarowitz, 2008; Slavin, 2010) and improve the effectiveness of the groups. Moreover, as the researcher engages learners through probes, they are prompted to deepen their critical thinking (Veenman, Denessen, Van den Akker & Van der Tijt, 2005; Gillies & Boyle, 2009) around the work facilitating them to develop own understanding.

When responding to learners’ probes, the researcher expanded his explanations and threw back the questions to the whole class engaging in dialogue, guiding them to make up own conclusions (Southwest Consortium for the Improvement of Mathematics and Science Teaching, 1995). Therefore the researcher was not the all-knowing teacher spoon-feeding his learners but encourages positive interdependence among the group members (Li & Lam, 2005; Finelli, Bergom &Mesa, 2011) and development of their cognition.

Regarding to subject matter knowledge, peer observers indicated that the researcher is knowledgeable (Mishra & Koehler, 2006) with regard to the theoretical content and was therefore able to engage learners from the start. Using baseline assessment to observe prior knowledge of learners to build upon as learners do not come in as ‘tabular rasa’ (Bada, 2015) but develop new knowledge on what they already know. A conducive environment for
generation of new knowledge is vital, as collaborator observers indicated that learners were free-spirited. Showing that learners were at liberty to engage each other in discussions as well as involving the teacher to guide their knowledge generation process (Holt-Reynolds, 2000). In this way, good classroom control and discipline was automatically maintained as the teacher was accessible and visible to the learners.

Time was also pronounced to be managed effectively due to thorough preparation for the lessons. Above that, it was dependant on the researcher to remind learners while their focus was on the task at hand and learners were encouraged not to rush through the work but exhaust every avenue (Bada, 2015) to complete a task before proceeding to the next.

**CONCLUSION**

The literature review and the empirical findings in this study has shown that STAD has positive effects on the teacher. It could therefore be used as a teaching method in Technology to improve teacher’s accessibility to all learners in the class for individual attention and assistance within their groups. Furthermore, STAD has proven to enhance educator’s professionalism in terms of prior preparation for lessons as well as building confidence during the content delivery. STAD has further proved to help the educator to manage time effectively and have a good classroom control while attending various groups. The researcher therefore propose to educators to use STAD in their Technology classes for their professional improvement and learners’ success.

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**Undergraduate Medical Curriculum: Relevance And Appropriateness to Community’s Health Needs**

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**Abstract**

Medical education, based on modern science, has contributed to doubling the lifespan of people in the global south. However, there continue to be inequities in health care provision, some of which can be attributed to the lack of attention given to community’s health needs in undergraduate medical curricula. Aga Khan University, Pakistan pioneered community-based undergraduate curriculum to develop leaders who are capable of addressing community’s health needs. The current paper assesses if this undergraduate medical curriculum is relevant and appropriate to community’s health needs.

To assess the relevance and appropriateness of Aga Khan University’s undergraduate curriculum to community’s health needs, a framework was developed. The framework had three major parameters for identifying community’s health needs including: public health concepts as recommended in national standards, major public health problems; and attributes required for fulfilling societal needs.

This assessment revealed that for relevance and appropriateness to community’s health needs, the curriculum has to be community-based. For this, primary healthcare prototypes are crucial that connect medical education to health system. This community-based experiential learning helps students to; identify context-specific health needs, and develop culture-sensitive practices. This approach is difficult to operationalize in developing countries where national health systems focus curative care at tertiary hospitals primarily and community-based primary healthcare facilities are mostly non-functioning. Another challenge is training and retention of motivated community-based teaching faculty.

We recommend that undergraduate medical schools should review and update their curricula to; match competencies to population needs, move beyond predominant hospital orientation to primary care and impart leadership and team work skills among health professionals. This argues for community-based medical education despite enormous economic, political and social challenges that hound the world today.

**BACKGROUND**

Based on the recommendation of educational reforms, modern science was integrated into medical curricula (Flexner & Pritchett, 1910). This integration contributed to the doubling of life span during the 20th century (Frank et al., 2010). Conventional undergraduate medical schools use curative care model where healthcare is patient-centred and learning mainly takes place at hospitals. In this model the curriculum designing is; teacher-centred, knowledge-focused, discipline-led, hospital-based, standardized and opportunistic (Fox, 1997). Recognition of health inequities due to socio-economic determinants across countries/communities, however, led to the ground-breaking Alma-Ata Primary Health Care conference. Subsequent to this conference, a global demand for centrality of community in healthcare designing was generated. This was further endorsed by Edinburg declaration later (Declaration, 1988; Walton, 1993).
For translating these international commitments into action, World Federation of Medical Education, many governments and regional medical education bodies’ called-for worldwide changes in health professional education. This call was to ensure that medical graduates’ are adequately and appropriately trained to improve the health of the population. The ideology that sensitization to community’s health needs and interdisciplinary approach are mandatory for the improvement of population’s health was a paradigm shift in the template for planning and designing medical education curricula (Bollag et al., 1982). The ‘SPICE’ model laid the foundation of the community-oriented content of medical education and recommended the curriculum to be student-centred, problem-based and integrated (Harden et al., 1984). Later, the ‘PRISMS’ model introduced community-based pedagogy in medical education recommending the curriculum to be practice-based, inter-disciplinary, multisite and symbiotic with the health services and communities in which the health professionals serve (Bligh, et al. 2001).

The Community-Oriented and Community-Based (COCB) medical education was pioneered in Pakistan in 1983 by the Aga Khan University Medical College (AKUMC) with the aim to translate AKUMC’s vision into action; ‘develop physicians who can serve the health needs of the poor, vulnerable and underserved populations of the country’. The department of Community Health Sciences (CHS) was established to design and launch COCB. The CHS designed COCB undergraduate public health curriculum based on Spitzer’s Report (Walter Spitzer’s Report, 1983) to bring science closer to humanism. This newly designed COCB undergraduate public health curriculum introduced many innovations in the content and pedagogy and has been in place for the last three decades. Very little robust evidence, if any, is available about the effectiveness of educational reforms launched by many institutions in the region (Frenk, 2010). Realizing this, a need was felt to review and document the design and implementation of AKUMC’s undergraduate public health curricular model, and wisdom acquired so far. This paper is based on this review and has: assessed the relevance and appropriateness of the undergraduate public health curriculum to community’s health needs; and documented success stories, challenges and lessons learnt.

METHODS
The methods included document review and in-depth interviews. Since the objective was to assess relevance and appropriateness of the AKUMC’s undergraduate public health curriculum to community’s health needs, therefore, the knowledge on the community’s public health needs was necessary. Identification of the community’s public health needs was a daunting challenge. It had to be comprehensive and holistic ideally, yet focused and context-specific practically as everything cannot be covered in a curriculum of five years. Acknowledging that standard under-graduate medical education templates best determine the parameters of the health needs of the communities (College, 1998; Council, 2009), the same templates were adapted to determine the parameters of the public health needs of Pakistani population. The parameters so selected included: nationally recognized public health concepts; evidence-based major public health issues; and attributes required for fulfilling societal needs. These three selected parameters were used to assess the three essential dimensions of the undergraduate public health curriculum including knowledge, competencies and attributes (McKimm, 2009). In this way a framework of analysis was developed that consisted of three parameters and dimensions respectively, refer to Table-1. This framework was used to determine if AKUMC undergraduate public health curriculum’s; conceptual basis and content is relevant to community’s public health needs, and pedagogy appropriate to deliver knowledge, competencies and attributes to medical graduates.
Table 1. Framework of analysis used to assess undergraduate public health curriculum

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Medicine Concepts and Skills considered Core- National Standards</td>
<td>Population Health Needs - Major Public Health problems</td>
</tr>
</tbody>
</table>

Knowledge

Skills

Attributes

The documents reviewed included: AKUMC’s vision, mission, attributes that AKUMC expects from its graduates, curricular goal, objective and schedule; national surveys and reports, national and international literature describing current morbidity and mortality burden and standards for content and pedagogical appropriateness; guidelines of the national statutory body namely Pakistan Medical and Dental College (PMDC) and Higher Education Commission (HEC).

In-Depth Interviews (n=15) were conducted to understand and document implementation of AKUMC’s undergraduate public health curriculum in terms of: success stories, challenges and lessons learnt. The participants were; AKUMC alumni as well those currently studying, medical faculty from AKU and other public and private medical colleges, public health specialists working in national and international Non-Governmental Organizations and government officials from health sector. Participants were selected purposefully as the objective was to involve those who are more knowledgeable about the issue under research and conversant with the circumstances prevailing. Semi-structured discussion guidelines were used to conduct interviews.

RESULTS
The results are presented in three main sections; development of framework to assess relevance and appropriateness of the curriculum to community’s health needs; assessment of the relevance and appropriateness of AKUMC’s curriculum to community’s health needs; and the process in terms of success stories, challenges and lessons learnt.

DEVELOPMENT OF FRAMEWORK TO ASSESS RELEVANCE AND Appropriateness OF THE UNDERGRADUATE Public Health Curriculum TO Community’S Health Needs
A list of core elements was determined for each of the three parameters selected for the identification of the public health needs i.e. core public health concepts and skills, major public health issues and essential attributes. These core elements are presented below under the three essential dimensions of the undergraduate curriculum (knowledge, competencies and attributes):

Knowledge and Competencies
Review of international commitments guided that public health curriculum can be termed relevant and appropriate if it is grounded into two principles; firstly that health is a human right,
and secondly that health is strongly linked to social determinants (Assembly, 2002; Marmot et al., 2008; Organization., 2012a; UNICEF, 1989; Women, 1979).

The “Core” public health concepts and skills were derived from: international statistics and literature that determine evidence-based public health issues on the basis of morbidity and mortality burden (Program, 2013; Khan, et al, 2009; Pappas, et al, 2001; Studies., 2013); public health issues prioritized by national professional bodies (PMDC MBBS Curriculum, 2011); and government undergraduate medical curricula (HEC MBBS Curriculum, 2011). Refer Table-2 for lists of core public health concepts and skills and major public health issues.

Attributes
Review revealed that attributes essential in medical professional for serving the communities are standardized universally and legalized nationally (Council, 2011; Matthew O’Donnell, 2012; Medicine, 2003). Refer Table-2 for list of attributes essential for medical professional. For imparting these attributes, however, the healthcare has to be equity-based and community centred for which hospitals have to extend services to communities’ (Bligh et al., 2001).

Table 2. List of core public health concepts and skills, major public health issues and essential attributes

<table>
<thead>
<tr>
<th>Core Public Health Concepts and Skills</th>
<th>Major public Health Issues</th>
<th>Essential Attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health and Disease</td>
<td>Childhood Diseases like</td>
<td>Knowledgeable and skillful</td>
</tr>
<tr>
<td>Epidemiology and Research Methods</td>
<td>Diarrhea, Acute Respiratory</td>
<td>Keen Learner- Self-directed</td>
</tr>
<tr>
<td>Biostatistics</td>
<td>Infections, Measles and</td>
<td>life-long learner</td>
</tr>
<tr>
<td>Health Systems Planning and Management</td>
<td>other infectious diseases</td>
<td>Leader</td>
</tr>
<tr>
<td>Demography and Population Dynamics</td>
<td>Pregnancy related issues</td>
<td>Critical thinker</td>
</tr>
<tr>
<td>Social and Behavioral Sciences</td>
<td>like Post-Partum Hemorrhage,</td>
<td>Problem solver</td>
</tr>
<tr>
<td>Community Development and Partnership</td>
<td>Eclampsia, Puerperal Sepsis</td>
<td>Team player -work in health</td>
</tr>
<tr>
<td>Ethics, Professionalism and Communication</td>
<td>Abortion and Obstructed</td>
<td>teams</td>
</tr>
<tr>
<td>Environmental Health Sciences</td>
<td>Labour</td>
<td>Initiating and participating</td>
</tr>
<tr>
<td>Occupational Health</td>
<td>Malnutrition among children</td>
<td>in change</td>
</tr>
<tr>
<td>Reproductive and Child Health</td>
<td>and women</td>
<td>Researcher- Evidence-Based</td>
</tr>
<tr>
<td>Nutrition and Health</td>
<td>Infectious diseases including</td>
<td>decision maker</td>
</tr>
<tr>
<td>Prevention and Control of Infectious</td>
<td>Tuberculosis, Malaria</td>
<td>Empathetic, tolerant,</td>
</tr>
<tr>
<td>Prevention and Control of non-infectious</td>
<td>Non-Communicable diseases like</td>
<td>responsible</td>
</tr>
<tr>
<td>Mental Health</td>
<td>Hypertension, cancers, Diabetes</td>
<td>Providing compassionate</td>
</tr>
<tr>
<td></td>
<td>Injuries and Accidents</td>
<td>ethical and cultural best</td>
</tr>
<tr>
<td></td>
<td>Occupational Health</td>
<td>possible care</td>
</tr>
<tr>
<td></td>
<td>Mental Health including</td>
<td>Communicator and</td>
</tr>
<tr>
<td></td>
<td>Depression and Domestic</td>
<td>collaborator</td>
</tr>
<tr>
<td></td>
<td>Violence</td>
<td></td>
</tr>
</tbody>
</table>
Pedagogy
Literature suggests that the pedagogy has to be a combination of objective-based and experiential (Fry H, 2003; RW., 1959). Students therefore “learn through experiencing and the dynamics of a group process” (W El Ansari, 1998).

ASSESSMENT OF THE RELEVANCE AND APPROPRIATENESS OF AKUMC’S UNDERGRADUATE PUBLIC HEALTH CURRICULUM TO COMMUNITY’S HEALTH NEEDS

Using the developed framework, the AKUMC’s undergraduate public health curriculum was reviewed to assess the relevance of the conceptual basis, content and skills and the appropriateness of the pedagogy to community’s health needs. Analysis revealed that conceptually, the AKUMC’s undergraduate public curriculum is based on rights approach, contemplates social factors as crucial determinants for health and uses Primary Health Care strategy to improve the health of the population. The curriculum aims to prepare health leadership in Pakistan; competent physician having sound foundation of basic biological and biomedical concepts and equipped with clinical and social sciences skills. Health leaders with these attributes are capable to serve both individuals and populations of rural and urban areas within limited financial and human resources. The curricular objectives are to help students: understand core Public Health concepts and issues; relate health to social, cultural, political, economic and environmental determinants; recognise public health strategies and technologies required to improve health of the population; interact with communities to get familiar with social norms and values; think critically to identify community’s health problems; and use evidence-based strategies to solve health problem.

The AKUMC’s undergraduate public health curriculum: teaches significant public health issues, priority health problems and research methods; imparts skills to review literature, think critically, solve problems, make evidence-based decisions and conduct research; and inculcates attributes so that they can be good team members as well as leaders, effective communicator and provide compassionate, ethical and culturally appropriate care with honesty and empathy. The themes covered are; health and disease, determinants of health, epidemiology, biostatistics, health systems, Primary Health Care and reproductive health. In addition students are also provided opportunity to conduct a small public health research project.

The AKUMC’s undergraduate public curriculum has a class room: field-based teaching/training ratio of 60:40. The concept are taught in classroom through interactive lectures while critical thinking and problem solving skills are imparted through small group tutorials using literature, documents, data, case-studies and case scenarios. Experiential learning pedagogy is used for behaviour modification and development of positive attitudes. In this pedagogy students are taken to community setting to learn through observation, interaction, enquiry, assessment and interpretation.

PROCESS-SUCCESS STORIES, CHALLENGES AND LESSONS LEARNT

Success stories
The AKUMC’s undergraduate public curriculum from inception till date has had piloted several innovations. Many of these innovations had resulted into successful outcome and therefore have been scaled-up at institutional and or country level.

Community-Oriented and Community-Based Curriculum and Pedagogy: The AKUMC’s undergraduate public curriculum is a pioneer in the conceptualization and implementation of COCB curriculum and pedagogy. This pedagogy has been institutionalized at other
departments/schools of the Aga Khan Medical College Hospital (AKMCH) including Family Medicine, Paediatric and Ob/Gyn and School of Nursing. Moreover, both the curriculum and pedagogy has also been replicated at almost all private and several government medical colleges of the country.

**Human Resource:** Though all cadres of healthcare providers were trained on public health concepts, skills and attributes of working in-and-with communities, in particular however, a new cadre of healthcare providers namely ‘Community Health Workers (CHWs)’ was introduced. These CHWs were community women who were given basic training on health and social determinants. Community Health Sciences faculty developed so far has been providing technical support at national, regional and international levels. Moreover, the CHW model was adopted at national level by developing Lady Health Workers (LHWs).

**Primary Health Care (PHC) Prototypes:** PHC prototypes were established in selected communities with specified catchment population to; teach and train students on Primary Care using community-oriented community-based pedagogy, and bring them close to the communities. The community-based primary healthcare prototypes provided opportunities for connecting students to communities for understanding their needs and social determinants, and primary level preventive and clinical teaching.

**Health Management Information Systems (HMIS):** A comprehensive HMIS was established to improve quality of PHC services and track health indicators of the catchment population. This HMIS was adapted by Pakistan’s government while developing District Health Management Information System (DHMIS).

**Challenges**

CHS, during the last three decades, encountered several challenges including:

**Saturation of Communities:** Change in the focus of donor community from long-term development programs to short-term target oriented projects resulted in the reduction of the number of community health programmes which were used for training of students. This caused saturation of communities that affected community-based training activities.

**Human Resource Drain-out:** Introduction of COCB education in other private and public medical colleges and better economic opportunities in new bilateral and multilateral donor projects resulted in draining out of trained faculty. The biggest challenge was hiring and training of faculty to meet the human resource requirement for maintaining the quantity as well as the quality of teaching.

**Insecurity due to Terrorism:** Security threats because of terrorism intensely affected planned community-based teaching activities and hence reduced students’ learning opportunities.

**Lessons learnt**

Several important lessons have been learnt from this extremely rich experience of three decades; community-centred development projects are crucial for COCB teaching; retention of mature, knowledgeable, motivated and experienced faculty is vital for maintaining the quality of teaching/training; and secure external environment is the prerequisite for experiential learning.

**DISCUSSION AND CONCLUSION**

Our analysis revealed that AKUMC’s undergraduate community-based and oriented public health curricular model is relevant to community’s health needs. Realizing that good health is partly knowledge-based and partly socially driven (C, C. L., 2010; Pablos-Mendez, et al.,
the curriculum duly considers social and environmental factors as significant determinants for health. In contrast to many medical schools which even to date emphasize curative care; AKUMC’s model is endeavouring to improve health through disease prevention and health promotion ("The Aga Khan University Progress Report ", 2004; Billings & Block, 1997; Christakis & Feudtner, 1997). The curricular design is neither traditional (Frank J et al, 2010; Lobst WF, 2010; Kreisle R., 2002) nor purely competency-based (Danielle Saucier et al, 2012) as primary objectives are to equip medical students with: knowledge of public health concepts, issues and strategies; skills to critically analyse, synthesize and use information for problem solving; and attributes of working with and for communities. It is likely, though, that only few health professionals will become public health managers and leaders, while rest may opt for clinical tracks. Yet however evidence indicates that clinicians better educated in public health issues and trained in community settings: have better understanding and awareness of the wider public health context in which they are practicing; are more compassionate and empathetic; effectively promote community health perspective; are a productive member of the interdisciplinary health team (M., 2000); and are effective role-models, supervisors and teachers for the health teams (Irby, et al, 2010; Prideaux, et al., 2000). Evidence shows that fragmented, out-dated and static curricula produce ill-equipped graduates with mismatch of professional competencies to patient and population priorities (Joint Learning Initiative, 2004). Literature identifies that a more coherent community-based public health mind-set is required for attainment of the wellbeing of the population (Walid El Ansari & Phillips, 2001). For this, incorporation of population based health principles and methods in the undergraduate medical education is needed (Ewles & Simnett, 2003; Ibrahim MA, 2001). This therefore suggests that undergraduate medical schools should review and update their curricula to; match competencies to population needs, develop leadership and team work to improve health system’s performance, and inculcate critical reasoning, empathy and ethics.

Assessment further shows that the use of community-based experiential learning pedagogy, a teaching methodology primarily used in sociology (Mooney & Edwards, 2001), was an innovation in medical education in Pakistan. This was operationalized through establishment of community-based primary healthcare prototypes in selected communities with specified catchment population. Conceptually, these prototypes are the connection between medical education and health systems and in fact were new methods and means for medical education (Organization, 2008). Such an approach is based on primary care ideology that recognizes that community centeredness in healthcare delivery model is vital to improve health of the population (W El Ansari, 1998; L. & Simnet, 1999). There is ample evidence that such formative learning transforms experts to professionals who are competent caregivers, communicators, educators, team members, managers, leaders and policy makers (Asad, 2009; Benner P, 2009; Busing, et al, 2009; "The Prime Ministers Commission on the Future of Nursing and Midwifery in England," 2010). This highlights the need to; expand the focus from only technical content to broader contextual understanding, and move beyond predominant hospital orientation to primary care.

Community-based experiential learning approach in medical education, however, is difficult to design and slow to implement even in developed countries and extremely challenging in resource scarce countries (Naylor, 2006; Siantz & Meleis, 2007; Y & BZ, 2010). The challenge is even more daunting in countries where national health systems are functionally curative focused with very few community-based services (Ahmed & Shiakh, 2011). The non-governmental organizations are though providing some community-based healthcare services, however sustaining these programmes at times becomes difficult because of donor’s preference for short-term target oriented projects (Recommendations for the international system to support country-level processes, 2006). In order to transform community-oriented content to
community-based curriculum, government has to take the stewardship role in making the network of the Primary Level Healthcare Facilities (PLHF) functional. This will; link academia to health systems, contextualize medical education, sensitize students to community’s needs, prepare them to work in community setting and help them understand the significance of interdisciplinary team (Walter Spitzer’s Report, 1983).

