Helping disadvantaged youth find employment in web development

Zoë AMANSURE

Department of Computer Science, University of the Western Cape,
Contact number: +27 79 535 7791, Email: zoe.jims@gmail.com

Abstract: The level of education of a large percentage of South Africans youth is not favourable for gaining meaningful employment according to Statistics South Africa. In disadvantaged areas, youth unemployment is at its highest. This research paper will consider the root causes of unemployment of South African youth and the factors that contribute to it. A case study of an intervention to improve the social development of disadvantaged youth by providing them with internships will be studied. It will focus on the expectations of interns and managers of an eLearning software solution to assist with intern training. A learning management software solution, designed to provide trainees with resources to learn web development; software engineering and prepare trainees with the necessary skills for employment in the corporate environment, will be discussed.

Keywords: information and communication technologies; internship; empowerment; learning management system; Moodle; e-learning; unemployment

1. Introduction

Unemployment amongst youth[1] is a huge problem in South Africa according to Statistics South Africa where 70% of youth (without disabilities) have remained unemployed since 2013; with black people[2] having the highest unemployment rates (Statistics South Africa. Pretoria, 2011). Reducing unemployment has been the government's plight for the last forty years (Lam, Leibbrandt, & Mlatsheni, 2008). A Labour Force (The World Bank, 2006) survey taken in March 2005 revealed that 42% of youth have dropped out of their studies. Further research reveals that even students who have access to bursaries or scholarships still drop out (Cramm, Nieboer, Finkenflügel, & Lorenzo, 2013). When students were questioned about why they dropped out of their studies, students had said that they would rather settle for average jobs to subsidise the income for their families (Statistics South Africa. Pretoria, 2011). The use of social and other networks and personal contacts, which disadvantage youth don't have access to, often improve the chances of youth finding employment (Cloete, 2016). However, the people in the networks of the disadvantaged youth are mostly also unemployed.

eLearning has the ability to reach groups of people in different regions, and has become the preferred level of learning for many individuals (Ellis & Kuz, 2014). Corporate eLearning is sought in businesses today and has become a driving force to offer customized training solutions to employees (Cross & Hamilton, 2002).

---

[1] Youth are ages between 15 and 24.
[2] In terms of the Broad-Based Black Economic Empowerment Act the term black people means African, Coloured or Indian persons who are natural persons.

1.1 User Requirements

Youth in disadvantaged areas find it challenging to further their education and gain employment. This is due to little or no work experience and an absence of resources and strong networks (Cloete, 2016). An eLearning platform that can provide information technology training for interns from disadvantaged backgrounds was developed. This platform considered two types of users, a manager and an intern.

The manager would like to take on interns from disadvantaged areas, but lack the capacity to train them. They want to be able to track the courses an intern has done and their performance in these completed courses. As well as implement assessment opportunities for the interns using an eLearning software package that considers all the skills the intern needs to be exposed to.

The intern would like to access the LMS on multiple platforms and have access to content off-site in order to revise work even when not at work. They would like to receive feedback in order to review their progress. Interns want to have access to content off-site in order to revise work even when not at work. Since Wi-Fi access and data is expensive they would like to be able to download content and upload tasks when in a Wi-Fi environment. Interns would like to be able to code offline; thus be able to access a text-editor. And it will benefit them to collaborate with peers and mentors.

eLearning platforms such as W3Schools and CodeAcademy do not offer the above nor does it provide interns with case studies that can be utilised for programming.

1.2 – Data collection

The research methodology employed for this study used both qualitative and quantitative methods. The data use for this study was collected through observation, literature reviews, semi-structured interviews and questionnaires. The research took place in the following locations:

- A digital agency known as *Responsive,* located in the suburb of Woodstock, Cape Town in South Africa. The company hosts an internship programme for 1 student per year. The aim of the internship program is to take on candidates from disadvantaged backgrounds. The program was initiated in 2017 when the company was approached by a non-profit organisation known as *Code4CT* (www.code4ct.com). The company, *Responsive*, intends to continue the program in the future, to improve their Corporate Social Responsibility (CSR) scorecard. One of the aims of the company is to provide opportunities for unskilled youth.
- The University of the Western Cape located in the suburb of Bellville, Cape Town in South Africa. The research participants included youth[3] who come from a disadvantaged background and who have an interest in computing, technology and web development, lecturers in the eLearning field and corporate companies who are interested in a program that employs disadvantage youth.

