

# Helping disadvantaged youth find employment in web development

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**Abstract:** A large percentage of South Africans youths have a level of education that is not favourable to gaining meaningful employment. According to media reports, youth unemployment is a problem in South Africa. Furthermore in disadvantaged areas unemployment rates amongst the youth are at its highest. This research paper will look at the root causes of unemployed South African youth and the factors that contribute to their unemployment rate. The research study will include methodologies used to gather information on the expectation interns and managers of an eLearning software solution have. The study will also include a case study aimed at improving social development that provides disadvantaged youth with employment. The proposed Learning Management Software (LMS) solution is designed to provide the user with the resources to learn web development and software engineering. The proposed software solution also prepares them with necessary skills for employment in the corporate environment.

**Keywords:** information and communication technologies (ICTs); internship; empowerment; learning management system (LMS); Moodle; e-learning; unemployment

## 1. Introduction

Unemployment amongst youth<sup>1</sup> is a huge problem in South Africa. According to Statistics South Africa, 50% of South Africa's population is living in poverty (Cramm, Nieboer, Finkenflügel, & Lorenzo, 2013). In South Africa alone, 70% of youth (without disabilities) have remained unemployed since 2013; with black people<sup>2</sup> having the highest unemployment rates (Statistics South Africa. Pretoria, 2011). 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). Online networks or personal contacts often assist the youth in obtaining employment. As a result they find mediocre jobs and earn minimum wage. The use of social and other networks as well as personal contacts, which disadvantage youth don't have access to, often improve the chances of youth finding employment (Cloete, 2016). However, the chances of the youth in disadvantaged areas in South Africa, that do not have access to online networks and

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<sup>1</sup> Youth are ages between 15 and 24.

<sup>2</sup> In terms of the Broad-Based Black Economic Empowerment Act the term black people means African, Coloured or Indian persons who are natural persons.

contacts, finding employment are limited 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 and 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).

Reducing unemployment 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 (The World Bank, 2014) (Cramm, Nieboer, Finkenflügel, & Lorenzo, 2013). 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). The objective of the research is to give disadvantaged youth an equal opportunity at employment and thereby improve their quality of life.

The proposed eLearning solution is targeted at a corporate entity so that they employ disadvantaged youth who do not have a 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). The eLearning solution approach is provided in more and more institutions and has been a good alternative for students in disadvantaged areas (Takalani, 2008). Information, Communication and Technology (ICT) has become an integral part of our modern world and eLearning is also becoming a huge part of that.

## 2. User Requirements Document

### 2.1 – Research problem

Youth in disadvantaged areas find it challenging to further their education and gain employment. This is due to little to no work experience and an absence of resources and strong networks.

### 2.2 – Data collection

The research methodology in this study is of both qualitative and quantitative nature. The research took place in the following locations:

- A digital agency known 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* ([www.code4ct.com](http://www.code4ct.com)). 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.

The research made use of the mixed methodological framework, which includes both qualitative and quantitative methodologies. The research was conducted using the following focus groups:

- Youth<sup>3</sup> 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 disadvantaged 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 reviews, semi-structured interviews and questionnaires.

### *2.3 – Users 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.

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<sup>3</sup> 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.

- 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.

#### *2.4 – What is and is not 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.

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.

### **3. Requirements analysis document**

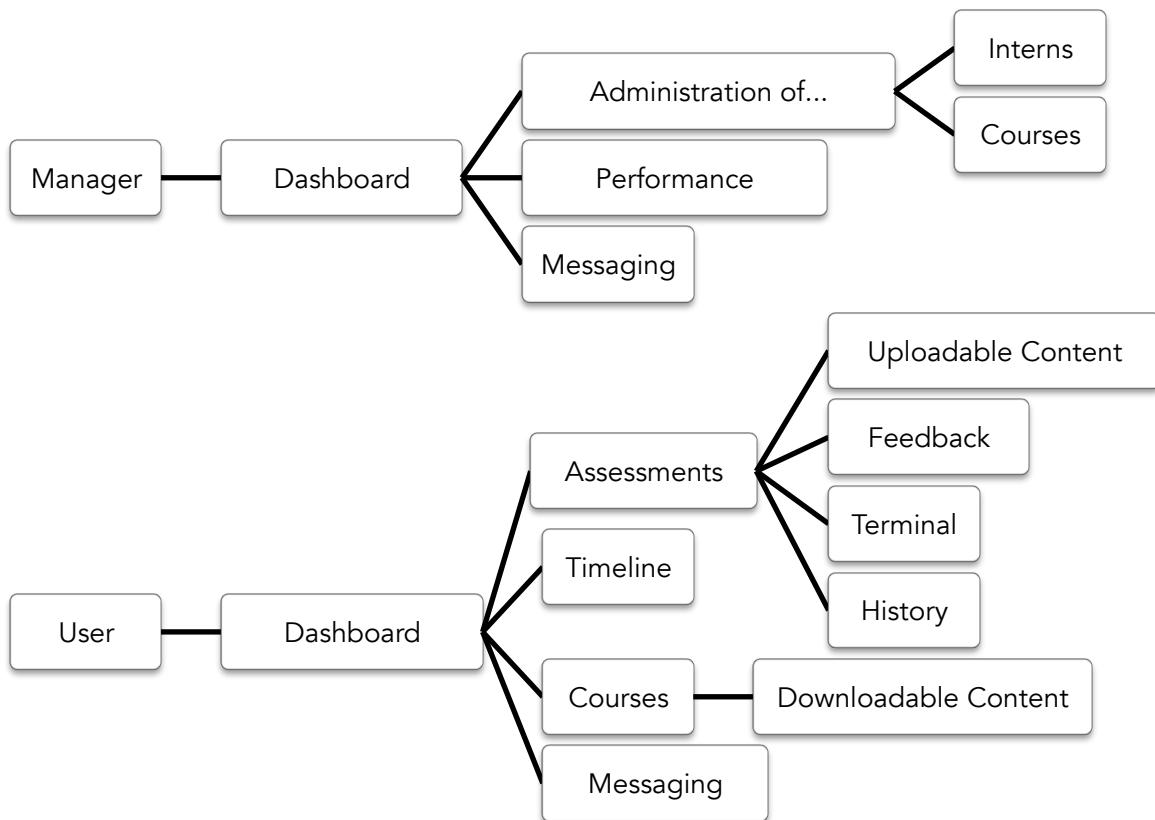
#### *3.1 – Designer's interpretation of the user's requirements*

The problem is that the platform that *Responsive* currently use, lack 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.

