umvuzo

A skills-centred mobile learning solution for the South African labour market

Fuaad Coovadia
Boitumelo Dikoko
Sakhe Mkosi
Keitumetse-Kabelo Murray

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EXECUTIVE SUMMARY

Our proposal introduces Umvuzo, a skills-centred mobile learning application intended to address key issues in the South African labour market: skills mismatch, excessive search costs and inefficient discrimination. Umvuzo offers job-seekers the opportunity to acquire new, in-demand skills, view vacancies and make job applications, all through their mobile phones. Harnessing the power of gamification to drive increased use and successful learning, the application thus takes advantage of trends in mobile learning to improve the skills base of the South African labour force. Off the back of the country's continent leading levels of smartphone penetration, the application also provides an innovative offering to employers: the opportunity to observe prospective employees' motivation, learning capacities and performance in skill areas directly related to their areas of business. For the labour market as a whole it introduces a low-cost, accessible means of skills the direct focus of recruitment and working towards overcoming structural inequities relating to formal academic qualification, race, gender or location.

Our proposal also provides a detailed analysis of the three labour market issues we intend to address (skills mismatch, excessive search costs and inefficient discrimination) and which contribute to unemployment in South Africa as well as topical means of addressing them. We maintain that there is a structural mismatch in the South African economy between the types of skills that are, and have increasingly been, demanded, and the skills base of the labour force. We also show that South African job seekers and employers are faced with excessive search costs due to a job seeker pool which is located far from employment centres, high telecommunication costs, and the shallow skills base of the South African labour force. We review two important and topical means of addressing these issues in the South African context: employment intermediation and transport subsidies. In the process we show that they have shortcomings upon which our proposal improves.

ABOUT THE AUTHORS

Sakhe Mkosi

Sakhe is a Rhodes Scholar and MPhil candidate in Development Studies at the University of Oxford's Department of International Department. Sakhe is a former audit consultant at Deloitte, has an undergraduate degree in Financial Accounting and an MPhil in Public Policy and Administration, both from the University of Cape Town in South Africa. His current research is on financial inclusion policy in South Africa but his research interests extend to tax administration reform – on which he wrote his Public Policy and Administration dissertation – international tax avoidance and illicit financial flows

Boitumelo Dikoko
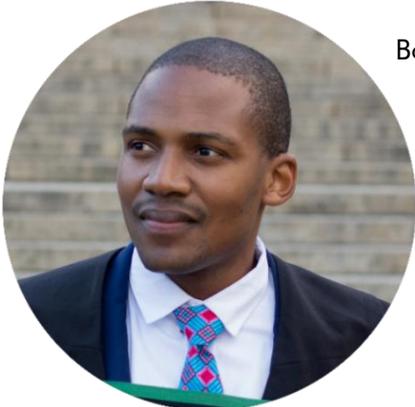
Boitumelo is an MSc candidate in Electrical Engineering at the University of Cape Town's Mechatronics Research Group. Boitumelo has a BSc(Eng) in Mechatronics also from the University of Cape Town. His current research interest is the application of Multiple-Robot Simultaneous Localisation and Mapping (SLAM) in the mining sector. In his current research, he aims to use robots to improve mine safety for workers by mapping and searching for any dangers after events such as blasts.

Fuaad Coovadia

Fuaad is a Bachelor of Business Science graduate in Economics from the University of Cape Town (UCT) and will begin an MPhil in Development Studies at the University of Oxford in October as a Rhodes Scholar. Fuaad has authored a microeconomics study guide for undergraduate students and co-founded Presto – a publishing company that specialises in providing educational materials such as study guides for university and high school students. Fuaad has worked as a consultant for the small enterprise development NGO Phaphama.

Keitumetse-Kabelo Murray

Kabelo completed an Honours in International Relations, cum lade, at the University of the Witwatersrand (Wits), is currently an MA candidate in international Relations at the same institution and will begin an MPhil in Development Studies at the University of Oxford in October on a Rhodes Scholarship. Throughout his time at Wits he served on the Student Representative Council as the Social and Community Development Officer. Whilst on SRC, he focused on tackling food insecurity on campus, a passion which then developed into his field of research. Situated in Joubert Park, Johannesburg, his research tackled issues of poverty, inequality and food insecurity.

1. INTRODUCTION

Umvuzo is an isiZulu word which means reward or earnings. We chose that name for our proposal because our solution is directly aimed at improving the country's dire unemployment situation and, thus, improve the earnings of South Africa's labour force. The proposal's core argument is that our mobile application solution, Umvuzo, is an innovative, feasible and accessible means of addressing three of the major problems in the South African labour market: skills mismatch, excessive search costs and inefficient discrimination.

The first half of this paper begins by establishing the problem landscape in the South African context, discussing the three central issues in a historically informed and interconnected manner. Following this discussion, a set of topical solutions that directly respond to the identified problems will be presented. This establishes the space in which the proposed solution may be introduced. However, prescribing solutions and actually treating a problem are not the

same. In order to efficiently implement the solutions, it is our view that innovation is necessary. This proposal therefore looks to introduce an accessible solution that leverages the rapidly increasing and continent-leading penetration levels of smartphone technology in South Africa.

The second part of this paper enumerates our proposed solution: the mobile application Umvuzo. This half of the paper looks to provide a detailed exploration of Umvuzo and in doing so motivate for its being the most efficient response to the identified problems. Umvuzo presents a direct response to the previous section and establishes a social enterprise proposal to allow for immediate development and implementation. By engaging current research in education, gamification and e/m-Learning this paper develops a strong argument for the strength of Umvuzo as a practical solution.

2. PROBLEM LANDSCAPE

The South African labour market is among the most patently dysfunctional in the world. The official general unemployment rate sits at 27.7% according to official government statistics while youth unemployment (i.e. among people between the ages of 15 and 34) is 38.6% (Statistics South Africa [StatsSA] 2017). The South African labour force of 22.4 million people is officially defined to exclude 2.3 million "discouraged work-seekers", those persons who are of working age who have given up searching for work (StatsSA 2017:19). If these discouraged work-seekers are included in the labour force, as some scholars contend that they should (Posel *et al* 2014; Bhorat 2012), a "broad" or "expanded" definition of unemployment is obtained. On this basis, the general unemployment rate becomes 36.4% while the youth unemployment rate rises to a staggering 45% (StatsSA 2017).