2. Requirement Analysis

The proposed eLearning solution was targeted at a corporate entity enabling them to employ disadvantaged youth without tertiary education. The South African Department of Education has emphasized an e-Education Bill that will improve the level of education in South Africa (Takalani, 2008). Therefore corporate companies are able to apply for funding

---

[3] All the participants in the study had obtained a National Senior Certificate (NSC). The participants are currently not studying at any tertiary institutions or are employed as unskilled workers.

towards educating the disadvantaged youth. eLearning solutions are being used in many institutions and has been a good alternative for students from disadvantaged areas (Takalani, 2008). Information, Communication and Technology (ICT) has become an integral part of the modern world and it has made eLearning almost indispensable.

The eLearning platform that was chosen for the development of this solution was Moodle. Moodle is an open source learning management system (LMS) that facilitates course creation. Moodle can be seen as a "technological Lego"—it comprises a set of plugins (similar to Lego blocks), which allows the developer to fully customise an application. It is open source and therefor also available for development without any cost to the developer.

The objective of this research was to develop a system that would give disadvantaged youth access to training and thus give them an equal opportunity for attaining employment and an improved quality of life.

3. Design

2.1 – High level design

The class diagram (Figure 1) depicts the flow of the LMS. Each part of the user interface is described below.

| Object	Description
User: Intern Admin: Manager	The manager is able to register interns to the LMS and the intern is able to login to their account
Dashboard	The manager is able to view a list of interns, which courses they have signed up for, completed, progress, and their performance level overall and within each course and when last the intern has logged in
Course manager	The manager is able to create, edit and delete courses and the intern is able to do courses they are enrolled in
Assignment and Feedback	The manager is able to add assessments and quizzes that can be graded. After assignments are completed or graded they can also provide feedback on the work the intern has done, this feedback is visible to the intern
Terminal	The intern is able to program on the platform. When programming, a checklist of requirements, which is expected from the intern, is ticked off when the specific program line is finished and working
History	The past work the intern has programmed should be recorded and the intern is able to refer back to it in the future
Upload and Downloadable content	The content on the site should be downloadable so the intern is able to view the work while at home where the intern does not have access to the internet. The interns should also be able to upload their own content
Chat	Messaging service where the intern is able to communicate with the manager of a course they are enrolled in
Announcements	The manager is able to sent out announcements of when assignments are due and when feedback is released
Collaboration	The interns are able to collaborate with other interns as well as mentors

2.3 – Class Diagram
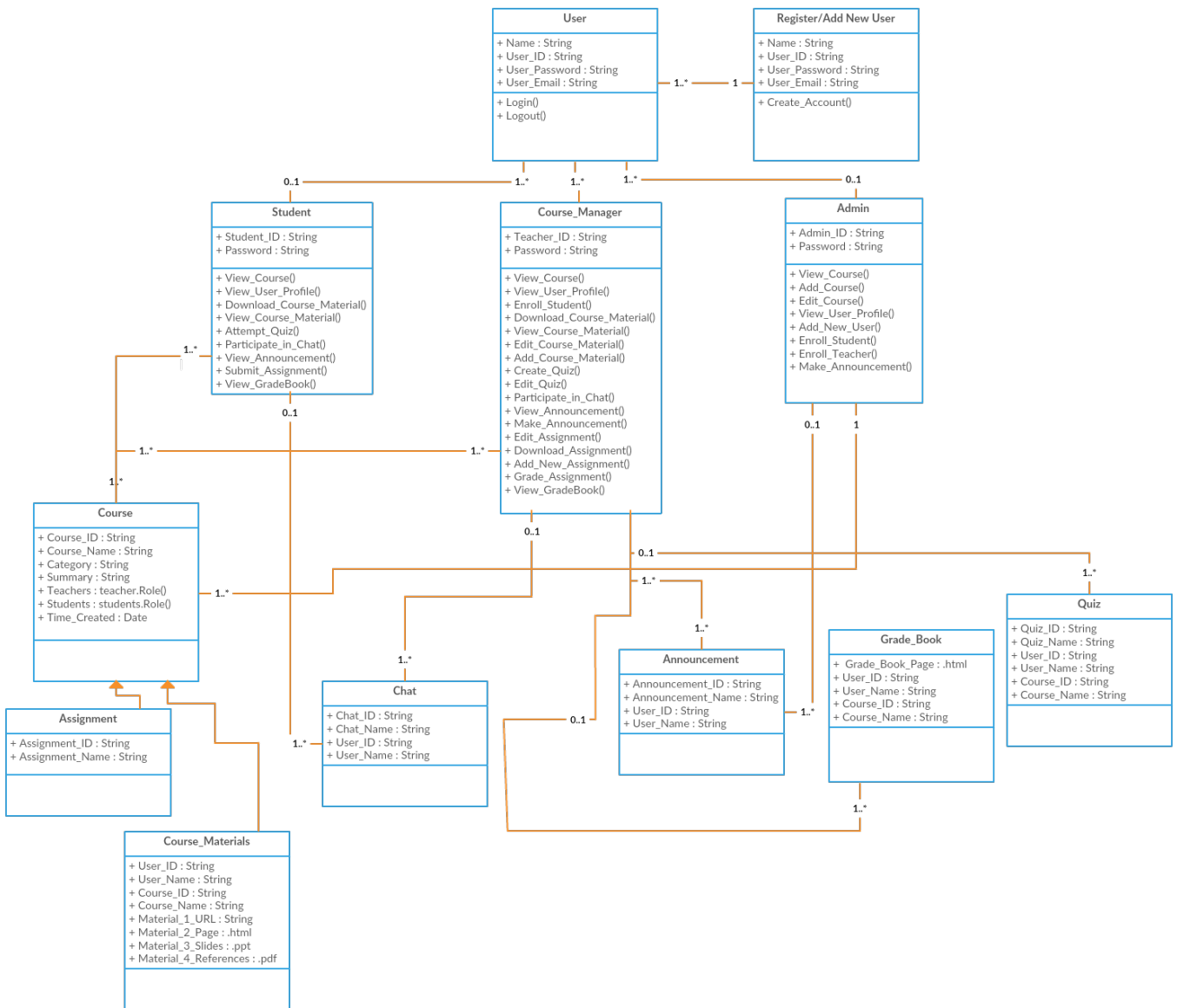
Figure 1 - Detailed Class Diagram (Authors own construct)