We found that, AKUMC’s model specifically hired and trained faculty for community-based teaching since health professionals trained in traditional medical schools are reluctant to work in communities (C, 2010; Yach, et al, 2005). However due to market demand, retention of experienced, skilled and motivated faculty became challenging. This suggests that strategies for the retention of trained workforce have to be given due consideration while planning human resource for health professional education (Organization, 2012c).

The core content of public health oriented medical curriculum has though been recommended in literature extensively, educational reforms launched by many institutions in the region highlight the need to tailor medical education to recent community’s needs (Carlson & El Ansari, 2001; Cooke, Irby, & O’Brien, 2010; Council, 2011; W El Ansari, 1998; Hernandez, Rosenstock, & Gebbie, 2003; Veenema, 2001). So far however no uniform format exists to identify community’s health needs (Ladhani, Stevens, & Scherpbie, 2014). Therefore, the biggest strength of this paper is the framework proposed to determine community’s health needs that can update and reform medical curriculum. It should however be remembered that this descriptive framework is an instrument to reach plausible conclusions about community’s health needs. The analytical approach used is a technique used for the assessment of health needs and priorities (K, 1996) and is not a methodology of “hard” science to establish causality as in case of experiments conducted in laboratories under controlled environment. This analytical approach is useful in linking means to end in case of interventions that are made in real life settings where process and outcomes vary with time and context. This framework is a step towards the prime goal of medical education endorsed by undergraduate medical bodies even today i.e. matching medical curriculum to population’s health needs.

The 21st century envisions for all health professional in all countries to be educated to mobilise knowledge, engage in critical reasoning and ethical conduct so that they are competent to participate in patient and population centred health systems as members of locally responsive and globally connected teams (Frenk, 2010). This argues for the imperative of community based medical education despite the economic, political and social challenges that hound the world today.

REFERENCES


Social Adjustment in the Context of ‘Fees must Fall’

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Abstract
This research seeks to investigate constraints to social adjustment of students within the context of a large South African university associated with two years of ongoing student riots and protests. A sample of 251 first year Economics students is used to test theory predicting the determinants of social adjustment. According to acculturation theory, acculturation, social adjustment is a function of two individual dimensions, namely (i) a desire to maintain one’s own culture, and (ii) desire to acculturate to popular culture. Findings indicate that having a parent who has attended university is a strong predictor of social adaptation in this context. The implication of this is that it is possible that those being the first in their family to attend university are significantly less social adjusted. It is argued that such findings are not independent of deeper structural contributors to student dissatisfaction in this context, which might be relevant to student protests. It is also recommended that further causal research investigate these relationships that underlie these findings. Arguably, the violence and scale of these protests suggest deeper dissatisfaction of students, and if social alienation is a possible explanatory factor, further research should explore this further. This study is taken to provide an important exploratory analysis which might contribute to further research to this end.

INTRODUCTION
South Africa is a country that boasts a great deal of diversity in terms of cultures, races, ethnicities and values. Over the last few centuries, people from all over the world have settled in South Africa. Early settlers brought with them their cultural ways, norms and values, and it became embedded into the local generations that followed. But these generations also started adopting the ways and values of other types of cultures that they became affiliated with. A more South African culture has since been created, and the country now can best be described as a ‘mosaic’ (Rossman, 1994) of cultures. This shifting behavior and adaption of other people’s cultures is known as ‘acculturation’.

Acculturation is defined as “…those phenomena which result when groups of individuals having different cultures come into continuous first-hand contact, with subsequent changes in the original cultural patterns of either or both groups” (Redfield, Linton and Herskovits, 1936; Ogden, Ogden and Schau, 2004). Berry (1997) defines acculturation as “the general process and outcomes (both cultural and psychological) of intercultural contact.”, and further defines acculturation as being three phases: conflict, contact and adaption. Penaloza (1994) defined acculturation as ‘the general process of movement and adaptation to the consumer cultural environment in one country by persons from another country”. Basically, acculturation is a process where individuals adapt or adjust socially and culturally to a new social and cultural context (Berry, 2008).

South Africa celebrated 20 years of democracy in April 2014. In the last 20 years, the country faced a great deal of political, social and institutional changes, which has greatly affected
individuals’ values and beliefs, especially among the youth. The values adopted by this cohort group are expressed in their behaviors and attitudes towards their daily activities and acts of consumption.

Universities in South Africa attract students from different cultures and places (Kamsteeg & Wels, 2012). The university environment over the last few decades in South Africa has achieved great strides in terms of transition, with a more diverse mix of race groups interacting with each other than in the past. Table 1 below shows the number of enrolments by race at South African universities in 2015.

<table>
<thead>
<tr>
<th>University Name</th>
<th>African</th>
<th>Coloured</th>
<th>Indian</th>
<th>White</th>
<th>Unknown</th>
<th>Total</th>
</tr>
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<td>Cape Peninsula University of Technology</td>
<td>19,738</td>
<td>8,754</td>
<td>348</td>
<td>3,834</td>
<td></td>
<td>32,674</td>
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<td>3,653</td>
<td>1,904</td>
<td>8,271</td>
<td>7,060</td>
<td>27,809</td>
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<td>Central University of Technology</td>
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<td>451</td>
<td>46</td>
<td>991</td>
<td></td>
<td>14,193</td>
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<td>384</td>
<td>4,036</td>
<td>715</td>
<td>8</td>
<td>27,023</td>
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<td>240</td>
<td>34</td>
<td>247</td>
<td></td>
<td>13,458</td>
</tr>
<tr>
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<td>1,747</td>
<td>684</td>
<td>8,578</td>
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<td>1,562</td>
<td>2,237</td>
<td>4,710</td>
<td></td>
<td>49,452</td>
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<td>10,763</td>
<td>2,140</td>
<td>246</td>
<td>45,506</td>
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<td>3</td>
<td>5</td>
<td>5</td>
<td></td>
<td>19,907</td>
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<td>486</td>
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<td>528</td>
<td>17,370</td>
<td>2,503</td>
<td>64,070</td>
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<td>1,264</td>
<td>2,735</td>
<td>23,858</td>
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<td>55,984</td>
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<tr>
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<td>339</td>
<td>420</td>
<td>2,563</td>
<td></td>
<td>8,007</td>
</tr>
<tr>
<td>University of South Africa</td>
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<td>22,298</td>
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<td>1,474</td>
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<td>960</td>
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<td>Sol Plaatje University</td>
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<td>83</td>
<td>6</td>
<td>20</td>
<td></td>
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<tr>
<td>University of Mpumalanga</td>
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<td>1</td>
<td>1</td>
<td>6</td>
<td></td>
<td>816</td>
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<tr>
<td>Mangosuthu University of Technology</td>
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<td>15</td>
<td>27</td>
<td>7</td>
<td></td>
<td>11,518</td>
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<tr>
<td>Sefako Makgatho Health Science University</td>
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<td>15</td>
<td>151</td>
<td>270</td>
<td></td>
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<tr>
<td>Total</td>
<td>696,320</td>
<td>62,186</td>
<td>53,378</td>
<td>161,739</td>
<td>11,589</td>
<td>985,212</td>
</tr>
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</table>

The intermingling of different race and religious groups at the universities has led to some degree of acculturation of behaviors, value systems, beliefs, fashion ideologies, tastes, preferences, interests and ideas among students. This student cohort is technologically savvy and has great access to the internet and social media. They have also adopted a much more consumerist, Western-type culture, as apparent in their fashion and food choices. With the explosive influence of internet and social media sites such as Facebook and Instagram in the last two decades, we can imagine that the process of acculturation is moving much faster, especially among the youth in South Africa. Overall, in South African universities we have individuals exposed to global ideas and values through social media systems, but are still battling to overcome the remnants of apartheid and the racial derogatory stigmas created during
that era. The process of acculturation has affected their choices of products and general consumption.

Measuring acculturation is not an easy process, as people are in a constant state of flux (Ogden, Ogden and Schau, 2004). Further, the educational system in South Africa is transitioning quite rapidly, and determining the nature and extent of the changes taking place can be challenging (Govinder, Zondo and Makgoba, 2013). Understanding the nature of target markets and ‘intranational cultures’ can help marketers in advertising products correctly (Ogden, Ogden and Schau 2004). Universities represent a different culture for students coming from school contexts and the transition in university is comparable to the acculturation of immigrants entering into new societies (Otlu, 2010). Students in a university tend to socialize and integrate with each other all the time, which leads to acculturation, especially if behaviours, attitudes and values are affected.

According to acculturation theory, acculturation orientations are determined by the interactive strength of two individual dimensions, namely (i) a desire to maintain one’s own culture, and (ii) desire to acculturate to popular culture, with combinations of these processes classified as assimilation, separation, marginalisation or integration. Marginalization occurs when individuals in a society are either forced to abandon their own culture, or choose to do it due to discrimination in a country. Separation occurs when an individual does not choose to adopt the host country values, but maintain their own values instead. Integration occurs when an individual maintains their own identity, as well as adopting the host country identity as well. (Berry, 1980:1997). An ideal South Africa would be one in which all individuals are successfully integrated.

The way individuals define themselves is largely based on their interactions with various social groups, as individuals do not exist in isolation of others (Jamal and Chapman, 2010). “Consumer acculturation agents” can be defined as “forces involved in the consumer acculturation process”, or “those individuals or institutions who serve as sources of consumer information and/or models of consumption behavior”. These could include “socialization agents”, such as family, parents, peers, mass media and social institutions such as schools and religious institutions (Penaloza 1986-1994; Parsons and Bale, 1955).

Consumption motives are largely affected by values implicit in a culture, and this further affects choices made by consumers and their respective attitudes to certain products and brands. Values help to shape choices made by consumers on certain product categories (Henry, 1976). Ethnic affiliation can be described as “the individual’s preference of one cultural orientation over the other” (Padilla, 1980), and has been used in some cases to measure the degree of acculturation (Kim, Laroche et al., 1990). Language usage is another measure used to measure acculturation (Barnett, Siegel et al., 1954). Cultural awareness is also used as a factor to measure acculturation (Padilla, 1980). This would include an individual’s cultural heritage, the cultural background of their parents, language preference and cultural identification (Padilla, 1980). Ethnic loyalty and cultural pride is also used in the measurement of acculturation (Padilla, 1980).

What is absent from the predictions of acculturation theory (which are premised on the individual level), is a consideration of individual-level differences which are not theoretically ascribed to cultural influences, but which derive from the individual, such as those predicted by personality theory. The failure of universities to enable acculturation of students to the university culture might have serious consequences. It is therefore considered important to understand constraints to acculturation to university culture. The 2016 “Fees Must Fall” crisis, although mostly centred on the concern relating to fees increases, was also fueled by other
factors, such as lack of transformation; the colonial nature of the university; and the more “Western” or “Euro-centric” norms, cultures and values held by the universities that were established during the country’s colonial period. This has led to a sense of alienation and isolation among students, primarily among the disadvantaged groups. They have called for a decolonialisation of the education system. Our study will investigate how student dissatisfaction among students might relate to the challenges of social adjustment in the university environment. In a complex setting, such as a university, adaption is vital for student well-being and ensuring that they develop successful social skills (Berry, 2011).

This research seeks to investigate constraints to social adjustment and acculturation to the university context, applying Berry’s acculturation theory as its theoretical framework. Various studies show that integration is the most strongly related factor to positive adaption outcomes, and is most preferred (Berry, 2010). It was found that preference for assimilation and marginalisation varies according to ethnic group, the society that groups have adapted into and situational domains (Sam and Berry, 2010). Individuals choosing to maintain their own culture while interacting with others daily results in the integration strategy. These individuals experience lower stress, better adaption and are able to maintain their cultural integrity (Berry, 2005). Assimilation results when individuals discard their own culture and preferences and become more engaged in the dominant culture through daily interaction (Berry, 2005). The separation strategy is adopted when individuals choose to hold onto their original cultures and avoid interaction with the dominant culture (Berry, 2005). Marginalisation occurs when individuals neither want to maintain their own identity or interact with other groups (Berry, 2005), and can result in acculturative stress through feelings of confusion, alienation and loss of identity.

Psychological mechanisms also play a role in the choices individuals make in their choices of acculturation strategy. The role of personality accounts for a great amount of variance in individual behaviour and decision making. Individuals with higher levels of openness are more likely to adapt to other cultures, while still maintaining their own. Openness relates to factors such as openness to new values and less resistance to change (Saksvik and Hetland, 2009). On the other hand, individuals with higher neuroticism, which is negative attitudes and higher resistance to change (Saksvik and Hetland, 2009), are less likely to adapt to other cultures and would suffer from acculturation problems and lower adaption. Extraversion, which is associated with the enjoyment of personal interaction (Vakola et al., 2003), has been found to be negatively associated with resistance to change (Saksvik and Hetland, 2009), and positively associated with factors such as positive thinking and rational action choices (McCrae and Costa, 1986). Conscientiousness, associated with ‘positive thinking’, is expected to be associated with greater adaption and successful acculturation. Agreeableness, which includes compassion in interpersonal interactions (Vakola et al., 2003), has also been found to be negatively related to resistance to change (Saksvik and Hetland, 2009), and should therefore help with greater adaption.

Our study will consider other demographic effects such as age, race, language, religion, as well as other factors. The age factor has produced mixed results in the literature, but is considered through its association with time spent to adapt. English was also included as a dummy, and was found to predict acculturation (Kuo and Roysircar, 2004). Differences in socioeconomic differences, was also considered, by determining whether the individual’s parents attended university. It is expected that they are able to adapt more successfully if their parents attended university.

This paper will focus on Social Adjustment, which measures how well students deal with interpersonal experiences at university (Cliniciu, 2013). It is considered as one of the important
issues directly linked to human behaviour (Alzboon, 2013), which involves a harmonization of
the individual’s motives and needs, and the surrounding environment and circumstances that
person is based in (Alzboon, 2013). Studies show that the level of social adaptation of the
individual is greatly affected by social interaction with the external environment and peers
(Alzboon, 2013). Similar studies have been carried out in other countries’ schools, colleges
and universities, but our study is unique as the first to measure acculturation and university
student adaption in the context of a large South African university.

METHODS
The study applied an empirical research design based on positivist ontological and
epistemological assumptions. The study proceeded from assumptions that variance in
individual personality and other characteristics that are systematically and objectively related
to variance in acculturation choices would be reflected in statistical testing. It was expected
that significant associations would provide a basis for the accumulation of evidence against
which the predictions of theory could be tested in this context.

Sample and Population
This study employed stratified convenience sampling of first year Economics students at a
large South African university. Approximately 600 respondents were targeted. The first-year
Economics class was chosen as this is a compulsory first-year subject primarily for commerce
and other subjects that were not explicitly related to the teaching of social theory. This group
was therefore representative of students that are studying business-related subjects. At the
university, first year Economics students were approached in lectures, and questionnaires were
handed out in the classes. The entire first-year Economics class cohort of a large South African
university was sampled. They were told that participation was totally voluntary and were
promised full anonymity. Ethics Committee approval was obtained prior to the study. Of the
questionnaires administered, 251 usable responses were obtained.

Statistical analysis
On the basis of a review of the literature, the following specification was formulated for testing
continuous values of MOC (maintain own culture) and AUC (adapt to university culture). In
this specification, $X_i$ represents social adaptation, and

$$X_i = a_i + Z_i + R_i + u_i + \beta_4 (tropicari + age_i + English_i + gender_i$$

$$+ parent_i + hostel_i + school_i + MOC_i + AUC_i)$$  \hspace{1cm} (1)

Given that the theoretical framework being tested relates to four acculturation orientations
(Berry, 2010), the first phase of testing applied logistic regression to test the extent to which
personality endowments and individual characteristics predicted membership of each of the
four acculturation orientations (Specification 1). The acculturation orientations were developed
following Berry’s (2010) method of grouping together those respondents (i) high in preference
for MOC and high AUC, representing integration, (ii) high MOC and low AUC, representing
separation, (iii) low MOC and high AUC, or assimilation, and (iv) low MOC and low AUC,
or marginalisation. The second phase of testing sought to test what personality and individual
characteristics were associated with the two underlying constructs, namely the preference for
MOC versus the preference for AUC (Specification 2). Table 3 reports these results. OLS
(ordinary least squares) regression tests were performed using standard OLS (Models 1 and 4),
OLS with bootstrapped standard errors (5000 iterations) (Models 2 and 5) and robust OLS
regressions (Models 3 and 6) which controlled for outliers using weighted values. The process
of testing therefore sought to test relationships between all four acculturation states, including
both the core preferences as well as specific acculturation orientations.
Measures
Scales were developed to measure the two dimensions of acculturation which measure; (i) the individual’s desire to maintain their “home” culture, and (ii) the individual’s desire to adapt to the predominant university culture. These were developed based on precedents used in other studies that have conducted research on acculturation and student adjustment, such as the study by Otlu (2010) and other work by Celenk and Van de Vijver’s (2011). Content and construct validity (Murphy and Davidshofer, 2005) was increased by ensuring the scale items were derived appropriately from theory. Different items were derived to capture different dimensions of the MOC and AUC aspects, to increase the validity of the measures, following the precedent of Schwartz (2007).

RESULTS
The descriptive statistics for the tested variables are reported in Table 2. The majority of the sample were female, with about a quarter reporting residence in a university hostel. Almost 85% reported attendance of a mixed religion school.

Table 2. Descriptive Statistics.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Mean</th>
<th>(3) Standard deviation</th>
<th>(4) Minimum</th>
<th>(5) Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintain own culture</td>
<td>3.770</td>
<td>0.597</td>
<td>1.4</td>
<td>5.2</td>
</tr>
<tr>
<td>Adapt university culture</td>
<td>2.857</td>
<td>0.816</td>
<td>1</td>
<td>5.3</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>3.073</td>
<td>0.765</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Extroversion</td>
<td>3.931</td>
<td>0.872</td>
<td>1</td>
<td>5.8</td>
</tr>
<tr>
<td>Openness</td>
<td>3.704</td>
<td>0.647</td>
<td>1.8</td>
<td>6</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>4.659</td>
<td>0.903</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>4.111</td>
<td>0.775</td>
<td>1.8</td>
<td>6</td>
</tr>
<tr>
<td>Age</td>
<td>18.82</td>
<td>1.489</td>
<td>0</td>
<td>25</td>
</tr>
<tr>
<td>English home language (proportion)</td>
<td>0.321</td>
<td>0.468</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Black</td>
<td>0.713</td>
<td>0.453</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Coloured</td>
<td>0.0319</td>
<td>0.176</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Indian</td>
<td>0.143</td>
<td>0.641</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Gender (proportion male)</td>
<td>0.412</td>
<td>0.493</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Either parent attended university</td>
<td>0.532</td>
<td>0.500</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Hostel accommodation</td>
<td>0.249</td>
<td>0.433</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Mixed religion school</td>
<td>0.847</td>
<td>0.361</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 3 reports the results of the OLS estimations. The first model reports robust regression coefficients, whereby weighting using Cook’s distance estimates are used to adjust for outliers in the data. The second model reports estimates based on heteroscedasticity-adjusted standard errors. The third model uses bootstrapped resampling (of 5000 iterations) to return confidence intervals which are more precise in terms of their identification of significant relationships. All three models support the positive association between having either parent attend university and social adjustment to university. Age is not found to be significantly associated with social adjustment. Although the second model found English home language to be positively associated with social adjustment, this effect is not found to be supported once outliers are removed, and once bootstrapped confidence intervals are used to check the significance of associations. Given that the specification tested negative for heteroscedasticity, according to the Breusch-Pagan/Cook-Weisberg test (Chi-square=1.7;p<.1917), the results of Models 1 and 3 were taken to be authoritative in this regard.
Table 3. Determinants of Social Adaptation.

