

E-LEARNING AIMED AT CONTENT  
DEVELOPMENT FOR COMPANY INTERNS

by

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Abstract

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Learning today is not confined to the physical classroom but has evolved into learning that is possible anytime and anywhere. This research project will consider building a learning environment by the training of interns for companies taking into account the needs of interns from disadvantaged areas. The intention is to develop an eLearning solution to extend the company's onsite training. The proposed solution will not only be available on a desktop but will be a fully responsive site viewable on a mobile phone. Initially the content of the course will consist of learning material for basic web development and software engineering that is downloadable and the intern can learn without requiring network access.

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## GLOSSARY

**eLearning.** eLearning refers to the use of technology to facilitate learning

**LMS.** Learning Management System

**Moodle.** Moodle is an open-source learning management system

**STEM.** Science, Technology, Engineering or Mathematics

**NSC.** National Senior Certificate

**CSR.** Corporate Social Responsibility

**HTML.** Hypertext Markup Language

**XML.** Extensible Markup Language

**SCSS.** “Sassy CSS”

**CSS.** Cascading Style Sheets

**PHP.** Hypertext Pre-processor

**SQL.** Structured Query Language

**JSON-RPC.** JavaScript Object Notation-Remote Procedure Call

**SDK.** Software Development Kits

**GUI.** Graphical User Interface

**Code4CT.** Code for Cape Town is a programme that introduces young girls to basic web building skills

## *Chapter 1*

### USER REQUIREMENTS DOCUMENT

Corporate eLearning has become a sought after necessity in businesses today, and has become one of the driving forces of a company because of its design to offer customized training solutions to employees (Cross & Hamilton, 2002). ELearning has the ability to reach groups of people in different regions, which have become the preferred level of learning for many individuals (Ellis & Kuz, 2014). According to Statistics South Africa, 50% of South Africa's population is living in poverty. In South African, 70% of youth remain unemployed as of 2013 (without disabilities) (Cramm, Nieboer, Finkenflügel, & Lorenzo, 2013). Online networks or personal contacts often assist the youth in obtaining employment. However, the chances of the youth in disadvantaged areas in South Africa, that do not have access to online networks and contacts, are very limited in obtaining employment because their off-line networks are also unemployed. Furthermore, women are less likely to choose a career in Science, Technology, Engineering or Mathematics (STEM) than men they are often paid less than their male counterparts in the same positions once they qualify (The World Bank, 2016). In United States, less than 25% of STEM positions are filled by women and for every dollar a man earns in this field, a woman earns only 86 cents (The World Bank, 2016). The majority of women with a STEM degree (56%) prefer to work either in education or in health care (The World Bank, 2016). According to Census 2011, black Africans have the highest unemployment rate in South Africa (Statistics South Africa. Pretoria, 2011). Reducing this number has been the government's plight for the last forty years (Lam, Leibbrandt, & Mlatsheni, 2008). A Labour Force (Bank, 2014) survey taken in March 2005 revealed that 42% of youth (ages 15 -24) have dropped out of their studies. Further research reveals that even students who have access to bursaries or scholarships still drop out (Bank, 2014). When students were questioned about why they dropped out of their studies student had said that they would

rather settle for an average jobs to subsidise the income for their families (Statistics South Africa. Pretoria, 2011).

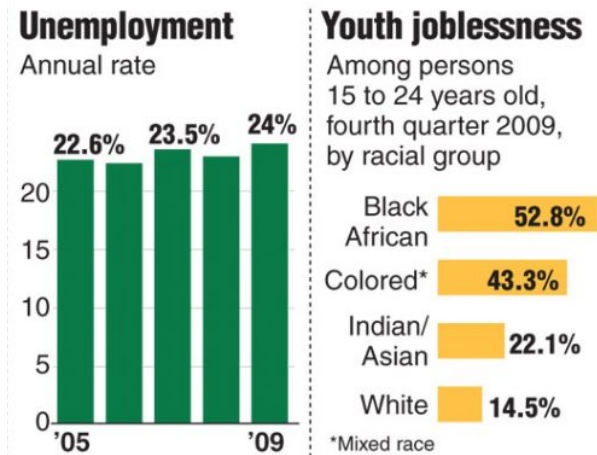


Figure 1 – Organization for Economic Cooperation and Development (Tech in Africa)

The purpose of this study is to create an integrated and responsive Learning Management System (LMS) for a corporate company specialising in web development and design called *Responsive*. The purpose of the LMS is to train interns both inside and outside of the workplace. Opportunities for disadvantaged students who are studying while simultaneously working in the corporate environment will be discussed. In addition, disadvantaged youth will be able to improve skills in a field they are interested in and thereby gain adequate knowledge to improve their quality of life.

