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PROJECT REPORT

PROJECT TITLE: LIFE SKILLS TEACHING CANVAS MANAGEMENT SYSTEM

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June 2019

Declaration

and

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I Kwagilwa, Joseph M of Registration number 2016-04-07592 hereby declare that this Project Report titled **LIFE SKILLS TEACHING CANVAS MANAGEMENT SYSTEM** was prepared by me. This report is prepared and written according to the rules and regulations of the College of Information and Communication Technologies (CoICT) of University of Dar es Salaam (UDSM) to fulfill the curricular requirement of Bachelor of Science in Computer Science.

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Date

Abstract

Life skills refers to the set of skills that are essential for an individual to participate in everyday social activities and roles. These skills include self-awareness, empathy, critical thinking, decision making, problem solving and effective communication. Despite the importance of life skills in everyday life, there is still a gap to life skills competencies to students in primary schools. This is revealed by The 2016 EGRA/EGMA assessment conducted in primary schools in Tanzania, this assessment based on measuring life skills in three areas: academic grit, self-control and problem solving. The assessment showed that only 0.8% of students assessed show a high level of competency in all three areas. Also the lowest result was in the area of problem solving with 72.3% of students presenting the low level of competency.

This report explains about using web application to deliver teaching materials that will help teachers deliver the life skills subject effectively, also the application will enable teachers to participate in chatting forum that will enable them to update their knowledge in life skills teaching.

This report consists of the introduction which gives the overview of the project, the literature review which gives details about the existing life skills teaching system, proposed system and related solutions, the methodology which explains the details on the methods and tools need to be used to accomplish the specific objectives of the project, system analysis and design which discuss about the requirements (functional and non-functional requirements), use case analysis, process modelling (Data flow diagrams and sequence diagrams) and the system architecture and lastly implementation which discuss about transforming the requirements into a real application.

Acknowledgements

First, I thank God Almighty for blessing me with good health and providing me with this opportunity, which has major contribution in my life.

I would like to extend my genuine gratitude to my lead supervisor Mr. Bernard Mussa and technical supervisor Dr. Hellen Maziku for their exceptional support, time and guidance. Thank you so much for your devotion to guide and help me.

I would also like to thank the whole staff in Computer Science and Engineering(CSE) Department, Special thanks to all my lecturers and all the staff members who have contributed throughout my studies and this project.

May God bless all of you

Table of Contents

List of Abbreviations

EGRA	Early Grade Reading Assessment
EGMA	Early Grade Mathematics Assessment
STD	Sexually Transmitted Diseases
HIV	Human Immuno Virus
AIDS	Acquired Immune Deficiency Syndrome
DFD	Data Flow Diagram
MOEVT	Ministry of Education and Vocational Training
API	Application Programming Interface
URL	Unified Resource Locator
REST	Representational State Transfer
WWW	World Wide Web
SQL	Structured Query Language

List of Figures

List of Tables

CHAPTER ONE
INTRODUCTION

1.1General Introduction

Life skills refer to a combination of cognitive, emotional and behavioral competencies that positively affect other learning outcomes, prevent risky behaviors (e.g. violence; truancy; drop-out; promiscuity) and form good behaviors in students which in later life also shape the behaviors of workers, or national and global citizens (Life Skills Education framework Tanzania, March 2009). Different parts of the world refer to life skills differently. In Asia, the recent use of the term "transversal competencies" refers to a composite set of skills that offer promise for economic, social and emotional well-being. The World Economic Forum refers to "21st Century Skills". In Tanzania refer life skills to "generic skills" and "values and attitudes". All these terms tend to have in common a set of process skills for life including: Communication, Critical thinking, Problem solving, Relating to Others, Perseverance, Emotional Intelligence, Creative thinking, Collaboration, Self-awareness, Self-direction, Self-regulation, Learning orientation, Stress management, Persuasion skills, Assertiveness (i.e. building confidence), Respect for self and others, Formation, maintenance of relationships and team work, Decision making skills, Respect oneself , others and the environment, Responsible citizenship, Compassion, empathy and fairness, Taking responsibility for the consequences of one's behavior, Tolerance, conflict and violence prevention and Peace Building etc.