As Graham *et al* (2016:11) point out, a feature of the South African labour market which is even more alarming than the extent of youth unemployment is the proportion of young people who are not employed nor studying, commonly referred to in the South African economic literature as "NEET" (Not in Employment, Education or Training). These are people who are "neither improving their future employability through investment in skills nor gaining experience through employment" (StatsSA 2015) and are

therefore most at risk of chronic unemployment and poverty (Graham *et al* 2016; Graham and Mlatsheni 2015). Labour force surveys reveal that one in three South Africans between the ages of 15 and 24 are NEET, while 42% of those between the ages of 30 and 34 are NEET.

Irrespective of whether one relies on the narrow or broad definitions of unemployment, the picture remains the same: the degree of unemployment in South Africa is alarmingly high. According to the International Labour Organisation (ILO) South Africa's unemployment is the fifth highest in the world and is far higher than the middle income country average of 5.6% (ILO 2016). And while globally, because of delays in entering the labour market, youth unemployment also tends to be higher than general unemployment, unlike South Africa many parts of the world are seeing falling levels of youth unemployment including most OECD countries and Sub-Saharan Africa as a whole (Graham *et al* 2016; ILO 2015).

The country's economic predicament is exacerbated by the fact that inequality among wage earners is high, racialised, gendered and features a significant proportion of working poor. The Gini coefficient for labour income is 0.732 (Hundenborn *et al* 2016) and 20% of South African workers live in households with per capita incomes below the

upper bound poverty line (Rogan & Reynolds 2015). All else being equal, being black African[1] results in 60% lower earnings relative to being white (Bhorat 2012) and being a woman on average results in a 29% lower wage (OECD 2016). Furthermore, apart from upward trends for the top deciles of income earners, median incomes in the South African labour market have remained stagnant over the past fifteen years (Wittenberg 2014; Liebbrandt *et al* 2012).

In many low and middle income countries around the world, the informal sector plays a significant role in absorbing those who cannot find employment within the formal sector, thus contributing considerable amounts to countries' national outputs, household incomes, poverty alleviation, and entrepreneurial activity (Maloney 2004; Castells and Portes 1989). In South Africa, for historical reasons to do with apartheid era suppression of black economic activity and strict migration control (see Feinstein 2005 and Seekings & Nattrass 2005), and due to barriers to entry such as credit constraints, crime, and poor social networks, this is not the case (Knight and Kingdon 2000).

Thus, instead of playing a considerable role in the country's economic prospects, including absorbing the labour deemed excess to the requirements of the formal sector, evidence indicates that the South African informal sector's current and potential contribution to the country's economic prospects is limited. The informal sector employs 16.5% (2.7 million people) of the country's employed population [2], a relatively low contribution which is principally the result of participation in the sector which is lower than comparator countries (StatsSA 2017; Maloney 2004). Also, the informal sector has demonstrated a long term trend of employing decreasing proportions of women; women constituted 45% of employment in the sector in the first quarter of 2008 but made up only 38% of the sector in the first quarter of 2017 (StatsSA 2017; Skinner 2016). Its contribution to the country's GDP is estimated at a mere 5.2% (Skinner 2016).

The problems in the South African labour market are of particular concern given the demonstrated centrality of labour market outcomes to a host of other crucial economic indicators, including the country's world-beating levels of income inequality (Finn 2015, Hudenborn *et al* 2016, Liebbrandt *et al* 2012). The roots of the unemployment problem and most of the other issues facing the South African labour market are deeply historical and structural. And while it is clear that any long-term resolution of many of the labour market's ills requires both consistent

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[1] All referenced to race in this proposal are based on official South African racial categorisation which differentiates between "white", "mixed race" (often included in "other"), and "black", where "black" includes "black African/African", "Indian", "coloured" and "Chinese".

[2] This is 17.5% of non-agricultural employment in the country (StatsSA 2017). Contrast this with the comparable figure in India of 90% (Kingdon & Knight 2000).

and skills sensitive employment growth and considerable attention to macroeconomic structural factors, there are several important microeconomic impediments to achieving a more equitable labour market. These work in concert to make job search less effective for black seekers than white seekers (Banerjee *et al* 2008). Three of these are central to the *Umvuzo* Proposal: skills mismatch, high search costs for both employers and job seekers, and inefficient discrimination in the labour market.

2.1 Skills Mismatch

An ironic aspect of the South African labour market is that while there clearly is an excess of labour supply there is also a demonstrable and significant degree of excess labour demand (Reddy *et al* 2016). The issue is that the employment opportunities constituting this labour demand are misaligned with the skills (perceived or real) of those seeking those opportunities (Kruger 2016; Bhorat & Mayet 2012; Oosthuizen 2003). This is what the World Economic Forum's Global Agenda Council on Employment (GAC) and much of the labour market policy literature calls "skills mismatch" (Graham *et al* 2016; Reddy *et al* 2016; GAC 2014; Doyle *et al* 2014; Bhorat & Mayet 2012). It is a labour market inefficiency which is detrimental to economic growth and accounts for a considerable portion of South Africa's unemployment problem (Oosthuizen 2003).

Research demonstrates that the numerous vacancies in the South African jobs market are

for persons with post-secondary school educational attainment and who are specialists in highly skilled professional service/finance-related fields or the science, technology, engineering and mathematics (STEM) fields (Reddy *et al* 2016; Tshilongamulenzhe 2012). These are also often skill sets which the country's basic education system is not equipping learners with, or with the capacity to acquire (Kruger 2016; Rasool & Botha 2011; Van der Berg 2009). Moreover, due to what Reddy *et al* (2016:8) call a "structural mismatch" which favours a service economy and high skilled financial services work to the detriment of low wage manufacturing and agricultural sector work, the fastest growth in employment opportunities since 1995 has occurred for those who have graduated from secondary school or have obtained a university degree (Reddy *et al* 2016; Bhorat & Mayet 2012:10). On the other hand, the persons constituting South Africa's unemployed are overwhelmingly without post-secondary school attainment and most – sixty percent – have not completed secondary school at all (Reddy *et al* 2016). Thus, the type of labour these individuals offer is low-, or at best semi-skilled, in nature. The poor quality of the South African public education system also means that many of those who do obtain the secondary school qualification, the National Senior Certificate, are still often without the "skills to compete for jobs where there is demand. Rather they enter the back of the labour market queue, joining thousands of workers with low-levels of skills, most of whom

have more work experience than they do" (Graham *et al* 2016:14).