#### *3.2 – 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.



*Figure 1 – Summary of the proposed solution*

### *3.3 – 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.

### *3.4 – 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.

### *3.5 – Testing 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.



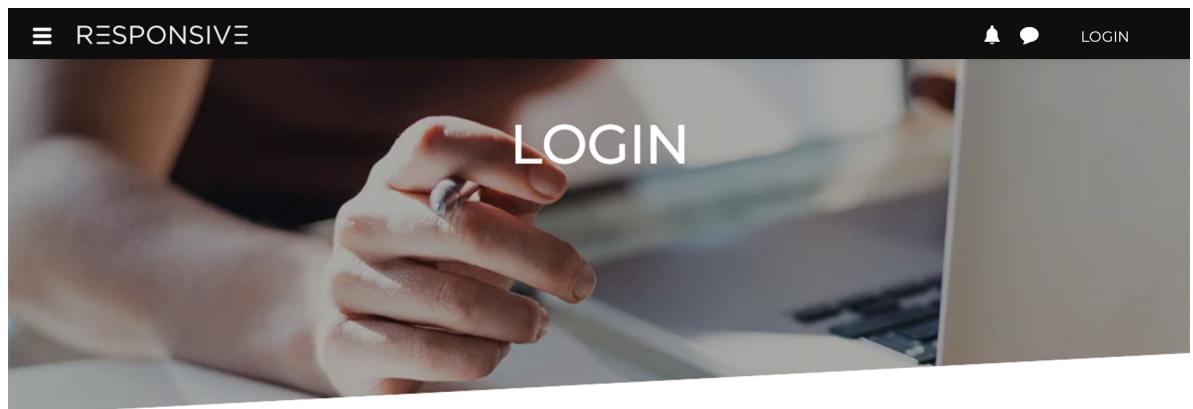
*Figure 2 – Testing Process*

## 4. User Specification Interface

### 4.1 – Description of the complete user interface

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

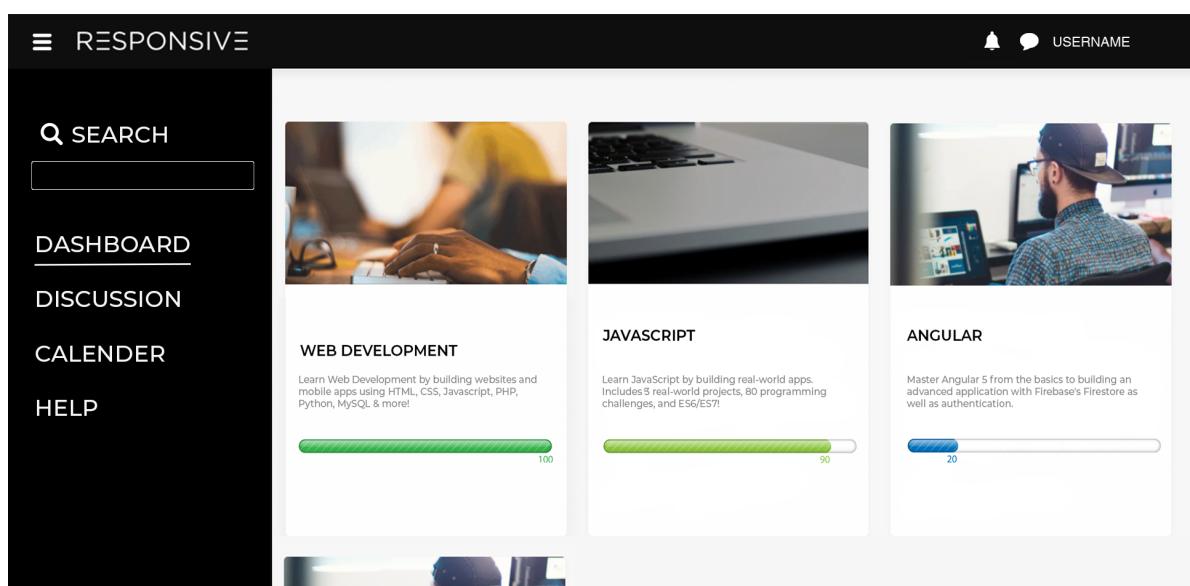
- Login Page (See Figure 3) – The intern is registered through the company and receives their login for the manager via email, the intern then logins with the details provided.



The screenshot shows a mobile-style login page. At the top, there is a dark header bar with the word "RESPONSIVE" in white. To the right of the header are icons for notifications, messages, and a user profile, followed by the word "LOGIN". Below the header is a large, semi-transparent background image of a person's hands resting on a keyboard. Overlaid on this image is the word "LOGIN" in large, bold, white capital letters. The main form area has two input fields: "USERNAME" and "PASSWORD", each with a corresponding text input box. Below these is a blue "LOGIN" button. The entire page has a clean, modern design with a focus on user interaction.

Figure 3 - Login Page

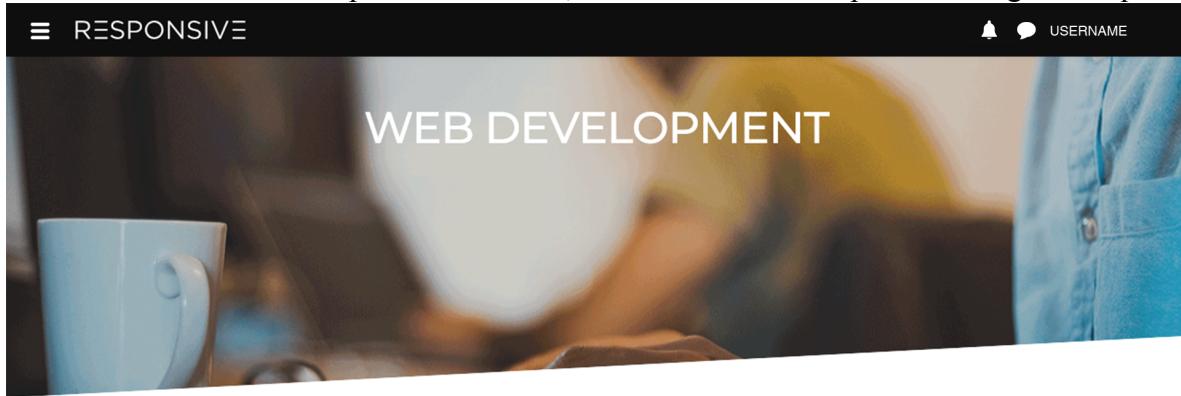
- Dashboard (See Figure 4)– The dashboard provides an overview of what the intern is able to do.



