

Seeking Barriers to the Development of Knowledge Transgressivity Potential (KTP): Lessons from a Postgraduate Student Survey at The University of Johannesburg

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ABSTRACT Institutional mergers coupled with the distinction between teaching-focused 'comprehensives' and traditional, research-intensive universities are evidence of differentiation in action within South African higher education. Comprehensive institutions such as the University of Johannesburg (UJ) are relatively underresearched. A UJ-based survey of postgraduate students (n=300) suggests the possibility of knowledge transgressivity within and outside of UJ. However, the development of a transdisciplinary platform [to facilitate the evolution of knowledge transgressivity potential (KTP)] between natural and social science-focused postgraduates, is likely limited by perceptual class and race barriers, with the former proving most influential. Moreover, inter institutional KTP between UJ, as a comprehensive, and WITS, as a traditional university, is present, but limited by material class barriers, such as fees differentials. Nevertheless, findings suggest that KTP could be developed at the junior postgraduate level if class perceptions and structural legacies are to be overcome. Comprehensives like UJ are capable of more than solely fulfilling an undergraduate teaching function as such, they should enjoy more research attention. While all South African universities contribute to transformation and competitiveness in distinct ways, the rigid demarcation, and potentially inadvertent 'privileging' of some South African universities, should be avoided. This is critical as such demarcation cannot lead to long-term institutional integration and increased potential for true knowledge transgressivity.

INTRODUCTION

Comprehensive institutions, such as the University of Johannesburg (UJ), play a significant role in knowledge generation, despite being cast largely as teaching-intensive conveyor-belts of undergraduates. There is no doubt that comprehensive institutions can, arguably, play a vital role in increasing student participation rates (Dugmore 2013). This is a critical goal of the National Development Plan (NDP) (NDP 2011). The question is, however, whether this is the only contribution that UJ can, and does make? Can UJ not impact the NDP goals of efficiency and competitiveness by producing postgraduate students, and associated research output? More than this, is there any possibility of transdisciplinary knowledge flows within UJ? Is transinstitutional knowledge sharing a likelihood? These sorts of questions are grappled with in this paper.

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To begin with, it is important to unpack core terms such as transdisciplinary knowledge and knowledge transgressivity in order to come to grips with knowledge transgressivity potential (KTP). This will be followed with a discussion of the South African higher education landscape, and the location of UJ within it. There are several important contextual issues that impact knowledge production and the potential for knowledge flows across disciplines and universities in South Africa. Apartheid legacies and the transformation of South African university structures will be highlighted alongside their consequences (Bunting 2006; van Vught 2007). Barriers to potential transdisciplinary and transinstitutional KTP are among the most important of the said consequences. This examination of barriers is done in order to heed calls to critically engage with transformation and institutional differentiation processes within South African higher education (Winberg 2006; Singh 2008).

What is Meant by Transdisciplinarity and Transgressive Knowledge?

The flow of knowledge cannot be grasped without an understanding of how the said knowledge is produced. In a very traditional sense,

sometimes called Mode-1 knowledge production, knowledge is created and used within the boundaries of a single discipline or profession. However, this implies that knowledge can be contained within disciplinary and institutional boundaries. Universities were traditionally deemed inflexible spaces, devoted to Mode-1 knowledge production, and the concomitant disciplinary knowledge rigidity (Nowotny 2003; Nowotny et al. 2003). However, the increased commodification of academic knowledge outputs has resulted in dramatic shifts within the academe (Kraak 2000). Increasingly, there are project teams drawn from multiple disciplines, and increased interactions between universities, corporates and communities attest to socially-driven knowledge acquisition (Nowotny 2003; Nowotny et al. 2003).

Knowledge itself cannot be static, or contained within disciplinary boundaries. Similarly, the way in which knowledge is produced has also changed from Mode-1 to Mode-2 knowledge production. Kraak (2000: 2) argues that Mode-2 knowledge production is, 'intrinsically transdisciplinary, transinstitutional and heterogeneous'. There is an abundance of research to suggest that Mode-2 production occurs within businesses and corporations and may be identified within corporate knowledge innovation processes (Gibbons et al. 1994; Kraak 2000). However, knowledge that transgresses the boundaries of the university is largely investigated by means of academic-industry partnerships, in South Africa and abroad (Rotheaume and Thursby 2005; van Zyl et al. 2007; Cooper 2011; Kay et al. 2014). This work has been augmented by scholarship regarding the triple helix, or knowledge that moves between the university, industry and governments in Africa (Cooper 2011; Mégnigbêto 2014). As such, relatively little attention is paid to an examination of contemporary knowledge flows between universities, in general. Moreover, the *transinstitutional* movement of knowledge to and from comprehensive universities in South Africa is yet to be thoroughly investigated.

Mode-2 knowledge production and *transfer across disciplines*, within the comprehensive university context, have also not been examined. It is important to note that transdisciplinarity involves more than multi- or interdisciplinary cooperation. Transdisciplinarity refers to a 'platform' or disciplinary-interactive space that is cre-

ated to facilitate the merging and blending of knowledge (Nowotny 2003: 2). Once a transdisciplinary space has been constructed, then knowledge may flow across, or transgress, disciplinary boundaries. In other words, the creation of transdisciplinary spaces or structures results in directed, and purposive knowledge transgressivity within higher education.

While studies abound regarding higher education in South Africa, issues pertaining to access mechanisms (Frick et al. 2007); lifelong learning (Aitchison 2004); university-state-economy-community partnerships (Kruss 2008, 2012; Cooper 2011; McLean and Walker 2012) and the normative role function of universities (Collins et al. 2009; McLean and Walker 2012; Walker 2012) have gained prominence. From this, it is clear that a knowledge lacuna exists regarding the actual functioning of comprehensive South African tertiary institutions, in general terms.