The result of this skills mismatch is that the South African labour market absorbs at far higher rates and remunerates better those who possess post-secondary school attainment, and that inter-occupation income inequality contributes markedly to labour market income-inequality. The narrow unemployment rate for those who have not completed secondary school is 33.1% (which is 5.4% higher than the overall rate of 27.7%). For graduates, however, the figure is only 7.3%. Furthermore, having a university degree on average increases wages by 18%, holding all else constant (Bhorat 2012:3). In addition, between 1997 and 2012 earnings returns to employment for those with secondary or post-secondary school education have risen while returns to those with levels of education below this have remained constant (Branson *et al* 2012). This accounts for why South African income inequality is generally high given the centrality of labour market outcomes to income inequality (Finn 2015).

2.2 Excessive search costs

There are several structural features of the South African socio-economic environment which increase the resources required for job seekers to find employment and for employers to recruit suitable employees. These resources include transport costs, recruitment agency costs and commissions, and internet costs (Dieltiens 2015; De Lange 2013). Although there are compelling theoretical reasons to view a certain level of job search costs as being conducive to promoting full employment in the labour market (see for instance Zapechelnyuk's (2013) argument based on a model of a labour market with moral hazard where effort is non-contractible), there is sufficient evidence to suggest that search costs in the South African labour market exceeds any theoretically useful level. For job seekers, the endurance of apartheid city spatial planning coupled with a poor public transport system and high telecommunications costs coalesce to make seeking work a particularly expensive exercise. This inefficiently increases job seekers' reservation wages, makes job search increasingly inaccessible and thus contributes to the country's high discouraged work-seeker rate (Posel *et al* 2013; de Lange 2013; Fedderke 2012). For employers, the poor public education system, the general paucity of skilled job seekers and the inefficiency of established recruitment methods, make the recruitment process one which is long, arduous and expensive. This section examines each of these contributors to high search costs.

2.2.1 Apartheid cities

One of the chief contributors to high job search costs for job seekers is the manner in which South African cities are spatially

organised (Budlender & Royston 2016). These cities, having been deliberately so engineered by the apartheid government to entrench racially segregated habitation and control migration while securing labour reserves for industry, particularly the mining sector, continue to be primarily racially organised to this day (Budlender & Royston 2016; Turok 2012; Pieterse 2009). This, unfortunately, is a feature the continuance of which can to some extent be attributed to poor post-apartheid housing policy (Budlender & Royston 2016; Turok 2012). This racial organisation is such that the areas closest to economic centres are disproportionally inhabited by white South Africans, while the residents of the areas on the outskirts of the city – and in the most rural areas of the country, furthest from economic centres – are overwhelmingly black South Africans. These outlying areas, which are usually townships, by design had – and continue to have – significantly lower educational outcomes, higher crime rates, lower quality of public service provision and resultantly higher levels of poverty and unemployment than their more centrally located counterparts (Budlender & Royston 2016; Pieterse 2009). Moreover, there is evidence to suggest that distance from economic centres is a statistically significant causal contributor to unemployment in most South African cities (Budlender & Royston 2016; Naude 2008).

Due to being located long distances from the economic centres where jobs tend to be created, the country's urban job seekers have to travel long distances to find employment, using a public transport system which is expensive and heavily biased in favour of road-based transport (Ngarachu et al 2015; Turok 2012). The Siyakha Youth Assets Study[3] found that the monthly job search costs of its sampled youths averaged R938 of which transport costs were R558 per month on average. This is an amount which is almost prohibitive in a context in which these seekers come from households where the average per capita income is R527 (Graham et al 2016:47).

It is also the case that employers in certain types of work are actively prejudiced against employees who reside far from work. For good reason, these employers are concerned that worker productivity will be lowered by the increased likelihood of tardiness and absence presented by living in an outlying area and/or relying on the country's public transport system (Budlender & Royston 2016:22). That being said, there is evidence that demonstrates that employers are often racially biased against black job seekers (Dieltiens 2015:7; Martin & Durrheim 2006) which

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[3] The Siyakha Youth Assets Study (Graham et al 2016) is a longitudinal study of 2 000 young people participating in the employability programmes of 8 South African employment intermediaries in 44 locations across the country. It began in 2015 and surveys young people before and after these employability programmes. It is carried out by researchers in the University of Johannesburg's Centre for Social Development in Africa.

complicates assessments of employers' prejudices against poorly located employers.

2.2.2 High telecommunication costs

Despite smartphone penetration in South Africa being the highest on the continent (Pew Research Centre 2016), access to the internet in the country is inhibited by the well-documented (relatively) high mobile airtime, mobile data, and broadband costs (Research ICT Africa 2017, Ensor 2017; Graham *et al* 2016; World Bank 2012; Genesis Analytics 2007) In an era where recruitment is increasingly being conducted online, this makes job search costlier for employees. Because searching the internet was among the most widely used reported job search strategies, it is unsurprising that the Siyakha Youth Assets Study also found internet costs to be the most frequently reported component of young South African job seekers' non-transport related costs (Graham *et al* 2016:48), even though data from the same study indicated that the most effective strategies were social networks and employment agencies.

The country's high telecommunication costs is discussed further in 4.3.2. below.

2.2.3 Low skilled, inexperienced workforce

Given the very large, inexperienced, low skilled nature of the South African job seeker pool and the challenges discussed elsewhere in this proposal, recruitment for South African employers is often a process which is expensive and filled with uncertainty. The 2016 Manpower South Africa Talent Shortage Survey found that 34% (2015:31%; 2014:24%) of employers had difficulties filling vacancies. The survey also found that employers equally cite the dearth of "hard skills" and experience as the main reasons why it is difficult to fill vacancies (Manpower Group 2017; Entrepreneur 2016).

Adding to the cost of labour that the shallow skilled labour force presents is the high degree "uncertainty associated with unknown productivity levels" (Rankin 2013). Given the paucity of the pool and the low faith in the basic education system, prospective employers are often unsure of the competency of new hires, making expanding the workforce a decision that employers are wary of making, especially given that many complain that South Africa's strict labour market regulations make dismissing underperforming employees unduly difficult (Dieltiens 2015; Ranking 2013).

2.3 Inefficient discrimination

Recruitment can be viewed as the art of conducting informed discrimination between possible candidates to find the one most suitable for a given vacancy. This discrimination involves setting selection criteria which allow the recruiter to readily

eschew those candidates who are most unlikely be suitable in favour of those who are most likely to be productive. Hence, most positions require certain levels of education or experience in tasks of relevance to the post. However, this process becomes inefficient for the recruiter, the applicant and the labour market as a whole when, for various reasons, potential employers use selection criteria which are misaligned to the tasks required in the job (Becker 1971). It means that applicants who would otherwise be deemed suitable for a given position are excluded for reasons which have little to do with the requirements of the job or the competitiveness of the applicant pool. It also means that employers are not making efficient hiring decisions; expending resources on carrying out selection procedures which do not correlate with job performance and are not making optimal hiring decisions given the possibility of arbitrarily excluding a potentially better employee.