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Mean</th>
<th>(3) Standard deviation</th>
<th>(4) Minimum</th>
<th>(5) Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>0.0874</td>
<td>0.245</td>
<td>0.245</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.470)</td>
<td>(0.413)</td>
<td>(0.455)</td>
<td></td>
</tr>
<tr>
<td>ENGLISH HOME LANGUAGE</td>
<td>1.899</td>
<td>1.770*</td>
<td>1.770</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.330)</td>
<td>(1.068)</td>
<td>(1.088)</td>
<td></td>
</tr>
<tr>
<td>BLACK</td>
<td>-3.386**</td>
<td>-2.088*</td>
<td>-2.088</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.603)</td>
<td>(1.249)</td>
<td>(1.441)</td>
<td></td>
</tr>
<tr>
<td>INDIAN</td>
<td>-3.552**</td>
<td>-0.213</td>
<td>-0.213</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.643)</td>
<td>(0.538)</td>
<td>(1.876)</td>
<td></td>
</tr>
<tr>
<td>COLOURED</td>
<td>-6.514***</td>
<td>-4.770***</td>
<td>-4.770***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.474)</td>
<td>(1.566)</td>
<td>(1.833)</td>
<td></td>
</tr>
<tr>
<td>GENDER</td>
<td>0.505</td>
<td>0.416</td>
<td>0.416</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.815)</td>
<td>(0.822)</td>
<td>(0.833)</td>
<td></td>
</tr>
<tr>
<td>EITHER PARENT UNIVERSITY</td>
<td>1.823**</td>
<td>1.834**</td>
<td>1.834**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.804)</td>
<td>(0.791)</td>
<td>(0.799)</td>
<td></td>
</tr>
<tr>
<td>UNIVERSITY ACCOMODATION</td>
<td>1.391</td>
<td>1.226</td>
<td>1.226</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.977)</td>
<td>(0.934)</td>
<td>(0.942)</td>
<td></td>
</tr>
<tr>
<td>MIXED RELIGION SCHOOL</td>
<td>0.962</td>
<td>0.599</td>
<td>0.599</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.153)</td>
<td>(1.104)</td>
<td>(1.163)</td>
<td></td>
</tr>
<tr>
<td>MAINTAIN OWN CULTURE</td>
<td>2.803***</td>
<td>2.923***</td>
<td>2.923***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.701)</td>
<td>(0.705)</td>
<td>(0.701)</td>
<td></td>
</tr>
<tr>
<td>ADAPT UNIVERSITY CULTURE</td>
<td>0.564</td>
<td>0.472</td>
<td>0.472</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.506)</td>
<td>(0.479)</td>
<td>(0.483)</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>20.31**</td>
<td>16.05*</td>
<td>16.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(10.14)</td>
<td>(9.146)</td>
<td>(9.886)</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>243</td>
<td>244</td>
<td>244</td>
<td></td>
</tr>
<tr>
<td>R-squared</td>
<td>0.198</td>
<td>0.191</td>
<td>0.191</td>
<td></td>
</tr>
</tbody>
</table>

Although the evidence is mixed, it is possible that racial inequities remain in terms of social adjustment. This might be a contributing factor in the FeesMustFall protests, if there is some lack of adjustment that has contributed to student dissatisfaction, given the university context is perhaps alien to many, premised as it is on Western norms and culture. The bootstrapped estimation, however, suggests that once non-normality in the data is addressed these racial effects are not present. If so, then it would appear that social adjustment might not be influenced by race. Further causal research, including qualitative investigations, might reveal the causal structure that underlies these findings.
Of the cultural orientations, a student’s preference to maintain his or her own culture in the face of other influences is found to positively predict social adjustment. The same orientation related to adaptation to university culture was found to not be significant. This result suggests that there may be some aspect of social cohesion, or social network advantages arising from the maintenance of an individual’s own culture. It is recommended that university administrators take cognizance of the cultural groups that may exist on campus, and enable these groups to provide support for students.

CONCLUSIONS
The objective of this study was to investigate the relative contributions of certain dependents of social adaptation in the context of a large South African university. What was considered particularly important to this investigation was the fact that for the preceding two years there had been violent and extensive student protests. In light of these protests, this study sought to understand the determinants of social adjustment, with the hope that this knowledge might contribute one more ‘puzzle piece’ to the literature seeking to understand the broader, or deeper reasons for the student protests, over and above the issue of financial support for higher education. The violence and scale of the protests arguably suggest that deeper dissatisfaction underlies these events, and the call for decolonisation suggests it might be possible that many students feel social alienated in this context. The findings of this study suggest that it might be possible that there is a racial element to social adjustment in this context, but evidence on this was mixed. If a parent had been to university a student was found to report being significantly better socially adapted. This suggests that there might be a sense of social alienation amongst those who are the first in their families to be at university. Age, race and English home language were not found to be significantly associated with social adjustment. Further research should use causal or qualitative methods to look at the relationships between social adjustment and the student protests. Such knowledge might help to mitigate the scale of future protests by addressing underlying issues proactively. Further studies would be useful for university managers who want to ensure that students feel less alienated by the university culture. It is concluded that support for cultural groups and the societies on campus might improve social adaptation in this context. It would increase students’ desires to maintain their home culture, which would help them to adapt more successfully to the university environment. Given the seriousness of large-scale violent protests across the country over the past two years, it is hoped further research can add more ‘pieces’ to the puzzle, so that student unrest in general can be better understood in this context.

REFERENCES


Formative Curriculum Evaluation Informs Curricula Refinement Process

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Abstract  

Background  
In response to the demand for developing a curriculum which addresses the scientific as well as the essential generic skills students require (Whittle et.al. 2010), such a curriculum was implemented at a health sciences faculty. A formative curriculum evaluation research process was started simultaneously with its implementation with the aim of informing faculty to intervene immediately where- and whenever needed (Bitzer, 2011). This process was repeated for four consecutive years (2008 – 2011) and then followed-up four years later (2015 – 2016).

Summary of work  
The formative curriculum evaluation process followed a qualitative research approach with data collected by means of focus groups, in-depth interviews and textual module evaluation documents. The evaluation process initially focused on the first semester of the first year of the curriculum – the so-called Inter-Professional Phase. Data analysis was aimed at the identification of the main areas of concern identified by the stakeholders. All relevant stakeholders in the curriculum were included in the research process.

Summary of results  
The formative research process made it possible for faculty to intervene immediate at the end of the first year after implementation, as well as in subsequent years. In most cases, this timeous intervention yielded the positive results intended at the outset, but in some aspects, it did not. The changes made were mainly of logistical-, value-, and content nature. The ‘logistical’ and ‘content’ issues identified were mostly successfully addressed, whilst those regarding ‘value’ were found to be more challenging. The major finding was that the embedding and teaching of crucial generic skills in a curriculum largely depend on the manner in which these skills are contextualised within the health sciences curriculum.

Conclusions  
To complete the curriculum development cycle (Kern et al. 1998) from a needs assessment, to the formulation of goals and specific objectives, to planning the educational strategies and the implementation of it, a last step in the cycle is to evaluate it and provide feedback. A formative qualitative research method that includes all stakeholders proved to be appropriate and is accepted as open and inclusive.

Take home message.  
Timeous qualitative research contributes to immediate intervention in that it ensures effective implementation of a curriculum.

BACKGROUND  
Curriculum transformation sometimes evolves because of global-driven trends and national or international changes in the workplace as well as in societies (Frenk et.al., 2010). There is a
common consensus among health scientists that students of the 21st century need more than only scientific knowledge to function optimally as health practitioners (Whittle, Godfrey & Murdoch-Eaton, 2010). For example, the development of generic skills such as interpersonal skills, professional behaviour, and good communication skills, to name a few, is highlighted in the literature of the new millennium (Koceic et.al., 2010; Goldie, 2000).

In the report by Frenk et.al. (2010) it was strongly stated that health sciences institutions should seriously reconsider the current curricula when they state that “In almost all countries, the education of health professionals has failed to overcome dysfunctional and inequitable health systems because of curricula rigidities, professional silos, static pedagogy (i.e., the science of teaching), insufficient adaptation to local contexts and commercialism in the professions” (Frenk et.al., 2010, p.1926). To respond to the need of this demand, change in the curriculum is normally one of the first actions to be taken in higher education.

In health sciences education, the shift from a curriculum that follows a process model, towards a curriculum that is more of a product model in nature, is evident in recent curricula. The product model focuses more on the outcomes of teaching and learning, and is known as competency-based education (Vander Lee et.al., 2011). It aims to prepare the student in a better way according to basic scientific knowledge as well as generic life skills (Koceic et.al., 2010). This mirrors the need for a wider spectrum of subject areas, which characterise or should characterise health sciences education at present (Bitzer, 2011).

Curricula need to be adaptive not only for social and political needs, but also because of professional demands (Bitzer, 2011) such as the demands of preparing undergraduate students to become lifelong learners and responsible citizens contributing to overall human capital endeavours. Curriculum change is an on-going process of enhancing the quality of teaching and learning, where quality refers to a process of self-reflection with the aim to improve management, the strategy or the process (Beyleveld, 2011).

In order to determine the value and merit of an education programme, a programme evaluation process that is systematic and comprehensive in nature, is needed (Wall, 2010). Action research as a way of constant evaluation in especially a new or revised curriculum seems to be a useful way to collect appropriate data in a systematic and objective way with the aim to act upon it (Beyleveld, 2011). However, it is possible that action research could be confused with formative evaluation research that is defined as process evaluation with the aim to improve the program (Patton, 2010). The difference seems to lie in the outcomes of the research. Action research is characterised by a forward-looking approach with the aim to invite new ideas while formative evaluative research aims at evaluating current practices in an attempt to change and correct (Beyleveld, 2011). Action research is a critical self-evaluation and focuses on lifelong learning for the individual, e.g. to improve teaching (Wood, 2011). Important in both types of research, is that it generates information timeously so that action may be taken. It involves an interactive approach that, in turn, enables decision makers to implement improvements immediately, instead of having to wait for failure before intervention can commence (Wall, 2010).

The voice of those involved in the curriculum should not be underestimated in any process of curriculum evaluation. To make informed decisions on any improvement of a curriculum, the decision makers have to obtain relevant information (Satterfield et.al., 2010), from those involved, particularly students. Valuable information about where, when and how to intervene in the curriculum can therefore be provided by those directly involved viz. students and university teachers.
A new revised curriculum for the MB, ChB programme of the Faculty of Medicine and Health Sciences at Stellenbosch University (South Africa) includes also a new Inter-Professional Phase during the opening semester of the first year of study. In comparison to the previous curriculum, major differences characterise this new component of the curriculum. The new Inter-Professional Phase is more clinically contextualized, and provides for the learning of personal, professional and other generic skills.

Universally, curricular changes (such as those mentioned above) are generally quite challenging (Satterfield et.al. 2010), and it was therefore very important to faculty to ensure an effective implementation of the revised curriculum. According to Wall (2010), evaluative information should be gathered timeously to be useful, and in this instance rather sooner than later because the clinical part of the curriculum follows the Inter-Professional Phase. It was therefore crucial that faculty determined the preliminary success of the revised curriculum in a scientific way, because of the decisive impact it may have on the subsequent clinical years.

It was essential to obtain the perspectives of both the students and the university lecturers involved in the Inter-Professional Phase, so that the needs of both parties may be met (Hemmer et.al. 2010). Gathering and interpreting these perspectives responsibly and scientifically could provide Faculty with important information regarding the content and teaching and assessment methods, to determine the effectiveness of the Inter-Professional Phase. The purpose was therefore not only to measure, but also to anticipate and solve problems if and when they occur. This process was repeated for two consecutive years, four years after the initial research project. This paper however, focuses only on the initial process.

The research objectives for this study were:

- To establish whether the Inter-Professional Phase of the new revised curriculum resulted in the intended outcomes it was designed to achieve.
- To gain an enhanced understanding of university teachers’ and students’ views of the design and implementation of the revised Inter-Professional Phase curriculum.
- To increase interest in and communication about the revised Inter-Professional curriculum amongst stakeholders with the aim to build evidence for refinement if necessary.
- To adopt the continuous improvement process for the revised curriculum.
- To change specific aspects of the revised curriculum if short-term outcomes demonstrates the need for it.

This paper describes the qualitative research methods that were used to determine the efficiency with which the curriculum was implemented. It also aims to demonstrate that immediate scientific research into a newly implemented curriculum could lead to early intervention and refining of the curriculum. Informed decisions were made on credible information provided by the relevant stakeholders, which could hopefully lead to better results (Goldie, 2000). Ultimately, the process would guarantee a proper foundation curriculum that could serve as a basis for effective future health science practitioners.

The findings of this study therefore could inform educational institutions about the value of formative qualitative research for any curriculum changes.

**METHODS**

**Introduction**

The research employed a formative iterative evaluation process with the aim to improve the program. It therefore followed a qualitative approach where the findings were context-specific...
and where the focus was on the program processes and outcomes (Patton, 2010). Data collection tools that were used were mainly focus groups (with students), individual in-depth interviews (with university teachers), and textual documents in the form of module-evaluation (as done by students at the end of each module). Module chairs, university teachers and students at the Faculty of Health Sciences of the Stellenbosch University in South Africa, were regarded as the relevant stakeholders to participate in this research. The approach that was followed was the now familiar SWOT analysis.

**Procedure**

Ethical approval was obtained from the Health Ethical Research Committee of Stellenbosch University (N15/08/073).

- A different set of probing questions for focus group discussions with students and interviews with university teachers was formulated.
- Students for the focus groups were purposively selected by means of a random selection process – being inclusive in terms of age, gender, race, language and previous qualifications. This initial process was repeated for three consecutive years.
- Module chairs and university teachers were purposively identified to be interviewed. Initially, the different module chairs were invited, followed by an additional lecturer from each module included in the Inter-Professional Phase. In the second semester university teachers involved in modules following on the Inter-Professional Phase, were also invited to take part.
- Fourteen focus group meetings were held in total over the period of three years. Sixteen different individual interviews with university teachers took place. Full transcriptions of all the interviews were made.
- Formal student course evaluation forms on all four the modules present in the Inter-Professional Phase were also analysed in the consecutive years.

**Analysis**

The fact that the method used was a formative evaluation research method implied that each year’s data of the research project be analysed timeously to provide faculty with the necessary information to act upon. A stepwise approach as described by Miles & Huberman (1994) was used to analyse the data – which was conducted independently by two different people. The analysis was based on analytical abstraction, which was executed on three different levels: At level one, dates were coded and preliminarily categorised. At level two, trends were identified, categories finalised and the relationships between the different categories were investigated which resulted in the identification of themes. At level three, clusters were formed and a table was developed with the purpose of summarising the findings in an ordered way.

Answers to open ended questions on the formal student course-evaluation forms were also analysed according to the Miles & Huberman model.

Finally, the data as categorised in themes and clusters were interpreted to find central and important issues. These central and important issues were used to provide faculty with information and appropriate recommendations to react on.

**Results**

Data from the survey collected over a three-year period, enabled faculty to react to urgent curriculum matters immediately from the first year of the research (see Figure 1).
Figure 1. Formative research process followed.

Although the focus of this paper is on the formative qualitative research process, it is still necessary to demonstrate the types of data that were obtained. The findings are therefore in most cases presented in table format, which is not generally considered the most appropriate way to present data from a qualitative research report. The results are therefore aimed at informing rather reporting.

The following data obtained from the research will be presented in two parts – viz. data obtained from students, and that obtained from university teachers.

**First year after curriculum implementation**

Table 1 and Table 2 depict the different factors that were found to be important to the students and the university teachers respectively in the first year after the implementation of the revised curriculum.

| Table 1. Perspectives of students in first year after curriculum implementation |
|-----------------|-------------------------------------------------|-------------------------------------------------|
| **Positive**    | **Negative**                                    |
| **General perspectives** | **Curriculum provided sufficient insight into other disciplines** |
|                  | **Curriculum established a good mastering of basic concepts needed in the field of health sciences** |
| **How students view the curriculum** | **Students found faculty very supportive** |
|                  | **Students appreciated attention to crucial life skills** |
| **Perspectives of students on actual course** | **Some students found the attention given to generic skills unnecessary, pointless and a waste of time** |
|                  | **Students lost some motivation towards studying health sciences during the first semester, because of the curriculum content** |
|                  | **Assignment overload** |
|                  | **Inappropriate assignments** |
|                  | **Inappropriate assessments** |
|                  | **Overlapping between modules which caused confusion** |
Contributions by the students are as aspects that they considered positive about the curriculum and those they found to be negative. These positive and negative aspects are grouped into three themes namely, those aspects which can be seen as more general in nature in terms of the curriculum, those which effect how they value the curriculum, and those aspects which have a definite influence on the actual course.

Table 2. Perspectives of university teachers in first year after curriculum implementation

<table>
<thead>
<tr>
<th>Concerns of university teachers</th>
<th>Concerns of university teachers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students demonstrate surface learning and demonstrate lack of comprehension</td>
<td></td>
</tr>
<tr>
<td>Lack of time to build relationships with students</td>
<td></td>
</tr>
<tr>
<td>Too many lectures per day</td>
<td></td>
</tr>
<tr>
<td>Staff/student ratio problematic in practical sessions</td>
<td></td>
</tr>
<tr>
<td>Too much overlap in modules and between different modules</td>
<td></td>
</tr>
<tr>
<td>Some university teachers involved in the Inter-Professional Phase were unaware of the bigger picture of the Inter-Professional curriculum as well as the curricula of the respective health sciences curricula</td>
<td></td>
</tr>
<tr>
<td>Aware of possible factual overload</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Perceptions on First Year lecturing</th>
<th>Find students eager to learn and willing to participate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic background of students often insufficient</td>
<td></td>
</tr>
<tr>
<td>First year students require special teaching strategies</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Negative experiences of university teachers</th>
<th>The large classes posed an administrative and logistical challenge to university teachers which can be very time consuming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some university teachers felt overwhelmed by large classes</td>
<td></td>
</tr>
</tbody>
</table>

The data obtained from in-depth interviews with university teachers involved in Phase I of the curriculum, are presented in the following themes: concerns expressed by the university teachers, perceptions about first year lecturing, and negative experiences of university teachers.

The above-mentioned findings were discussed at several platforms in faculty. At module-level, the respective module team chairs meet at first to discuss the way forward before each of them meets with their respective module team. Module Chairs reported to the Phase Chair, and interventions were implemented. Faculty responded to the findings and intervened in the following ways at the end of year one after curriculum implementation:

Table 3. Curriculum intervention at the end of year one after curriculum implementation

<table>
<thead>
<tr>
<th>Interventions in reaction on data from students</th>
<th>Drastic changes to the formal timetable. The aim was reduce the number of set classes by freeing-up space in the afternoons. Specific slots on the timetable were allocated for self-study. The intention was also to free up space where students could do group work as required by the curriculum. It also provided space where formal tutor groups could meet as it was a need expressed by especially non-residential (private) students.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changes to manner in which two of the four modules were assessed, were introduced. The two modules that addressed content of generic nature changed from summative assessment to continuous assessment. Continuous assessment was regarded as more appropriate for the content of these two modules.</td>
<td></td>
</tr>
<tr>
<td>Specific attention was afforded by module teams to contextualize assignments in the field of the health sciences. The aim was to make the assignments more appropriate to the health sciences.</td>
<td></td>
</tr>
</tbody>
</table>
Table 3. continued

<table>
<thead>
<tr>
<th>Interventions in reaction on data from university teachers</th>
<th>The inclusion of inter alia portfolio’s in scientific subject matter as part of the assessment to counter surface learning of students.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A workshop held at the beginning of year two after curriculum implementation to inform inter alia university teachers about the curriculum at the faculty.</td>
</tr>
<tr>
<td></td>
<td>A reduction in module content.</td>
</tr>
<tr>
<td></td>
<td>Short course held at the beginning of year two after curriculum implementation to address issues concerning the special skills needed to teach first year students and the different techniques to use in teaching large classes.</td>
</tr>
</tbody>
</table>

Second year after implementation

It was clear at this stage that all the positive factors mentioned by the students and university teachers were still relevant in the data obtained in the second year after implementation. Table 4 therefore only contains the aspects that were (still) negative or of concern to the stakeholders, and distinguishes between factors mentioned by the students and the university teachers respectively. Although the negative aspects were less, it was clear that certain aspects persisted. No new aspects were found to be negative.

Table 4. Negative or factors of concern in year two after implementation

<table>
<thead>
<tr>
<th>Students</th>
<th>Too many university teachers involved which caused confusion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large classes found to be alienating</td>
</tr>
<tr>
<td></td>
<td>Some students considered attention to generic skills as unnecessary, pointless and a waste of time</td>
</tr>
<tr>
<td></td>
<td>Students lost some motivation towards studying health sciences during the first semester, because of the curriculum content</td>
</tr>
<tr>
<td></td>
<td>Assignment overload</td>
</tr>
<tr>
<td></td>
<td>Inappropriate assignments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>University teachers</th>
<th>Students demonstrated surface learning and a lack of comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lack of time to build relationships with students</td>
</tr>
<tr>
<td></td>
<td>Staff/student ratio problematic in practical sessions</td>
</tr>
<tr>
<td></td>
<td>Academic background of students was often insufficient</td>
</tr>
<tr>
<td></td>
<td>Some university teachers felt overwhelmed by large class groups and experienced it as intimidating</td>
</tr>
</tbody>
</table>

Faculty responded to the findings and intervened in the following ways at the end of the second year after curriculum implementation:

Table 5. Curriculum intervention at the end of the second year after curriculum implementation

<table>
<thead>
<tr>
<th>Interventions in reaction on data from students:</th>
<th>More effective and appropriate assignment contextualizing specifically the modules of generic nature after more and specific conversations between module teams.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reducing the number of assignments and aligning of assignment due dates with formal assessment dates.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interventions in reaction to data from university teachers:</th>
<th>Specific attention paid by university teachers to contextualize the content in the health sciences.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Another short course held at the beginning of year two after curriculum implementation to address issues concerning the special skills required to teach first year students and the different techniques to use in teaching large classes.</td>
</tr>
</tbody>
</table>
Third year after implementation

Data retrieved from the research in the third year after implementation showed that the positive factors were still present, and that some negative or factors of concern persisted. Table 6 contains only these negative, or factors of concern, as stated by either the students or the university teachers.