If the comprehensive university is relatively underresearched then, so too, is the postgraduate student community. This is most especially true in the field of educational policy studies (Deacon et al. 2010). Moreover, the actors most often associated with having KTP are full-time scholars and academics (Henkel 2005). This implies a critical oversight. Postgraduates, while students, occupy spaces that allow for the generation of fresh knowledge flow channels.

This discussion underscores the need to unpack the role of the newly created 'comprehensive university' as linked to knowledge transgressivity and the construction of transdisciplinary and transinstitutional platforms to facilitate this. It is beyond the scope of this paper to accomplish an analysis of knowledge flows between postgraduates embedded within disciplines and universities across South Africa. The more modest, but significant, goal of this article, is to consider the potential for the development of transdisciplinary spaces (TDP) within and between comprehensive universities such as UJ. Knowledge cannot transgress boundaries, be they disciplinary or institutional, without a Mode-2 inspired environment. As such, context bound impediments to KTP and TDP are considered in the following section.

Researching Higher Education Mergers in South Africa and Locating UJ within this Milieu

In March 2001, the South African Minister of Education, Kader Asmal, released a National

Plan for Higher Education according to which the number of public higher education institutions would be trimmed from 36 to 23 through the mechanism of mergers (Arnolds et al. 2013). Of these 23 institutions, eleven institutions would be 'traditional' or research-intensive universities, six would be universities of technology (formerly technikons) and there would also be six 'comprehensive' universities (which offer both university and technikon type programmes) (Mapasela and Hay 2005; Arnolds et al. 2013).

The most important reason for the mergers was the unification of the fragmented higher education systems inherited from the previous dispensation, and the need for the eradication of the profound inequalities and distortions of these education systems (Wyngaard and Kapp 2004; Bunting 2006; vanVught 2007). Added to this, is the need to ensure that South Africa remains globally competitive in economic terms. Skilled workers, of many varieties ranging from purely scientific to vocational, are required to ensure a growing and stable economy. This indicates a very contemporary need to differentiate tertiary institutions into multiple forms so as to meet transformational and economic competitiveness goals (vanVught 2007).

Kader Asmal is quoted by Seepe (2010: 2), as having described the restructuring and transformation project as follows:

[t]he creation of a new institutional landscape through mergers and incorporations was the last piece in the educational jigsaw, which consigned to history Verwoerd's 'grand' vision of an educational system in which Africans would be prepared for their role as the 'hewers of wood and the drawers of water' and as the administrative cogs for ensuring the smooth functioning of the Bantustans.

Seepe (2010: 2), however, cautions against Asmal's well-intentioned words by arguing that the latter's assertions were probably a bit of an exaggeration, as not all of South Africa's institutions were subjected to mergers or incorporations. Some of the 'traditional', research-focused, institutions such as the Universities of Cape Town, Witwatersrand and Pretoria were excluded from the mergers to avoid the political backlash that might have ensued from some of the powerful interest groups involved in these 'traditional' universities (Seepe 2010; Cloete 2011). This selective exclusion from the merger process has been referred to as an elite transformation (Kraak 2000; Cooper 2014).

While some institutions were not called upon to merge, still others were required to do so. The Rand Afrikaans University (RAU), Vista University and the Technikon of the Witwatersrand were all impacted by the merger process. RAU had been established at Auckland Park in central Johannesburg in 1967 (SARUA 2014). In her narration of RAU's roots, Brink (2010) notes that the university was created with the distinct political agenda of providing a new generation of the Afrikaner community from a largely working class background with first language instruction at the tertiary level. The second UJ precursor, Vista University, was set up in 1982 as part of the apartheid social engineering agenda of the then Nationalist government in acknowledgement of and in response to the growing educational needs of the urban Black population (Brink 2010). The Technikon of the Witwatersrand which constituted the third UJ precursor, was founded in 1925 in response to the vocational education needs of Witwatersrand industries. Brink (2010) observes that this institution was firmly rooted in the British imperialist educational model, with English as the medium of instruction. In 2004, along with the first wave of mergers introduced to rationalise the South African higher education sector, the Soweto and East Rand Campuses of Vista University were incorporated into RAU.

In 2005, RAU merged with Technikon Witwatersrand to make UJ one of the largest residential universities in the country (SARUA 2014). A salient feature of UJ and its precursors is the fact that these institutions all aimed to accommodate a diverse number of previously disadvantaged communities and catered for students who largely, within their family context, were the first generation to enter tertiary education (Brink 2010).

Knowledge Spectrum

Being a 'comprehensive' institution, UJ sits midway between a 'traditional' university offering formative degrees and a university of technology that is more focused on vocational and technical programmes. For instance, in addition to the traditional degrees UJ offers in faculties such as Humanities, Law, Financial and Economic Management and Science, it also offers technical degrees such as the Bachelor of Technology

degree in Podiatry and the Master of Technology Degree in Homeopathy. This implies that UJ has the best of both worlds, and this is in line with the university's vision of being a premier African university by offering a mix of vocational and academic programmes (SARUA 2014). As such, UJ is centrally positioned upon the knowledge spectrum in that it falls at the midpoint between vocationally-focused and research-intensive tertiary institutions. This is highly significant because transdisciplinarity requires a nexus of applied and scientific foci in terms of research.

Comparisons have been drawn between UJ and other leading 'comprehensive' universities such as the Nelson Mandela Metropolitan University (NMMU) which was also created in 2005, the year that UJ came into existence. The NMMU was a merger between the University of Port Elizabeth, the Port Elizabeth campus of Vista University and the Port Elizabeth Technikon (SARUA 2014). Mgqibela (2008) has drawn some parallels between UJ and NMMU. For instance, both comprehensives are contact institutions created from mergers between a university and a technikon. Moreover, they have a similar spread of programme offerings with no medical or dental school. However, there are also sharp differences, as UJ has an overall student population which is twice as large as that of NMMU. A second poignant distinction is the fact that while both UJ and NMMU are the result of university-technikon mergers, the ethos and focus of the former RAU arguably dominates at UJ, while a more vocational ethos has likely shaped NMMU (Mgqibela 2008).