This, evidence suggests, is occurring in the South African labour market. This is caused at least in part by the fact that many South African employers have little faith in the South African basic education system (Graham et al 2016). Research has shown that many South African employers use requirements such as proficiency in pure mathematics and physical science in the secondary school qualification, possession of drivers' licences or certain levels of experience for entry level positions which have little or no connection to the selection criteria used (Graham *et al* 2016:14).

Surveys have further shown that the most common way that South African employers disseminate information about vacancies is through their own workforce, and thus the social and professional networks of those employees, as opposed to other recruitment methods such as advertising through their own websites (Graham *et al* 2016; Direct Hire 2015; Rankin 2013; Posel 2013). This is because employers seek to minimise the monetary search costs discussed above and have a mistrust of the competence of the labour pool at large due in large part to their perceptions of the South African public education system. While it is possible that employee referrals result in successful recruitment for a given vacancy, because of inequalities in "productive" social capital (Graham *et al* 2016:16), it is also likely that this perpetuates the market's racial, formal education and geographic location biases. The poor quality of much of the social circles in which many of South African's unemployed operate is evidenced by the fact almost 28% of young people are living in households where no-one is employed (Stats SA, 2015).

3. SOLUTION LANDSCAPE

This section serves as a brief review of the most topical short to medium-term interventions to address skills mismatch, excessive search costs and inefficient discrimination. It shows that while there are promising avenues, these currently do have shortcomings. What the section thus establishes before Umvuzo is presented in detail is that Umvuzo, as a readily implementable and scalable labour market intervention, capable of addressing the three issues at hand, is a potentially standout means of positively affecting the South African labour market.

While wholesale reforms various aspects of the country's public policies have all been topical in discussions of the South African labour market, the section dedicates itself to a focus on short to medium term oriented microeconomic interventions. It specifically focuses on two potential solutions, each of which have demonstrable records, in South Africa and elsewhere, of alleviating one or more of the three labour market challenges on which this paper centres.

3.1 Employment intermediation

Employment intermediation refers to initiatives which intervene in the labour market to increase the prospects of job seekers to find employment. This includes work readiness programmes which seek to enhance the employability of seekers and those expand employment opportunities through interactions with employers. Even though South Africa spends comparatively little on such employment services – R38 (US$3) per unemployed person compared to R11 000 (US$843) per person in Brazil (Graham *et al* 2017) – South Africa does indeed have numerous such employment intermediaries. In the context of a South African labour market plagued by skills shortages, "unproductive" social capital and high job search costs, these programmes' role is to attempt to "play a significant role in reducing the costs of work-seeking, standing in for and enhancing social networks, and providing information about how best to search for work." (Graham *et al* 2016:59).

Although the models by which they operate vary widely, many of them engage in "impact sourcing": the "process of working with employers to shift their perceptions of who they consider to be 'employable' in order to promote more inclusive recruitment and placement processes" (Graham *et al* 2016:9). Dinaledi Alumni, which "runs advocacy campaigns to encourage government and

business to hire graduates" (Dieltiens 2015:4) is one such initiative.

Some organisations seek to reduce the barriers to entry in the labour market by improving "information flows about labour market opportunities" and actively try to connect the unemployed to work opportunities (Graham *et al* 2016:9). Harambee Youth Employment Accelerator, one of South Africa's largest employment intermediaries, does work of this nature, by matching job seekers to employment opportunities, including those for which it has pre-contracted with employers to fill (Dieltiens 2015).

Dieltiens (2015) and Graham *et al* (2016) both attempt to provide evaluations of these organisations, an exercise made particularly important by the fact that most of these organisations have not conducted their own evaluations of their programmes, especially against employment outcomes (Graham *et al* 2016:20). This is true for employment intermediaries the world over as Kluve *et al*'s (2014) study found that only 13% of organisations surveyed had conducted any sort of impact evaluation of their work. And despite the absence of rigorous impact evaluations conducted by other bodies as well, there have been some studies which "have sought to understand the nature and outcomes of employability interventions" Graham *et al* (2016:20). There is evidence from Latin America and other parts of the developing world which suggests that these programmes are positively associated with employment and higher earnings (Aedo and

Nunez 2004; Betcherman *et al* 2007; Attanasio, Kugler, and Meghir 2008; Monk, Sandefur, and Teal 2008).

Graham *et al*'s (2016) Siyakha Youth Assets Study is a longitudinal study of 2 000 young people participating in the employability programmes of 8 South African employment intermediaries in 44 locations across the country. Beginning in 2015, it seeks to survey young people before and (nine and eighteen months) after these employability programmes. As such its results are still forthcoming. Despite this, its overview and initial assessment of the sector is still useful. One such assessment is that shortages of funding and concerns about lower quality often constrain the non-governmental organisations' ability to scale while those in the public sector appear to be constrained by "bureaucratic processes" (Graham *et al* 2016:19). As a result, of the 20 programmes prospectively surveyed, "only seven programmes reached at least 200 young people per year and only three reached more than 1 000 per year" (*ibid*). Exceptions to the funding issue were presented by those run as part of for-profit companies' social responsibility programmes since these could access various state skills development funds and be granted considerable budgets from internal sources (Graham *et al* 2016:19-20).

Dieltiens (2015) performed case studies of nine South African employment intermediaries and found that although these organisations have varying levels of success in matching young job seekers to available

posts, the extent to which they are able to expand the availability of positions for young seekers – that is, the extent to which they carry out impact sourcing – is limited despite their best efforts (Dieltiens 2015:10). Moreover, the fact that the operating models of these organisations vary widely and is accompanied by a dearth of concrete evaluations of the performance of these models means that there are uncertainties about the potential for any one model to scale (Dieltiens 2015:16). This is compounded by the high cost per successful job placement which detrimentally affects financial sustainability and thus their potential to scale (Dieltiens 2015:16). As a result Dieltiens (2015:17) proclaims they do not operate at "any scale that makes an impact on unemployment".