The screenshot shows a dashboard interface. At the top, there is a dark header bar with the word "RESPONSIVE" in white. To the right of the header are icons for notifications, messages, and a user profile, followed by the word "USERNAME". On the left side, there is a vertical sidebar with navigation links: "SEARCH" (with a search bar), "DASHBOARD" (which is currently selected and underlined), "DISCUSSION", "CALENDER", and "HELP". The main content area features three cards: "WEB DEVELOPMENT" (with a progress bar at 100%), "JAVASCRIPT" (with a progress bar at 90%), and "ANGULAR" (with a progress bar at 20%). Each card includes a small thumbnail image and a brief description. Below the main content area, there are two smaller, partially visible cards.

Figure 4 - Interns Dashboard

- Courses – Courses that are offered to the intern is displayed here. The intern has to be enrolled to these courses by the manager.
  1. Description (See Figure 4) – The description provides a brief overview of what the course is about.
  2. Progress Bar (See Figure 4) – The progress bar gives the intern a clear indication of how far they are in the course.
    - Curriculum (See Figure 5) – 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 has to complete an assignment/quiz.



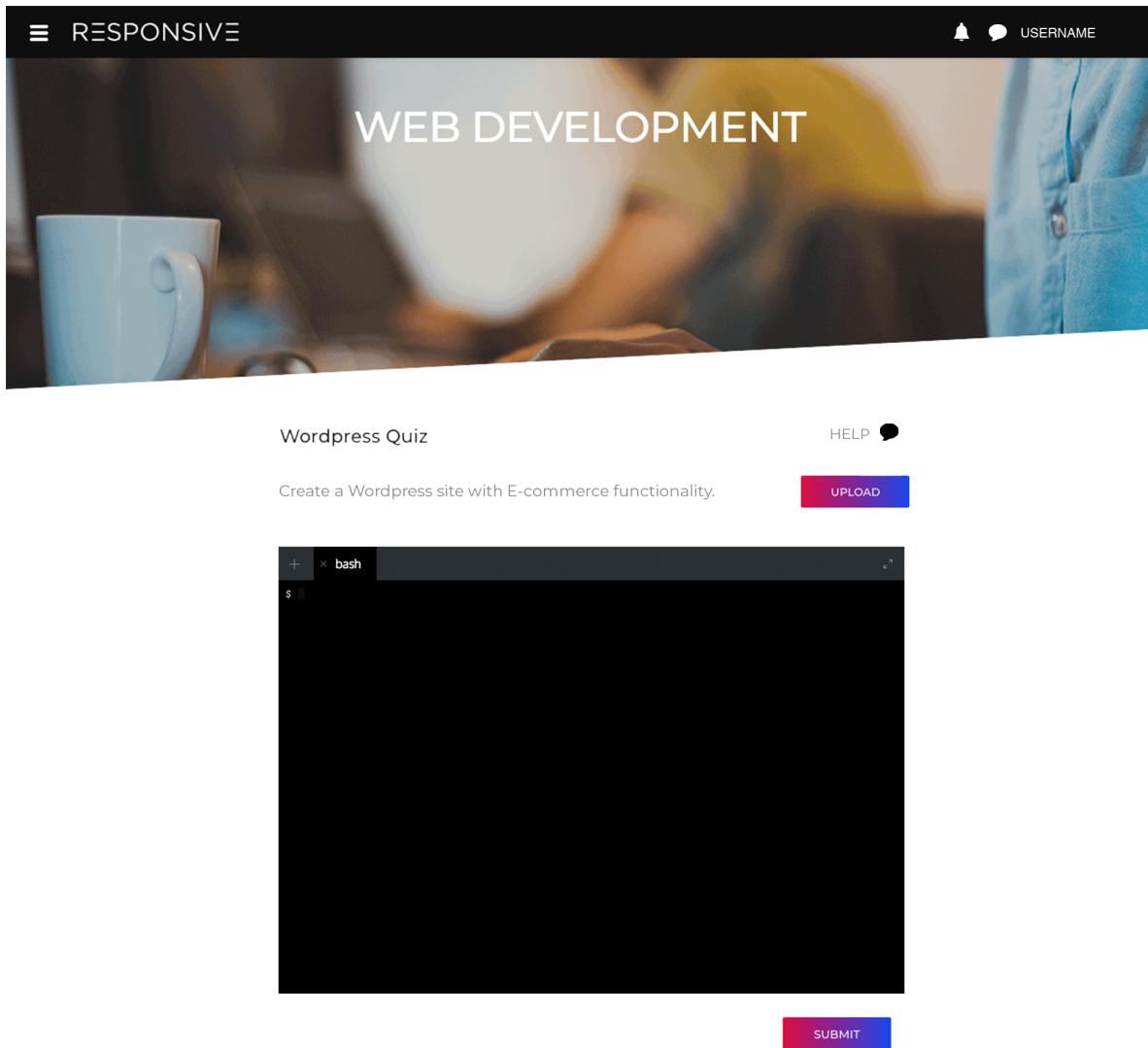
Learn Web Development by building 25 websites and mobile apps using HTML, CSS, Javascript, PHP, Python, MySQL & more!