2.3 – State Diagram

Figure 2 depicts the state machine diagram for the LMS, the intern or manager first logs into the LMS. The system verifies the username and password of the intern or manager. Once the username and password of the intern or manager is verified, the system will display the relevant dashboard. The intern may search the courses available to them on the site. Then the intern may complete courses the intern is enrolled in and the information is stored in database. Once the intern has ended their session, they may logout. The manager is able to handle different events on the site such as, viewing interns, viewing reports, add and edit courses and assignments.
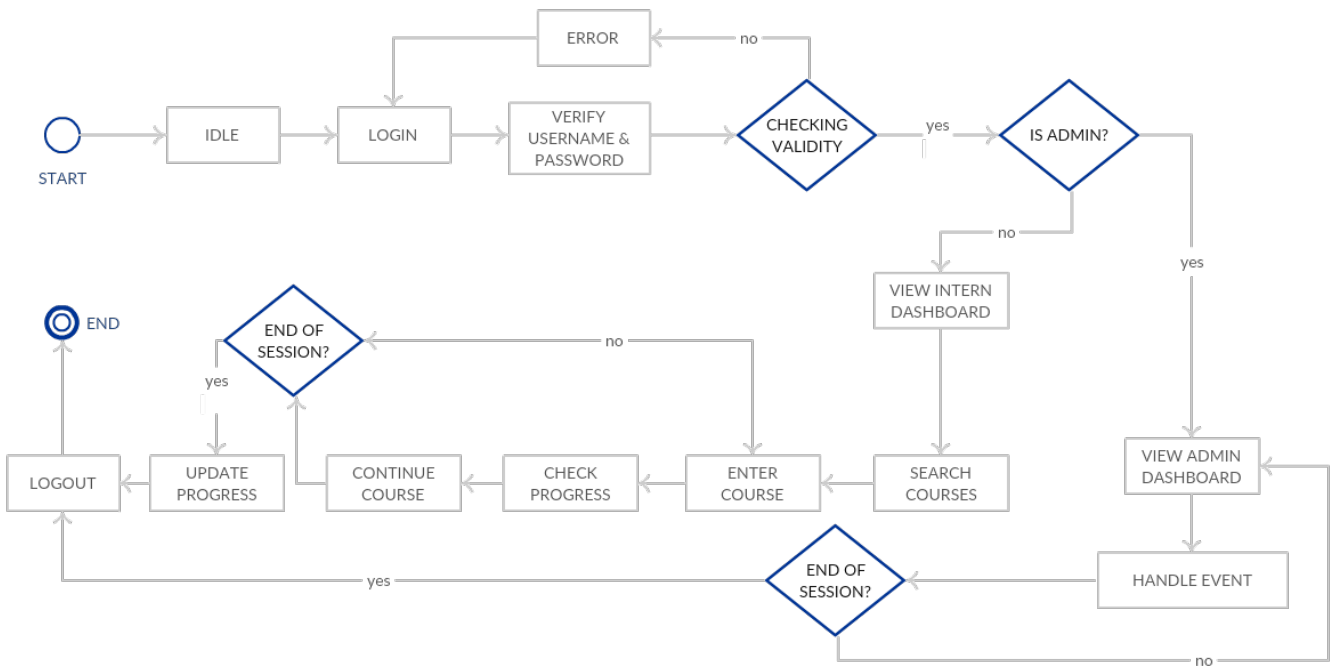
Figure 2 – The state machine diagram for Learning Management System - Moodle (Authors own construct)