In addition to the institutionalised interventions discussed thus far, there are also several promising cutting edge ad-hoc interventions carried out primarily for impact research purposes. Abebe *et al's* (2016) randomised evaluation of two programmes in Ethiopia, one a transport subsidy and the other a job application workshop found that both of these interventions improved the quality of jobs obtained by young job-seekers. While the transport subsidy increased the intensity of job search, the job application workshops improved job search efficacy. Abel *et al* (2017) also found that their experiment encouraging South African job-seekers to obtain and use a reference letter significantly increased successful job search for seekers, particularly if they were women.

3.2 Transport subsidies

Transport subsidies are transfers made to job seekers in respect of the transport costs incurred during job search. Several transport subsidy randomised evaluations have produced promising results. In the South African context, the largest and most promising work is currently being carried out by the MIT-affiliated J-Pal (Banerjee & Sequeria 2016). The J-Pal RCT involves evaluating the impact of giving 1200 young job seekers pre-loaded public transportation cards to use over a period of several months. The study is ongoing and the results are forthcoming.

There are however a few completed studies from other parts of the world. As stated above, Abebe *et al's* (2016) Ethiopian transport subsidy experiment found that it increased the quality of jobs obtained by young job-seekers by increasing job search intensity. Phillips' (2014) experiment providing transport subsidies to job seekers in the United States found that it on average increased search intensity by 19%, with the greatest effect being observed from those seekers living farthest from employment opportunities. This, given the suggestive evidence that Phillips' finds of higher search intensity resulting in lower unemployment duration, is highly encouraging for the use of transport subsidies.

While the impact evaluation results of transport subsidies promising, there is still

more research to be conducted to prove their efficacy in different contexts and with more types of job seeker. Moreover, the costs required to enact transport subsidies on a mass scale are substantial which means that in developing countries it is likely that they can only be effected by governments. This, of course, requires political will, resources, and navigation of public finance systems. Encouragingly, a South African local government has taken initiative in this respect. In May 2017 the City of Cape Town announced that it had made a budgetary provision of up to R6.6 million to provide transport subsidies to unemployed residents of Cape Town (Pather 2017).

4. UMVUZO

4.1. Outline

To address the problems of skills deficiencies, excessive search costs and inefficient discrimination in the labour market; we propose *Umvuzo*, a mobile application solution. The primary focus of the app will be skills development - allowing job-seekers to complete modularised training courses which focus on in-demand skills, job readiness and effective job search. Employers will be able to access the performance data produced by the job-seekers' activity on the app - thus allowing employers to track potential job candidates based on skills they have acquired. Therein lies the innovation that *Umvuzo* brings: linking a skills development platform directly to potential employers, thereby making the hiring process more efficient for both parties.

The app will also allow job-seekers to adapt their skillsets to those sought by businesses – in that way directly combatting the skills mismatch discussed above and promoting job-efficient skills training. For the job-seeker trapped in their own financial inability to actively seek jobs or engage in formalised training, this solution provides much needed relief. Section 4.2 elaborates on the functionality of the application, including detailing the user journeys. Section 4.3. provides empirical and theoretical justification for this as a solution, demonstrating how it directly addresses the three labour market challenges at the heart of this proposal.

The application will be developed to suit the most used mobile operating platforms in South Africa: Android, iOS, and Windows mobile. A web version, accessible from desktop browsers, will also be available.

Although the first versions of the application will be in English, we intend to develop more versions in other widely spoken South African languages including isiZulu, Afrikaans and Setswana. Our MVP will have several skills modules for three skill sets (career paths). Further development of new modules will take place on a rolling basis.

4.2 Functionality

Umvuzo will have a dual-facing operating model: one for employers and the other for job-seekers. How the application functions will be explored through the user journeys of its targeted users: job seekers and employers.

4.2.1 Job-seeker user journey
[a beta version of the job-seeker user journey is depicted in figure 1 on page 22]

As the solution aims to reduce job-search costs, the app will be free to download. Our vision is to also make the application costless in terms of data for the job-seeker. How this

will be made possible is discussed in depth below under 4.3.2.

Customised profile

After creating a profile new users will be asked to complete a short questionnaire. Through this questionnaire, the individual's pre-existing skill-set and interest areas will be established. New users will also be invited to take an optional aptitude test. Together with the skill-set questionnaire, this information will act as the baseline from which the application will be programmed to make learning suggestions for the user and thus be able to build a customised learning path.

Training Modules

Following this questionnaire, users will immediately be able to commence with one of the available modularised courses. Available courses will relate to in-demand occupation-related skills, job readiness or job search. The modules will follow the model of mobile education providers such as Duolingo by leveraging the power of gamification to encourage learning. Gamification's utility in driving learning has been tested and is discussed further in 4.3.3. below. Gamification in this context will come in the form of awarding users rewards for completing modules and for high activity. The rewards will be redeemable for search useful items such as public transport and mobile data vouchers. More detail on the reward system is provided in the next sub-section.

An example training module is one aimed to teach "General Security Practices" as part of a security guard skill set, as represented in Figure 1. Upon opening the training module, users will be walked-through a combination of written information on "General Security Practices", followed by short quizzes which provide regular feedback to the user on their learning journey, and assess the extent of the user's progress. In this way, the app adapts the teaching to the individual user: repeating information based on the areas with which the user most struggled. Successful completion of the first module on "General Security Practices" will unlock new modules to the job-seeker; "Communication Skills" for example.

Reward system

As the user completes courses and learns skills, they will be awarded experience points. Upon reaching certain levels of experience points, or by obtaining certain achievements, such as completing their first course, users will earn units of the in-game currency, *Vuzo* (VZ), Users would be able to use VZ to purchase items priced at a conversion ratio of VZ20 to R1 (US$0.08).

Through frequent use, an Umvuzo user will earn a *Vuzo Multiplier* which will increase proportionally to the amount of time spent learning new skills on a consistent basis. As a user learns more, their multiplier increases and the rate at which they earn *Vuzo* increases. This condition provides further motivation for users to engage and learn more frequently and consistently.

As previously stated Vuzo will be redeemable for real life, job search related vouchers.

These vouchers will be aimed at further aiding *Umvuzo* users in finding employment. Upon collecting enough Vuzo a user will be able to purchase various items/vouchers from the in-game store (see the Redeem page in Figure 1). Vuzo can be exchanged to pay for costs such as transport, grooming costs (haircuts, outfit hire from partnering NGOs, etc.) and airtime. Not only will this in-game currency provide greater incentive for Umvuzo users but it will also add a real-life element that provides tangible rewards and outcomes.

The user's achievements will be collected on her Achievements page which will thus act as a report card. By allocating small awards for certain activity Umvuzo uses these awards to help motivate increased and frequent use.