Curriculum For This Course		
	Expand All	306 Lectures
+ Getting Started	6 Lectures	17:20
+ HTML 5	39 Lectures	02:09:55
+ CSS 3	39 Lectures	03:46:20
+ Javascript	36 Lectures	02:42:26
+ JQuery	32 Lectures	03:24:09
+ Bootstrap 4	20 Lectures	02:15:26
- Wordpress	59:18	
○ Introduction To Wordpress Section	01:45	
○ What Is Wordpress?	04:17	
○ The Wordpress Dashboard	12:51	
○ 6.3 Wordpress Themes	18:58	
□ Important: A note about X Theme and the next lecture	00:17	
○ 6.4 Creating A Blog	13:24	
○ Creating An Ecommerce Site	06:40	
○ Wordpress Challenge - Create A Site	01:02	
□ Further Reading - Wordpress	00:04	
◊ Wordpress - Quiz and Exercise		
+ PHP	28 Lectures	02:36:16
+ MySQL	23 Lectures	02:51:56

Figure 5 - Course Curriculum

- Download (See Figure 5) – Interns are able to download content in both document and video form.
- Upload (See Figure 6) – Interns may submit assignments by uploading their own work.

- Terminal (See Figure 6) – 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.



*Figure 6 - Submit Assignment Page*

- Retractable Menu (See Figure 4, top left) – This provides the intern with a easy view menu where the intern can navigate to the following menus:
  - Search – The intern is able to search to easily find courses available to the intern on the website
  - Discussion – The intern is able to view and participate all discussions previously started and is able to start a new discussion.
  - Calendar – The intern is able to view important dates such as due dates of assignments and when courses start and complete.
- Notification Icon – The intern is able to view notifications such as announcements, course information, and assignment due dates (Shown in Figure 4, top right).
- Messenger Icon – The intern is able to see messages the intern has received from admin or other interns. The intern is also able to create a new message (Shown in Figure 4, top right).

- Logout Navigation – The intern is able to logout after the intern has completed using the website.

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

- Login Page (See Figure 4). – The manager is able to login with the details given from the service provider.
- Dashboard (See Figure 7) – The dashboard provides an overview of what the manager is able to do such as add an intern add a course, add an event, view the calendar, add announcements send a message, grade assignments.

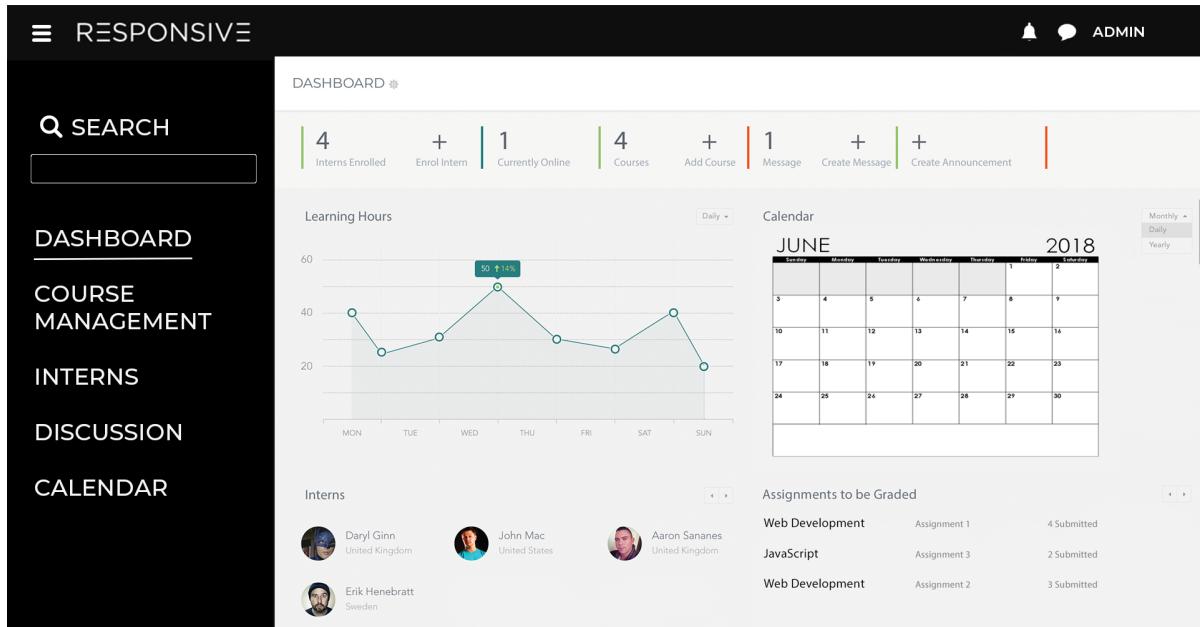
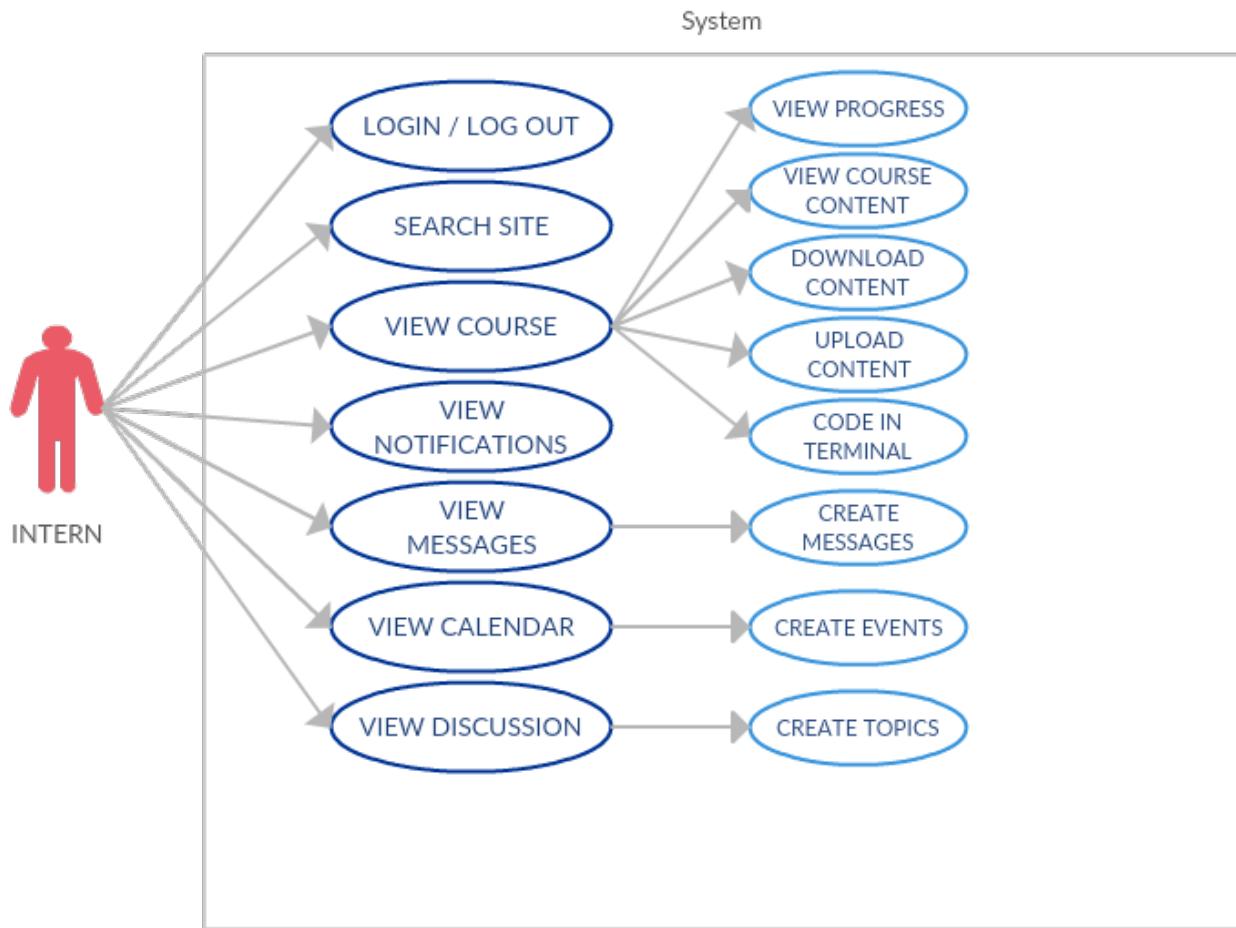