4. User Interface and Prototype

The intern's user interface will consist of the following:

- Login Page– The intern is registered through the company and receives their login via email, the intern then logins with the details provided. The intern is also able to logout after they have ended their session.
- Retractable Menu – This provides the intern with an easy view menu where the intern can navigate to calendar and private files, which include assignments, and uploaded files.
- Notification and Messenger Icon – The intern is able to view notifications such as announcements, course information, and assignment due dates and see messages they have received from the manager or other interns as well as create a new message.
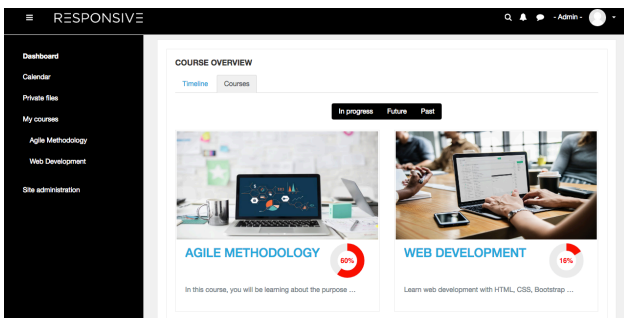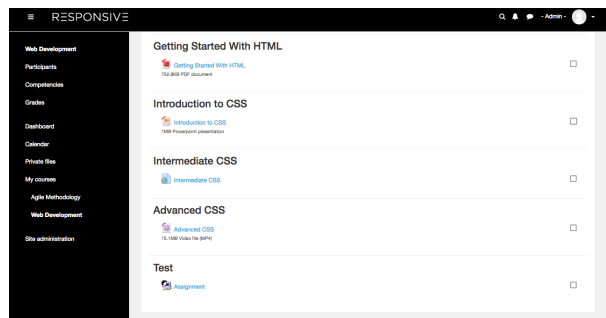

Figure 3 - Home Page

Figure 4 - Course page

- Dashboard – The dashboard provides an overview of what the intern is able to do.
  - o Courses – Courses that the intern is enrolled in will be displayed here. The intern has to be enrolled to these courses by the manager.
    - ▪ Description – The description provides a brief overview of what the course is about.

- **Progress Donut** – The progress donut gives the intern a clear indication of how far they are in the course.
- **Curriculum** – The curriculum of each course is available to the student under retractable bars. The intern is able to select a topic and view or download the content. Once the intern has completed the course, the intern is able to complete an assignment/quiz.
- **Download** – Interns are able to download content in both document and video form.
- **Upload** – Interns may submit assignments by uploading their own work.
- **Terminal** – Interns may also submit assignments on the website by coding directly in the terminal. The student is able to code in several different tabs and submit once the intern has completed their work.