### Description of the problem

The absence of a comprehensive but user-friendly LMS, specific to *Responsive* digital agency, that assists interns with learning specific programming skills.

### Data collection

The research methodology in this study is of a quantitative nature. The research was conducted using the following focus groups:

- Youth\* who come from a disadvantaged background and who have an interest in computing, technology and web development
- Corporate companies who are interested in a program that employs disadvantage youth
- Lecturers in the eLearning field that have been exposed to programs assisting disadvantaged youth

The data use for this study was collected through observation, literature review, semi-structured interviews and questionnaires.

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

### **User's view of the problem**

There are 2 types of users that will be using the LMS platform. It is targeted at managers and interns in the corporate environment.

The manager's view of the problem:

- The manager would like to take on more interns from disadvantaged areas but does not have the capacity to train them.
- The manager is not able track what courses the intern did as well as their performance in the completed courses.
- Currently the manager cannot determine the progress of the intern because of the absence of a comprehensive LMS system.
- There are no assessment opportunities for the interns because the available eLearning software packages are not linked to each other and most of the packages do not provide assessment.

The intern's view of the problem:



- The intern is forced to access multiple platforms to complete a specific course.
- The platform that interns are currently using does not record thereby making access to completed work impossible.
- The existing platforms do not have a feedback mechanism and therefore does not allow interns to review their progress.
- Current eLearning platforms such as W3Schools and CodeAcademy do not offer case studies that the intern can utilise for programming.
- Currently the intern does not have access to the content off-site and is not able to revise work from different locations.
- Currently the content is not downloadable.
- ELearning platforms such as W3Schools and CodeAcademy do not allow interns to upload their own content.
- The current platforms used do not offer methodologies (such as Agile and presentation skills) courses that are predominantly used in the company.
- Interns are unable to determine the accuracy of the code in some of the packages that is available.
- Collaboration between student and mentors, both in text and voice form, is not possible.

### **Brief description of the problem domain**

The research took place in the following locations:

- A digital agency know as *Responsive*, which is located in the suburb of Woodstock, Cape Town in South Africa. There are two complimentary aspects to the company:

1. The “build” aspect which primarily focuses on development i.e. web development and back end development
2. The “create” aspect, which is the creative aspect i.e. social media, photography and videography.

The employees of the company include developers (entry – senior level); quality assurers; business analysts and creatives (i.e. videographers, photographers, social media writers, etc.).

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*. The company, *Responsive*, intends to continue the program in the future, to improve the 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, which is located in the suburb of Bellville, Cape Town in South Africa. The research participants included lecturers, student from disadvantaged backgrounds and student who oversaw similar programs that facilitate disadvantaged youth.

### **What is expected from the software solution**

The software is expected to provide a smooth transition between the company’s website and the new eLearning platform. The eLearning platform provides interactive and educational content for interns to learn specific skills.

### **What is not expected from the software solution**

The proposed platform will not offer videoconferencing tools because it is too complex to implement because of encryption and network security. Videoconferencing facilities are already available in the form of Skype and FaceTime, etc. The software will offer tailor made courses for the company and not off-the-shelf courses.

## **Conclusion**

Chapter 1 focussed on the user requirements that were gathered, the problem description and the needs of the manager and the intern. The chapter also gave an overall view of what is and is not expected from the software. In the following chapter we discuss the requirements analysis document, which looks at the problem from the designer's point of view.

## Chapter 2

### REQUIREMENTS ANALYSIS DOCUMENT

#### **Introduction**

The overall problem that *Responsive* was faced with was addressed in Chapter 1. In this chapter the software solution to solve the problems as well as what is and what is not expected of the software from the view of the programmer will be discussed.

#### **Designer's interpretation of the user's requirements**

The problem is that the platform that *Responsive* and interns is currently using is lacks aspects that will be of benefit to the company and the interns. Such as a performance chart that displays the interns current level, progress and times of activity, that will benefit the manager. As well as collaboration features and more robust learning and activities, that will benefit interns and the learning process.