Job Applications

Users will also be able to submit job applications to vacancies uploaded by employers directly through the app, simply by completing a form created by the employer. In addition to the information provided by the job seeker in her application form, employers will be able to access data on the scores users obtained on the app's training modules.

Based on the user's aptitude test, acquired skills and performance, the application will also suggest potential job listings that match a user's profile.
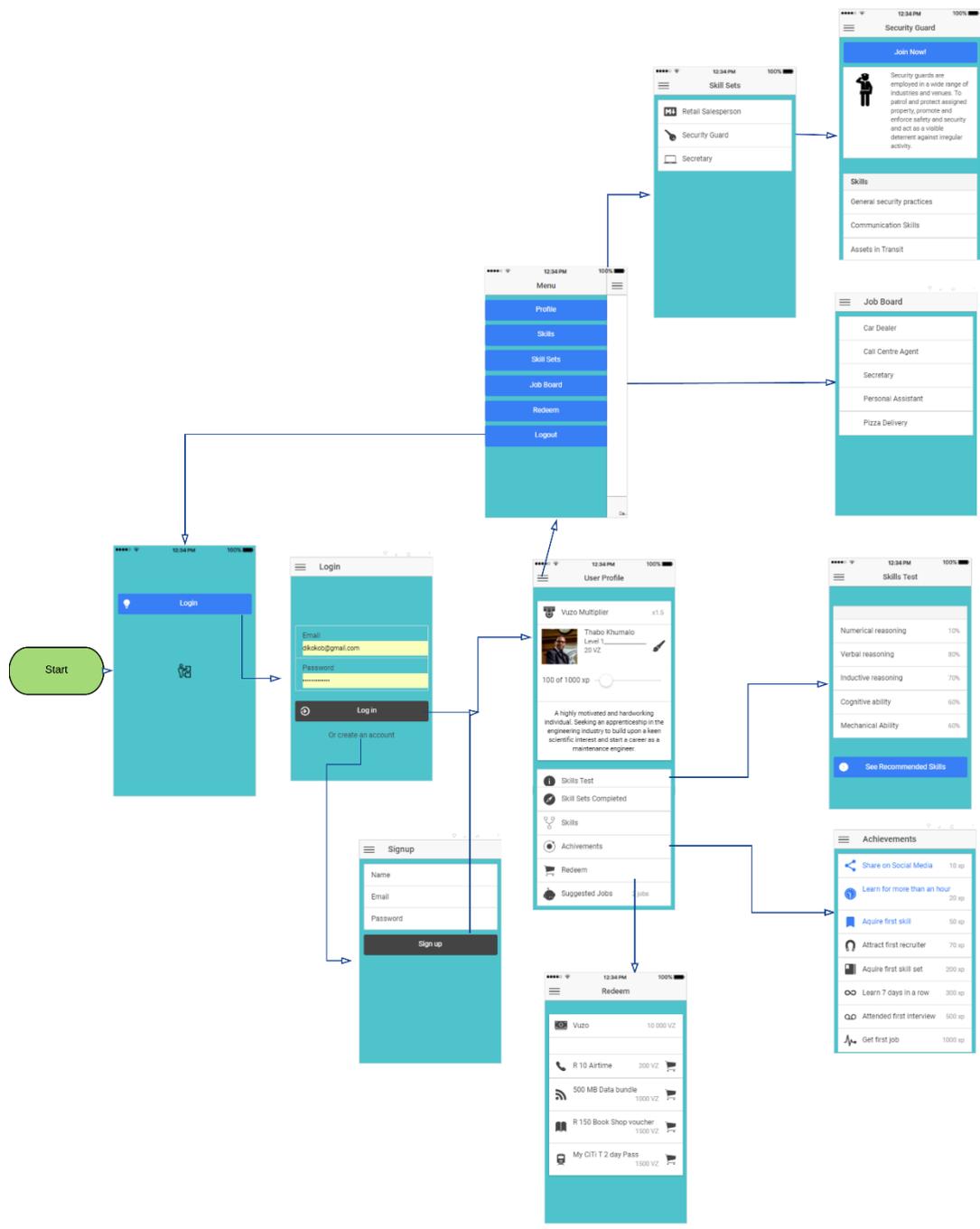
Figure 1: Beta version of the user journey (job seeker version)

4.2.2 Employer user journey

New employers will be able to access Umvuzo through a dedicated website or, like the seeker-facing application, download the compatible version from application stores. These employers will need to complete a registration process similar to that of new job seekers but requiring more information including details of a contact person at the company, industry, nature of workforce, recruitment cycles, etc.

Once registered, employers will be able to make use of one of the three main features available to them: create or advise on training modules, make job postings and receive applications, or access job seekers' performance data in skills of relevance to their work.

Employers' access will be on a freemium basis. All employers will have unlimited abilities to access and influence training modules. However, while "Premium" employers will also have unlimited access to performance data, and new job postings and applications, "Basic" users' access to these functions will be limited. "Basic Users" will not be charged anything while "Premium" users will be charged a small monthly fee. This revenue will support the sustainability of the application, including its ability to create and maintain high quality tailored content, offer real-life rewards and ensure seamless technical operation.

Job Postings

To create new postings, employers will be required to create the listing – where information such as job description, skill requirements and details of the company will be provided – and construct an application form for seekers. To ease the recruiting process, employers will be able to construct their forms based on customisable pre-loaded templates. The app will also allow for communication between the employer and the job applicant.

Performance data access

In addition to posting an opportunity and allowing job-seekers to apply, employers will be able to use performance data such as courses completed and skills obtain to find suitable candidates. Employers will be able to filter seekers' profiles by courses taken, skills obtained, test scores obtained, progression speed and improvement record. This is Umvuzo's unique and beneficial addition to the recruitment experience; unlike other employment intermediation devices *Umvuzo* provides data that is, firstly, centred on demonstrable occupation-related skills and, secondly, which relates to the entirety of a job-seeker's learning journey. This intertemporal insight into the learning progression of an individual will make patent previously unobservable characteristics of the seeker such as determination, diligence and learning efficiency.

Training module creation

Employers will be afforded the opportunity to use their in-house training programmes and intimate knowledge of their industries to advise, contribute to and create new modules. Employers who have pre-established in-house training programs, will be offered the opportunity to incorporate that material into the app's skills modules. Alternatively, employers will be able to comment on our existing modules and contribute any in-house ad-hoc material to the modules. Employers will benefit from this as it will allow them to evaluate the performance of potential employees on the exact work that they will be required to carry out. This reduces the risk for employers of only discovering an employee's inability to complete a training course after the hiring decision has been made or of not hiring the most suitable candidate for a given vacancy. Umvuzo will incorporate the training material provided by the company in such a way as to make the skills learnt here transferrable, so that even unsuccessful applicants to the company in question, will still have developed themselves in the process.