Despite the importance of life skills in a 21st Century, there is still a gap to life skills competencies to students at different levels (i.e. primary and secondary schools). The 2016 EGRA/EGMA assessment in Tanzania, conducted by RTI in primary schools measured life skills in three areas: academic grit, self-control and problem solving. The assessment showed that only 0.8% of students assessed show a high level of competency in all three areas. The lowest results were in the area of problem solving, with 72.3% of students presenting in the low level of competency.

On the other side the link between life skills and academic performance is significant. The 2016 EGRA/EGMA life skills assessment found that students with high academic grit scores outperformed students with low academic grit significantly. Students with high academic grit showed a 16.6% higher mean score for oral reading comprehension than those with lower academic grit. Therefore, the assessors found that increasing students' academic grit and self-control may be a way to increase the effectiveness of instruction and mitigate some of the performance barriers facing economically disadvantaged students. The results also found that

students who scored lowest on problem solving were those who tried to solve problems in their heads without the use of extra resources. This suggests that developing life skills (problem solving skills and applying problem- solving techniques) in the classroom could be beneficial to students.

1.2 Statement of the problem

Life skills incompetency is still a big problem to youth (in primary schools, secondary schools and university) in the society, this is demonstrated by different issues such as unemployment, early pregnancies, moral decay, irresponsibility among youth, this leaves us with the question “How can we better impart life skills in an effective and efficient way”.

1.3 Project Objectives

The project objectives are mainly divided into two parts.

1.3.1 Main Objective

The main objective of this project is to design life Skills Teaching Canvas where-by teachers will be able to access different teaching materials and contents that will help them to teach life skills in a more practical approach.

1.3.2 Specific Objectives

- **i.** To gather and analyze requirements for the system
- **ii.** To design the system as per the analyzed requirements
- **iii.** To implement and test the designed system
- **iv.** User documentation of the whole system

1.4 Significance of the Project

The significance of this project includes the following.

- **i.** To supplement the existing life skills curricula in preprimary and primary school by adding practical approaches to learning life skills.
- **ii.** To fill the skill gap to Teachers as they will gain new skills and approaches on how efficiently and effectively teach life skills.
- **iii.** To create a wider learning ground for students so as to make them understand the subject and be able to apply it to day to day activities in academic and society in general.

1.5 Scope of the project

Life Skills Teaching canvas is a web based system that will be accessed through World Wide Web (WWW). Also the project targets pre-primary and early primary (grade 1- 3) school teachers in Tanzania.

1.6 Organization of the Project Report

This report is divided into three chapters.

Chapter One, this part consists of the background of the problem, statement of the problem, objectives (i.e. general objectives and specific objectives), significance of the project, scope and limitation

Chapter Two covers the Literature Review, which consists of a clear description of the problem together with research findings from the research and surveys conducted.

Chapter Three explains about all the methods undertaken to obtain information about the problem (researches and surveys) are explained in detail.

Chapter four explains about requirement gathering and system designing of the proposed system

Chapter five explains about different techniques that has been used to model and design the system it includes sequence diagram and data flow diagram which shows the flow of data inside the system.

Chapter six explains about system implementation which describes in details the implantation of the system as per the design from the previous chapter.

Chapter seven explains about conclusion, recommendation and future works which they are the closing remarks of the project

CHAPTER TWO
LITERATURE REVIEW

2.1 The existing life skills subject teaching approach

The current curriculum for primary school do not include life skills as a subject but instead life skills topics are embedded in other subject such as Science, Sports (Haiba na michezo), Kiswahili and English. For preprimary curriculum life skills is not taught as an independent subject it is incorporated in other subjects as well. Therefore, during the learning process the subject teacher has to make sure that all the life skills subjects covered in his/her subject are properly delivered to the students. During the process he/she prepares the lesson plan which guides the whole subject delivery in the entire annual period. Apart from the lesson plan also they are required to prepare the teaching materials including selecting books as instructed by TIE and Ministry of Education and Vocational Training (MOEVT) also they are required to prepare necessary teaching aids so as to enhance students understanding of the subject. Through this whole process the subject teacher is the main actor in the whole process, he /she uses his knowledge and professional to make sure that the subject is delivery successfully.

2.1.1 Drawbacks of the existing system

In the current system there are drawbacks that hinders the successfully delivery of the subject, for instance during the lesson planning, the teacher has to design the teaching aid materials so as to simplify students understanding of the topic, this pose challenge as limited time is allocated to this process which makes it difficult for a teacher to develop effective materials and proper methodology to deliver the subject, also teachers are allocated many subject to teach so it makes it difficult to put it together for all individual subjects (Twaweza-Uwazi Monitoring brief no 3, 2011)

Another drawback is that teacher manual provided for helping them deliver the subject do not have effective practical approach to the delivering the subject, most of them do not clearly consider the actual learning environment therefore leaves the teacher with only option of using theoretical way to deliver the subject.