Figure 7 - Admin dashboard

- Retractable Menu (See Figure 7, top left) – This provides the manager with a easy view menu where the manager can navigate to the following menus:
  - Search – The manager is able to search to easily find courses or topics on the website.
  - Course Management – The manager can view and manage all courses. The manager may also add a new course.
    - 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
      - Delete the course
  - Interns – The manager is able to view a list of all the interns and their individual courses and progress.
  - Discussion – The manager is able to view and participate in all discussions previously started and is able to start a new discussion.
  - 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.

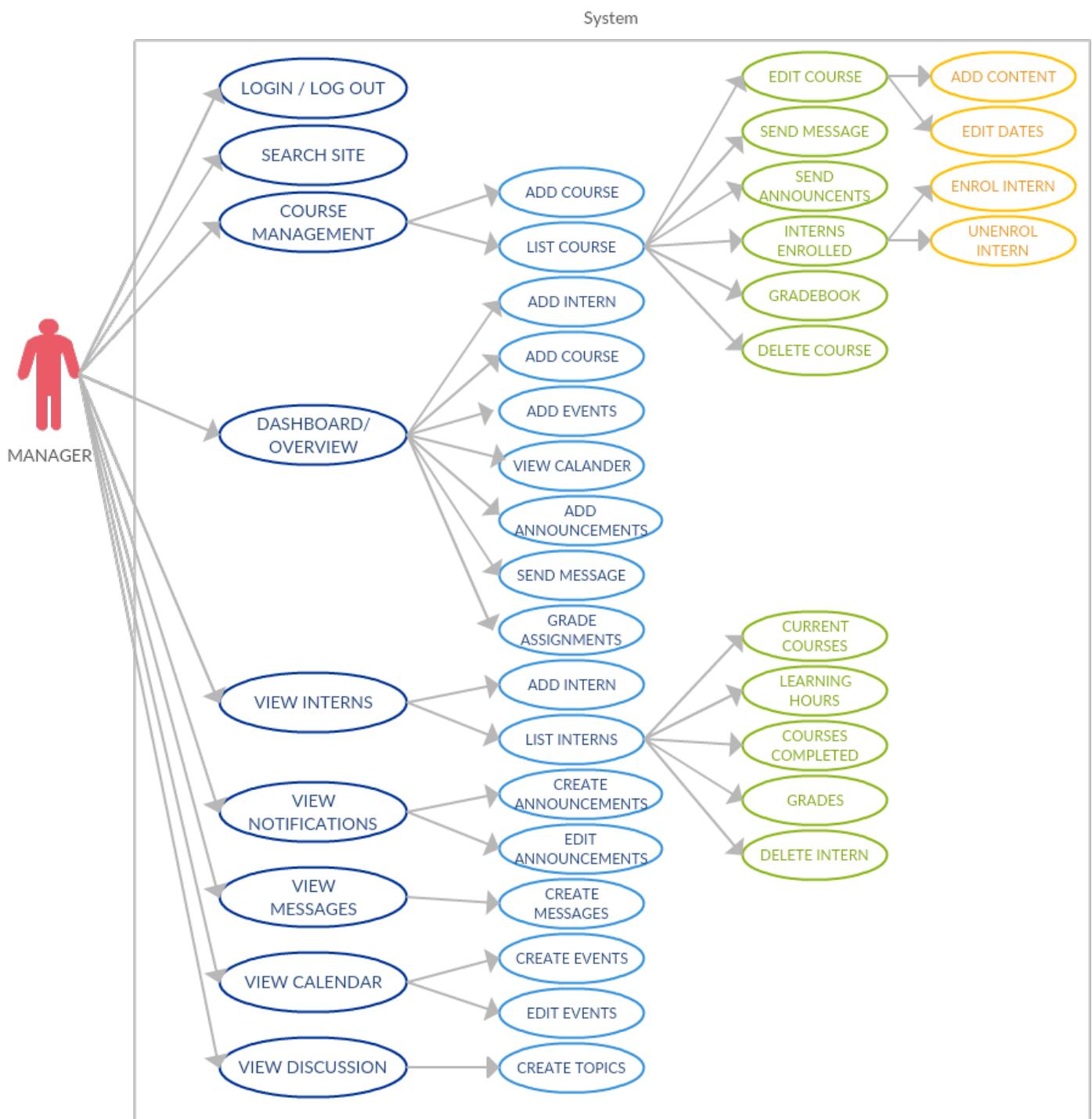
- Notification Icon – The manager is able to view notifications such as assignments received, assignments that need to be graded and when courses are starting and completing.
- Messenger Icon – The manager is able to see messages the manager has received from the interns and can also create a new message.
- Logout Navigation – The manager is able to logout after the manager has completed using the website.