#### **High level constituent parts and a deep analysis of these parts**

- Registration: The intern is able to set up an account on the portal.
- 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.
- Assessment 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.
- Timeline: There is a visible view of the timeline on the dashboard and the intern can see assignments and due dates for each.
- 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.
- Messaging: Messaging service where the intern is able to communicate with the mentor or the manager.
- Notifications: For the intern, notifications of deadlines and assessments that needs to be done. For the manager, notifications of due dates of interns, when assessments need to be graded.
- Collaboration: The interns are able to collaborate with other interns as well as mentors.
- Gamification: The platform offers a game like interface where users can code games relating to the content at hand.

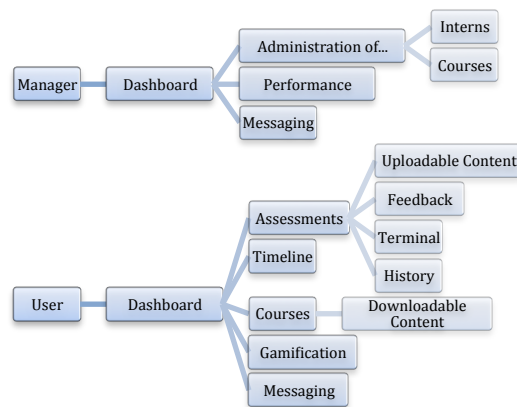


Figure 2 – Summary of the proposed solution

### **Identify existing solutions**

There are many public eLearning platforms available for programming online. An example of an eLearning platform used by interns is W3schools ([www.w3schools.com](http://www.w3schools.com)). W3schools offers learning, training and simplified examples for the user to grasp. W3schools offers web development content such as HTML and CSS, XML, JavaScript, web building and server based languages. This could be a good solution yet it is not viable because it doesn't offer different levels of content, it also has not got a record platform where the user is able to keep track of their work and refer back to it later.

Edmodo is a LMS similar to a social networking platform, where learners, teachers and parents can comment on and share. The platform excels in teacher-student collaboration as well as support. The platform is not intended for tertiary education or businesses because it offers very limited third-party integration functionality other than Google Apps and Microsoft Online. The platform is also not mobile friendly.

### **Proposed solution and linking these solutions to aspects the problem**

The solution proposed is Moodle. Moodle is an open source eLearning platform that facilitates course creation that is only accessible by enrolled students. Moodle can be described as Lego blocks that comes with a set of blocks, which are the plugins; because of its free availability full customisation is possible

The languages used in Moodle consist of:

- PHP – PHP is the core scripting language for the server side of Moodle
- HTML, SCSS and JavaScript – These languages are used for the client side of Moodle
- SQL – MySQL is used for any database extractions
- Registration: Create a form that will connect to the database and update the USER model object using SQL. The USER entity will consist of the fields: **username, email, password** etc.

- Dashboard: SQL will be used to collect information from the database and be displayed on the front-end using HTML and SCSS.
- Assessment and Feedback: Different forms are linked to the webpage to allow for assessment and feedback.
- Terminal: An emulator plugin can be displayed on the site, it is linked to a JSON-RPC (data sent to the server that does not require a response) service when the intern types commands.
- History: Access database that keeps a record of the terminal and assessments, and export it as `.txt` files.
- Timeline: Pulls due dates from the database and displays them on the front end.
- Upload and Downloadable content: Uploads and Downloads are handled by the server (apache) in a chosen directory and accessed via a link.
- Messaging, Notifications and Collaboration: Implement SDK appropriate for this platform and integrate it into the platform.
- Gamification: This requires Enki GUI that is integrated into the platform

### **Devise ways to test the solution**

The software will undergo 3 types of testing:

1. Basic functionality testing: This is making sure that every page is running smoothly and every button, text field, upload links and download links are functional.
2. Code review: A peer review test is performed on the code.
3. Single user performance testing: The software is tested on 10 individual users by making sure that the software is user-friendly and easy to navigate.