**Table 6. Negative or factors of concern in year three after implementation**

<table>
<thead>
<tr>
<th>Students</th>
<th>University teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Too many university teachers involved which caused confusion</td>
<td>Students demonstrated surface learning</td>
</tr>
<tr>
<td>Large classes found to be alienating</td>
<td>Staff/student ratio problematic in practical sessions</td>
</tr>
<tr>
<td>Students lost some motivation towards studying health sciences during the first semester, because of the curriculum content</td>
<td>Academic background of students often insufficient</td>
</tr>
<tr>
<td>Some students found attention to generic skills as unnecessarily, pointless and a waste of time.</td>
<td>Some university teachers feel overwhelmed by large classes and experienced them as intimidating.</td>
</tr>
</tbody>
</table>

**DISCUSSION**

A systematic and scientific formative evaluation research process was used to determine possible gaps, deficiencies, problems and concerns in a newly implemented revised curriculum specifically within the first semester (Inter-Professional Phase) of the first year of the curriculum. Figure 1 demonstrated the formative evaluation process that was followed with the aim to adjust and improve the curriculum wherever needed and as soon as possible. It is evident that it was possible for faculty to intervene immediately at the end of the first year after implementation to counter as many as possible factors that negatively influenced the curriculum. The main interventions were related to logistic-, value-, and content matters. The following curriculum matters were filtered out by the qualitative research process, and will briefly be discussed to demonstrate the nature of issues that were present and dealt with.

The interventions made by faculty every year had a very positive effect in some cases, but in some other aspects, it did not have the expected results. Most of the first year students enrolled in this university were still attending school in the previous year where they only had a few teachers who they normally have to know quite well. They experienced the increased numbers of university teachers at university as different, impersonal, and most of all, confusing. Many different departments (with the accompanied large number of teachers) are currently involved in the curriculum because of the nature (content) of the curriculum. In some cases, lecturers would teach students only for a single session or very few sessions. University teachers themselves found this as not ideal and together with the large classes which make it almost impossible for them to get to build a relationship with the students. No bond between lecturer and students is formed – a bond which could possibly positively influence the affective component of learning in students (Ten Cate, Snell, Mann & Vermunt, 2004).

The research identified a need for teachers to learn more about how to teach large groups of students – especially first year students. A short course for university teachers at the beginning of each of the academic years during the research period seemed not to have the desired effect on students who still perceived large classes as alienating. University teachers may succeed by using different techniques and teaching strategies in large classes to make teaching and learning...
more effective, but students still found the large groups as scary and overwhelming. Inexperienced university teachers, who often lecture to first year students, find it extremely hard to lecture to large groups of students and do not always have the confidence to apply large-group teaching techniques within such a group. With the continuous demand for more health scientists in Africa and South Africa as well, faculties have to think innovatively to address this issue. Funding, space, and time are some of the issues that complicate this problem.

According to literature, the learning of the necessary generic skills has to be taught early in the curriculum (Murdoch-Eaton & Whittle, 2012). For this reason, generic skills learning was introduced in the first semester of the first year of the curriculum. Unfortunately, students in the first year sometimes regarded the learning of the generic skills as not necessary, pointless and a waste of time. This was mentioned during several focus group meetings held.

Interventions like the change of assessment formats, and better contextualisation of the content of the generic skills into health sciences, did not always have the desired effect on the students’ perceptions of the generic skills learning. Students entering the medical school are often high academic achievers with lots of confidence at entry (Patterson & Fergunson, 2010). It is therefore obvious that some of them will regard learning these skills as unnecessary. At the start of the programme, students are highly motivated to study medicine, and immediately want to be involved in matters of real medicine. When matters of generic skills are presented to them, some easily become demotivated. However, in another study done over a period of five years (2007 – 2011) specifically focussing on the impact the revised curriculum has on the generic skills of students in this programme, it was found that the new curriculum from implementation in 2008 showed a sustained and positive impact upon students’ practice in various generic skills (Murdoch-Eaton, Louw & Bezuidenhoudt, 2016).

The focus groups used to collect data in this research were found to be very effective in exploring the students’ motivation. Faculties worldwide face the challenge of getting students motivated, but an even bigger challenge is to keep them motivated (Palmer, 2007). The fact that Faculty at this university does not always succeed to keep students motivated is a matter of concern. It seemed that the way the curriculum – specifically the Inter-Professional Phase of the curriculum - is structured or presented, affects some students negatively. Many reasons for this could be put forward, but it seems that the students have unrealistic expectations of what to expect at medical school in the first phase of the curriculum. The answer to this is not an easy one, and innovative thinking is required. An example of such an innovative intervention was implemented in 2014. Students in small groups were exposed to rural clinical sites with specific tasks to complete at the sites, with the main purposes of observing, reflecting and presenting. Many of the generic skills taught were practised during this exercise, and it seems that it effectively contributed to the motivation of the students (Snyman & Geldenhuys, 2016).

The data obtained from the one-on-one in-depth interviews with lecturers, as well as the statements made by students during the focus group interviews, put faculty into a position to take immediate action. For example, the drastic changes faculty made to the timetable after year one of implementation, have had an enormously positive effect on more than one aspect. Freeing up time in the timetable contributed positively towards more effective group work and participation in other academic and non-academic activities and can lead to more effective academic integration at especially first year level. This is an example of student-centeredness, where curriculum decisions are made based upon factors related to the wellbeing of students and the most appropriate circumstances for the students to learn in (Peelo, 2002; Grant, 2010).

Meetings between the different module teams also resulted in assignments that were more synchronised, appropriate and contextualised. Horizontal assessments i.e. where an assignment is assessed by more than one department - but for different purposes - were implemented. For
example, it is currently possible that an anatomy assignment can be assessed by the Anatomy department for scientific correctness, while the same assignment can be assessed by the Language Centre for academic writing correctness. The academic literacy assignment is then better contextualised within the field of health sciences and therefore, appropriate and relevant to the students. Furthermore, the students do not have to do an extra assignment for Academic Literacy, which saves them time, and they do not experience academic literacy as a waste of time.

Another intervention implemented immediately after the first year of the revised curriculum (and because of the immediate formative research that was done) was the change of summative assessments to formative assessments in two of the four modules of the first semester. Formative assessments in the modules of a generic nature currently involves assignments, presentations, smaller tasks, and class tests to name a few. This was experienced as much more appropriate by students (and university teachers) than summative assessments. Students started to enjoy these assessments, because they could reason and debate about the different topics presented in these modules.

The overlapping of content can easily occur in any curriculum. This can be a cause for frustration and uncertainty amongst students (Yorke 2002). Specific curriculum mapping meetings directly after the first year of implementation of the curriculum aligned the respective module contents in such a way that students never mentioned it again during the second and third rounds of the research process.

It is evident that the formative evaluation process resulted in the fact that Faculty was able to respond timeously to various aspects of concern of and discomfort in the students as well as the university teachers.

**CONCLUSIONS**

This work suggests that it is appropriate and effective to do curriculum evaluation immediately after a new or revised curriculum is implemented. It is furthermore appropriate and effective to do it in the consecutive years after the implementation of the curriculum for the sake of insurance and quality control. The process of programme evaluation is often regarded as intimidating, but in this research the qualitative research methods in which students and university teachers inform faculty about the curriculum, were found to be an appropriate method to obtain information. The involvement of students and university teachers in this process resulted in the perception that the research was open and inclusive. It is not always possible to fix and correct a curriculum immediately, but it is possible to correct the major problems within a short period after implementation. This prevents unnecessary negativity and resistance against change, and ensures furthermore that the curriculum is presented in a proper and effective way.

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What Does an (South) African Economics Look Like?

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Abstract

Demands for the ‘decolonisation’ of universities and curricula in South Africa raise important questions as to how economics should be taught in South African economics departments. Internationally, other student movements have called for an overhaul of economics curricula, particularly after the Financial Crisis of 2009. The objective of the paper is to examine what decolonisation might mean for the South African economics curriculum. Five dimensions of decolonisation are identified and provide the backdrop for the analysis. It is critical to understand the status quo of the discipline in South Africa in order to establish where decolonisation critiques are most pertinent and why that is the case. This requires consideration not only of the curriculum, but also academic staffing and research. The overall diagnosis is that the South African economics curriculum aspires to be a standard neoclassical one, largely based on North American content, but often falls short even in that narrower objective. One notable problem is that the expanding use of quantitative methods and content is not necessarily matched by corresponding competence among faculty or students. With that in mind, the paper then considers alternatives. I reject suggestions that the solution is to merely replace ‘orthodox’ (neoclassical) economics with ‘heterodox’ economics; instead I argue for a pluralist approach that incorporates both. As a cautionary aside, I note that various, valuable, topics which have been proposed for inclusion in a decolonised curriculum would not satisfy narrow conceptions of decolonisation. A very brief outline is provided of what an ideal curriculum might look like. Various practical obstacles to development and implementation are then considered. Given the significant disjuncture between the ideal and the possible, the priority – once there is some agreement on an ideal curriculum – is to come to a consensus on second- or third-best alternatives.

DECOLONISATION AND ECONOMICS

The ‘Rhodes Must Fall’ (RMF) and ‘Fees Must Fall’ (FMF) movements that originated in South African universities have presented a number of challenges to the higher education system. One of the explicit challenges raised as part of both movements has been ‘decolonisation of the curriculum’. My objective here is to make a first attempt at a substantive response to this challenge as regards the economics curriculum in South African universities. Although there have been some general contributions on this topic (Le Grange, 2016) and substantive contributions on other disciplines, such as philosophy (Allais, 2016; Wolff, 2016), there have not yet been any that specifically address economics.

The challenge of decolonization has merit and should be taken seriously. However, there are many important nuances to the high-level problems that the call for decolonisation identifies that need to be recognized and addressed if the process is to be a constructive one that leads to real improvements. As will become clear in the analysis that follows, the broad stance of the paper is that we should not be overly preoccupied with the specific narrative surrounding decolonizing curricula per se; rather, we ought to focus on the plethora of specific issues that the call for decolonization raises and that academic economists need to address. With that said, we should first reflect on what ‘decolonisation’ might mean in a pragmatic sense, and how this meaning, or its implications, vary across academic disciplines. (There exist substantial analyses...
of the intellectual and historical origins and dimensions of decolonization in many other disciplines, and I will not delve into those here). I briefly list some of the key pragmatic issues raised by the decolonization narrative, with some very simple illustrative examples.

First, *content* of the curriculum; for instance, does the curriculum include analysis of the negative effect of taxation on firms but not the benefits of social grants? Second, the *framing* of content; for example, how does one interpret evidence of African countries having disproportionately low per capita gross domestic product? Third, *contextualisation* of the content; how do theoretical results, or empirical findings reflect the local context and history – if at all? Do curricula dealing with unemployment reflect on the role of South Africa’s migrant labour system? Fourth, *relevance*; is the material relevant to current economic concerns and the relevant country’s history? Fifth, *accessibility*; is the way the material is taught, including who teaches it, such that it is equally accessible to students of different social and cultural backgrounds? Are all the examples from the United States and all the instructors conservative white males? These five dimensions are neither exhaustive nor mutually exclusive, but provide a useful reference point for what follows.

Where, one might ask, is the ‘colonisation’ aspect? The answer is implicit in the above: curricula that are ‘colonial’ in nature – that have been developed based on supposed superiority of one culture/society/race/group over another, imposition of foreign knowledge without regard to local contributions or circumstances, ahistorical analysis of current phenomena, are taught in a way that portrays some cultures/societies/races/groups as inherently superior to others and/or without regard for the experiences of groups that have suffered discrimination, and lack relevance to the problems and interests of local communities – will fall foul of an analysis across these dimensions. I suggest that the importance of, and answers to, these questions will vary significantly across disciplines. It is *not* coherent to act, or argue, as if the challenge relating to content applies as much to mathematics as it does to anthropology. Down that path lies various harms and absurdities. But it is also important not to casually dismiss the possibility that there may be legitimate issues in relation to the accessibility, relevance and contextualization (Brodie, 2016) of some of the material in mathematics curricula.

Economics is a particularly problematic discipline in this respect, because while many areas of the discipline deal with questions that are social in nature many economists like to see themselves as engaged in ‘science’. This is, indeed, one of the primary markers of the ‘neoclassical economics’ that began to emerge in the early 20th century – the founders of which sought to create a ‘social physics’. Despite ample evidence to the contrary, many economists – especially those who are imitative of the neoclassical mainstream – consider themselves exempt from questions of bias and positionality that afflict other social science disciplines (sociology, anthropology, etc). Some leading academic economists lay claim to scientific status, while others are disparaging of the merits of methodology and philosophy of economics, or critical study of the history of economic thought. That very denialism, amplified by South Africa’s own unique history of colonialism and apartheid, means that economics is likely to be among the worst culprits along the dimensions outlined above.

In this respect, however, the various student movements also face a challenge they are unable to surmount on their own: they may be able to correctly identify basic flaws and omissions in what they are taught, but they typically do not have the knowledge or training to dissect those and propose substantive solutions. RMF and FMF are no different to their international counterparts in this regard; student movements in countries like the United States, United Kingdom and France have railed against the dominance of conservative, neoclassical thinking but have rarely been able to propose solutions other than simplistic gesturing at ‘heterodox economics’. There is no satisfactory definition of ‘heterodox’ here and its most common usage
implies merely being in opposition to, or excluded from, the orthodox/mainstream neoclassical literature and curriculum. There are many problems with that definition, one of which is that neoclassical economics is subject to rapid change and has in some instances integrated sub-disciplines (such as ‘experimental economics’) that were once considered by some to be more aligned to heterodox thinking. Below I argue that the idea of resolving the decolonization challenge by abandoning ‘orthodox’ economics for ‘heterodox’ economics is a poorly defined proposal and a misguided one at that. Instead, I argue for ‘pluralism’ of content and approach; the curriculum should be more broadly representative of different views, within the ‘mainstream’ and outside of it.

Because of the obstacles faced by students in this regard, it has ultimately been initiatives led by either advanced graduate students, or academics themselves, that have constructed proposals that could plausibly begin to change dominant approaches. I briefly discuss some international initiatives at the end of the paper. There have been a small number of more substantive contributions by graduate students in the South African case (Bassier, 2016; Chelwa, 2016; Aboobaker, 2016), which generated some responses from young academics (Fourie, 2016; Muller, 2016a; Muller, 2016b) but notably no public responses or contributions from more senior scholars. (As an aside: it is somewhat concerning, that all the above contributors are male). It is therefore important, and appropriate, that academics reflect on, and debate, the issues and possible solutions.

THE STATUS QUO

In order to ascertain the extent to which the above criticisms are relevant to the South African case, and identify paths for improvement, it is necessary to have some appreciation of the status quo. A full and thorough analysis is well beyond the scope of the present paper, not least because it would require a critical, historical analysis of South African economics departments that does not exist at present. (Incidentally, I believe such an analysis would be invaluable for this and other reasons). Nevertheless, a good deal can be said even based only on the author’s experience. In addition, a small number of clearly structured studies (Luiz, 2003; Luiz, 2009; Yu, Kasongo, & Moses, 2017) have been conducted on the state and ‘performance’ of South African economics departments. There are various limitations to these given that they tend to focus on quantifiable measures and adopt definitions of quality that are low by international standards but also uncritically reflect the current, aspirational thinking in the local academy. Nevertheless, they provide some valuable information and I draw on them where possible.

The curriculum

It is natural to begin an analysis of the status quo by considering what is taught, though – as we will see – there is no neat separation between this and other factors. In relation to the two main pillars of the discipline, microeconomics and macroeconomics, most South African economics departments follow a standard neoclassical economics syllabus from 1st year through to Master’s level. What has historically tended to distinguish ‘stronger’ departments from others is the prevalence and sophistication of mathematical theory (Luiz, 2009). This is now beginning to change, at least in form, with more departments basing their core courses on relatively quantitative material. It remains an open question as to whether this material is substantively engaged with, given the comparatively limited training of many staff in quantitative methods and the well-known problems with mathematics in the South African education system (Wittenberg, 2017).

The third pillar of economics is now recognised to be econometrics – the methods by which the vast majority of economists (and all within the ‘mainstream’) conduct empirical analysis. Such methods can be used to cloak ideological biases, and one could argue that mainstream
economists exhibit over-reliance on these methods and overemphasise the definitiveness of the associated findings. Nevertheless, knowledge of econometrics is essential for accessing, understanding and indeed critiquing empirical work in the discipline across the ideological spectrum. Yu, Kasongo, & Moses (2017) note that by the time of their study, all departments offered econometrics at the Honours level, but its availability at undergraduate level was limited and largely restricted to the final year. The problem this points to is that most students are only being trained to access modern empirical work at the end of their undergraduate degrees, which in turn implies that the majority – who do not go onto further study – never meaningfully engage with such work.

The key problem that arises is as follows. The vast majority of students who study economics – in the sense of doing at least one course in the subject – do not proceed beyond second year. First and second year undergraduate courses consist of large classes, that are often taught by junior or contract academics using conservative, neoclassical textbooks with American authors that rely almost solely on examples from the United States. Very few departments offer courses at the undergraduate level in economic history or the history of economic thought (Yu, Kasongo, & Moses, 2017) and those that did tended to offer these courses later in the undergraduate degree (mostly in third year). It is therefore not an exaggeration to say that undergraduate students may be ‘indoctrinated’ with conservative, free-market notions of how economies and societies function, even if that indoctrination occurs as the result of a variety of different dynamics and incentives rather than explicit, deliberate intent on the part of institutions.

An often-cited example, which is certainly relevant to the South African context where a R3,500 national minimum wage has recently been agreed upon, is the teaching of the effect of a minimum wage on employment. Taught with a conservative neoclassical textbook, many students will emerge from their economics training (‘Economics 101’) believing that minimum wages cause unemployment as a matter of scientific fact. In fact, this has long been contested in the academic domain and remains a contested issue. Some textbooks now acknowledge this, while others continue to downplay the fact that at least two decades of empirical research (Card & Krueger, 2015) provides mixed evidence in relation to the above assertion. One should note, however, that while the promulgators of the original claim were Western economists (either by origin or location), many recent critics are as well. This gestures at a broader point, namely that crude notions of ‘decolonisation’ – as meaning that all knowledge generated in Western societies should be disregarded – are often unhelpful.

Development economics, labour economics and public economics are among the more common undergraduate electives; these in principle provide scope for addressing issues of context and relevance, but whether they play that role in practice would require further investigation.

Wittenberg (2017) provides a useful discussion of quantitative content and methods in economics with reference to the South African case, from which a number of points are worth noting. First, that mathematical pre-requisites for economics are relatively high, and there is a possible tension here with efforts to improve access. Second, that students devote most of their effort to trying to understand technical details and in doing so lose sight of the insights that mathematical models supposedly provide. Third, that introducing more ‘realistic’ models of economic phenomena is likely to require greater proficiency in mathematics rather than less. Each of these observations is extremely important in conceiving possible responses to the decolonisation challenge.
A recent study (McKenzie & Paffhausen, 2015) by authors at the World Bank sought to examine the content of development economics curricula in developing country economics departments. It found, somewhat ironically, that they were more heavily dominated by theory than comparable courses in the United States. The theory in question is almost entirely drawn from the neoclassical literature and cannot be in any meaningful way be said to reflect African contributions or concerns. While the ‘international’ (US-based) literature is increasingly empirical in nature, this was mostly absent from developing country curricula. The study has its shortfalls, notably in presuming that ‘better’ curricula are those that are closer to the dominant curriculum structure and content at US departments. In the vast majority of South African cases it would, however, be disingenuous to dismiss the negative findings on this basis. One cannot base curricula on imitating a foreign paradigm and then claim local exceptionalism when one falls short. As noted earlier, it is this author’s observation that very often such curricula are simply a decade or two behind the current mainstream.

**Composition of faculty**

One issue that has come-up explicitly in the broader RMF and FMF movements is the composition of faculty, mostly in relation to race but also in relation to gender. The overall picture for South African higher education (CHE, 2016) shows significant progress, especially at lower levels of seniority (lecturers and senior lecturers), but still significantly skewed demographics, especially in the professoriate. In principle it should be straightforward to access such information for each discipline via the Higher Education Management Information System (HEMIS), but I am unaware of any published reports of this kind. Luiz (2009) notes that there had been significant improvements in representation since his earlier study (Luiz, 2003), but nevertheless the dominant demographic characteristics was still white and male (Luiz, 2009, p. 593). Anecdotal observation by this author suggests that progress may have continued in this regard, but unfortunately, the study by Yu, Kasongo, & Moses (2017) does not provide more recent figures.

To the extent that the faculty composition continues to differ significantly from population demographics, this would emphasise the need for even more heightened awareness of the dimension of decolonisation that deals with ‘accessibility’. Unlike others, including within the student movement, I am disinclined to wholly conflate race or gender with recognition of the other dimensions. In other words, I suggest that we should not take it as given that a black academic will be less likely than a white academic to (problematically) frame slow economic development in Africa as a result of the continent’s ‘backward traditions’. While there may be correlations between demographic characteristics and such a ‘colonial mindset’, the latter merits an analysis of its own rather than being crudely sublimated to racial identity. Indeed, I would argue that such attitudes can often be demonstrably more strongly associated with the social background and training individual academics have received than their demographic characteristics per se. Transformation at the faculty level is a worthy objective in its own right. Nevertheless, while it may serve certain interests to do so, demographic transformation should not be assumed to address the many other issues decolonisation raises. If these issues are conflated, transformation solely concerned with demographics may in fact entrench failures on other dimensions.

No less important than demographic composition, is faculty composition by ideological views and postgraduate training. Yu, Kasongo, & Moses (2017) show that the percentage of lecturing staff members with doctorates ranges from 0% to 80% across departments, with most clustering between 40% and 70%. There is no information on where these were obtained but my impression is that the majority are from local institutions and many academics have not been exposed to foreign study.
No survey, that I am aware of, has yet been conducted on the ideological positions or political views of academic economists in South Africa. However, while there is certainly some variation, one can reasonably confidently classify the modal South African academic economist as politically and socially conservative. The modal academic also subscribes to a fairly uncritical view of the neoclassical mainstream, regardless of whether or not they have the capabilities to fully engage with it. There are a small number of heterodox and/or ‘radical’ economists, scattered across various departments and with often quite differing views on what might be the best alternative to neoclassical economics.