2.1.2 Solution from the proposed system

The use of practical approach and inclusive way is very important during the delivery of the life skills education. The proposed system will help by providing life skills teaching materials that will help the teachers during the delivery of the subject, the provided material will contain information

on how to effectively apply them as well as how to adopt them according to the learning environment. This will help teachers during the lesson planning to come up with diverse way and material to use them during teaching.

Also the proposed system will provide knowledge to the teachers based on life skills education and how to deliver the subject effectively, this will be achieved by creating a chatting platform/forum where it will connect teachers together with life skills education specialists /advisors, where they be able to learn from the specialist different approaches and methods as well as be able to discuss different issues around life skills education delivery. Therefore, via this platform teacher will be able to receive training and get their knowledge about the subject updated easily.

2.2 Related work

There are different initiatives done before to solve this problem “life skills incompetence in primary schools”. Sara Radio program has been developed in Tanzania in September 2017, the main objective of it was to improve life skills among primary school children, especially girls. This radio program includes developing and broadcasting pre-recorded episodes about life skills, the radio drama series that are educational and entertaining. This program is crafted in a way to be fun as well as engaging pupils, teachers and parents to have discussions around the key issues in life skills education.

The challenges facing this program is high running costs as well as improper organization of the contents with respect to the curriculum.

2.3 Overview of the proposed system

The proposed system is divided into three components

i. A web application for providing interaction with the users of the system
ii. A server software that directly interacts with the web application and database in order to provide required response to the user.
iii. Database and content repository, this contains information from different users of the system also the repository provides different resources to be used by the teachers.

2.4 System development model

A software process model is a standardized format for planning, organizing and running a development project. The waterfall model is the classic process model. It is widely known,

understood and used. As indicated in Figure 2-2, Waterfall has basic phases each with its own purpose:

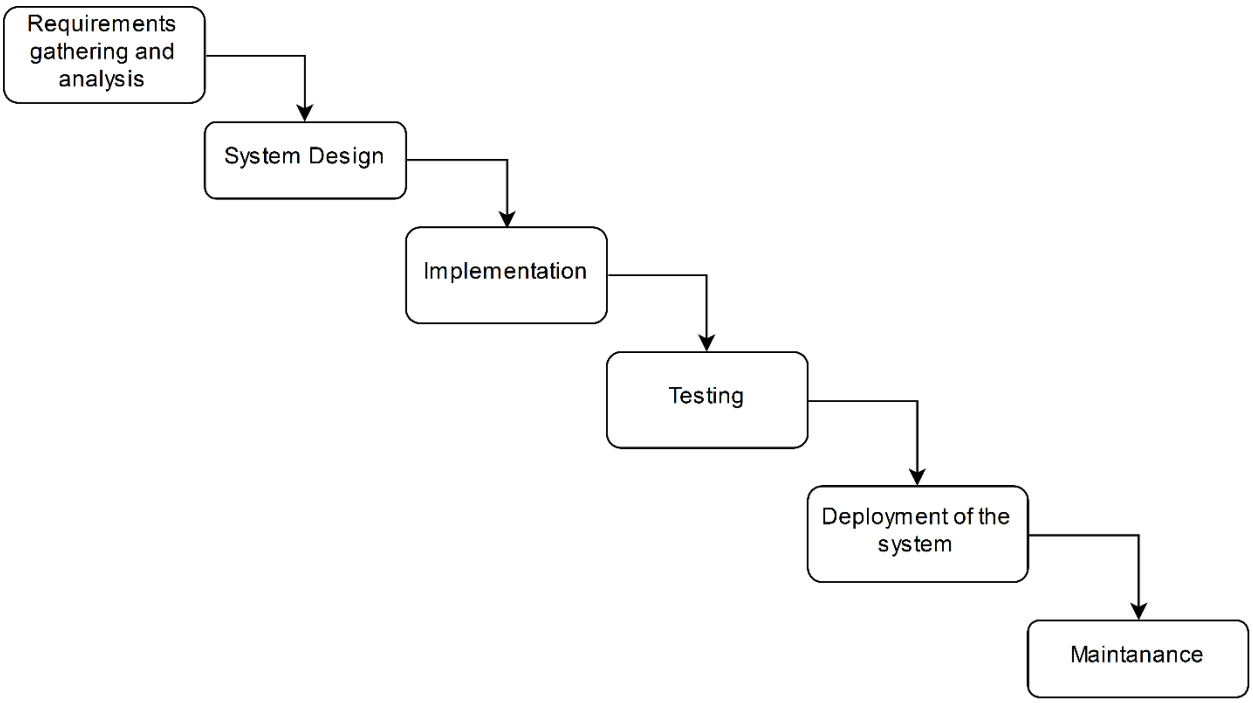


Figure 2.1Waterfall model

- Requirement Definition

All possible requirements of the system to be developed are captured in this phase and documented in a requirement specification document. We are going to collect the requirements from stakeholders (primary school teachers in Dar-es-salaam, Tanzania Institute of Education (TIE)) and other literature review out there and hence create both functional and non-functional requirements of the system.

- System and software design

In this phase we customized our software and design extra components if needed to suit the requirements. This phase also involved structuring of the actual data in the physical database. The result of this phase is an internal schema and database.

- Implementation

By employing different techniques, tools and programming languages we are going to implement the design that we made previously. In this stage it involves

- Web based application coding implementation: Here we employed the knowledge of Web designing and implementation using advanced tools and editors.
- Database coding implementation: In this part the database implementation work is done.

- Integration and testing

All the units developed in the implementation phase are integrated into a system after testing of each unit. Post integration the entire system is tested for any faults and failures. After assembling the System, we will start the Initial Testing of our System before deploying it.

- Operation and Maintenance

There are some issues which come up in the client environment. To fix those issues patches are released. Also to enhance the product some better versions are released. Maintenance is done to deliver these changes in the customer environment.

2.5 System Architecture

Client-server refers to the way in which software components interact to form a system. There is a client process, which requires some resource, and a server, which provides the resource. According to Thomas Connolly et al (2005), Client server models can mainly be classified into two categories, namely 2-Tier Client/ server Architecture and 3-Tier Client/Server Architecture.

2.5.1 Three tier client/server architecture

From the figure 2.2 below illustrates the three tier client/server architecture, the main components include the following

- The user interface layer, which runs on the end-user's computer (the client). This system involves the interaction with the web browser.
- The business logic and data processing layer. This middle tier runs on a server and is often called the application server. One application server is designed to serve multiple clients. The system will use apache as its web server
- A DBMS, which stores the data required by the middle tier. This tier may run on a separate server called the database server.

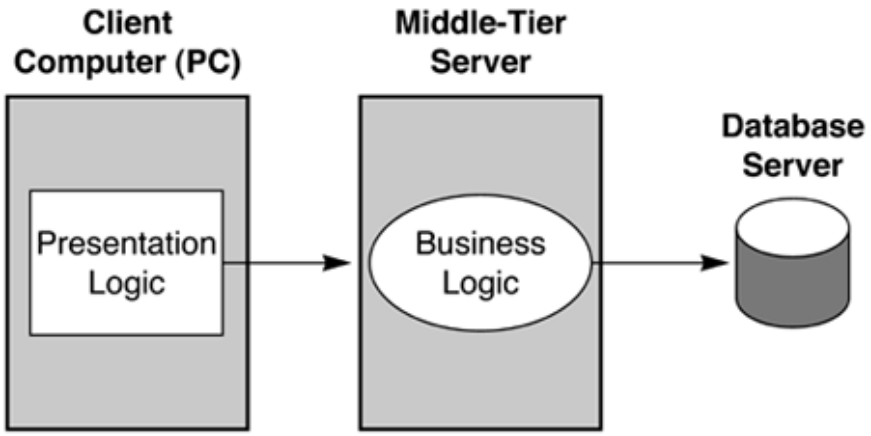


Figure 2.2 Three tier architecture

CHAPTER THREE
METHODOLOGY

3.1 Overview

This chapter covers the detailed explanation of methodology that is being used to make this project complete and working properly. Methodology is the systematic, theoretical analysis of the methods applied to a field of study, or the theoretical analysis of the body of methods and principles associated with a branch of knowledge. It, typically, encompasses concepts such as paradigm, theoretical model, phases and quantitative or qualitative techniques (Irny & Rose, 2005).