As such, of all possible comprehensives that could have been chosen for analysis in terms of TDP and KTP, UJ was selected. Due to its history, it is placed to make a continued contribution to both student participation and research output needs set out in the NDP (2011). Therefore, UJ is not only a strong and vibrant comprehensive, but it is the ideal location to begin to consider TDP and KTP within the post-apartheid university context.

Possible Barriers Against the Development of TDP and KTP

There are, however, possible barriers towards the attainment of TDP and KTP within and between universities, and UJ cannot escape these

forces unscathed. Kraak (2000) cautions that, in as much as TDP appears to be a relatively painless and instantaneous activity of teamwork and social partnership, it is not. One possible barrier against TDP and KTP in the South African context is the elitist nature of 'traditional' institutions and the 'hard' sciences. Kraak (2000: 142) cites an example of an anthropologist from the University of the Western Cape who collaborated with medical academics from the Medical Research Council and found the experience difficult, as the medical paradigm remains 'dominating' and 'controlling', 'very quantitative', and 'unresponsive' to the qualitative nuances of an ethnographer. Such gulfs between disciplines and institutions can militate against TDP and KTP.

Apartheid legacies could also function as potential barriers against achieving TDP and KTP. Race and class divisions created by the apartheid system may persist, despite efforts to transform the higher education sector. The issue of financial inequity in South Africa's higher education system is still a problem as ranks of the working class and the poor – who are mostly Black Africans – struggle to pay their fees (Leibowitz et al. 2012). In addition to this, Reddy (2004) underscores the elitist nature of the transformation agenda in South Africa's universities post-1994, by arguing that higher education's impact on societal transformation has contributed towards the creation of a new Black middle class. This has consequently enhanced the consolidation of the post-apartheid democratic gains, but in the process, has helped reproduce and maintain the class divisions inherited from apartheid.

Letseka and Maile (2008) go on to make the contention that as a consequence of the low economic status of mostly Black African students in 'comprehensive' institutions such as UJ, a number of these students find it difficult to remain in these institutions for long periods, and for instance, pursue postgraduate studies. This in a way perpetuates the 'elite' academic culture which is mostly synonymous with 'traditional institutions' (Cooper 2014). The issue of race and racism in institutions of higher learning is still a problem and institutions such as UJ are not immune to this drawback. Erasmus (2006), Jansen (2009) and Soudien (2010) have all argued that, in some instances, university, staff and students still work with essentialised no-

tions of race, and this presents a challenge when working towards transformation and the possible emergence of KTP.

Given the potentially divisive nature of race and class-linked barriers identified here, it is possible to suggest that university students may experience interpersonal and interinstitutional social distance. Social distance is, arguably, a force that would stand against the development of the interactions necessary to the evolution of the transdisciplinary platform required to foster KTP. As such, perceptions relating to race, class and institutional barriers were examined at WITS and UJ (both universities in Johannesburg) by means of the following methods.

METHODOLOGY

Measuring and Exploring Knowledge Flow Potential Within and External to the University of Johannesburg: Methods

Tracking actual knowledge flows between postgraduates within UJ, and outside of the university, was not the intended goal of this paper. There are no extant scales to measure the flow or transgressivity of knowledge. Given the current structure of South African higher education, the legacy of fragmented apartheid university education and the fact that little is known about comprehensives, UJ was selected as a site to examine the potential of TDP and KTP. What this implies, in real terms, is that possible transdisciplinary and transinstitutional sites were sought as these may form the necessary platform for future knowledge transgressivity. These spaces or potential platforms for KTP were located between disciplines (within UJ) and inter-institutionally (by comparing UJ with the University of the Witwatersrand, WITS). As such, two focus areas emerged:

- ♦ TDP spaces for KTP development between natural/applied science students and social/behavioural science students (within UJ)

- ♦ TDP spaces KTP development between UJ, as a comprehensive, and a nearby research intensive institution WITS (interuniversity comparison).

In order to consider KTP within UJ, between the ‘hard’ and ‘soft’ science focused postgraduate students, a survey was conducted. A multi-university project team contributed to drawing up the questionnaire that was administered in the postgraduate survey. A total of 300 postgraduate students were surveyed in 2012. Multiple cluster sampling was employed. The total sample of 300 postgraduate students was also reflective of the student breakdown ratios across the three different UJ campuses that host postgraduate students (Kingsway, Bunting and Doornfontein Campuses) and faculties amongst the total number of 6 801 postgraduate students. The Soweto Campus was not included within the sampling frame as this campus did not accommodate any postgraduate students at the time of the survey.

The postgraduate survey was challenging in terms of accessing respondents. Many senior postgraduates, whose programmes did not have a coursework component, proved difficult to reach. Despite this, a fairly ideal sample was achieved (see Tables 1 and 2) as it was satisfactorily proportional in terms of representation across campuses and faculties.

This is significant as KTP within UJ could not be examined without a representative distribution of respondents across the natural and social sciences. Moreover, as the sample size amounted to 300 students, statistical testing was not limited.