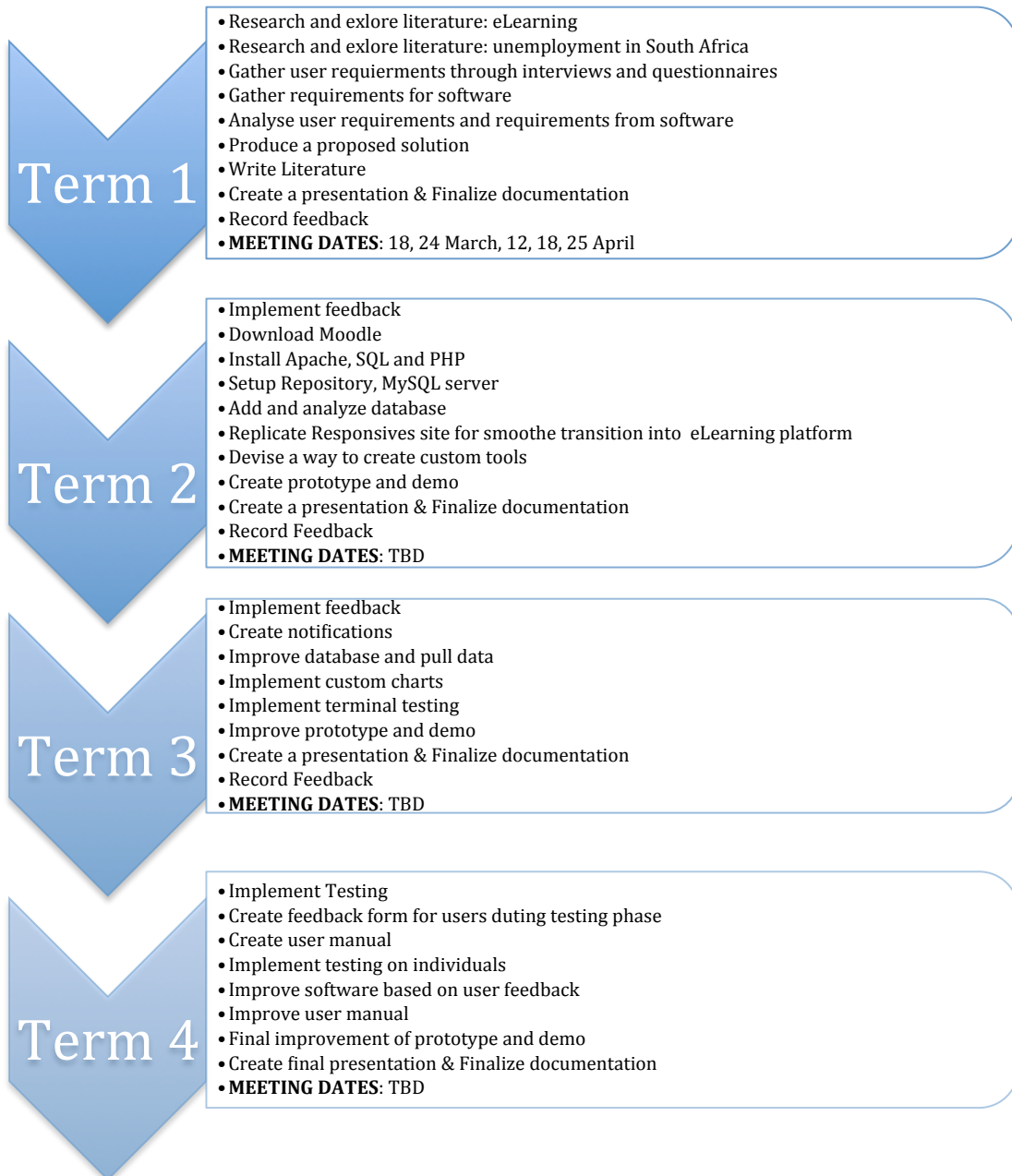
Figure 3 – Testing Process

### **Conclusion**

Chapter 2 focused on the requirements analysis. This chapter provides solutions to the problems of the user. It also indicates particular programming that best suits specific functions but it will be addressed in the future. It also states the best software solution and devises ways to test it. The next chapter will discuss what the interface is expected to look and how the user interacts with the software.