4.3 Justification

This section outlines why it is we believe that this will be a feasible, positive and successful addition to the South African labour market. It begins by introducing reasons for how it directly tackles the three central labour market issues while at the same time overcoming some of the shortcomings of existing interventions, particularly those mooted in the solution landscape above. It proceeds to articulate why South Africa's high degree of smartphone penetration, and the manner in which we plan to circumvent the country's high data costs, make this a feasible option. We also include two sub-sections demonstrating the power of gamification and e/m-learning to entrench occupation-useful skills which are taken seriously by employers.

4.3.1 Addressing the triple challenges

We have already established that one of the central contributors to South Africa's alarmingly high unemployment rates is the issue of skills mismatch. The country's economy has grown to demand skills which the labour force as a whole, and the unemployed pool in particular, do not possess. Umvuzo directly bridges that gap. By offering modular courses on both job readiness skill sets and specific, in demand, skills sets *Umvuzo* offers job seekers the opportunity to acquire those particular skills demanded by employers in a manner which, due to the gamification, increases their chances of motivated, consistent learning and, thus, course completion. Because, as detailed below, the app will be cost free in monetary terms for the job seeker, our application will thus be offering job seekers educational opportunities which would otherwise be prohibitive. We therefore believe our intervention has the potential to significantly improve the skills base of the South African labour force.

The fact that it is in the form of a cost-free mobile application also serves to reduce the transport and other search costs required to find employment. From their own homes, job seekers will be able to view vacancies, make applications, acquire in-demand skills, learn about improving their job search strategies, track their progress and be awarded rewards which can aid their physical job search. From the perspective of employers, this app works to decrease search costs by reducing the degree of uncertainty that comes with new hires and, to the extent that the skills acquired by new hires overlap with in-house initial training, reducing the amount of training required by new hires.

Moreover, *Umvuzo* is an innovative effort to make demonstrable skills the focus of recruitment. By providing a platform through which employers can observe job seekers' skills competencies, learning aptitudes, and levels of motivation, independent of academic qualifications, location, race or other confounding variable, our proposed application makes the discrimination that goes into recruitment a much more efficient process. Umvuzo will not be able to sort or filter job seekers or applicants according to these personal characteristics. Instead employers will have to use performance data generated through the app to sift through potential hires. Furthermore, employers who, as discussed above, have been setting inefficient, arbitrary, criteria in their selection processes, will be able to eschew these in favour of the performance data provided by

our application. Resources inefficiently spent on the recruiting process will then be available for use elsewhere, and more precise hiring decisions will be possible. Both these factors should prove favourable to labour and firm productivity.

In addition, whereas the roll out of transport subsidies and the provision of physical employment intermediation is often a costly exercise, this application promises to be a much less costly intervention, in per user terms. Without the need to incur overheads related to large amounts staffing and one or more physical locations, coupled with the potential to earn revenue from Premium employers and a low variable cost per user, the application presents a more cost-efficient solution. Also, because of these low variable costs per user and its compatibility with a wide range of operating systems, our application is much more scalable than the models adopted by existing forms of intermediation.

4.3.2 Smart phone penetration and mobile data costs

At 37% South Africa's smartphone penetration – the percentage of the adult population which own a smartphone – is the highest on the African continent and ranks among the top 30 countries in the world (Pew Research Centre 2016). Furthermore, the most recent Afrobarometer poll found that 47.6% of South Africans in the age group 15 – 29 use the

internet every day with an additional 17% using it various times a week through a mobile phone or via a computer (Afrobarometer 2016).

The above demonstrates a high enough degree of smartphone penetration to make *Umvuzo* feasible and wide-reaching, particularly among young people, the age demographic with the highest incidence of unemployment in the country and which is therefore likely to benefit the most from our proposed intervention.

There is evidence which demonstrates that South African telecommunication costs, particularly mobile data and broadband, are high. Research ICT Africa, for instance, found that the most affordable data bundles in South Africa rank as the 16th most expensive of its 47 assessed African countries (Research ICT Africa 2016:3), even though smartphone penetration is the highest on the continent.

Furthermore, the National Income Dynamics Study, a nationally representative panel study including over 20 000 South Africans in over 7 000 households, has shown that telecommunication costs as a percentage of income is highest for the poorest households, which, unsurprisingly, are also the most likely to have unemployed household members (Southern Africa Labour and Development Research Unit 2016). This could prove detrimental to the introduction of a data based mobile application such as Umvuzo. However, in addition to being a free application, Umvuzo aims to be cost free with regards to data usage.

To make the application data-cost free we will leverage the fact that it is a social enterprise, is a singular application and has a target market numbering in the hundreds of thousands to partner with South Africa's mobile network operators to "zero-rate" (Research ICT Africa 2016, Futter & Gillwald 2015) use of the application, especially as a corporate social responsibility initiative. There is now a large amount of precedence of applications being zero-rated in South Africa (Research ICT Africa 2016:7). Three of South Africa's major banks, Absa, Capitec and FNB, have concluded deals with all of the country's network operators to make their banking apps data cost-free (Venktess 2017). MTN made the app of streaming radio station *Touch Central* free between certain hours on weekdays following its founder starting a social media campaign demanding the lowering of data costs (Mybroadband 2016a). There is also philanthropic precedent; in 2016, in the midst of severe disruptions to the academic activities as a result of student protests at the university, Telkom, Cell C and MTN "zero-rated" all access to the University of Cape Town's websites, including online study material (Mybroadband 2016b). With a target market and potential take up numbering in the hundreds of thousands, a clear philanthropic benefit, a low data requirement per user, and a singular application, the potential to partner with mobile network providers to make our application data free is high.

In addition, given the social issue being addressed by our proposed solution there is certainly potential for obtaining funding to compensate mobile network operators for the mobile data consumed by our application. Youth unemployment is very high on the national policy agenda. This is evidenced by the large amount of government programmatic activity in this regard including public employment programmes, tax incentives for hiring young employees and the creation of funds to give grants to young entrepreneurs and organisations involved in employment intermediation of young people (Graham *et al* 2016:8). Such funds, like National Treasury's Jobs Fund and the Skills Development Fund demonstrate the potential for sourcing state financial resources. The centrality of youth unemployment on the national policy agenda provides several avenues for our team to obtain the government backing to lend credence to our initiative, particularly as we approach private sector investors and look to partner with the mobile network providers.