Data analysis was carried out by means of the SPSS (version 22) statistical software package. Special attention was paid to demographic data, as well as to ascertaining association (by means of chi-square and Fisher’s exact tests) and determining the independence of means between key indicators (using Levene’s independent samples t-tests). In order to facilitate

Table 1: Postgraduate survey: campus targeted versus achieved sample

<i>Campus</i>	<i>Population frame</i>	<i>Population (%)</i>	<i>Sample frame</i>	<i>Sample achieved</i>
Kingsway	6450	95	285	267
Bunting	54	1	1	5
Doornfontein	296	4	14	24
Missing ¹				4
Total	6801	100	300	300

Table 2: Postgraduate survey: faculty targeted versus achieved sample

<i>Campus</i>	<i>Population frame</i>	<i>Population (%)</i>	<i>Sample frame</i>	<i>Sample achieved</i>
Economic and Financial Sciences	1274	19	57	57
Education	1227	18	55	55
Engineering	403	6	19	19
Faculty of Art, Design and Architecture	38	1	1	1
Health Sciences	1153	17	52	52
Humanities	883	13	37	37
Law	170	2	8	8
Management	941	14	40	40
Science	712	10	31	31
Total	6801	100	300	300

the latter, critical nominal indicators were recoded (that is, faculty registration); and normality was found to be present. The scales employed in the analysis were tested and found to be reliable (average Cronbach alpha scores of 8.26 and 7.17. As both exceed 7, all scales were found to be in the acceptable range).

The comparison across WITS and UJ was facilitated by secondary data. This data was obtained from the Higher Education Management of Information Systems (HEMIS) for that same year, as well as from university fees booklets provided by the respective university departments of student finance. Each public higher education service provider in South Africa is obliged to report to HEMIS on an annual basis. HEMIS falls under the aegis of the Centre for Higher Education Transformation (CHET). CHET seeks to collect and verify information pertinent to higher education in South Africa. This information is made available for research purposes to all parties with an interest in South African tertiary education (CHET 2012). The secondary data obtained from HEMIS, as well as fees booklets used in this paper, was comparatively analysed by means of extant HEMIS dimensions in 2012, as this time period corresponded most directly with the collection of primary survey data at UJ (HEMIS 2012).

A thorough search of the literature suggests that there is no extant scale that may be used to measure knowledge transgressivity within and between tertiary institutions. However, the primary and secondary data analysed for the purposes of this fairly exploratory paper is sufficient in terms of pointing to a possible platform for, and barriers against, transdisciplinary and

transinstitutional KTP. As such, the findings set out in the following section will likely be the first, vital step, along the KTP scale development journey.

RESULTS AND DISCUSSION

KTP within UJ: Factors Impacting Transdisciplinary Platforms for KTP Development

Demographics: Who Are the UJ Postgraduates?

An examination of KTP amongst UJ postgraduate students would be impossible without a demonstrable, and indeed rather conventional, presence of a postgraduate student grouping. As such, this discussion of crossdisciplinary KTP begins with a brief synopsis of the students sampled in the 2012 postgraduate survey.

Perusal of Table 3 indicates that UJ hosts a fairly typical set of postgraduates. Survey data illustrates this by means of the presence of the following ideal-typical factors. These include:

- ♦ students that are not largely campus bound
 - students that own and operate their own vehicles (58%)
 - students that generally live off campus (90% live off campus)
- ♦ students that are youthful, but clearly adult (mean age is 29 years of age).

Moreover, the transformation of UJ into a representative institution is also in evidence. Nearly three quarters of the postgraduates surveyed reported their race as Black African. English and Nguni languages are nearly equally

Table 3: Demographic data pertinent to the UJ postgraduate survey

<i>Indicator</i>	<i>Demographic data</i>
<i>Gender</i>	Female: 57% Male: 43%
<i>Race</i>	Black: 72% Coloured/Asian: 14% White: 14%
<i>Age</i>	Mean: 29 years old
<i>Language Most Often Spoken at Home</i>	English: 35% Nguni languages: 31%
<i>Nationality</i>	South Africa: 79% SADC: 11% Rest of Africa: 8% Other: 2%
<i>Mobility (Car Ownership)</i>	58% drive themselves to campus
<i>Live in Campus During Term</i>	10% reside on campus
<i>Residence During Term</i>	Residence: 14% Off-campus accommodation: 15%
<i>Employment</i>	Home: 44% On own/partner: 27% Part-time: 31% Full-time: 40%

dominant as spoken languages on the UJ campus. However, transformation can only prove truly effective if there is a potential for an active knowledge sharing culture at UJ and beyond.

Exploring KTP within the UJ Postgraduate Student Community

One of the most important schisms in knowledge production is that between the so-called 'hard' and 'soft' sciences. Postgraduates involved in the hard, or natural/applied sciences at UJ are those enrolled in the faculties of science, health sciences, engineering, architecture and design. Soft sciences were defined as those that dealt with the study of human behaviour and social constructs. As such, these included the faculties of Humanities, Education, Economics and Finance, Management and Law.

The schism between natural/applied and social/human behavioural sciences may limit KTP, or it may be a case that opposites attract. In order to assess the potential for developing transdisciplinary spaces within the postgraduate cohort surveyed, potential perceptual and material barriers to TDP and the resultant KTP were sought. Perceptions relating to class, or more specifically personal perceptions of material well-being, soon emerged as significant. When questioned about the funds available to pay for basic necessities, the postgraduates surveyed reported a mean of 3.56. As this was a five-item Likert scale question, the mean sug-

gests a group that tends towards an average class position.

However, when taking cognisance of the fact that the questionnaire was constructed with the express purpose of avoiding central tendency bias, the responses take on greater heuristic meaning. The students surveyed were asked to report whether they had the funds to cover basic consumptive necessities within a given time period. The mean of 3.56 refers to the most common response being 'sometimes' (28.5% respondents stated this). A total of 55% of the postgraduates surveyed reported that they usually or always had the requisite funds available, while 16.5% reported that they rarely, or very rarely could afford basic necessities. Consideration of these additional figures allows for the conclusion that the majority of postgraduates are fairly well off, but that this is counter-balanced by the 45% who sometimes or quite often tend to struggle to make ends meet. In other words, there is clear evidence to suggest that there is a class-based hierarchy of sorts within this survey cohort.