## PROJECT PLAN



## APPENDICES

### APPENDIX A

Consent form:

|   |  |                          |
|---|--|--------------------------|
| <u>Project Title: ELearning Aimed at Content Development for Company Interns</u>  |  |                          |
| Name of Participant: _____  |  |                          |
| Researcher: Zoë Amansure  |  |                          |
| <p>Learning today is not confined to the classroom but has evolved into learning that is possible anytime and anywhere. This research project will consider building a learning environment for the training of interns for companies taking into account the needs of interns from impoverished areas. The intention is to develop an e-learning solution to extend the company's onsite training. The proposed solution will not only be available on a desktop but will be a fully responsive site viewable on a mobile phone. Initially the content of the course will consist of learning material for basic web development using a text editor and not requiring network access.</p> |  |                          |
| I, the undersigned, confirm that (please tick box as appropriate, and sign below):  |  |                          |
| 1.  | I have read and understood the project description as provided above.  | <input type="checkbox"/> |
| 2.  | I have been given the opportunity to ask questions about the project and my participation.   | <input type="checkbox"/> |
| 3.  | I voluntarily agree to participate in the project.   | <input type="checkbox"/> |
| 4.  | I understand I can withdraw at any time without giving reasons and that I will not be penalized for withdrawing nor will I be questioned on why I have withdrawn.                              | <input type="checkbox"/> |
| 5.  | The procedures regarding confidentiality have been clearly explained (e.g. use of names, pseudonyms, anonymisation of data, etc.) to me.   | <input type="checkbox"/> |
| 6.  | This consent form includes audio recordings for interviews or other forms of data collection have been explained to me.  | <input type="checkbox"/> |
| 7.  | The use of the data in research, publications, sharing and archiving has been explained to me.   | <input type="checkbox"/> |
| 8.  | I understand that other researchers will have access to this data only if they agree to preserve the confidentiality of the data and if they agree to the terms I have specified in this form. | <input type="checkbox"/> |
| 9.  | I, along with the Researcher, agree to sign and date this informed consent form.   | <input type="checkbox"/> |
| Participant: _____ Researcher: _____  |  |                          |

## APPENDIX B

### Interview Probes:

#### Questionnaire Probes for Management

- Tell me more about the company
- When did you start incorporating CSR in your company?
- Why are you involved in social development?
- What benefits has social development had on your company?
- What is the interview process like for disadvantaged youth?
- Tell me more about the training facilities?
- Tell me more about the program offered for disadvantaged students? (Background, How it came about? What they'd like to achieve)
- What have you noticed about people from disadvantaged people coming into corporate?
- How will having a solution such as an eLearning portal benefit you?
- Would you like to take on more interns if they had the opportunity to finish a course?
- Would you like to take on more interns?
- What do you expect from a software solution? What would you like it to do and not do?
- How would you like the software to look?

#### Questionnaire Probes for Intern and candidates

- Where did you grow up and where do you currently reside? 4 women, youngest.
- Where and how do you have access to the Internet? (Café, home/landline, mobile phone, electricity?, own laptop?, own phone?)
- How do you access the Internet, do you use Wi- Fi, Mobile Data, etc.)
- What school did you attend?
- What subject did you take?
- Was CAT or IT offered at your school?
- Are you interested in technology?
- Did your school offer career guidance?
- If so, did they offer you assistance to applications and bursaries?
- Were you interested in studying further?
- What is your highest level of qualification? Completed school, how did you pay for that?

- What did you do before you came to Responsive?
- Is your salary your own or do you give some to your family?
- What do you feel the problem is with the way things are run?
- What do you expect from a software solution? What would you like it to do and not do?
- How would you like the software to look?
- What languages are you expected to learn?

## APPENDIX C

### Questionnaire:

#### Honors Project 2018

Thank you for taking the time to complete this...

My honours project deals with the design of an e-learning platform for web-development technologies. It will provide learning material for interns from disadvantaged backgrounds to upgrade their technical skills so that they can cope within a corporate work environment. The lessons will be available on mobile phones and can be downloaded so that it will be available when not in a wi-fi environment.

When answering these questions, please consider any e-learning environment (such as ikamva or moodle) that you are acquainted with.

**\* Required**

Currently I am an intern, student, lecturer or other (perhaps you should allow them to mark more than one of these.) \*

- Student
- Lecturer
- Other:

Assume you will be using the learning environment to upgrade your skills. What would your minimum requirements be for such a platform?

This is software based (eg. a messaging service where learners are able to communicate with each other, or accessible on mobile devices...)

Your answer

Do you think that you would enjoy the gamification of the learning material?

Your answer

Would you want to collaborate with other interns/students?

Your answer

Must the system give you feedback about your performance for the different tasks?

Your answer

**SUBMIT**

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