#### *4.2 – How the user interacts with the system*



*Figure 8 - Use case diagram for intern*

Figure 8 displays the task the intern will perform when entering the system. It outlines, from a user's point of view, a system's behaviour as it responds to different request. The actor in the scenario is the intern.



*Figure 9 - Use case diagram for manager*

Figure 9 displays the tasks the manager will perform when entering the system. It outlines, from a user's point of view, a system's behaviour as it responds to different requests. The actor in the scenario is the manager.

## 5. Object Orientated Analysis & Design

### 5.1 – Data Dictionary

*Table 1 - Data Dictionary*

Entity	Field name	Data type (size)	Description
user	id	INT (10)	The user, intern or managers, ID is a unique number
	username	NVARCHAR (100)	Each user will receive a username to login with, which consists of only characters
	password	NVARCHAR (32)	Each user will receive a password to login with, this can be changed
	firstname	NVARCHAR (32)	The first name of the user which consists of only characters
	lastname	NVARCHAR (32)	The last name of the user which consists of only characters
	email	NVARCHAR (32)	The business email given to the user
	lastaccess	BIGINT (10)	Last access records the last time the user accessed the site
	picture	BIGINT (10)	Picture displays a profile picture of the user
course	id	BIGINT (10)	The id consists of a unique number for the course table
	courseid	BIGINT (10)	The course id consists of a unique number for individual courses
	name	NVARCHAR (32)	Each course is given a name that describes the course
	description	NVARCHAR (-1)	Each course is given a description that summarizes the course in an unlimited entry field
	enrolmentkey	NVARCHAR (50)	Each course has an enrolment key so that users can enrol in specific courses
	picture	BIGINT (10)	Picture displays a picture that best describes the course
	startdate	BIGINT (10)	Start date is the date which the course runs from
	enddate	BIGINT (10)	End date is the date which the course runs to
	showgrades	TINYINT (2)	This is so that the user can see the grade after the user is marked
	showfeedback	TINYINT (2)	This is so that the user can see the feedback after the user is marked
asignment	id	BIGINT (10)	The id consists of a unique number for the assignment table
	course	BIGINT (10)	This is the name of the course the assignment is for
	name	NVARCHAR (50)	This is a unique name for the assignment

Entity	Field name	Data type (size)	Description
	assignmenttype	TINYINT (2)	Boolean to assess assignment type
	resubmit	TINYINT (2)	Boolean to accept or reject resubmissions
	preventlate	TINYINT (2)	Boolean to accept or reject late submissions
	timedue	BIGINT (10)	
	grade	BIGINT (10)	The grade the intern receives will be held in here
message	id	BIGINT (10)	The id consists of a unique number for the message table
	useridfrom	BIGINT (10)	Tracks where the message is sent from
	useridto	BIGINT (10)	Tracks where the message is sent to
	subject	NVARCHAR (-1)	Holds the subject of the message
	fullmessage	NVARCHAR (-1)	Holds the body of the message
	notification	SMALLINT (5)	Manages the notification to be sent when message is received
	timecreated	BIGINT (10)	Tracks the time the message is created and sent
	timeread	BIGINT (10)	Tracks the time the message is received and read