The manager's user interface will consist of the following:
- **Login Page** – The manager is able to login with the details given from the service provider. The manager is able to logout after they have ended their session.
- **Notification and Messenger Icon** – The manager is able to view notifications such as assignments received, assignments that need to be graded and when courses are starting and completing. As well as receive and create new messages.
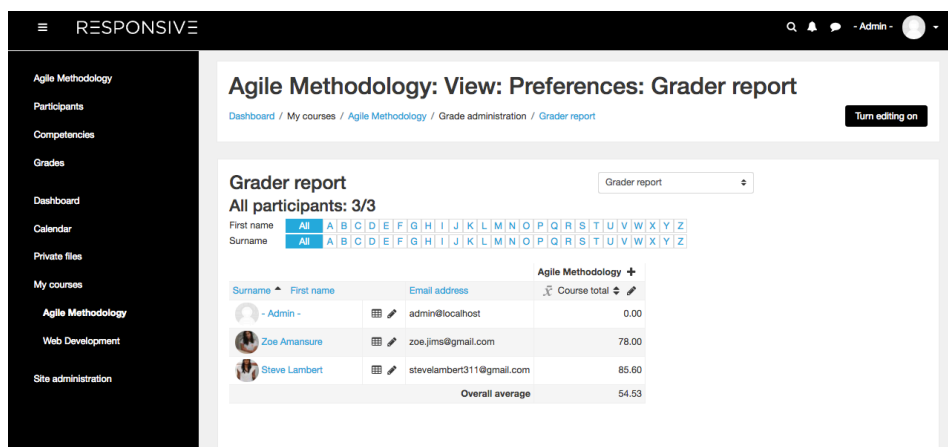

Figure 5 - Admin Grader Report

- **Retractable Menu and Dashboard** – This provides the manager with a easy view menu where the manager can navigate to the following menus:
  - **Course Management** – The manager can view and manage all courses. The manager may also add a new course. Here the manager has access to the following:
    - Edit the course content or dates
    - Send a message or announcement within the course
    - Enrol or un-enrol interns
    - View the grade book (See Figure 5)
    - Delete the course
  - **Interns** – The manager is able to view a list of all the interns and their individual courses and progress. (See Figure 6)
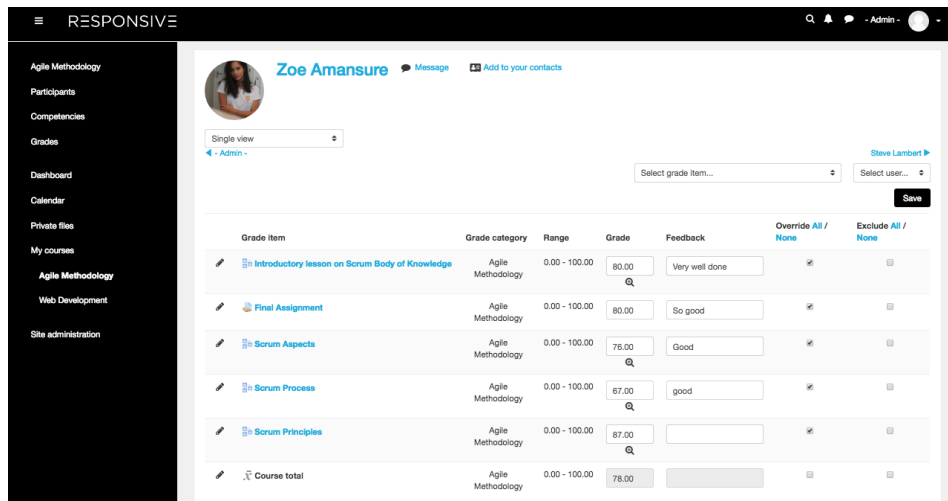
Figure 6 - Individuals Progress

    o   Calendar – The manager is able to view important dates such as assignments received, assignments that need to be graded and when courses are starting and completing.

5. Implementation

- The solution was developed in the form of a webpage using Moodle 3.3.7 (Build: 20180709). To develop the website Visual Studio Editor was used. Visual Studio is a code editor that is optimized for building web and cloud applications. The reason for using an editor was because it was easy to use and push the code to GitHub for version control. The programming languages included PHP, HTML, SCSS, JavaScript, Mustache and SQL. The prototype of the website was created with Photoshop and InVision. Photoshop is a graphic editing software. This software was used because it wasn't limited (like other prototyping software's, which expired after a certain period). InVision is a prototyping tool that allows one to create hotspots on pictures (.png/.jpeg). This software was used to bring the Photoshop static images to life. Youtube, a video sharing website, as well as Moodle Development Resource Documentation was used consistently throughout the implementation of the project for guidance and assistance when encountering errors.