Research

The views, skills and beliefs of academic staff bring us to the issue of research. While there is a natural inclination to focus on curricula when issues of decolonisation are raised, that is problematic. What academics teach is partly a function of what they themselves have been taught, what they are familiar with and able to understand, and what they research or have otherwise contributed to. It is, therefore, important to understand what the state of affairs is as regards economic research.

The studies that have been done of South African academic economics focus particularly on research output. In his reviews of South African economics departments, Luiz (2003; 2009) lays bare the fact that despite improvements between the two surveys, “the gap between South African economics departments and their international counterparts remains large” (2009, p. 602). For example, at top international economics departments a rough rule-of-thumb for tenure is five publications in the highest-ranked journals. In each of Luiz’s survey periods, only a single South African economist had published an article in one of those journals. Furthermore, the second review found that between 2004 and 2007, the top economics department (the University of Cape Town) published only three papers per annum in the top 150 ISI-listed economics journals (ranked by total citations).

There are various caveats to these findings, given the much higher obstacles academics on the periphery face in relation to research time, assistance, funding and networks. Nevertheless, the extent of the gap between the standards for publication at international departments and local research output is such that even when accounting for such factors the picture remains stark. One could, furthermore, note that the top-ranked local journal in economics, the South African Journal of Economics, was ranked only 291 out of 333 economics journals on the ISI Journal Citation Reports in 2015. The distance from the proverbial frontier is due, in part, to the limited high-quality quantitative analysis that is required for publications in top economics journals. As Wittenberg (2017) notes:

> Indeed at present it is not clear that for many South African economists the level of rigour is even strictly required. Very few South African economists work at the cutting edge of either economic theory or the application of new mathematical and statistical techniques to applied problems. (p. 12)

Those academics who have the ability and inclination to engage with the mainstream literature at a competent level more often replicate empirical work done elsewhere, using already-developed theories; original criticism of, or substantively new contributions to, the neoclassical mainstream are extremely rare. The most highly ‘ranked’ academic economists in South Africa tend to be those who have a solid grasp of modern techniques, can absorb the current literature and apply both to the South African context using local data. That is unproblematic, and even highly desirable, if the relevant methods and associated inferences are correct and locally appropriate, but who is in a position to determine that?

In all respects, the implied conclusion is an uncomfortable one: South African departments aspire to the standards of the neoclassical mainstream, but there remains a large gulf between...
reality and aspiration. This has concomitant implications for what takes places in terms of teaching and learning at present, as well as what may or not be possible in future.

**WHAT IS THE ‘AFRICAN ALTERNATIVE’ TO THE (WESTERN-DOMINATED) NEOCLASSICAL MAINSTREAM?**

The brief characterisation of the status quo given above should make clear that any critique of the typical South African economics curriculum is essentially a critique of an aspirant neoclassical curriculum. A narrow neoclassical curriculum centred on developed countries would be problematic enough. But the point Wittenberg (2017) alludes to is that whatever merits neoclassical economics has, if faculty and students struggle to engage with the quantitative methods and content, then little valuable learning or insight is likely to take place. Students will regurgitate mathematical results without understanding them, and absorb ideologically-informed positions without having a substantive appreciation for their basis.

**Crude Substitution of Orthodoxy with Heterodoxy is Not the Answer**

Given this, one obvious response from proponents of decolonisation may be: get rid of the neoclassical curriculum. That demand will, in most cases, be supported be self-identified heterodox and radical economists. This would be a fatal error.

There are at least three reasons to ensure that students in developing countries are familiar with the content of the mainstream curriculum and each of these can be supported by particular examples. The first is practical: most economists and international policymakers with whom graduates subsequently engage will have been trained in neoclassical economics; the scope for constructive dialogue is limited if developing country economists cannot speak the dominant ‘language’ of the discipline. The second reason is that the mainstream literature does contain useful methods and valuable insights in various places. For instance, there is little basis for abandoning the wealth of econometric and theoretical tools developed to analyse poverty, inequality and labour markets. What one infers from such analyses, and how one locates associated empirical results within a local context, is a different matter that can be addressed without abandoning the tools themselves. Finally, one cannot get students to appreciate substantive critiques of dominant narratives without them actually understanding those narratives. Teaching students heterodox critiques of neoclassical economics, without actually teaching them neoclassical economics, requires the same passive acceptance of contested authority that exists in the status quo.

An additional point bears mentioning. Just because something is currently excluded from the curriculum does not mean that its inclusion fits narrower definitions of ‘decolonisation’. Many heterodox theories are associated with specific academics at European or North American institutions. Some adherents of a narrow definition of decolonisation, reject the work of Marx as colonialist. Relatedly, some topics – such as Islamic finance – are not associated with European colonialism, but may have historical roots in other forms of domination. Since I have already argued that we should not be overly preoccupied with the term decolonisation per se, these tensions are not problematic for what I propose. They would be, however, for those who argue the extreme position that decolonisation means relying on material that has been generated by Africans, on the continent, without material external influence.

**What does an ideal alternative look like?**

Within the limits of the space available, consider the following as an *ideal* (i.e. disregarding practicalities). The curriculum would continue to have many components of current neoclassical curricula, including quantitative material, but with examples and empirical results reflecting the local (country or regional) context. Around this would be built a much richer
body of material that can be separated into three main categories: methodology and philosophy of economics, including various internal and external critiques of the discipline; economic history (with a particular emphasis on local economic history and policies); and, alternative/heterodox theories on key questions. Courses or material on history of economic thought, and economic history, should be introduced in first year, and empirical methods should also be taught from first year.

Two of the five dimensions not directly addressed by the above are ‘framing’ and ‘accessibility’. Both are more complex than curriculum development. To give an example, there has been a marked revival in South African economic history; an important development in light of the critical role of that subject in an alternative curriculum. However, as things stand this emergence is characterised by a fairly conservative, North American framing of economic history. Some such work (Fogel & Engerman, 1974) argues that slavery was economically efficient and that slaves were not treated as badly as is often supposed. Whatever the academic merits of such assertions, they should be a shot over the bow for those who think that the introduction of certain topics necessarily implies the introduction of a broader range of (ideological or other) perspectives.

What the above should also make clear is that the ideal critical, and locally-informed, economics curriculum is substantially more, rather than less, challenging for students and lecturers. Ideally it requires similar quantitative skills to those expected in top international programmes, as well as much greater capacity to think critically, across disciplinary boundaries and using non-quantitative methods. Under this version of a ‘decolonised’ curriculum, lowering of standards – the defensive response of many opponents to decolonisation – is the least of our problems.

Faculty, Institutions and Students Are Ill-equipped to Meet the Challenge

The primary problem with demands to decolonise the economics curriculum and the kind of ideal I suggest above, is that scholars currently based on the African continent, and their institutions, are typically woefully ill-equipped to do this in various respects. Furthermore, a good number of such scholars – having been trained in neoclassical methods and absorbed very conservative positions on content and the discipline as a whole – may well be actively hostile to such ideas. As noted already, the notion that African scholars (however broadly or narrowly defined) are inherently well-equipped to construct an African curriculum that meaningfully addresses the challenges posed by decolonisation is crude and wrongheaded.

Even on topics that adherents to the narrow definition of decolonisation would cite as meriting inclusion in a ‘South African economics curriculum’, much of the substantive work is being done elsewhere. One obvious example is the empirical analysis of the effect of colonisation on institutions in African countries, work on which has won many prizes for a handful of North American scholars. Another example relates to community saving schemes (‘stokvels’), which have been studied by a number of European and North American scholars within the broader, rapidly growing, literature on microfinance and collective insurance schemes. Scholars from developing countries have made sizeable contributions to some of these fields of study, although very few are from the African continent and even fewer remain here. Questions also arise in that regard as to whether the ‘global South’ is sufficiently homogenous that content from other developing countries is deemed acceptable to those demanding decolonisation, or whether heterogeneity in that regard is also important. Unfortunately, wholly local work on such topics is almost always heavily derived from work elsewhere and/or is of lower quality.

On a more positive note, outside of neoclassical economics, there are some notable historical contributions that rarely appear in economics curricula but certainly deserve to do so. Some
Examples are: Francis Wilson on labour in the South African gold mines (Wilson, 1972), Walter Rodney on the effect of colonialism on underdevelopment of African countries (Rodney, 1972), Arthur Lewis – the only black winner to date of the Nobel Memorial Prize in Economics – on economic planning and development planning (Lewis, 1951; Lewis, 1966), and Bernard Magubane on the political economy of race and class in South Africa (Magubane, 1979). Some modern contributions are Seekings and Natrass on class, race and inequality (Seekings & Natrass, 2005), and Terblanche’s history of inequality (Terreblanche, 2002). So at least in some respects, there is material to work with.

The problems relating to scholars themselves are reflected in many of the continent’s formal economic research institutions (or that have significant economic research dimensions), such as the African Economic Research Consortium (AERC), the African Development Bank (AfDB), the African Econometric Society (AES), Economics Research Southern Africa (ERSA) and the Economic Society of South Africa (ESSA). A cursory examination of the research funded, published or otherwise produced by AERC, AfDB and ERSA reflects a primary aspiration of reproducing the neoclassical mainstream. Worse, at least for decolonisation, is that the state aspired to is arguably one that is sometimes a version that is lagged by a decade or two, and the prevailing ideological slant is more stereotypically conservative than the ‘Western mainstream’, rather than less. There are various reasons for this, but a detailed discussion is beyond the scope of the present paper.

Somewhat related issues arise concerning formal accreditation of economics courses and degrees by relevant regulatory authorities. In South Africa: what role have institutions such as the South African Qualifications Authority and Council on Higher Education played in cementing mindlessly-replicated, homogenous curricula that have limited engagement with local context? Are such institutions likely to be obstacles to, or enablers of, attempts to address such limitations? And even more challenging: are they capable of exercising the complex judgement required to distinguish between high quality, substantive decolonised curricula and those that conceal mediocrity beneath a veneer of decolonisation?

Compounding all the above problems are the stark realities of the South African education system as a whole. The basic education system does not yield a high proportion of well-educated young adults, and within that mathematics and advanced literacy are notable areas of weakness. At the same time, there is a strong push, usually with the best of intentions, for ever-greater access to higher education. The result is large undergraduate class sizes and learners that are often under-prepared (CHE, 2016) even for the current curriculum. (And incidentally that means junior or contract academics teaching those classes who have not yet had the opportunity to develop their own expertise). This means that the kind of curriculum described above may be completely unrealistic for the vast majority of South African students of economics, especially at the undergraduate level.

What is the Way Forward?

This is a rather gloomy picture, but that does not mean progress is impossible. The present paper has fleshed-out what decolonisation might mean for economics in South Africa, identified misconceptions, sketched the skeleton of an ideal alternative curriculum and then considered practical obstacles. Each of these needs to be the subject of further discussion and debate. The ideal curriculum, in particular, should be fleshed-out in much greater detail – to serve as a reference point, if nothing else. With sufficient consensus, preferably on a national level, but at least in some departments, gradual progress can then be made in selected areas.

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1 I am grateful to an anonymous reviewer for suggesting this additional dimension.
Provided one does not subscribe to the narrowest definitions of decolonisation, there are international initiatives that could be leveraged by local scholars. Among these are The CORE Project (‘Curriculum Open-access Resources in Economics’), which has produced an alternative undergraduate economics e-book integrating economic history, differing perspectives (to conservative neoclassical positions) and – to a lesser extent – history of economic thought. A related, more heterodox, initiative that has begun to establish local ‘chapters’ is Rethinking Economics. On the research side, there is the Institute for New Economic Thinking (INET), which also has within it a Young Scholars Initiative. On the continent, the Council for the Development of Social Science Research in Africa (CODESRIA) has for some time provided a forum for radical and heterodox African economists. None of these are without problems, but they at least provide something to work with beyond the norm.

Finally, it is important to pre-empt possible contention, or misunderstanding, around the extent of change required. Heleta (2016), citing Garuba (2015), argues that ‘adding new items to curricula’ is promoted “by those who want to maintain the status quo”, whereas what substantive decolonisation requires is ‘rethinking the object of study and how it is constituted’. I suggest this binary is problematic in as much as it fails to recognise the institutional and intellectual dynamics of the decolonisation process. Reconceptualising entire disciplines is no small matter, not least with the limited resources available on the continent; adding new items to curricula may be a perfectly acceptable approach at the earlier stages of a lengthier, and more ambitious, process.

The decolonisation movements, while often anarchic and without clear alternative proposals, have nevertheless drawn attention to a critical issue for post-apartheid South African higher education. There are many dimensions of this challenge that economics certainly needs to address. The extent to which academic economists will be able to do so depends, however, on broader systemic improvements, including in the calibre and knowledge of faculty. Nevertheless, there is no appealing alternative and therefore we must, in economics parlance, establish what second- and third-best decolonised worlds are feasible. The sooner the better.

REFERENCES


Development of SoTL Activities Amongst Post Phd Researchers in a Centre for Higher Education

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Abstract
This paper focuses on activities relating to the scholarship of teaching and learning currently being carried out by the Post PhD Research Group in the Centre for Higher Education Development (CHED) at the University of Cape Town. Through regular meetings and writers’ circles the Post PhD Research Group has developed into a supportive research community and we are building the capacity of members of the group to take the research mentoring forward beyond the term of the senior scholar. Most of the group of thirteen Post Phds have moved from PhDs in their disciplines, disciplines as varied as molecular biology, geography, genetics, cardiovascular research, sociology, history, media studies etc., to studies in the scholarship of teaching and learning. Huber and Morreale (2002) argue that “growth in knowledge also comes at the borders of disciplinary imagination” (p. 2) and that cross-disciplinary forums, such as our Post PhD group are beginning to allow these literatures and knowledges to be shared. They describe this as “reading - and raiding - across the fields” and they say that these interdisciplinary conversations have become “a trading zone” or “borderland”. This paper questions whether we, in South Africa and more broadly, have done sufficient sharing across the disciplines or encouraged enough of the cross-disciplinary talk and considers what the benefits are of doing so in our context. We use two case studies to illustrate the benefits of such cross-disciplinary sharing for studies in two different disciplines in the sciences. The first case study focuses on high stakes assessment in first year biology and the second focuses on the metacurriculum in the sciences. These were chosen as examples of the type of “trading” and “reading” and “raiding” across the disciplines that should be happening more at our institutions.

INTRODUCTION
This paper describes some of the work in the scholarship of teaching and learning currently being carried out by the Post PhD Research Group in the Centre for Higher Education Development (CHED) at the University of Cape Town (UCT). This group has developed out of a three-year plan of the Faculty Research Committee in CHED aimed at increasing research output and strengthening research capacity in educational development practice within the faculty. Consistent with the transformation goals of the faculty and UCT, this plan seeks, in particular, to support the research capacity of black and female researchers. I was one of two senior scholars appointed to assist the faculty in achieving their goals and my responsibilities have been to mentor academics in CHED with a PhD who are developing a post PhD research profile. A further responsibility is to contribute to other research capacity development activities offered by the Faculty Research Committee e.g. collaborative research projects and grant writing. Through regular one-on-one meetings and writers’ circles, the Post PhD Research Group has developed into a supportive research community and we are building the
capacity of members of the group to take the research mentoring forward beyond the term of the senior scholar.

Most of the group of thirteen Post PhDs have moved from PhDs in their disciplines, disciplines as varied as molecular biology, geography, genetics, cardiovascular medicine, sociology, history, media studies, language, etc., to studies in the scholarship of teaching and learning. These young scholars recognise that scholarship means more than the discovery of new knowledge in the discipline, they are interested in how knowledge is constructed, curriculated and assessed. They have become interested in their teaching as a reflective practice that is evidence based and goes beyond teaching as common sense and based on everyday experience. The research projects being investigated by this group cover a range of issues relating to the literacies required at both undergraduate and postgraduate levels, assessment, curriculum, the first year experience, the challenges of changing university contexts for professional higher education, an evaluation of the National Benchmark Tests and an analysis of policy/public statements by universities on sexual identity. These projects draw on a wide range of research theories and methodologies. Cross-disciplinary forums, such as our Post PhD writers’ circles are beginning to allow the literatures and knowledges about teaching and learning in different disciplines to be shared. This paper questions whether we, in South Africa and more broadly, have done sufficient sharing across the disciplines or encouraged enough of the cross-disciplinary talk and considers what the benefits are of doing so in our context. In the paper we use examples of two research projects, carried out by members of the post PhD group to illustrate the benefits of such cross-disciplinary sharing. These projects were conducted in two different disciplines in the sciences: Roisin’s study focuses on high stakes assessment in first year biology while Dale’s focuses on the metacurriculum in the sciences.

**Disciplinary Styles in SoTL**

As Senior Scholar leading the Post PhD research group, I agree with scholars in the Carnegie Academy for the Scholarship of Teaching and Learning (CASTL) and many others who argue that research based knowledge about teaching and learning can make an important contribution to teachers’ professional knowledge in higher education by increasing teaching scholarship across a range of academic disciplines. However, I have a growing concern that, although our courses are offered to a range of scholars from diverse disciplines, those of us who teach in Higher Education Studies courses and seminars are focusing our teaching rather exclusively on our social science education theories and the methodologies that go with them. The different disciplinary styles then become buried in layers of new educational knowledge and we tend to forget that it is important for scholars of teaching and learning in mathematics to focus on issues that are relevant to their discipline such as the nature of mathematical thinking or for those in biology to enquire into traditions of assessment which are specific to the biological sciences.

Huber and Morreale (2002;15), in their exploration of disciplinary styles in the scholarship of teaching and learning, note that while there are many issues in SoTL that cut across disciplines, “teaching and learning are, in the end not the same across the fields – nor for that matter, are inquiry and exploration into these processes”. They point out that each discipline has its own traditional pedagogies, its own research methods and its own community of scholars interested in teaching and learning, with journals and associations where this kind of exchange takes place. In order to draw their colleagues in and convince them of the importance of SoTL, scholars of teaching and learning located in the disciplines must address issues that are specific to the field in a language that is understood by their colleagues because, as Huber and Morreale (2002:2) say, “the literature of one field …may be hidden from the view of others by its language, methods and specific concerns”. At the same time, discipline based scholars of
teaching and learning often find that the discipline’s familiar modes of inquiry, conceptualisation and research procedures may not work well in classroom based research. For instance, it may not be possible “to attain the level of control, isolation of variables and manipulation of treatments that have made the experimental method so powerful a tool in psychology” (Huber and Morreale 2002:5). Similarly, chemists are used to “performing reproducible experiments on a well-defined system” and “getting results with a high level of confidence” but this is not possible in the social sciences (Coppola and Jacobs, 2002: 213-214) and so research in education is often viewed somewhat skeptically by their colleagues in the disciplines.

Huber and Morreale (2002:2) argue that while SoTL acknowledges and is strengthened by these disciplinary differences, “growth in knowledge also comes at the borders of disciplinary imagination” and that cross disciplinary forums have allowed these literatures and knowledges to be shared. They describe this as “reading - and raiding - across the fields” and they say that these interdisciplinary conversations have become “a trading zone” or “borderland”.

In my roles as mentor, researcher and supervisor in a Centre for Higher Education, I have become particularly aware of the enormous leaps scholars have to make when they travel an extended journey from fields such as the sciences to the field of education and the social sciences. And, as these scholars from different disciplines become immersed in new educational theories such as activity theory or academic literacies or critical realism, it seems very important that those of us working in and teaching educational research acknowledge the contributions that scholars from different disciplines bring to the scholarship of teaching and learning. This has become very clear to me not only in the cross-disciplinary conversation that develops in the writers circles in the post PhD research group, but also while working collaboratively on educational research projects with colleagues from a range of different disciplines.

It also seems important that these scholars working in SoTL value the skills and contributions that they bring from their disciplines and pursue their research in ways that are relevant and useful in their disciplines. Therefore, I have encouraged the Post PhD researchers to both draw and write an autobiography of their research journeys focusing particularly on how the earlier discipline based research has impacted on their current thinking. In the case of those who have moved from the sciences to education, these autobiographical sketches have provided fascinating insights which I have permission to share in this paper.

My career has taken an alternative route to that normally pursued by scientists, in that I am currently applying the skills I acquired through my scientific research to Higher Education Research. Most specifically, I feel that the careful attention to detail, my critical eye for scientific writing and a healthy respect for ethics that I developed during my time in scientific research have transferred well and enhanced my research in education. Furthermore, science education research is often carried out by social scientists, psychologists, linguists and education specialists with no background in the natural sciences. Therefore my background provides me with a very different perspective on this type of research. (Dr Roisin Kelly-Laubscher)

and

Two concepts fundamental to the lexicon and thinking of any geographer are space and scale. Typically, a geographer will ask questions such as: What is space? What does space do? How does space organize things? Why does space organize things in particular ways? Or, why does space not organize things in particular ways? What is the “grip” that space has on all of our lives? How do we/can we alter space? Similarly, a geographer will ask: Why is scale important? What is the most appropriate scale of analysis (say, of a particular phenomenon)? Why do things (e.g., urban accessibility patterns) happen at and across multiple scales?
Both of these concepts are constructs for helping us (geographers; anyone, really) organize our thinking around a common “something” geographical (e.g., climate change; the size and shape of cities; in the case of my dissertation research: how does the built environment (a space) facilitate or constrain children’s access to daily physical activity); but, they are also concepts that have much currency beyond geography. Many things or processes that on initial reading might not appear to be geographical (e.g., higher education) in fact benefit from a reading through the lenses of space and scale…Thus, the identity of a university is shaped, in no small part, because of where it is located. Similarly, the work many of us do in higher education – FYE (First Year Experience) is one particularly prudent example – happens at multiple scales and in multiple spaces. The FYE happens both at a centralized level (as a university project and ethos) and at a more devolved level within each of the faculties (more individual identities). Bringing a geographer’s perspective and understanding of scale to such an initiative really helps me see connections and alignments at and across multiple scales. (Dr Danny Fontaine)

I believe that the two SoTL case studies, which are illustrated below and describe the research projects carried out by Roisin and Dale from the Post PhD Research group, showcase the “trading zone”. This cross disciplinary work will be relevant and useful to teaching and learning in their disciplines.