## 5.2 – Class Diagram

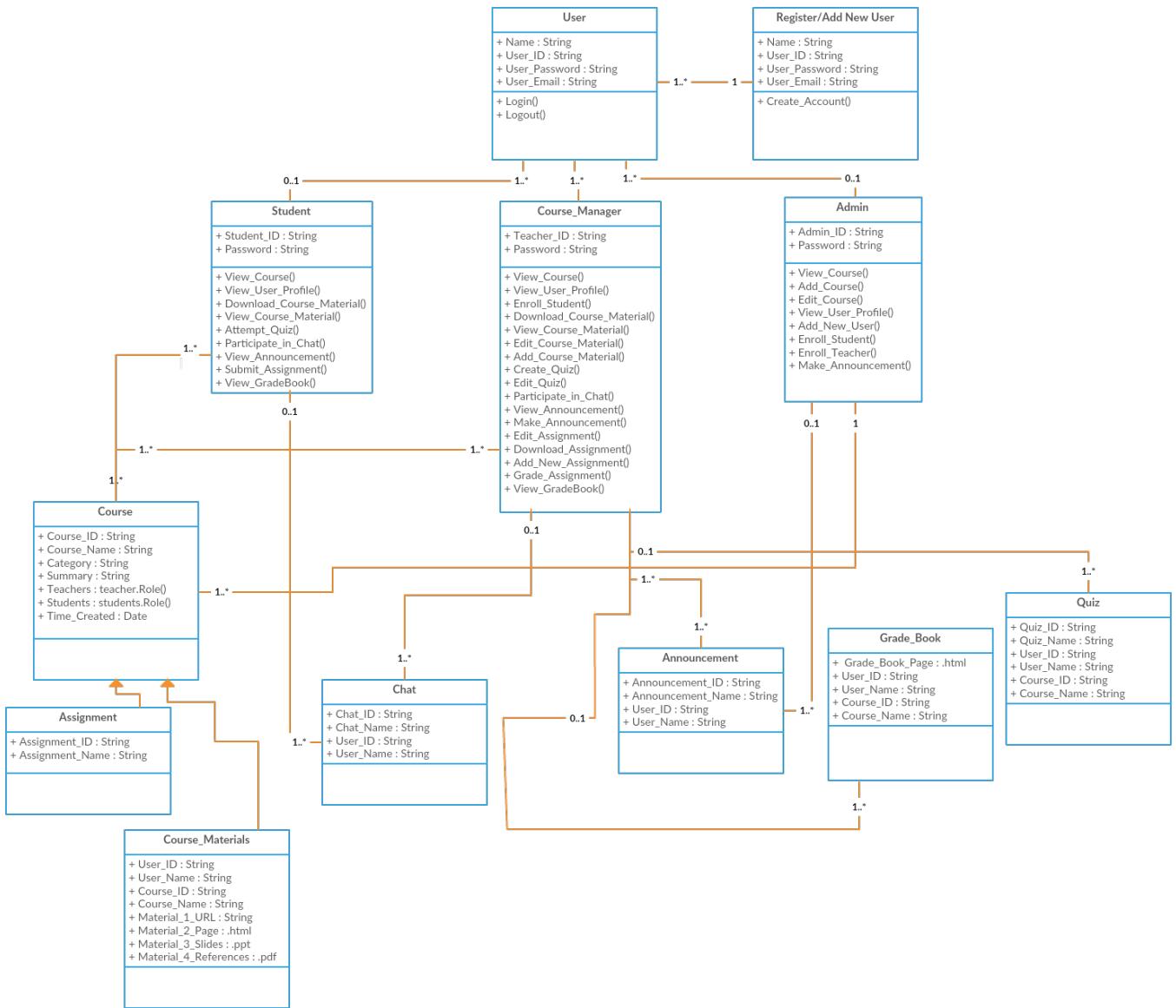


Figure 10 - Detailed Class Diagram

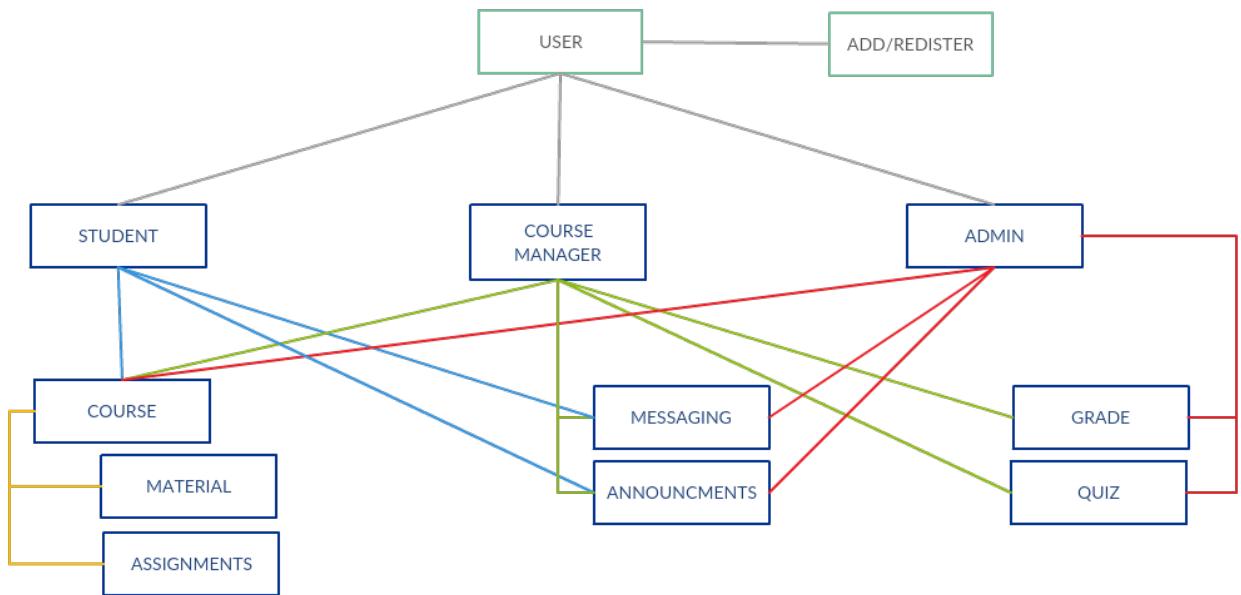


Figure 11 - Simplified Class Diagram

### 5.3 – Class Methods

Table 2 - Class Methods

Class	Function
User	User class to access user details
Event	Handles all events that needs to be added, updated and deleted, such as discussion topics, calendar events, courses, users etc.
Progress	Progress handler that displays progress of a specific course
Notifications	Alert user of notifications
Messages	Class used for various messaging tools, such as sending and receiving messages
Grades	Returns interns grades for assignments and total course grade

## 5.4 – State Diagram

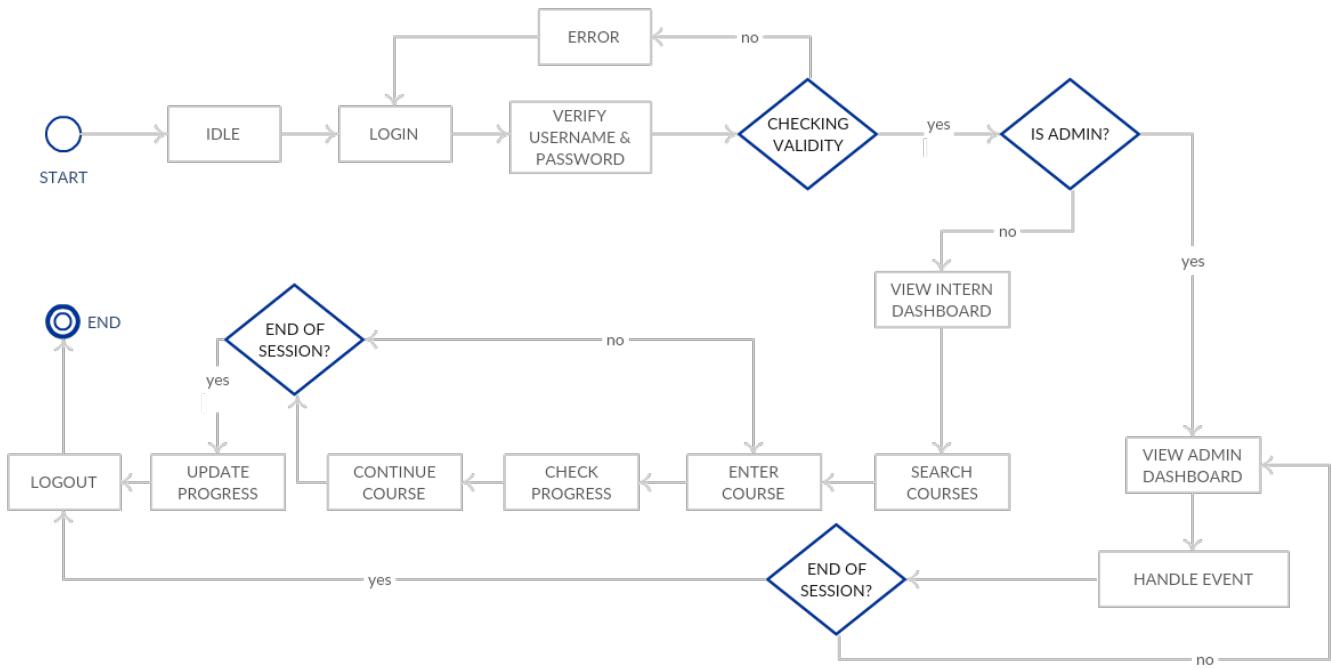


Figure 12 – The state machine diagram for Learning Management System (Moodle)