The significance of perceptions of relative subsistence-related wealth is truly apparent when linked to faculty registration (that is, natural / applied or social/human behavioural sciences). There was a statistically significant difference found across the respondents registered in the hard and soft science faculties ($p < 0.05$). Social/human behavioural sciences students reported perceptions of greater financial well-

being than their natural/applied sciences counterparts. In other words, the natural/applied sciences-focused postgraduate respondents reported a lesser perceived ability to pay basic bills and tuition fees.

What makes this relationship between material well-being and hard/soft science interesting, is that further analysis has revealed no objective basis for it. For instance, a true class or material difference between postgraduates should be readily identifiable during an examination of funding sources. The key funding sources examined were kin, public and private student loans, bursaries/scholarships and various forms of employment. There was no statistically significant association noted between the type of faculty registration and each of the various sources of funding ($p > 0.05$). Therefore, there is no immediately identifiable need to transform institutional funding structures. Rather, what is indicated, is that institutional culture could perhaps be transformed in ways that dismantle this sort of perceptual material well-being hierarchy.

There is no absolute way of knowing the extent to which a perceived class difference will impact TDP and KTP. This being said, there is evidence that the amount of money a postgraduate student has to spend ($p < 0.05$), his/her personal mode of transportation ($p < 0.05$), and where the student lives ($p < 0.0005$) all impact the process of 'fitting in' on campus. The amount of available spending money was found to be especially important to postgraduate students registered for natural/applied science qualifications. There is a common anecdotal belief that natural science students receive far more funding (from state and private sector sources) than their social science counterparts. This is due to the perception that natural science students are engaged in learning and acquiring scarce and desirable skills in South Africa. However, this may only be true for some students of the natural/applied sciences at UJ.

As a comprehensive, UJ is a home to traditional and vocational science-focused career paths. It could be argued that not all of the natural/applied science postgraduates would enjoy superior funding, as not all of them are part of the research-intensive scarce skills grouping. For instance, of the 19 survey respondents housed within the Engineering and Built Environment Faculty, 11 are located on the old RAU campus. This implies a traditional degree struc-

ture reliant upon the logic and teaching of 'pure' science. The remaining eight respondents were drawn from the more applied and vocationally focused Doornfontein Campus. Students registered for less vocational, research-driven science degrees could, arguably, expect to receive more funding than their vocational / applied science counterparts. However, when students drawn from 'traditional' and 'vocational' pre-merger campuses were compared across funding sources, no statistically significant association was found ($p > 0.05$).

The postgraduate students surveyed appear to have a common class experience in terms of funding sources, and this could enhance TDP through the development of a platform for disciplinary co-operation based on a material commonality. However, class commonality is not a perception that is shared amongst these students. This could act as a barrier to KTP because if natural / applied science focused students feel that they have less money, and that money is needed to fit in on campus, the discipline-based schism between natural and social science majors may widen due to perceptions of social distance.

Scholars such as Erasmus (2006), Jansen (2009) and Soudien (2010) have argued that race could prove an additional and divisive campus-based factor. Analysis of the postgraduate student survey responses may bear these predictions out, albeit in a nuanced fashion. Encouragingly, UJ postgraduates across all disciplines reported feeling comfortable when engaging in cross-racial academic and social activities. Academic activities included attending lectures and participation in multi-racial study groups, while developing friendships and romantic relationships with members of another race, comprised the social aspects considered. In this regard, the pessimistic race-based assertions made by Erasmus (2006), Jansen (2009) and Soudien (2010) seem to find little purchase at UJ. This is likely due to the fact that the university boasts a strong Black African postgraduate contingent and this is replicated in the survey sample.

This notwithstanding, race may still prove a barrier to the development of TDP. T-test results reveal that natural science students are not as comfortable when taking part in cross-racial academic activities as their social science/humanities counterparts. In terms of attending lectures, natural science students tended towards neu-

trality, while social science students owned to a high level of cross-racial comfort ($p < 0.0001$). Participation in study groups was similarly more comfortable for social science students, as opposed to their natural science counterparts. This implies that lecture halls and study groups are more likely to be sites of TDP for students registered in the humanities focused degrees. However, these spaces will not prove as fertile from the natural and applied science perspective. Like class, race could, therefore, negatively impact on campus. Perceptions of difference act against the environment of openness and collaboration likely fostered by a true transdisciplinary knowledge sharing platform.

Nowhere are perceptions of difference stronger, and more sharply defined, than in the discourse and rhetoric that surrounds the comprehensive versus the research-intensive, traditional university (Mgqibela 2008; Cloete and Bunting 2013). Given this, the potential for inter-institutional KTP will now be explored.

Interinstitutional Spaces for and Impediments Against KTP: Comparing UJ and WITS

Johannesburg is a conurbation, with a massive potential student population drawn from

local communities and those further afield. As such, the existence of comprehensive (UJ) and traditional (WITS) universities in such close physical proximity is fully justifiable. What is the likelihood of developing KTP across universities that occupy different spaces along the knowledge generation spectrum? The only means of answering this question is through a comparison of salient dimensions. These include: the number of postgraduate students hosted by each university, throughput, and research output. Table 4 contains a synthesis of HEMIS data that allows for this much-needed comparison.

From Table 4 it is clearly apparent that UJ boasts a far larger student body overall. In fact, this 2012 data suggests that UJ hosted almost double the number of students than WITS did in the same year. These overall population trends certainly account for the very high student-academic staff ratio of 20:1 noted at UJ, and the comparatively lower ratio of 11:1 at WITS. Despite having fewer students overall, WITS hosts far more postgraduates than UJ. With nearly one third of the WITS student population (31%) registered for postgraduate degrees, WITS appears to outperform UJ (13% postgraduates in the total student population).