**WHAT COUNTS IN HIGH STAKES BIOLOGY ASSESSMENTS?**
(Roisin Kelly-Laubscher)

In South Africa, degrees and diplomas in Science exhibit low completion rates with 23% of all students completing a BSc within the regulation time (3 years). This low completion rate in the face of the low overall participation rates (19%) is a major cause of concern. One of the factors affecting the progression of many students is the discontinuity between the high school and university curricula- a so called “articulation gap”(Council on Higher, 2013). This articulation gap is more pronounced for students from certain schools due to the legacy of apartheid. The response of the government and universities has been the implementation of foundation/extended degree programmes where students are given extra time and support at the beginning of their degree. However, in 2011 the Academy of Science in South Africa stated that foundation programs alone could not address the articulation gap and they called for a rethinking of mainstream undergraduate science curricula (ASSAf, 2011).

Assessment is an important element of any curriculum and, according to much of the literature, may be one of the most important elements of any curriculum. Assessment refers to judgments of students’ work “…which can be justified according to specific weighted set goals, yielding either comparative or numerical ratings.” (Taras, 2005, p. 146). We make such judgements for two main reasons, firstly to provide what Knight (2002, p. 276) calls “feedout …in the form of grades or classifications that can be used as performance indicators for the student…”, as well as for institutional quality assurance purposes and, secondly, to provide feedback that identifies gaps between the students’ performance and the specific weighted set goals (Taras, 2005). Assessment is suggested to “drive learning” (Biggs, 1996) and Elton & Laurillard (1979) even suggest that “the quickest way to change student learning is to change the assessment system.” The mechanism by which learning is changed has been called the “backwash effect”. This is the potential effect of testing on teaching and learning. However, whether the backwash effect is positive or negative for student learning, and thus performance, depends on the assessment practices of lecturers and universities (exam setting, marking, validation procedures, etc.)

While many disciplines have shifted their assessment focus to assessment for learning (Black, Harrison, Lee, Marshall, & Wiliam, 2004) and assessment as learning (Earl, 2007) which provide more feedback than feedout, most science courses continue to dedicate at least 50% of their assessment marks to the type of assessment that provides feedout only, namely assessment of learning or summative assessment. In these courses, the heavy weight attributed to summative assessments, at university level, means that failure to perform well on them can
have wide-ranging implications, from a fail on the student’s record, to having to repeat the course and, thus, delaying their degree by a year, to exclusion from university. Such life-changing consequences need to be based on feedback that is rooted in good academic practices. Therefore, this paper draws on a study, which sets out to address the question;

How do the assessment practices in a first year biology course affect student performance?

To answer this question I collected several forms of data including: Institutional data on students, lecturer interviews, the course exam paper, model answers and student answers. The assessment analysed in this paper forms part of a first year biology course at a research-led university where English is the main mode of instruction. Model answers are the main form of assessment criteria used in these summative biology assessments, however some assessors seem to work without any formal marking criteria. The validation practices—“mechanisms—structures, rules, policies, and procedures,” by which institutions ensure the validity of their assessments (Butler Shay, 2004)—of the department include a departmental exam paper review, review by an external examiner of the exam questions prior to the exam and review by the same external examiner of a selection of students exam answers.

In this case study I will focus on a subset of this data outlined above and will present only the exam question, model answer and some of the lecturer interview data in the form of a case study.

Exam Question

Through comparing and contrasting linear electron flow with cyclic electron flow, explain which one of these processes you would expect to find in the bundle sheath cells and why.

(10 marks)

The question is phrased as one long complex sentence instead of three individual parts. These types of questions can be particularly difficult for relatively underprepared students whose first language may not be English (Shay et al., 1994). In the original phrasing of the question, the main question, which consists of two parts, was “explain which one of these processes you would expect to find in the bundle sheath cells and why” and this was foregrounded by an instruction on how to go about doing this.

This question could easily have been rewritten as;

a) Compare and contrast Linear electron flow and cyclic electron flow.

b) Identify which one of these processes you would expect to find in the bundle sheath cells.

c) Explain your answer to part b

By breaking this question down into three parts, it can easily be seen that part (a) requires students to compare and contrast two things, part (b) requires the identification of an individual process and part (c) requires an explanation genre. The compare and contrast genre is often used in biology assessments at a university level, however the moves and language associated with this genre are not always taught and so it is possible that students who have not been taught this genre may perform poorly on this question. The particular type of explanation genre required in part c is unclear, as it does not fall into any of Veel’s (1997) explanation genre categories, however if the type of process did not have to be identified by the student, then part b could have been phrased more clearly as;

Explain why cyclic electron flow is the preferable process in the bundle sheath cells.
When the question is phrased in this way, it becomes clear from the instruction “explain why” as well as the topic, which describes an unobservable process, that the causal explanation is what is required.

In the new phrasing of the question I have omitted the word *through* which I concede omits an important part of the question. Through the addition of this word the lecturer wants students to use some of the differences in cyclic and linear electron flow to explain why cyclic electron flow is preferable in the bundle sheath cells. However, of the student answers that I analysed, the only one to get full marks had not done this.

**Model Answer**
The following is a lecturer created model answer for question 2:

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Describe linear flow and cyclic flow and their outcomes. Key points: Linear makes ATP, NADPH and O₂. No O₂ and NADPH from cyclic, just ATP. Useful for in the bundle sheath cell where you want ATP (extra energetic cost of C₄), but no O₂ (to minimize photorespiration).
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This model answer consists of an overview of what is required with a list of key points incorporated. Interestingly, the model answer suggests that for full marks the student would need to describe linear electron flow and cyclic electron flow with particular reference to their products and how the differences in these products can determine their effectiveness in the bundle sheath cells. There are several points of misalignment between the exam question and the model answer. Firstly, there is no mention of comparing or contrasting in the model answer. Instead, the model answer is looking for the description genre. This mismatch may suggest that this lecturer is not worried about genre. Secondly, the differences in linear electron flow and cyclic electron flow include both their processes and outcomes, however in the model answer the main key points included all refer to outcomes or products of these processes. It is likely that the students were expected to identify this focus because it is the outcomes or products that are related to the explanation for selecting one process or the other as the most suitable for structure A. However, the students may have been better directed to this by including the word “outcomes” or “products” in the question text. How did such a misalignment of the question and model answer go unnoticed? It may be because academics at the departmental review committee were presented with exam questions but not model answers. This approach was possibly taken because all academics involved in the exam were meant to attend this meeting. However, due to operational demands this was not always possible. In addition to this, it is unclear whether the model answers were submitted to the external examiner for review. It would be very difficult for either the academics in the department or the external examiner to identify this mismatch and the problems that it may raise for students without some indication of what was expected by the lecturer.

**Lecturer interview**
The lecturer interview sheds further light on this lecturer’s expectations. He is looking for focused answers;

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I would view looking at the question and saying, “What happens in structure A and how could that possibly relate to the differences between those two and then talk about that”, rather than saying, “Tell me everything about process 1 and everything about process 2”, which of course many students do.
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The complex nature of the question and the implicit nature of the focus on outcomes and products may be part of the reason for such broad answers. However he admits that he would provide a limited (although substantial) number of marks for students who exhibited mere recall in their answers without fully answering the question.
So, if someone had explained in great detail, process 1 and process 2, showing great understanding or I should say great recall of those processes they’d probably get a maximum of six out of ten, that sort of thing.

In this quote, the lecturer says that he would award, six out of ten marks for explaining process A and process B in great detail. This is quite disappointing since such an answer does not compare and contrast these processes as asked for in the question, it does not identify the process that is preferable in structure A and it does not use some of the differences in these two processes to explain which process is preferable. In other words, it does nothing that the question asks for. Six out of ten marks for not answering the question is a lot of marks and this is important because it could lead to a negative backwash effect. For example, if all lecturers on this course marked in this way and students were rewarded with 60% overall for this rote learning they might consider their rote learning based study methods quite appropriate for success. However, if students know that they need to be able to apply their knowledge to the question asked to obtain quality marks, then they are more likely to study in a way that facilitates such learning. It was also clear from the lecturer interview that he expected students to demonstrate certain higher order thinking skills such as explaining and comparing and deducing. The fact that these could only be achieved through the use of different genres seems to suggest that, although this lecturer does not realise it, genre is important him.

Discussion

There were several problems with the assessment practices surrounding this exam, some of which may have impacted on student performance. In several of the assessment questions instructions were not explicit enough to allow students to answer the question without making assumptions about what was required and others used complex sentences which were not sufficiently unpacked to be clear about what was required. Furthermore, in the case study, the model answer and the marking approach described by the lecturer do not reflect the superficial demands of the question, both in terms of focus and genre. Such a mismatch highlights the implicit assumptions that are made in the question. Assumptions can disadvantage anyone who does not think in exactly the same way as the examiner and complex sentences can make it difficult for students, especially those for whom English is not a first language, to unpack. It is often difficult to see the implicit assumptions in or complexity of our own writing and this may be why the lecturers did not see it. However, either the external examiner or the departmental review team should have noticed. The failure of these two checks on the process may point to problems with the internal and external validation practices of this exam.

The marking practices of the lecturer in the case study may have had a negative backwash effect. The fact that the information that does not answer the question is rewarded may mean that students decide that it is better to write down everything they know about a topic than to identify relevant information. Such a backwash effect may also reinforce unwanted study methods such as rote learning. It is unclear why lecturers do this. It may be out of concern for the efforts that students have put into learning the irrelevant information, concern that it was their own question that was badly written or concern for the pass rates for their course, which might be used for evaluation purposes.

The main limitation of this study is that it relies on a small sample of questions from one university in a very specific context. This means that it is not possible to draw any generalisations from this work. However, some of the problems with assessment practice may be evident in similar ways in other courses and the following recommendations can be made in response to these problems;

1. Complex questions should be broken up so that their requirements are clear
2. Lecturers and external examiners should be made aware of the importance of response
genres for demonstrating achievement of high level cognitive objectives
3. Model answers or marking guidelines should always accompany exam questions
presented to the external examiner for review.
4. Lecturers should be more aware of the potential backwash effects of their marking
practices

THE INTENDED METACURRICULA OF FIRST YEAR SCIENCE COURSES
(Dale Taylor)

The ‘metacurriculum’ (Perkins, 1993; Tripp, 1989) of a course can be defined as the sum of
the messages that influence students’ attitudes to the course, approaches to learning and
ultimately success in the course. The metacurriculum includes messages intended and made
explicit by lecturers, as well as the hidden curriculum (Jackson, 1968), which typically includes
unintended messages. Every course has a metacurriculum alongside the formal syllabus of the
course, whether the teacher is aware of it or not. Dekle (2004) regards the metacurriculum “as
an important driver of the culture of the university”. Ackerman and Perkins (1989:266) see the
metacurriculum as “that which transcends the explicit curriculum and leads students towards
the ability to learn, reason, solve problems and make decisions independently”.

Curriculum theorists distinguish between the intended curriculum, the implemented curriculum
and the attained curriculum, drawing attention to the reality that what is intended by a teacher
is never completely congruent with what is attained by the students (van den Akker, 2003).
The intended metacurriculum can be conveyed in a standalone study skills module or by
integrating it into course content – this approach is known as a ‘metacurriculum approach’
(Weinstein, 1996). The intended metacurriculum may include deliberate integration of
academic literacy teaching into course content. In science degrees, the metacurriculum of a
course is typically not paid attention to in the same way as the disciplinary syllabus.

Hence the purpose of the two studies described here was to make explicit the intended
metacurricula of first year courses in the Faculty of Science at UCT. The first study focused on
the Physics ‘service’ courses, i.e. the courses which serve other disciplines where students are
required to take a year of physics as part of their degree, specifically the courses for medical,
Engineering and Science students. These courses have different emphases and goals from the
‘major’ course for students planning to continue with physics. The second study covered a
range of different disciplines (biology, chemistry, earth science, mathematics and physics) in
the Science Extended Curriculum Programme (SEDP), which spreads the first year of study
over two years with extra support and input. The first study focused on one discipline with
different cohorts of students, whereas the second study gave a picture of the overall
metacurriculum intended for a particular cohort of students, although none of the students took
all of the courses. Both studies asked what, how and why questions, i.e. what is the intended
metacurriculum, how is it communicated and why do lecturers include particular items in the
metacurriculum.

These studies are the first research projects which I have embarked on since completing my
doctoral study. These studies grew out of reflection on the metacurriculum of my own courses,
and thus are located at the nexus of teaching and research. My main teaching responsibility is
lecturing physics to students on the SEDP. This means I work with colleagues in the Physics
Department as well as SEDP lecturers spread across the Faculty of Science. In each case, I
conceived, initiated and coordinated the project, drawing colleagues into a research group. I
started with my physics colleagues, persuading them to participate so we could present at the 2016 South African Institute of Physics conference. Then I invited SEDP colleagues to join me in the second project in order to present it at the Western Cape Extended Curriculum Programme Symposium. Thus both projects are part of an emerging programme of post-PhD research.

Methodology
The sample for this study comprised the main lecturers on the courses of interest, although there were also other lecturers teaching on some of the courses. These lecturers care deeply about their teaching and are recognised by students as good lecturers. The courses are successful courses insofar as they have good throughput. The sample had not previously encountered the term ‘metacurriculum’ or thought of their ad-hoc additions to their courses in terms of a curriculum which operates in parallel with the disciplinary curriculum. Moreover, although every course has an information sheet which includes the syllabus, there is no requirement at UCT to specify course outcomes or address a checklist of graduate attributes. After an introduction to the concept of metacurriculum, the lecturers mapped out their metacurricula individually. They then met to share their representations, which tended to be a list of brief statements. Further elaboration came in discussion. This sharing helped the lecturers reflect further on their own metacurricula and add to their representations. With the first study, it became apparent that it was necessary to distinguish between what a lecturer did with students and the underlying message they were trying to convey, as well as the origin of each message.

The refined representations provided the data for the study. For the physics study, the refined representations ranged from 7 – 21 items, and were 239-544 words in length. It should be noted that these representations were not representations of the complete metacurriculum of the courses or even the complete intended metacurriculum. Rather, they were what the lecturers remembered of what they had done. As such they probably are a good measure of the aspects of the intended metacurriculum that the lecturers found most important. The refined representations were then subjected to grounded analyses (Strauss & Corbin, 1990) by two of the researchers. The results of this analysis are presented in the following sections.

Results
Our first research question asked about the content of the metacurriculum. Across both studies, lecturers included measures intended to help students access the discourse of the disciplines, i.e. the disciplinary “ways of behaving, interacting, valuing, thinking, believing, speaking, and often reading and writing” (Gee, 2008). This involves making the ‘rules of the game’ explicit. Some aspects were intended to help students to make the disciplinary discourse a way of life, and take on the values of the discipline. The physics lecturers particularly embraced a constructivist approach to learning, and communicated that successful learning in physics requires students’ active participation in lectures. Study skills relevant to the discipline were often included. Many lecturers intended to motivate students, often by pointing to the relevance of the discipline to students’ lives. Some of the physics lecturers also explicitly addressed gender inequality in physics. All the physics lecturers took steps to build students’ self-image in regard to their ability in physics, and most emphasised that success in science is more about work ethic than it is about natural ability.

Across both studies, the lecturers also included metacurriculum messages that were not disciplinary specific. All the lecturers included in their recognition some sort of recognition of the ‘whole person’ of the student, encouraging students to look after themselves and have a healthy lifestyle, for example getting sufficient exercise and sleep. Most emphasised to students
the importance of their overall health and well-being, for example the need for exercise and adequate sleep. Nearly all the lecturers were explicit to students about the lecturer’s own humanity and fallibility, at the same time as encouraging student agency and peer learning. All included metacognition strategies in some way, as well as generic time-management, study and test skills.

The second research question was about the means of communicating the metacurricula. Rather than simply telling students what they wanted them to think or know, lecturers employed a variety of strategies. Across both studies, lecturers used stories, current issues, quotes, metaphors, and mottos, i.e. catchy statements that they repeat often, e.g. “There’s no such thing as a stupid question” and “You can be wrong but you can’t be apathetic”. The physics lecturers also made use of multiple-choice questions with student responses, a strategy that they also use for the physics content. The particular mix of strategies used by a lecturer emanated from their individual teaching style and personality.

The third research question looked at the origin of the messages in the metacurricula. This data has only been analysed for the physics lecturers. Some drew on their own experiences as students, particularly negative experiences. Many items in the metacurricula can be traced to a particular conversation a lecturer had one-to-one with a student, often outside of class time, which gave them insight into how students think and study. Some lecturers drew on experiences as Student Advisors whom students may consult in regard to their curriculum choices. Contributions also came from student feedback in course evaluations and student surveys, comments from colleagues, reading Physics Education research and contemporary issues.

**Discussion**

I have presented an overview of the intended metacurricula of a selection of science lecturers in their first year courses, as articulated by the lecturers who drew on their own memories and course resources at a particular point in time. Therefore this is not a description of the metacurriculum as received by students. The projects were also purely descriptive and did not seek to critique these metacurricula. Making the intended metacurricula explicit is a first step towards critiquing and improving upon them.

Here it is worth noting that when lecturers draw on their own experiences in constructing the metacurriculum, their metacurricula are most suited to students like themselves. Lecturers were themselves successful students; otherwise they would not be in the positions they are today. Thus their own experiences may not be a good reference point for understanding the needs of struggling students. Their metacurricula will also be skewed towards the experiences of students from backgrounds similar to themselves, and thus may not address the needs of students from diverse backgrounds.

Hence it important that the two projects facilitated the sharing of lecturers’ thinking and approaches in a way that had not happened before, even though the physics lecturers usually have coffee together after their lectures and discuss their teaching, and the SEDP lecturers meet from time to time. In the process of these research projects, the pedagogical content knowledge (Shulman, 1987) of more experienced lecturers was harnessed and shared. In discussing how we communicate our metacurricula, we widened our imagination of possible pedagogy. In sharing the reasons for various aspects of our metacurricula, we shared our own experiences and our knowledge of our students. Thus the projects led to a higher level of pedagogical discussion than has happened before.
Recommendations
The workshop process used in this research project has potential as a strategy for staff development. While lecturers may be resistant to being told ‘how to teach’, they are generally open to discussing their own teaching and sharing with colleagues. This could lead to the intended metacurriculum being formally planned in departments, rather than being left to chance and the whims of individual lecturers.

Students may see time spent on the metacurriculum as distracting from lecturers’ ‘real work’ of teaching the syllabus. In the same way that it has helped lecturers to frame their ad-hoc ‘addons’ to their courses as a metacurriculum, it may be helpful for students to see it in the same way, i.e. for students to be introduced to the term ‘metacurriculum’ and the purposes behind it. A lecturer could thus be explicit about when certain aspects of a lesson are the metacurriculum rather than the curriculum, and remind students that the purpose of the metacurriculum is to facilitate success in the curriculum. It is conceivable that, along with getting syllabus details at the start of a course, students could also be given an outline of the course’s intended metacurriculum. It may also be helpful to lecturers for students to reflect on the unintended aspects of the metacurriculum in course evaluations.

Further studies could investigate students’ perceptions of the metacurriculum of courses. Such an investigation would also uncover aspects of the unintended metacurriculum. Research into the metacurricula of second and third year courses could explore the trajectory of the metacurriculum over the course of three years of an undergraduate discipline, exposing repetitions, resonances and dissonances.

CONCLUSION
These reflections on assessment and curricula in the sciences which are based on evidence gathered in carefully constructed research projects are good illustrations of the “borderland” where scholars from different disciplinary cultures come to trade their wares (Huber and Morreale 2002: 3). For instance, in Roisin’s study, she draws on linguistics and genre theory, but her detailed analysis of one biology assessment question and its requirements illustrate her scientist’s eye for detail and precision. At the same time, this case study shows how her project has had to operate within the culture of the discipline in which it is applied. It becomes clear in reading the case study that in summative assessments in first year biology, no assessment criteria are spelled out, other than in the form of a model answer. This may surprise scholars from other disciplines where assessment criteria are argued over, debated and refined. However, in order for Roisin’s research to be valued by her colleagues, it is important that she speaks a language that is understood by her colleagues. From this position she can move to critique current assessment practices in the discipline.

Dale’s study, on the other hand, draws more on ethnography and theories from the social sciences, and yet she demonstrates her understanding of the culture of science and particularly physics when she explains that one of her reasons for studying the metacurriculum is that “in science degrees the metacurriculum of a course is typically not paid attention to in the same way as the disciplinary syllabus”. This might be very different in disciplines in the humanities and social sciences.