In this figure, the state machine diagram for Learning Management System (Moodle), the intern first logs in the Learning Management System (Moodle). The system verifies the username and password of the intern. Once the username and password of the intern is verified, the intern will search the courses available to them on the site. The intern may then complete courses the intern is interested in and the information is stored in database.

## 5.5 – Pseudo Code

- User
 

```

Initiate user class
User class accesses user details on database
Return user object from database
  if userid found return record from database
  else return "user not found"; error message "user needs to be registered"
Return user object from database based on their email or username.
      
```
- Event
 

```

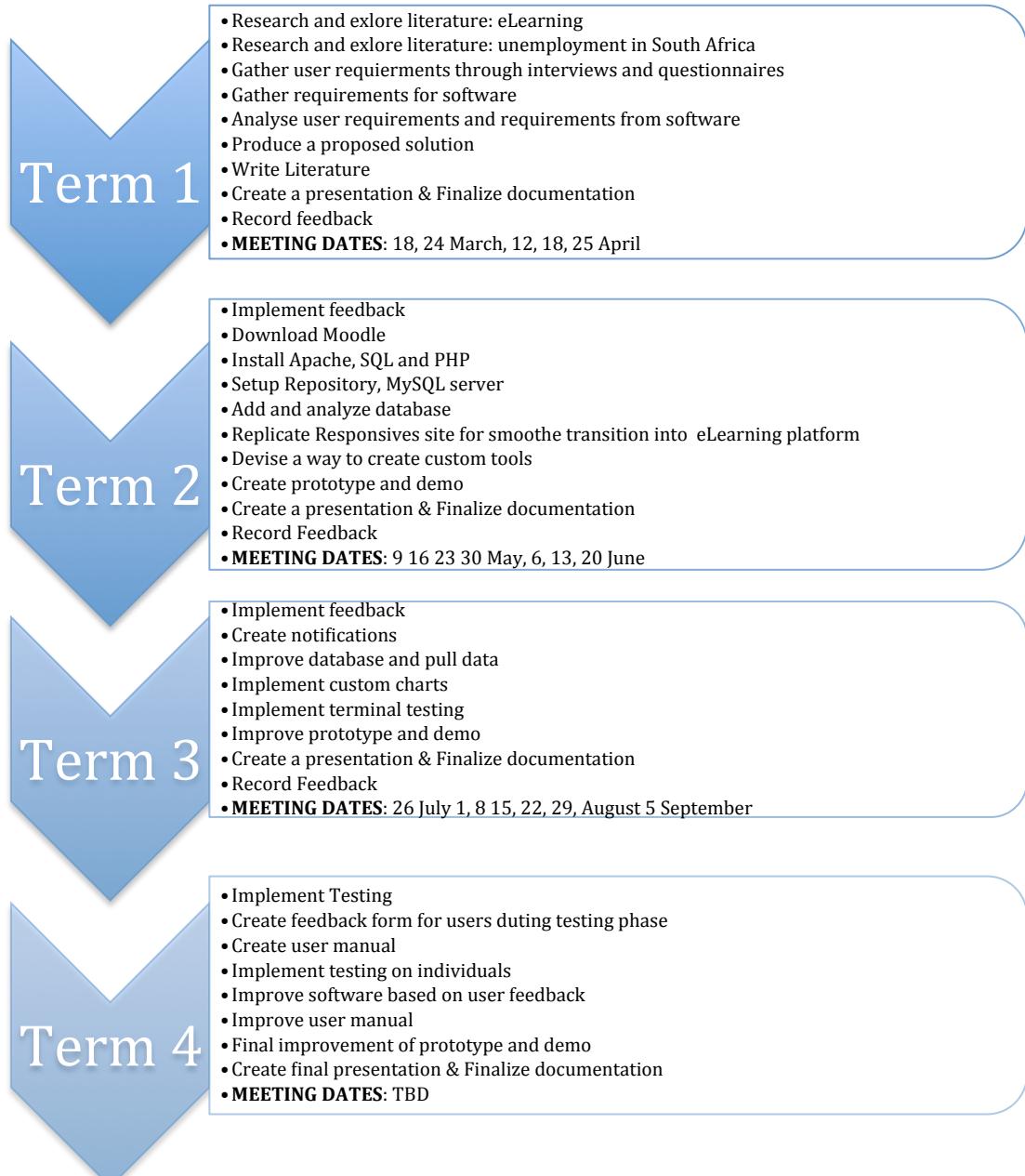
Initiate event class
Initialize required event data properties
Return event name
Returns event description with id's
Return name of the legacy event, which is replaced by this event.
Return event names legacy event data.
Returns array of parameters to be passed to legacy function.
Custom validation
Create instance of event
      
```
- Progress
 

```

Initiate progress class
Return if event_material or event_assignments was completed
If true
  Increment the internal counter by one
  Internal progress counter != $max (100%)
Else maintain lastprogress
Return progress
      
```

- Notifications
  - Initiate notification class
  - Create stack
  - Add a message to the session notification stack
  - Fetch all of the notifications in the stack and clear the stack
  - Send a success or error message to the notification stack
- Messages
  - Initiate message class and properties (name, userto, userfrom, subject, message. etc)
  - Store properties into array \$message
  - Trigger event for sending \$message
  - Output message

## 6. Project Plan



## 7. Conclusion

## 8. References

### Bibliography

- 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* .
- 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.
- 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>
- 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 Dividends*. Retrieved 03 27, 2018 from Worldbank.org:

<Http://documents.worldbank.org/curated/en/896971468194972881/pdf/102725-PUB-Replacement-PUBLIC.pdf>