Table 4: Comparison of traditional (WITS) and comprehensive (UJ) universities in Johannesburg (2012)

Cluster of performance	Specific performance indicators	Comprehensive university: UJ	Traditional university: WITS
Enrolment	Enrolment (headcount)	48 300	29 500
	Enrolment determined by FTE (full-time students enrolled)	37 300	21 500
	Enrolment undergraduate/postgraduate ratio	87%: 13%	69%: 31%
	Enrolment by qualification type 1 Undergraduate	87%	69%
	Enrolment by qualification type 2 PG e.g. Fourth year / Honours/Junior postgraduate	8%	9%
	Enrolment by qualification type 3 PG: Masters and Doctorates/Senior postgraduate	5%	22%
	Enrolment by race (white: inclusive black ¹)	18%:82%	26%:74%
	Enrolment by gender(% female: male)	56%:44%	54:46%
Throughput	Success rates	78%	80%
	Actual graduates Undergraduates	8 000	3 700
	Actual graduates Postgraduates	2 300	2 700
	Graduates as % of total head count	21%	22%
Student: Staff Ratio	FTE student: FTE staff	20: 1	11: 1
Staff Seniority Outputs	Academic staff with doctorates (%)	22%	53%
	Ratio of research publication units: academic staff	0.69	0.94
	Ratio of weighted output (i.e. including PG students): academic staff	1.13	1.94

However, postgraduates in South African universities are not a uniform group. The South African Qualifications Authority (SAQA) has published a National Qualifications Framework (NQF). All university students qualify at different levels on the NQF. For instance, a Bachelor's degree is allocated an NQF level of 7, while postgraduate qualifications are allocated levels 8-10. Junior postgraduates, such as Honours level students, will attain a level 8 qualification. Levels 9 and 10 are allotted to the Master's and Doctoral levels of study, respectively. The only exception would be Business Administration Master's (that is, MBA) degrees, as these are restricted to level 8 (SAQA 2014).

NQF levels 9 and 10 are logically clustered together due to the complexity allocated to the tasks completed for the purposes of earning Master's and Doctoral degrees. For instance, the amount of research expected at the Honours level is far lower (that is, approximately 20% of the final mark is earned through conducting research) than at the Master's (50-100% research component) and Doctoral degree ranks (conventionally 100% research component).

Closer examination of the junior and senior postgraduate categories would suggest that WITS boasts a larger number of senior postgraduates. The reality is that just over half of all WITS academic staff hold doctoral degrees. This qualifies them to supervise greater numbers of Master's and Doctoral degree students. Moreover, the lower student-academic staff ratio at WITS may imply sufficient time to focus on the needs of postgraduate students, given that there is a relatively small undergraduate population registered at this university. This implies limited opportunities for the development of a transinstitutional platform to increase KTP at the senior postgraduate level.

Consideration of junior postgraduate student numbers interestingly, and quite conversely, shows that UJ and WITS are in an almost identical position. In both universities, nearly 10% of all full-time, registered, students are at the fourth year, or junior postgraduate level. This is a most significant finding for the development of a transinstitutional framework for KTP, and it may be further evolved at this junior level of study.

However, equality across junior postgraduate numbers will do little to boost KTP across these traditional and comprehensive institutions

if there is no indication of a research focus within both. Such a focus is demonstrably present given the fact that both UJ and WITS can claim an academic staff research output of close to one article (or unit) per staff member for 2012. WITS does outperform UJ as WITS academics tend to produce just under one article (0.94 of a publication unit). However, UJ staff produce at least half an article, as well as clearly contribute to another, when their output unit of 0.69 is examined. Simply put, WITS academics outperform UJ academics, in terms of research output, by one quarter of an article or publication unit. In other words, UJ academics only lag behind their WITS counterparts by 25% in terms of research output. This is extraordinary, given that the UJ undergraduate teaching load is far greater than that at WITS, and that UJ staff have nearly double the number of students to contend with. What this also shows is that UJ staff have managed to develop a productive research culture, while teaching vast numbers of students. As such, UJ is operating as a true comprehensive institution, and maintains its research focus along with its teaching efforts.

In real terms, however, WITS remains far more firmly embedded within the research-intensive part of the knowledge spectrum (as compared to UJ). Under these conditions, is knowledge transgressivity possible? Consideration of postgraduate throughput rates suggests that it is. When postgraduates are added to the output framework, research output rates are augmented. This shows the importance of postgraduates in boosting research output, and identifying the research potential at both universities under examination.

There is also the telling matter of comparative fee structures to be considered. UJ is by far the most affordable tertiary institution. This may presumably create a class barrier between the discursively and materially elite WITS, and the working class comprehensive UJ. However, upon closer examination, this presumption finds a more complex reality.

The fees averages were calculated by finding the mid-point between highest and lowest degree-linked fees associated with each degree type in 2012. As UJ and WITS have different foci, the degree offerings were not entirely comparable. For instance, UJ offers technical degrees that are very much vocationally driven. WITS, for example, has a fully developed medical

school, while UJ has relatively fewer medical courses on offer. Despite the limitations inherent to performing comparisons across somewhat dissimilar degree programmes, sufficient similarity was found across the Humanities, Commerce and Science Faculties to produce Table 5.