Table 1 - Modules of the Moodle Platform

No.	Activity	Module	Description
1	Creation	Database	Allows to build, display and search entries
2	Organization	Lessons	List of ordered topics summarizing the materials for specific courses
3	Delivery	Assignments	Allows manager to collect work from interns, for grading and feedback Allows student to upload or code assignments
4	Communication	Messenger	Allows synchronous conversation
		Forums	Communication tool where interns and manager can exchange ideas by posting comments
		Announcements	A special forum that allows for general announcements Allows manager to broadcast posts and emails
5	Assessment	Choice	Allows manager to ask questions and specify multiple choice answers

		Quiz	Allows managers to design and build quizzes with a variety of questions, such as multiple choice, true/false, short answer
		Survey	Allows teachers to gather feedback from students using prepackaged questionnaires
6	Admin	Graphing	The manager is able to view a graph displaying the progress of interns in a specific course

Table 2 - Modules of the Author

No.	Activity	Module	Description
1	Terminal	Code Editor	Allows intern to code assignments in a terminal
2	Admin	Feedback	The manager is able to give feedback on interns assignments, quizzes and code
3	Intern	Downloadable Content	The intern is able to download documents and video from the course
		Progress Donut	The intern is able to view their progress of a specific course

References

Banerjee, A., Galiani, S., Levinsohn, J., McLaren, Z., & Woolard, I. (2007, 06). WHY HAS UNEMPLOYMENT RISEN IN THE NEW SOUTH AFRICA. *NATIONAL BUREAU OF ECONOMIC RESEARCH* .

Bank, W. (2014, 05). South Africa - Labour Force Survey March 2005.

BEE Commission. (2001). *Black Economic Empowerment Commission.* Woodmead, Johannesburg: Skotaville Press.

Cloete, A. (2016). Youth unemployment in South Africa. *Missionalia* .

Cone LLC. (2010). Cone Cause Evolution Study. *ppqty* .

Cramm, J. M., Nieboer, A. P., Finkenflügel, H., & Lorenzo, T. (2013). Comparison of barriers to employment among youth with and without disabilities in South Africa. *WORK: A Journal of Prevention, Assessment & Rehabilitation , 46*, 19-24.

Cross, J., & Hamilton, I. (2002). The DNA of eLearning. *Internet Time Group* .

Du, Z., Fu, X., Zhao, C., Liu, Q., & Liu, T. (2013). Interactive and collaborative e learning platform with integrated social software and learning management systems. *International Conference on Information Technology and software Engineering & Digital Media Technology* .

Ellis, P., & Kuz, K. (2014). Corporate Elearning Impact on Employees. *Global Journal of Business Research , 8* (4).

Groenmeyer, S. (2011). Intersectionality in Apartheid and Post-apartheid South Africa. *SAGE Publications* .

ict Development Associates ltd. (2011). ICT for Teaching and Learning in South Africa. *African Development Bank & partners* .

Lam, D., Leibbrandt, M., & Mlatsheni, C. (2008). Education and Youth Unemployment in South Africa. *Southern Africa Labour and Development Research Unit* , 34.

Maree, J., & Molepo, J. (2007). Changing the approach to career counselling in a disadvantaged context: a case study. *Australian Journal of Career Development , 16*.

New Zeland Business Council for Sustainable Development. (2010, 12). The Social Role of the Business: How to leverage business - community engagement for a more prosperous society.

Omer, M., Klomsri, T., Tedre, M., Popova, I., Klingberg-Allvin, M., & Osman, F. (2015). E-learning opens the door to the global community. Novice users experiences of e-learning in a Somali University. *Journal of Online Learning and Teaching , 11*.

Redclift, N., & Sinclair, M. T. (1991). International perspectives on labour and gender ideology. *London: Routledge* .

Snyders, J. S. (2013). An interpretive study of high school dropouts in the context of a former disadvantaged community. *Stellenbosch University* .

Statistics South Africa. Pretoria, S. A. (2011). *Stats SA*. From https://web.archive.org/web/20151113203528/http://www.statssa.gov.za/publications/P03014/P030142011.pdf

Steve Rochlin, R. B. (2015). Defi ning the Competitive and Financial Advantages of Corporate Responsibility and Sustainability. *IO Sustainability* .

Takalani, T. (2008, 02). Barriers to E-Learning amongst Postgraduate Black Students in Higher Education in South Africa. 124.

Tech in Africa. (n.d.). From http://www.techinafrica.com/impact-zumas-departure-african-economy/

The World Bank. (2014, 05). South Africa - Labour Force Survey March 2005.

The World Bank. (2006). World development Report 2007. *Development and the next generation* .

The World Bank. (2016). *World Development Report: digital Dividents*. Retrieved 03 27, 2018 from Worldbank.org: Http://documents.worldbank.org/curated/en/896971468194972881/pdf/102725-PUB-Replacement-PUBLIC.pdf