4.3.3 Gamification

Gamification is the introduction of typical gaming elements into a non-game context (Herger & Kumar 2013: 12). This includes the concepts of point scoring, leveling up, competition, potential socialization, achievements and various other game playing aspects (Kapp 2012). The gamification of an application allows for increased motivation and engagement (Herger & Kumar 2013:

60). By gamifying progress a subject has the opportunity to directly compare and track one's progress in comparison to themselves, other players or set up goals and achievements (Kapp 2012). This creates greater ambition and motivation in a subject to engage with the gamified application. However, gamification only works when this aspect of motivation and challenge is present. By placing the user "in-charge" gamification allows the user to be autonomous in their progress. This provides a sense of autonomy and control that amplifies the motivation to engage (Herger & Kumar 2013: 73). In introducing the leveling up or experience based system traditional to games, gamified applications attach immediate value to skills learnt or tasks completed. This promotes competence development as well as a genuine desire to grow or develop a skill (Hamari, Koivisto, & Sarsa 2014).

An example of effective gamification is that of the language learning mobile application *Duolingo*. The fact that in 2012, *Duolingo* was proved to be more efficient in teaching a language than a full semester in College shows the power of successful gamification to improve learning outcomes (Grego & Vesselinov 2012: 1). As demonstrated by our rewards system above, Umvuzo seeks to harness this power as well.

4.3.4 Online/app-based learning

Online/app-based learning can be understood as virtual learning and teaching through the internet or through a mobile application (Nichols 2003: 7). Over the last decade the concept of online or e-learning has gained popularity – gaining greater presence within the workplace (Clark & Mayer 2016: 7). This increased prevalence is due to the many benefits presented by online learning. The immediate strength of online learning is the massive reach information develops when not limited to a physical location (Clark & Mayer 2016: 8). The ability to learn at a distance or in almost any environment makes learning much more accessible. Online learning allows for the formation of a "virtual classroom" in which students can be in any location at any time yet still have the same access to information and lessons (Clark & Mayer 2016: 10). This allows for a flexibility that enables freedom and autonomy in participating students. Without the structures of set class times a student can participate in many more activities such as maintaining a full or part time job. Furthermore, online learning enables the rapid distribution of information (Vazquez-Cano 2014).

Umvuzo, like other app based education platforms, capitalises on these benefits of online learning to make the learning process even more accessible. As previously established, about 64% of South Africans use the internet on a regular to daily basis (Afrobarometer 2016), much of which occurs through mobile phones. Even though the app is designed to cater primarily for job seekers, it does provide additional training opportunities to all of that 64%.

Online learning is also individually focused – this means that the 'virtual classrooms' are simply the student and the virtual teacher (Clark & Mayer 2016: 8). This one-on-one style of teaching results in direct feedback, a teaching pace based on the student's ability and the attention and focus on the individual that is necessary for optimal learning (Clark & Mayer 2016: 26). On the other hand, online/application based learning does require both access to and literacy with particular technology (Clover 2017). Moreover, the lack of person-to-person interaction can be seen to impede the transfer of knowledge (Brown 2005). Being aware of these shortcomings, we at *Umvuzo* intend to host "Umvuzo Open Days" where we will run workshops on maximising use of the app. Further, top users (as measured by experience points, VZ and motivation data) will be invited to Career Workshop Days where potential employers can engage with job seekers face-to-face, and in the process speak to job seekers about the nature of the labour market, presentation, interviews, lifelong learning, social skills at the workplace and other job readiness issues, all of which our review of the literature on employment mediation demonstrates is supportive of job search and are aspects in which South African job seekers are lacking (Graham *et al* 2016; Kraak 2015; Dietliens 2015). Both these types of events will occur in townships to ease access and

attendees will be reimbursed for any transport costs incurred.

Umvuzo looks to equip potential employees with the skills needed to find employment. However, establishing an online/application based institution that is recognized by targeted employers requires some form of accreditation which gives gravitas to the qualifications provided (Pappano 2012). A "nanodegree" is one such form of accreditation. A nanodegree is an online certification that is awarded to those who complete courses hosted by recognized online institutions (Udacity 2017). The term was coined by the online education provider *Udacity*. *Udacity* has established itself as a reputable educational facility where its "nanodegrees" are recognized by potential employers. *Udacity* achieved this through researching the skills needed to qualify for entry level job applications and subsequently focusing their courses on teaching those necessary skills (Pappano 2012). Potential employers now recognize a nanodegree from *Udacity* as proof of qualification in their potential employees. A similar system is utilized by *Lynda,* another online educational institution. *Lynda* offers various entry to advanced level courses that equip its learners with the necessary skills. *Lynda* also offers their equivalent of a nanodegree. Although not universally recognized the *Lynda* degree can be linked to one's Linkedin profile and carries some weight for those who have no formal qualifications at all.

Umvuzo will follow a similar model. Upon completion of a skill set, job seekers will be issued a printable certification – a nanodegree of sorts – through the application. Because we provide employers with the opportunity to involve themselves in the course creation process (Pappano 2012) and because we tailor our courses to those demanded by the labour market, our skills are constructed to inculcate those skills most likely to result in employability. We also believe that the awarding of a *Umvuzo* nanodegree would encourage course completion because its printability means that it would be presentable to potential employers outside of the app.

5. CONCLUSION

This paper began by establishing the contours of unemployment in South Africa, a lingering, seemingly intractable problem of South Africa's democratic-era socio-economic landscape. Over the last 23 years various attempts to combat this phenomenon have proved unsuccessful thus impeding the country's economic development. An exploration of the nature of this problem permitted a wide analysis of the South African labour market as well as a narrow fine-tuned look into skills mismatch, search costs, and discrimination

Through analysing employment intermediation and transport subsidies, the solution landscape highlighted some contemporary means of addressing the proposal's chosen areas of focus, highlighting both the successes and shortcomings of these interventions. The proposed solution, the mobile application Umvuzo, proved to encompass the tools needed to directly challenge unemployment while its reliance on tested learning strategies, low cost nature and scalability meant that it could potentially overcome the shortcomings of physical employment intermediation and transport subsidies. Umvuzo was thus shown to be an intervention which could equip job seekers with tools and skills to aid them in their job search and improve their employability while at the same time providing an innovative, efficient recruitment mechanism for employers.

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