Cognisance of the findings set out in Table 5 allows for three important conclusions to be drawn. In the first instance, WITS is generally more expensive than UJ, as is reflected in tuition fees that are consistently higher than those charged by UJ. In the second instance, the gulf between fees, across WITS and UJ, becomes wider as the seniority of the postgraduate degree advances. For example, there is only an eight per cent difference across fees for junior postgraduate (Honours level) students. However, the difference escalates to at least twenty per cent for senior postgraduate fees. In the third instance, this finding provides a material explanation for the similarities and differences noted in the HEMIS data for the same period. As the cost of Honours degrees is relatively similar across both universities, the fairly even number of Honours students noted across both universities is unsurprising. The relative cost would not act as a barrier to their registering at either institution for the fees are in a similar range.

By the time students reach senior postgraduate status, as Master's or Doctoral degree candidates, the difference across fees becomes massively apparent. As such, there is a large distinction between students who can afford senior postgraduate study across these universities. What this implies is that the junior postgraduate period of study is the likely moment, or space in time, to create a platform that may facilitate the development of KTP across institutions.

CONCLUSION

Survey and secondary data have been used, in tandem, to assist in the identification of barriers to the development of a transdisciplinary

platform that may facilitate the growth of KTP. The likely barriers to the development of TDP and concomitant KTP are linked to perceptions of class and race differences, and the resultant social distance that this may bring, amongst postgraduates at UJ. As such, this paper was not written from an overly structurally deterministic viewpoint, as student perceptions attained emphasis. While this student-focus is a clear boon for this paper, KTP was not solely linked to students. Students are not free agents as they experience university life within a merged, comprehensive university structure. Forces of history and transformational governance have combined to construct UJ, and have placed this university at the midpoint between research and vocational learning on the knowledge spectrum. As such, barriers to KTP were also examined through an inter-institutional comparison between UJ and WITS. Here the evidence suggests that there are real structural differences between the two universities. Nevertheless, a platform for the development of transinstitutional KTP could come into being at the junior postgraduate level.

What the findings in this paper also suggest is that UJ may find it possible to hold its own in competition with traditional, research-intensive, universities such as WITS. KTP is possible within UJ, and there is room to suggest that stronger research and knowledge links could be forged between WITS and UJ. In this way, fears that there has been an elite transformation and a resultant hierarchical ordering of South African universities, can be overcome. By pointing to this possibility, and to the role of UJ as a comprehensive, this paper seeks to create room for new debate and novel directions for discussion.

RECOMMENDATIONS

True transformation/equity and global competitiveness may continue to elude the South African university sector. Efforts must be made

Table 5: University tuition fees comparison across UJ and WITS

<i>Average fees per corresponding degree type</i>	<i>UJ</i>	<i>WITS</i>	<i>Percentage difference</i>
Undergraduate degrees	R 25 089	R 28 677	WITS fees 8% higher
Honours degrees	R 22 615	R 25 768	WITS fees 8% higher
Master's degrees	R 10 300 per year	R 15 240 per year	WITS fees 20% higher
Doctoral degrees	R 10 300 per year	R 16 450 per year	WITS fees 21% higher

to mitigate overt or inadvertent notions of privilege, and related negative consequences for integration. Little is known about comprehensives as they are a fairly novel phenomenon. Further investigation is required to plumb the depths of the postgraduate student communities at both UJ, and at comprehensives across the nation.

Furthermore, a climate of co-operation between students, sharing what could be an authentically similar postgraduate student experience, could yield transgressive benefits both during and following postgraduate studies. Efforts should be made to facilitate interactions between junior postgraduates registered at WITS and UJ. Joint research projects, driven by senior academics and cross-university postgraduate conferences are examples of initiatives that could achieve this end. Within UJ itself, perceptual class and race barriers could be countered through the encouragement of grant-funded transdisciplinary research projects that attempt, within reason, to be inclusive of students from different class and racial backgrounds.

KTP and its possible enhancement within the UJ postgraduate student community and between institutions such as UJ and WITS, require further investigation to attain a sense of any additional barriers that exist towards its attainment. As such, a qualitative study within UJ's postgraduate cohort and an inter-university study between UJ and WITS (also of a qualitative nature) could be conducted in order to augment the findings of this study. Moreover, instruments should be developed so that TDP and KTP could be measured. Should the aforesaid recommendations, regarding the erosion of TDP and KTP barriers, be adhered to, the relative success of these steps could be measured and the effectiveness of all interventions could be ascertained.

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REFERENCES

- Aitchison J 2004. Lifelong learning in South Africa: Dreams and delusions. *International Journal of Lifelong Education*, 23(6): 517-544.
- Arnolds CA, Stofile R, Lillah R 2013. Assessing the outcomes of the higher education mergers in South Africa: Implications for strategic management. *Acta Commercii*, 13(1): 1-11.
- Brink E 2010. *University of Johannesburg: The University for a New Generation*. Johannesburg: Jacana Media.
- Bunting I 2006. The higher education landscape under apartheid: Transformation in Higher Education. *Higher Education Dynamics*, 10: 35-52.
- CHET South African Higher Education Open Data 2012. From <<http://www.chet.org.za/data/sahe-open-data>> (Retrieved on 10 September 2014).
- Cloete N 2011. South Africa: Radical New Plan for Higher Education. From <<http://www.university-worldnews.com/article.php?story=201112022252975>> (Retrieved on 25 March 2013).
- Cloete N, Bunting I 2013. *Strengthening Knowledge Production in Universities: Five South African Case Studies*. Cape Town: OECD.
- Collins A, Loots L, Meyiwa T, Mistrey D 2009. Nobody's business: Proposals for reducing gender-based violence at a South African university. *Agenda: Empowering Women For Gender Equity*, 23(80): 33-41.
- Cooper D 2011. *The University in Development: Case Studies of Use-oriented Research*. Cape Town: HSRC Press.
- Cooper D 2014. Social Justice and South African University Student Enrolment Data by 'Race' 1988-1998-2008: From 'Skewed Revolution' to 'Stalled Revolution'. *Paper presented at the South African Sociological Association (SASA) Annual Congress*, 6-8 July 2014, Nelson Mandela Metropolitan University, Port Elizabeth.
- Deacon R, Osman R, Buchler M 2010. Education policy studies in South Africa, 1995-2006. *Journal of Education Policy*, 25(1): 95-110.
- Dugmore H 2013. Measuring Success. A South African University League Table. *The WITS Review*, January 2013, P. 13.
- Erasmus D 2006. Living the future now: 'Race' and challenges of transformation in higher education. *South African Journal of Higher Education*, 20(3): 51-63.
- Frick L, Bitzer E, Leibowitz B 2007. Integrating assessment and recognition of prior learning in South African higher education: A university case study. *Education as Change*, 11(2): 131-155.
- Gibbons M, Limoges C, Nowotny H, Schwartzman S, Scott P, Trow M 1994. *The New Production of Knowledge: The Dynamics of Science and Research*