These examples of cross-disciplinary work show how knowledge grows when new theories and perspectives, borrowed from other disciplines, are brought to bear on the traditional knowledges. But, this cannot be a one way transfer from the social sciences to the sciences. The scholarship of learning and teaching in the social sciences has a lot to learn from SoTL in the sciences and engineering. I believe the challenge for those of us working in the field of SoTL is to work out how we can provide more spaces for the cross disciplinary conversations.
and for valuing the way in which disciplinary styles influence enquiry into teaching and learning.

REFERENCES


The Impact of the Student-To-Supervisor Ratio on Research Proficiency in Postgraduate Economics

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Abstract
In 2007, the Higher Education Qualification Framework (HEQF) prescribed that all Bachelor degrees and Bachelor Honours degrees at National Qualification Level (NQF) level 8 include a research component worth 30 credits. The purpose of the research component is to prepare students to conduct independent and authentic field-specific research at an Honours-level with emphasis on discipline-specific research methodologies, data analysis and rigorous interpretation of results.

Institutions have opted to present this research component in different ways depending on the discipline. In the discipline of Economics, the Honours research component is usually presented as a separate research module over one academic year and involves conducting and reporting research under supervision. The research module includes 10 two-hour research methodology lectures in the first semester so that students are provided with guidance on how to conduct independent research.

The research proficiency of an Honours student in Economics is not only dependent on their own knowledge and ability, but also on the knowledge, ability and supervision capacity of their supervisor. Since universities usually have different student intakes, they are very likely to have different student-to-supervisor ratios. The aim of this study is to contribute to the emerging research on postgraduate supervision pedagogy in South Africa. The study does this by investigating whether the students’ research proficiency in Honours-level Economics (measured by the final grade of the module) at the University of Pretoria and at the University of Johannesburg is influenced by the Honours student-to-supervisor ratio of their supervisor.

After controlling for a range of factors, preliminary empirical findings suggest that the Honours student-to-supervisor ratio has no significant impact on research proficiency of an Honours student in postgraduate Economics. These findings are a signal that there are many other factors that need to be considered when modelling the research proficiency of postgraduate students in Economics.

INTRODUCTION
The purpose of postgraduate education is manifold. Development for the labour market (employment), the production of research, contribution to discipline-specific scholarship and the personal development of an individual are but some of the major purposes of postgraduate education (Burgess, Band and Pole, 1998). The South African Department of Higher Education and Training (DHET) recognised the importance of postgraduate education and implemented additional research requirements into all Bachelor Honours Degrees as part of its recurruculation process in 2012 in order to “deepen the student’s expertise in a particular discipline, and to develop research capacity in the methodology and techniques of that discipline” (Council on Higher Education, 2013). The Honours year is a critical year in postgraduate education because it is the point where students transition from knowledge acquisition to knowledge creation (Kiley et al., 2011). In the South African context, the Honours year is typically a student’s fourth year of study.
Research student supervision is one of the most important roles in postgraduate education. It is important because supervision can be seen as a “mutual, interactive process aimed at improving the supervisor’s ability to be sensitive to the student’s competence and ability” (Severinsson, 2012, p.215). In addition, “[supervisors] socialize students into disciplinary research cultures, provide emotional support, and assist with broader career development” (Pearson and Brew, 2000). Without adequate supervision, the aims and objectives of postgraduate education cannot be met.

In this study, research proficiency is defined as meeting the research outcomes stipulated for a Bachelor Honours Degree. These outcomes were stipulated by the South African Higher Education Qualifications Sub Framework (HEQSF) as “preparing students for research-based postgraduate study” by “conducting and reporting research under supervision, worth at least 30 credits, in the form of a discrete research component that is appropriate to the discipline or field of study” (Council on Higher Education, 2013, p.30).

The Honours research component in South Africa for Bachelor degrees and Bachelor Honours degrees is unique because it is usually delivered in different ways across institutions and disciplines with the aim of achieving the same outcome which is conducting and reporting research under supervision. For example, some disciplines offer mandatory research methodology training before each student undertakes research while other disciplines offer optional training as the student undertakes their research. At many South African universities, the Honours research component in Economics is usually presented as a separate research module over one academic year and involves conducting and reporting research under supervision. The research module includes 10 two-hour research methodology lectures in the first semester so that students are provided with guidance on how to conduct independent research. These comprehensive research methodology lectures cover a wide spectrum of topics from drafting your introduction, conclusion and literature review to identifying and executing qualitative and quantitative methodologies. Upon completion of the module, registered students are required to submit a research essay for grading to prove their research proficiency at the Honours level.

Among the factors influencing the postgraduate research proficiency is the ratio of students-to-supervisors. Little is known about how exactly the student-to-supervisor ratio influences research proficiency at an Honours level in the discipline of Economics in South Africa. The purpose of this paper is to gain meaningful insight into the factors that influence research proficiency at an Honours level in the discipline of Economics in South Africa. The study uses data from 2016 and the sample contains students from two prominent residential universities in the Gauteng province – the University of Johannesburg (UJ) and the University of Pretoria (UP).

**LITERATURE REVIEW**

Scholarly literature has many themes pertaining to postgraduate supervision at an Honours level. Table 1 below presents the key articles, in the area of Honours research supervision, that are most useful to the framework of this study along with the main claim of each article. The articles below are also an indication that inquiry into research proficiency at an Honours level within the realm of Economics in the South African context is clearly lacking.
Table 1. Honours supervision literature: state of the art

<table>
<thead>
<tr>
<th>Study</th>
<th>Main claim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brydon and Flynn (2014)</td>
<td>In the field of social work, Honours students see their supervisors as “expert companions” but also feel the need to be seen as the drivers of their own work. They consider their relationship with their supervisor as an alliance.</td>
</tr>
<tr>
<td>Drew, Subramaniam and Clowes-Doolan (2002)</td>
<td>Bachelor of Business Honours students prefer supervisors to take on a mentoring role and preferred facilitative processes during their studies (as opposed to authoritative interventions).</td>
</tr>
<tr>
<td>Laming (n.d)</td>
<td>An effective 3-step recipe is formulated for Honours students across disciplines namely Getting Started with Your Thesis, Writing Up and the Writing Space.</td>
</tr>
</tbody>
</table>

Source: Authors’ own adaptation

**ANALYTICAL FRAMEWORK**

In this section, the analytical framework of the paper is presented. The study makes use of a probability model, in the form of a probability unit (probit) regression, to examine the impact of the Honours student-to-supervisor ratio on an Honours student’s research proficiency.

Let us denote an Honours student’s research proficiency as \( RP \). \( RP \) represents a student’s final Honours Research Project (HRP) mark and is used as a proxy for an Honours student’s research proficiency. The final mark is a combination a student’s semester submissions and their exam submission. The semester submissions are usually smaller parts of the project that are developed during the year and scaffolded to form the exam submission. At UJ, the exam submission, and at UP, the final research essay, is the final version of the HRP which comprises of all the revised semester submissions. At UJ, these smaller parts are semester activities namely the introduction (5%), literature review (5%), methodology (5%), results (5%), a first draft (10%) and a final draft (70%). At UP, these smaller parts are semester activities (10%), proposal and examination (15%) and the final research essay (75%).

Because we are interested in the probability of a student being research proficient, the dependent variable is binary. \( RP \) takes on the value 1 if a student is research proficient and 0 if a student is not research proficient. Thus, this paper will estimate the probability of being research proficient based on the following latent variables model.

\[
RP^*_i = \alpha + \beta SSR_i + \eta X_i + \epsilon_i \tag{1}
\]

\[
\begin{cases}
RP^*_i = 1 & \text{if } RP^*_i \geq 50 \\
RP^*_i = 0 & \text{if } RP^*_i < 0
\end{cases}
\tag{2}
\]

where \( RP^*_i \) is the binary dependent variable taking a value of 1 if the student’s final mark is 50% or more and 0 otherwise; \( SSR_i \) refers to the Honours student-to-supervisor ratio for each
Honours student and $X_i$ is a set of individual characteristics affecting the respondent’s research proficiency. $\varepsilon_i$ is the residual term that follows a standard normal distribution; and $\alpha, \beta, \eta$ are constant parameters to be estimated. A grade of 50% was used as the cut off for research proficiency because it is the grade used by most universities in South Africa to determine whether a student has passed or reached a basic level of proficiency for a particular subject. It is very unlikely that a student could obtain 50% from semester submissions alone. At UP and UJ, an examination submission is mandatory in order to pass the subject or in this case, to be considered as research proficient. In this study, a binary variable, determined by the 50% threshold, facilitates more accurate measurement of the “pass” or “fail” probability.

**DATA**
For this paper, data from two higher education institutions, UJ and UP, were used. This data was acquired from the research methodology lecturers’ faculty class records as well as each institutions planning and enrolment management divisions (the Institutional Planning and Enrolment Management (IPEM) and Data Governance & Management division at UJ and the Division for Institutional Planning (DIP) at UP). The sample contained 185 students (149 from UJ and 36 from UP) of which 148 were active (116 from UJ and 32 from UP). Students were registered for a Bachelor of Commerce Honours in Economics or Econometrics on a part time or full time basis at UJ and for a Bachelor of Commerce Honours in Economics (and Econometrics) on a full time basis at UP.

**Dependent variable: Honours Research Proficiency**
Since the aim of this paper is to examine research proficiency, particularly for Economics students at a postgraduate level, the dependent variable used here is Honours Research Proficiency which is quantified by an Honours student’s final HRP mark. The final mark variable is transformed into a binary variable taking a value of 1 if the student’s final mark is 50% or more and 0 otherwise. The final mark is a combination a student’s semester submissions and their exam submission. The semester submissions are usually smaller parts of the project that are developed during the year and scaffolded to form the exam submission.

**Independent variables**

*Student-to-supervisor ratio ($SSR_i$)*
The main independent variable of interest is the Honours student-to-supervisor ratio. This variable was calculated by taking the number of Honours students supervised by each supervisor. This number was then assigned to each student and ranged from 1 to 9. This is our main independent variable of interest because we are interested in how this variable influences the research proficiency of Honours students in Economics.

*Control variables ($X_i$)*
The control variables chosen for this study were based on data availability at the respective institutions. Variables that were most preferred were not always available.

*Age*
The age range was 22 – 45 years old. The study made use of all the students who were registered for the module at both UJ and UP irrespective of their age. The age range would differ from cohort to cohort annually. Age is an important factor to consider because research proficiency could improve with age or maturity.
Marital status

Marital status was represented as a binary variable with 0 being married and 1 unmarried. Divorced or separated was not accounted for in this marital status variable. Marital status is important to consider because unmarried people may have more time to study. However, married people may be better at balancing their work, study and personal commitments.

Racial group

Racial group was also represented as a binary variable with 0 representing European, Indian and Coloured students and 1 representing African students. Other racial groups were not present in this sample and thus, were not accounted for. The sample comprised of predominantly African students which is why the racial group variable was presented as binary. Considering the legacy of apartheid, it would be interesting to see whether there are any noticeable differences between African students and European, Indian and Coloured students.

School quintile

In the South African education system, the quintile system ranks schools from quintiles 1 to 5 – with 1 representing a group of schools catering for the poorest 20% of learners in a particular area and 5 representing the least poor (Van Wyk, 2015, p.5). The aim of this quintile system is to categorise schools for government subsidy – schools classified in a lower quintile qualify for more non-personnel, government subsidy per learner. In this study, school quintile is used in an attempt to control for socioeconomic status as income information per student was not available.

Study duration (part-time or full-time)

Students at UJ were offered the choice between part-time study (over two years) and full-time study (over one year) while UP students had the option of full-time study (one year) only. As a control variable, full-time or part-time study matters because it controls for timetable constraints and influences the kind of attention a student can give their research during the year.

RESULTS

Descriptive Statistics
The HRP module was a 28 week year module and carried a 30 credit value at both universities. Module delivery was similar at both institutions. At the beginning of the academic year, a designated lecturer provided the HRP students with a series of lectures on research methodology in Economics. The aim of these lectures was to provide the students with perspective on postgraduate writing, the HRP structure and a clear guideline on methodologies in the discipline of Economics. Parallel to these lectures, students were assigned to supervisors based on their sub-disciplines of interest. Supervisors submit topics or areas of interest and students select their topics or areas of interest. Together with their supervisor, students would then agree on an exact topic so that they could contextualize their topic with the research methodology lectures as they took place.

Because class sizes differed substantially per institution (UJ had an intake of less than 150 while UP had an intake of less than 40), the student-to-supervisor ratio also differed substantially per institution. Table 2 below illustrates this per institution. The supervisor total refers to the total number of supervisors in the department who supervised Honours students in 2016. The student intake refers to the number of students who remained registered up until the examination date. The active students refers to students who submitted their final project.
for examination. The average student-to-supervisor ratio was calculated by taking the total number of active students and dividing this by number of supervisors.

**Table 2.** UJ versus UP average student-to-supervisor ratio for the HRP

<table>
<thead>
<tr>
<th>University of Pretoria</th>
<th>University of Johannesburg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor total</td>
<td>10</td>
</tr>
<tr>
<td>Student intake</td>
<td>36</td>
</tr>
<tr>
<td>Active students</td>
<td>32</td>
</tr>
<tr>
<td>Average student-to-supervisor ratio</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Source: Authors’ own calculations

Table 3 depicts the number of students who were in similar size groups per supervisor. Only 7 supervisors had one student each. On average, most supervisors had HRP student groups of between 2 and 6 students. There were 3 supervisors who had HRP student groups that exceeded 6 students.

**Table 3.** Total student-to-supervisor ratio

<table>
<thead>
<tr>
<th>HRP supervision student range</th>
<th>Number of students</th>
<th>Supervision groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>31</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>25</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Authors’ own calculations

Tables 4 to 7 depict the individual characteristics of the sample. More than half the sample are female, single and of African ethnicity. 24% of the sample is 24 years of age with very few students exceeding the age of 35 years.

**Table 4.** Gender frequency

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>83</td>
<td>44.8</td>
</tr>
<tr>
<td>Female</td>
<td>102</td>
<td>55.2</td>
</tr>
</tbody>
</table>

Source: Authors’ own calculations

**Table 5.** Marital status

<table>
<thead>
<tr>
<th>Marital status</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>4</td>
<td>2.16</td>
</tr>
<tr>
<td>Unmarried</td>
<td>171</td>
<td>92.43</td>
</tr>
<tr>
<td>Unknown</td>
<td>10</td>
<td>5.41</td>
</tr>
</tbody>
</table>

Source: Authors’ own calculations
Table 6. Age frequency

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>2</td>
<td>1.08</td>
</tr>
<tr>
<td>23</td>
<td>35</td>
<td>18.92</td>
</tr>
<tr>
<td>24</td>
<td>45</td>
<td>24.32</td>
</tr>
<tr>
<td>25</td>
<td>31</td>
<td>16.76</td>
</tr>
<tr>
<td>26</td>
<td>23</td>
<td>12.43</td>
</tr>
<tr>
<td>27</td>
<td>11</td>
<td>5.95</td>
</tr>
<tr>
<td>29</td>
<td>7</td>
<td>3.78</td>
</tr>
<tr>
<td>30</td>
<td>7</td>
<td>3.78</td>
</tr>
<tr>
<td>31</td>
<td>11</td>
<td>5.95</td>
</tr>
<tr>
<td>32</td>
<td>5</td>
<td>2.70</td>
</tr>
<tr>
<td>33</td>
<td>2</td>
<td>0.54</td>
</tr>
<tr>
<td>35</td>
<td>1</td>
<td>0.54</td>
</tr>
<tr>
<td>37</td>
<td>1</td>
<td>0.54</td>
</tr>
<tr>
<td>39</td>
<td>1</td>
<td>0.54</td>
</tr>
<tr>
<td>41</td>
<td>1</td>
<td>0.54</td>
</tr>
<tr>
<td>45</td>
<td>1</td>
<td>0.54</td>
</tr>
</tbody>
</table>

Source: Authors’ own calculations

Table 7. Race

<table>
<thead>
<tr>
<th>Race</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>African</td>
<td>162</td>
<td>87.57</td>
</tr>
<tr>
<td>White, Coloured, Indian</td>
<td>23</td>
<td>12.43</td>
</tr>
</tbody>
</table>

Source: Authors’ own calculations

In addition to individual characteristics, an important indicator of socioeconomic background is the school quintile for each student. Table 8 below displays the school quintiles for 40.54% of the sample – quintile information was not easily available for all students at UJ and not available at all for students at UP. Nevertheless, 24.86% of students in the sample were from quintile 5 schools.

Table 8. School quintiles

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>1.62</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>5.41</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>2.70</td>
</tr>
<tr>
<td>4</td>
<td>11</td>
<td>5.95</td>
</tr>
<tr>
<td>5</td>
<td>46</td>
<td>24.86</td>
</tr>
<tr>
<td>Unknown</td>
<td>110</td>
<td>59.46</td>
</tr>
</tbody>
</table>

Source: Authors’ own calculations

Table 9 below shows that most students in the sample studied a Bachelor of Commerce Honours in Economics or Econometrics at UJ and UP on a full time basis (over one year).

Table 9. Study duration (part-time versus full-time)

<table>
<thead>
<tr>
<th>Full time</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>59</td>
<td>31.89</td>
</tr>
<tr>
<td>1</td>
<td>126</td>
<td>68.11</td>
</tr>
</tbody>
</table>

Source: Authors’ own calculations
Moreover, in this study, research proficiency was measured using the students’ final HRP mark. The average final mark for the HRP across both institutions was 49.66% and the highest mark was 88%.

**Univariate probit results**
The estimation of the baseline univariate probit model includes all the covariates used (age, marital status, gender, race, school quintile and study duration (full time or part-time)) without controlling for endogeneity. While the coefficient for the student-to-supervisor ratio is negative, which is to be expected, it is insignificant at the 10% confidence level. This means that the Honours student-to-supervisor ratio has no significant impact on research proficiency of an Honours student in postgraduate Economics. This is in line with the correlation coefficient between the student-to-supervisor ratio and the final mark of -0.2164 which suggests a weakly correlated and negative relationship.

**Discussion**
The univariate probit results are an indication that the research proficiency of an Honours student is not simply related to the number of Honours students supervised by an individual student’s supervisor. In addition, the variability of marital status and race is limited which might not confirm the hypothesis that married people have other responsibilities and less time. While the probit model controls for many important socioeconomic factors, many other factors need to be considered from a supervisor and student perspective to improve the robustness of the model in future.

In future, we will need to control for a supervisor’s overall supervision, lecturing and research workload. While the literature on the student-to-supervisor ratio is sparse, one would expect a similar rational to the small class debate i.e. smaller class sizes tend to have higher success rates. The workload of the supervisor is bound to have an impact on the research proficiency of the HRP student. The impact could be through the time allocated to the Honours students. Supervisors with a heavier workload may not necessarily be able to allocate enough time to their Honours students. In addition, the study did not control for supervision experience. This variable is important because it could determine the supervision proficiency of a supervisor while controlling for their workload i.e. an experienced supervisor may be able to handle a full supervision, lecturing and research workload. A third variable to consider from a supervision perspective is the supervision style of a supervisor. Some supervisors guide their students through each step of their research while other supervisors prefer to limit their advice to allow the student to learn independently. A fourth variable to consider is the number of senior postgraduate students that a supervisor supervises. Some supervisors may choose to allow senior postgraduate students to mentor Honours research students which could decrease a supervisor’s supervision workload, especially at the Honours level.

From a student’s perspective, there are also additional control variables that require consideration or modification in the future. For instance, access to a writing tutor was not controlled for. Students who have access to a writing tutor may become more research proficient than those who do not have access to a writing tutor. Secondly, the school quintile variable had many missing observations for the UJ cohort of the sample and was just not available for the UP cohort of the sample. This means that socioeconomic status was partially-controlled for in the entire sample which could definitely impact the reliability of the results. Thirdly, the final mark was calculated differently for UJ and UP. At UJ, the final mark is calculated by weighting the semester mark as 30% of the final mark and the examination mark as 70% of the final mark whereas at UP, the final mark is calculated by weighting the semester mark as 50% of the final mark and the examination mark as 50% of the final mark. This could
result in a slight difference in final mark calculated which could in turn influence the results. Furthermore, attendance to the methodology lectures was not controlled for which could have influenced a student’s access to information and subsequently, their research proficiency. In addition, the intensity of a student’s timetable was not considered. A busier timetable could mean less time for research especially if the other modules have regular formative and summative assessments. In addition, the binary dependent variable could also be analysed in its continuous form to better understand the impact of the student-to-supervisor ratio on a student’s overall grade as opposed to whether they simply “pass” or “fail”. Lastly, most students at UP who submitted, passed their final submission which is different to UJ where not everyone who submitted passed. The reasons behind this should be controlled for in the future.

A more serious empirical issue that needs to be addressed relates to the problem of endogeneity in the probit regression. With reference to the analytical framework section, the parameter of interest in (1) is \( \beta \). As shown in Wooldridge (2002, p.477), a standard probit estimation of (1) will produce consistent estimates of \( \beta \) only when the variable \( SSR \) is exogenous. When \( SSR \) is endogenous, a simple probit regression (1) will deliver invalid estimates of \( \beta \). The student-to-staff ratio variable may be endogenous in situations where \( SSR \) is correlated to the error term in (1) or when there is reversal causality between research proficiency and the student-to-staff ratio. Going forward, the next step is to test for endogeneity and control for it if it is present.

**CONCLUSION**

The aim of this study was to investigate the impact of the Honours student-to-supervisor ratio on an Honours student’s research proficiency. The study was undertaken using 2016 data from the University of Johannesburg and the University of Pretoria. To the best of the authors’ knowledge, this is the first study in South Africa that uses a probability unit (probit) model to investigate the impact of the Honours student-to-supervisor ratio on an Honours student’s research proficiency.