- in *Contemporary Societies*. Berkeley: Sage Publications.
- HEMIS 2012. Data was from the CHET Website. From <<http://chet.org.za/data>> (Retrieved on 12 September 2012).
- Henkel M 2005. Academic identity and autonomy in a changing policy environment. *Higher Education*, 49(1-2): 155 – 176.
- Jansen J 2009. *Knowledge in the Blood: Confronting Race and the Apartheid Past*. Cape Town: University of Cape Town Press.
- Kay L, Youtie J, Shapira P 2014. Inter-industry Knowledge Flows and Sectoral Networks in the Economy of Malaysia. Knowledge Management Research and Practice. From <http://www.palgrave-journals.com/kmrp/journal/vaop/ncurrent/abs/kmrp_201430a.html> (Retrieved on 12 September 2014).
- Kraak A 2000. *Changing Modes: New Knowledge Production and its Implications for Higher Education in South Africa*. Pretoria: HSRC Press.
- Kruss G 2008. Balancing old and new organisational forms: Changing dynamics of government, industry and university interaction in South Africa. *Technology, Analysis and Strategic Management*, 20(6): 667-682.
- Kruss G 2012. Reconceptualising engagement: A conceptual framework for analysing university interaction with external social partners. *South African Review of Sociology*, 43 (2): 5-26.
- Leibowitz B, Swartz L, Bozalek V, Carolissen R, Nicholls L, Rohleder P. 2012. *Community, Self and Identity: Educating South African University Students for Citizenship*. Pretoria: HSRC Press.
- Letseka M, Maile S 2008. *High University Drop-out Rates: A Threat to South Africa's Future*. HSRC, South Africa, Policy Brief.
- Mapasela M, Hay HR 2005. Through the magnifying glass: A descriptive theoretical analysis of possible impact of the South African higher education policies on academic staff and their job satisfaction. *Higher Education*, 50: 111-128.
- McLean M, Walker M 2012. The possibilities for university-based public-good professional education: A case-study from South Africa based on the 'capability approach'. *Studies in Higher Education*, 37(5): 585-601.
- Mêgnigbêto E 2014. Efficiency, unused capacity and transmission power as indicators of the Triple Helix of university-industry-government relationships. *Journal of Informetrics*, 8(1): 284-294.
- Mgqibela L 2008. Comprehensive University Reality, 'Fraught and Complicated'. *University World News*, Issue 1, 29 January 2008.
- National Development Plan (NDP) 2011. South African National Planning Commission. From <<http://www.ncponline.co.za>> (Retrieved on 15 January 2013).
- Nowotny H 2003. *The Potential of Transdisciplinarity. Article 5 in Rethinking Interdisciplinarity Online Conference*. Manuscript in authors' possession.
- Nowotny H, Scott P, Gibbons M 2003. Introduction: 'Mode 2' revisited: The new production of knowledge. *Minerva*, 41(3): 179-194.
- Reddy T 2004. *Higher Education and Social Transformation: South Africa Case Study*. Pretoria: Council for Higher Education.
- Rothearmel FT, Thursby M 2005. University-incubator firm knowledge flows: Assessing their impact on incubator firm performance. *Research Policy*, 34: 305-320.
- SAQA- Summary Lists of all Registered Qualifications and Unit Standards – August 2014. From <<http://www.saqa.org.za/show.php?id=5677>>(Retrieved on 15 September 2014).
- Seepe S 2010. South Africa: Reflections on a Major Merger. *University World News*. Issue 67, 28 November 2010.
- Singh M 2008. Valuing differentiation as a qualified good: The case of South African higher education. *Higher Education Policy*, 21: 245-263.
- Soudien C 2010. Entering the gates of the elect: Obtaining the doctorate in education in South Africa. In: P Thomson, M Walker (Eds.): *The Routledge Doctoral Student's Companion: Getting to Grips with Research in Education and the Social Sciences*. London and New York: Routledge, pp. 116-127.
- South African Regional Universities Association (SARUA). 2014. From <<http://www.sarua.org>> (Retrieved on 1 September 2014).
- VanVught F 2007. Diversity and Differentiation in Higher Education Systems. *Paper presented at the CHET Anniversary Conference*, Cape Town, November 2007.
- Van Zyl A, Amadi-Echendu J, Bothma TJD 2007. Nine drivers of knowledge transfer between universities and industry R&D partners in South Africa. *South African Journal of Information Management*, 9(1): 1-22.
- Walker M 2012. Universities, professional capabilities and contributions to the public good in South Africa. *Compare: A Journal of Comparative and International Education*, 42(6): 819-838.
- Winberg C 2006. Undisciplining knowledge production: Development driven higher education in South Africa. *Higher Education*, 51(2): 159-172.
- Wyngaard A, Kapp C 2004. Rethinking and re-imagining mergers in further and higher education: A human perspective. *South African Journal of Higher Education*, 18(1): 185-201.