After controlling for a range of factors, preliminary empirical findings suggest that the Honours student-to-supervisor ratio has no significant impact on research proficiency of an Honours student in postgraduate Economics. These findings are a signal that there are many other factors, related to both the supervisor and the student, that need to be considered when modelling the research proficiency of postgraduate students in Economics.

The study also highlights a range of factors that need to be considered going forward, both from a supervisor and student perspective in order for accurate policy recommendations to be made. University data repositories and enrolment management systems need to include more holistic student information to make data analysis and analysis of context-specific problems, such as this one, easier without the hassle of distributing multiple surveys to university students. Furthermore, to measure the impact of curriculum amendments, universities need to invest in rigorous cohort studies which requires more detailed and continuous collection of data every year.

Because this is the first academic paper of its kind in South Africa, areas related to HRP supervision require further investigation. For example, it would be interesting to see how a supervisor’s workload and supervision experience influences research proficiency for Honours students in Economics. It would also be interesting to measure the efficiency of the research module it its current form.

In addition, this paper opens the door for more investigations from an econometric analysis perspective. A probit that includes more appropriate control variables and controls for
endogeneity will provide more robust and meaningful results. Also, future investigations can include more institutions and potentially after a few years, more of a time-series analysis.

The findings from this paper could help programme managers in the discipline of Economics to understand the kinds of curriculum amendments needed to assist Honours students from a timetable perspective and from a research methods perspective. Furthermore, the results could also help school or department heads to offer additional support to supervisors involved in Honours-level supervision.

REFERENCES
Co-Designing the Driver’s Seat: A Call for an ‘Open’ Approach to Drawing Production in Spatial Design Practice

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Abstract

The question of what the architect is actually doing … raises questions about authorship. Is the architect a creative author with the will to produce a specific work, or do the conditions imposed on him inevitably result in something interchangeable, something that could as easily have been produced by someone else? (Reidijk, 2010, p20)

This inherent contravention of authorship, summarised in the prologue of Reidijk’s collection of writings in Architecture as Craft, brings to light a crucial aspect of the built environment’s process of production; rarely is a building or a space solely brought together through an individual’s vision and efforts. As a rule, the built spaces occupied by society are the result of multiple forms of agency and ownership working together at different levels.

While this co-productive nature of built space is well established through Open Building discourse, the nature of the design communication artefacts to which are trusted to carry the idea to be understood through remain largely ‘closed’ within the disciplinary boundaries of the designer and select group of building professionals. Nowhere is this closure more evidently seen than in technical output produced and commoditised by large scale design practices, such as urban and city design in South Africa.

The author firmly stands by the belief that in order to allow for the true co-production of the South Africa built environment to take place equitably and efficiently, spatial design practitioners need to develop more ‘open’ approaches to the practice in the built environment – in particular to allow the design communication artefacts of their discipline to be co-owned and co-produced in the face of a rapidly urbanising world.

In 2015 the author of this paper assisted in the running of UJ_UNIT2; a design-led architectural research unit housed in the master’s programme at the University Of Johannesburg (UJ). The research unit embarked on an exploration of new forms of design and building exposing the nature of agency through the levels that make up the South African built environment. This experience, combined with the author’s personal work in providing socio-technical support to the grass-roots international organisation Slum/Shack Dwellers International, provide the experiential reference to support the above stated belief.

This paper will examine two projects conducted through the author’s own teaching and design practice that attempted to change the manner in which designer’s see and control design communication artefacts. A summary of these experiences will then be outlined through a call for design practitioners to develop their own means of sharing control not only in the spatial drawing artefact, but in the design itself. This is done with the hope of supporting a growing national movement that seeks to responsibly relinquish power through design in the aim of achieving social and spatial justice in South Africa.

A CALL FOR CO-PRODUCTIVE PRAXIS

According to macro-economists Thomas Malone, the world is experiencing a global market economy shift towards a networked economic system (Malone, 2014, [O]); a point in history
that the author believes global professionals should proactively be taking on the challenge of co-production in as a means of practice. Recognising the need for co-production in city building practice is crucial as the current patterns of space-making are increasingly taking place outside the professional realm – an inevitability the author believes spatial design practitioners need not fight, but embrace.

This sentiment, supported by Nabeel Hamdi, suggests that spatial design practitioners should engage with the “creative and adaptive mess of informality” rather work within the existing systems in order to support resilient and sustainable change. (Hamdi, 2010, p.78) Co-production in its true form goes beyond simplistic ideas of participation or capacitation and recognises the complex values held by stakeholders in not just producing spatial change, but taking ownership and transforming the built environment from within. Described by Boyle and Harris as “delivering public services in an equal and reciprocal relationship between professionals, people using services, their families and their neighbours. Where activities are co-produced in this way, both services and neighbourhoods become far more effective agents of change.”

Although the focus of this paper is on the formative qualitative research process, it is still This call for co-production in spatial design practice has a critical position in South Africa in light of the most recent student protest where the call for power distribution requested by the student protest leaders echoes an ongoing call from a majority of South African’s who do not feel the injustices of the past have been equitably addressed in the post-1994 society. The challenge of power-distribution remains the critical aspect of South Africa in the fledgling post-apartheid democracy.

THE POWER OF THE DESIGN COMMUNICATION ARTEFACT
Globally only 10% of structures are built by professionals (Smith, 2011, p.24). Within the South African context this figure sits even lower where a large majority of structures produced have no professional involvement, let alone control from any local authorities.

Professionals work largely through established technical drawing practices governed by construction industry standards such as the American Institute for Architecture (AIA) and the International Standardisation Organisation (ISO). These bodies set governed standards and protocols and are regulated by the industry related entities of the built environment professional spectrum. When forced to engage with the various publics they intend to ultimately serve, the need to communicate effectively is not considered as it is proposed that a ‘professional’ must interpret these standards and thus protect the profession.

Architecture’s engagement with visual documentation has always been in close proximity with the developments in technology and arts, and in turn it has been problematic but productive as well. Problematic in terms of appropriating different means of expression and yet to stay with a notational structure that can be communicated among the professionals of the discipline and the practice. (Reidijk [Alkan], 2010, p129)

The regulatory bodies who govern this control as well as the built environment’s professional disciplines have done very little to transform their constituency towards this reality and even less effort has been made to adjust the nature of professional design practice to find ways to support the emerging South African society. (O’Toole, 2014, [O]) Rather these entities have focussed their efforts on policing the boundaries of the discipline in relation to the other professions, securing their stake in the capital available to ‘build’. In particular, this is seen when the formal systems of building are outpaced by ‘informal’ forms of delivery. The reaction forces the regulatory bodies hold tighter to their position through the control of these drawing
artefacts and ultimately distance themselves from being accessible to the majority who use and produce public space.

This protection of these boundaries manifests acutely around the control in authorship of their discipline specific design communication artefacts that have become legal documents in the building industry and the allocation of responsibility through this means. These legal documents have become the measure of the one’s professional discourse in relation to other professionals and within tertiary education institutes still stand as the core means of evaluation. Awan et al make strong mention of this in the seminal text, *Spatial Agency: Other Ways of Doing Architecture*:

> The specialist knowledge of the architectural discipline is guarded as if it preserve a form of objectivity, on which professional credibility might be founded. Architectural language is the gatekeeper to that knowledge is extremely codified, from the technical vocabulary of the profession, through to the jargon of academia and trade magazines. (Awan et al, 2011, p.60)

With such a weight attached to these elements of the discipline these design communication artefacts, their articulation and the importance of their means of their production and dissemination remain largely undefined. This is particularly true for schools of architecture, where the academic institutions are constantly undergoing a critical self-reflection (Awan et al, 2011, p. 63) of what constitutes architecture and how this is represented this fluid understanding through student work.

The ambiguity around the objectively measurable values of the design communication artefacts is not necessarily negative, as it allows for the space to include the teaching of crucial ‘soft skills’ and methods of co-production within the academy. This perpetual self-criticality allowed for in architectural practice and training places spatial design practitioners in an optimal position to constantly adapt their methods of practice. A flexibility that according to Harold Jarche is essential for the journey towards embracing the network economy, “…we have to be prepared for perpetual Beta. What worked yesterday may not work today. No one has the definitive answer any more but we can use the intelligence of our networks to make sense together….” (Jarche, 2016, [O])

**THE LIMITS OF PRODUCT VERSUS PROCESS IN ARCHITECTURAL PRACTICE AND TEACHING**

“The teacher delivers architectural knowledge that remains in a safe and defined realm, so the students, kept within the boundaries, emerge…as absolute and non-negotiable experts in a certain formation of architecture” (Awan et al, 2011, p. 60)

In South African architectural design education lectures arrange hypothetical scenarios for student’s to test and develop their skills and experiences through a synthesised series of observations, thoughts and ideas which are evaluated through a series of drawings, models and artefacts which should reflect a student’s level of work ethic, design skill and insight into the topics outlined by the course conveners within a larger curriculum as outlined by the institution.

The system is meant to prepare students for the working world where they will often be given a very simple brief instruction and will have to employ their own position and perspective to determine a means of action towards a built output. Both of these processes focus on a series of outputs at determined points which are either evaluated or remunerated for by the client or the lecturer.

While this system is very effective in preparing and managing the remuneration for design professionals it places the value of the process solely on the artefacts produced and through
evaluation or payment put places ownership of this artefact on those who wield educational or capital power while not recognising or allowing the importance of process to be embodied in this artefact. This process in its structure only allows for one author to control and receive validation for this process and makes shared ownership and shared user ship limited due to the nature of the output focus. It places the designer as a key person in this process, without allowing said designer to recognise this position of power or distribute it. In doing so it re-enforces its power by only speaking other professional or an ‘educated’ viewer.

Within regards to large scale spatial design projects, particularly at the urban design scale the lead time towards implementation takes place over a much longer time period that often seeing different forms of ownership and governance involved. (Awan et al, 2011, p. 62) These larger scale projects also include a much larger user group of more often than not contrasting social, cultural and educational backgrounds. The spatial and technical design communication artefacts employed in these projects rarely consider the importance of being understood and re-in force power structures largely through their production and consultation.

Even participation processes (often offered at face value) mandated by governance structures only require the presentation of these artefacts at a form of public meeting, and not really an integration of what these spaces and the implications of them to communicated effectively.

![Figure 1](image.png)

Figure 1. 1:1 students attempting public ‘consultation’. Copyright 2010 by Jhono Bennett. Reprinted with permission.

How does the architect act in his studio? How are designs produced, and what instruments are used for this? What are the respective roles of the model and the drawing? Now that the computer enables the architect to manage all the design data within a single integrated drawing system, do models and drawings still serve any purpose? (Reidijk, 2010, p19)

**OPENING UP THE ARTEFACT**

The premise of Open Building recognises this dynamism of the built environment and places the designer in a position of facilitating many options for users over a long period of time through various levels of control in an intervention. (Habraken, 2008, p. 78) This approach offers a manner in which to understand and engage with the built environment. While this understanding of the built environment allows for practitioners to engage more effectively with it, the approach still employs traditional means of design communication that keeps much of the control of the ‘open’ system in the hands of the professional.
Figure 2. 1:1 students exploring alternative artefacts for design communication. Copyright 2012 by Jhono Bennett. Reprinted with permission.

Somehow South African designers need to find a way to allow the energy and recognition for the co-production of these artefacts to be built into the nature of their valuation and their communication. The training of those who produce this work has to find a way to encompass this into the methodological means of communication and production. Potentially new forms of artefacts need to be considered to allow this to take place, perhaps in new digital media, BIM and open source platforms of information sharing.

Perhaps through considering how these artefacts can be shared, considered as the design process as well as be communicated. Designers can consider how this can start allow multiple people to own such information and thus distribute the power associated to such artefacts in the built environment and public spaces.

UJ_UNIT 2: AN INVESTIGATION INTO DESIGN LED PRAXIS

“Unit 2 is based on the understanding that the Built Environment comes into existence and transforms as a social/physical ecosystem in which neighbourhoods and buildings are never finished, but rather transform part by part.” (www.uj-unit2.co.za, 2016, [O])

UJ_Unit 2 was part of the first iteration of the University of Johannesburg’s new Graduate Programme in Architecture (GPA) within Institute’s Faculty of Art, Design and Architecture (FADA). The unit was set up under a design-led research structure, which allowed the unit leader’s to determine a two year-long programme of design projects and selective academic and experiential inputs that would curate a very specialist approach to the themes and topics of the unit within the GPA. Unit 2 was one of three units in the first iteration of the school’s development of the Unit System Africa, which through the GPA seeks to develop unit style design-research led teaching in Africa.

The premise of UJ Unit 2 recognises the fluid nature of South Africa’s shared built space, and embraces this notion through the principles of Open Building as outlined by Dr. Amira Osman Open Building’ as a concept resonates strongly with present-day South African concerns in the post-Apartheid era. The principles contained in Open Building thinking can be linked to some of the principles contained in the National Development Plan, Vision 2030, the newly launched (and perhaps wrongly termed) Master Spatial Plan, as well as a number of city level visions, such as the “corridors of freedom” in Johannesburg. Issues of participation, social integration, mixed use, mixed income, accessibility, choice and affordability are all principles that can be better facilitated and achieved through the use of an “open” approach to design and delivery in the built environment (Toffa & Osman; 2015)
The unit set out to embrace the complexity of spatial agency in urban Johannesburg and explore the nature of what is deemed ‘architecture’ to be in relation to the city, its people and its infrastructure. The unit leadership encouraged the students to develop their own unique ways of designing through critically including finance, implementation, management and maintenance through design thinking. Essentially UJ_Unit 2 regarded the social capital in the built environment as fundamental, and sought to capitalise on the systemic relationship society holds with the built environment. As Toffa, a Unit 2 co-leader, stated, “The unit allowed the built environment to functions as a ‘mediator’ and ‘interface’ between individual and collective needs.” (Toffa & Osman, 2015)

The proposed curriculum sought to immerse the students into complex urban conditions through the multiple lenses of agency in architectural design and equip them with tools and lessons in order to determine a systemic, open and architectural set of responses to the conditions they observed. The projects set out by the unit leadership exposed both the student’s and the staff to the shortcomings of architectural discourse and representation is currently accepted it in South Africa.

The simultaneous challenge of introducing a new school of thought and practice to students and staff, building a new staff student body and the inherent difficulty in masters level architectural education proved to more daunting than the unit leadership expected. Of the projects conducted through the year the most insightful in within regard to the unit’s aims proved to be a multi-disciplinary project conducted between the Industrial Design, Multi-Media and Graphic Design departments of FADA.

This project put the UJ_Unit 2 students into mixed groups with undergraduate students of the other disciplines and split them across two sites of social development being conducted by the
University of Johannesburg’s community development department. The students were tasked with identifying a particular social issue and using their various design skills proposes a strategy to address it.

Staff provided some key inputs, and guided groups through the 6 week project with very mixed results. As a whole the students could only engage in a limited fashion to the depth of issues faced by the stakeholders, and moved quickly to their disciplinary tools to ‘fix’ the issues seen without engaging systematically with the problems. Although what the architecture students brought to the groups, due to their postgraduate status and training, was a more holistic view on how to combine different skills and perspective, the multi-media students were more equipped to translate complex ideas into simpler ones and communicate this to the stakeholder groups.

![Figure 5. Joint FADA Community project. Copyright 2015 by Jhono Bennett. Reprinted with permission.](image)

This exercise revealed how the students, when working with other design disciplines, held a deep spatial understanding the non-professional disciplines were freer to communicate effectively to the beneficiaries of the project. The architectural communication tools were not sufficient to capture the complexity of urban Johannesburg, and re-enforced the disjuncture between professional and ‘non-professional’ in grass roots projects conducted during the year.

The unit leaders recognised that in order to engage with the complexity of understanding and proposing spatial interventions in fluid urban environments, a design communication language needs to be first developed that allows students to clearly articulate the nature of the complexity they are engaged with as well as the strategy they propose. Simultaneously, these artefacts need to recognise agency, and communicate this effectively to the very stakeholder it represents as well as a peer group.

Only once this was done effectively could students then articulate an effective design response to this system, and again the nature of this representation should engage with the manner in which the observations were documented and articed. But when the measure lies in the softer social and systemic elements that do not translate easily nor is there any form of spatial standard as to how to depict that in the current form of training. This proved to be a very difficult task for the students to grasp as well as the staff to facilitate.

Attempts were made to include other staff from parallel disciplines as well as in put of key readings and precedents from similar schools or spatial practitioners, but students seemed to begin developing their own unique version for this near the end of the year with surprising results. One of which emerged strongly was the idea using narrative became a strong tool to tie together the systemic complexity faced by the students.
The author began working with the South African Shack Dweller’s International Alliance (SASDI) in 2012 as technical support to the organisation’s Community Based Organisation’s (CBO); the Informal Settlement Network (ISN) and the Federation of the Urban Poor (FEDUP). The SASDI is the local alliance affiliated to Shack/Slum Dweller’s international (SDI) who are a global alliance of grassroots organisations who share rituals and values around community mobilisation to lobby for the right’s and needs of the what they term the global poor. (www.sdinet.org, 2016, [O])

The author’s role at the SASDI’s office was to support the various CBO’s technically in their regional efforts to attain development in the form of access to city services and ultimately
housing through the national entities of South Africa. This job had the author working with a local informal settlement residential groups and understands the specific technical needs that each group required; often identified tactically by residents and the CBO to garner a stronger position in advocating for development from larger government bodies.

While the author was originally tasked to assist residents in designing their homes and possibly some shared facilities, the job quickly led to project management and information co-ordination than anything else. Basic data sets were not available, or lost, that would allow for more tactical development choices at a larger scale. This lack of information often led to the duplication of research or analysis work or weakened the perceived position of the residents in their negations with government. More so the mis-coordination of information wasted resources that could have been used to address more pressing needs at both the local and large scale of the CBO’s.

The experience exposed the need for technical support included a deeper understanding of social and systemic aspects and these the collective termed a socio-technical design began to emerge. Once a larger project structure was established for the organisation, the collective began collecting and arranging the information available for each project into four broad categories. This was done to create an information set that was robust and easy to categorise for non-professionals and allowed for an easy communication to local government entities who were often the gate keepers for access to higher level support from the government.

The approach to arranging information stemmed from a technique developed by the author as a student after forming the student entity of 1:1 with his peers - this entity was later formed.
into a fully-fledged non-profit entity; 1to1 – Agency of Engagement, currently run by the author. The system was termed *The Blue File*, and its purpose was to create an information system that quickly, clearly and powerfully explained what each settlement required in the short, medium and long term while allowing residents to add and edit information as it grew.

This device had both a physical life as well as a digital presence and proved to be one of the more powerful devices in assisting the alliance in its aims. This was a crude tool, and after the national alliance began its own programme of data collection they have now refined it into a much more advanced system used today.

The system ideally should have allowed users to add, remove and edit as they saw fit and strengthen their position. The collective still use this system for their various practices, and have evolved it into what they now term the ‘cheat sheet’: a method of drawing production and packaging that allows a presentation to also be a tool for co-production and critical feedback.

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**Figure 10.** Cheat sheet example. Copyright 2015 by Jhono Bennett and Counterspace. Reprinted with permission.

### AN ‘OPEN’ APPROACH FOR DESIGN COMMUNICATION ARTEFACTS

Teaching at the University of Johannesburg has allowed for the author and colleagues to proposition this approach and co-develop ideas and positions on how to approach this challenge. While the work conducted in the development sector has shown a dire need for such design communication artefacts to support a rapidly urbanising and re-developing South Africa. Of the options available to us today, none are more powerful than human behavioural systems that are far more resilient and robust than any of the technical systems:

Currently, we make cities into closed systems. To make them better, we should make them into open systems. We need to applying ideas about open systems currently animating the sciences to animate our understanding of the city. More, in an open city, whatever virtues of efficiency, safety, or sociability people achieve, they achieve by virtue of their own agency. (Sennett, R, 2013, [O])

As an architect, the author recognises that architecture as a discipline is limited in its own agency to effect large scale spatial change, but it remains one of the few disciplines that cross such a variety of levels of agency and complexity in its practice and training that it reliably produces highly skilled spatial design practitioners able to embrace the challenge of facilitating co-production of the built environment. (Awan et al, 2011, p.70).

This does not mean that architects will lead this challenge, but as a profession are placed in an optimum position to affect meaningful change in the challenging of developing co-productive spatial design practice. Of these challenges, a critical aspect still lies developing an appropriate
means or manner of design communication that will bridge the gaps between ‘beneficiary’, designer and ‘decision maker’.

Figure 11. Alternative forms of design communication exercised by Author. Copyright 2013 by 1:1 – Agency of Engagement (left) and Jhono Bennett (right). Reprinted with permission.

The practice should speak at multiple levels in both its process and product to convey basic technical and spatial information while being able to be understood by non-spatial disciplines. This approach should actively seek to distribute the power held by capital and design in attempting to control all aspects of the production of the built environment. It may require designers need to abandon drawing as the sole legal means of design communication and engage developing digital interfaces that allow for multiple authors and owners. Conversely this abandonment of could lead us to low tech strategies that employ model and diorama as the means of spatial communication.

It is important is that these artefacts of communication need to tactically share and distribute the power held by the designer to those that will benefit. While this may not be a singular device, this should be underpinned by an ethical and systemic approach to social development that recognises the danger in an individual holding too much power and actively seeks to distribute this power.

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