3.2 Project Methods

This part describes in detail different methods that were used in requirement gathering and the method used in the undertaking of the whole project. The methods mainly used in requirement gathering stage was questionnaires and the method used in the project execution is waterfall development methodology

3.2.1 Requirements Gathering Method

In the requirement gathering process the techniques used were the following

- Interviews

Interview refers to the one on one conversation where one(interviewer) asks question and the interviewee gives answers. In this technique different interview session were conducted to teachers from pre-primary and early grade primary. The main interview question was “To what extent life skills is taught more practically than theoretically?”.

3.2.2 Software Development Method

This project use Waterfall model. The Waterfall Model takes the fundamental process activities of specification, development, validation and evolution and represents them as separate process phases such as requirements specification, software design, implementation, testing and so on. Sommerville Ian, (2007). The following are some advantages of this approach

i. This model is simple and easy to understand and use.
ii. It is easy to manage due to the rigidity of the model – each phase has specific deliverables and a review process.
iii. In this model phases are processed and completed one at a time. Phases do not overlap.

iv. Waterfall model works well for smaller projects where requirements are very well understood.

Tasks to be accomplished in this design approach are

i. Requirement gathering and analysis, different information about the project will be collected so as to come up with the system requirements (Functional and non-functional requirements)
ii. System Design, in this phase the design of the system will performed based on the requirements collected and analyzed. This will provide the systematic framework of the project to be implemented
iii. Implementation, this phase involves programming of the designs into a working system.
iv. Testing, this involves testing the system to identify any errors and improving the system
v. Deployment of the system, this phase the system will be deployed to the user for use while watching for further improvements.

3.3 Data Collection

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes.

There are various methods of data collection which were used such as interviews, questionnaire and documents analysis. Depending on the project, all these methods can be used separately or combined.

- Primary data

Primary data are those which are collected for the first time and are always given in the form of raw materials and originals in character. The primary data are collected by the following methods.

i. Direct personal investigation.
ii. Indirect personal investigation
iii. Investigation though questionnaire.
iv. Investigation through local's reports.

- Secondary data

The secondary data are those which have already been collected by someone other than the investigator himself, and as such the problems associated with the original collection of data do

not arise here. The secondary data can be collected directly either form published or unpublished sources.

In this project both primary and secondary data were gathered. Primary data collected through interviews conducted in 3 Primary schools in Dar-es-salaam region (Ukonga, Mzambarauni and Amani) the interviewees were teachers from pre-primary and standard 1 to 4. Secondary data was also gathered from different previous research and documents include National Baseline for Education Assessment, 2016. Life Skills framework for Primary schools and National standards and training manual for life skills training for out of school youth

3.4 Data Analysis and Results

The following are the views obtained from first interview session conducted to standard 4 to 7 teachers and pupils.

i. Teacher's views on the challenges facing life skills education

Participants were asked ten questions each concerning the extent to which Life Skills is taught more practically than theoretically. Since life skills is not taught as a subject rather it is broken down into topics which are incorporated in different subjects, teachers have reported that most topics which require practice are taught theoretically, for example cookery, pottery, painting, ICT etc. Most teachers state that the children should be prepared psychologically from a young age, one should know what the child is interested in and build them from there, build the talent into something the child can use later on as a means of earning.

Also for the case of self-esteem, empathy and critical thinking, they are taught in a theoretical manner. There are no practical guidelines on how to teach such sub-topics. When it comes to art sub-topics like pottery, drawings, sports the teachers suggested the possibility of having teachers who have the technical skills from either university or college to teach these topics also there is not enough resources or none at all to facilitate the children's understanding for instance 40% of the schools have no sports grounds and the rest rarely have sports time

Coming to the topic of HIV/AIDS, teachers are restricted by the cultural norms within the society not to speak freely on the entire topic of building relations and STDs since most of the people in

the society are scared of talking about it to the children fearing that they will be exposed to such acts and may engage in them.

ii. Pupil's views on the challenges facing life skills education

There is lack of enough teaching resources and there are no practical sessions specifically in sports topic. Also more than 90 percent of the pupils do not know the terms such as self- esteem, critical thinking, it is hard for them to remember since they are not taught using practical means. They would prefer it better if they were taught in a more practical way.

The following are the views obtained from teachers from pre-primary (shule ya awali) and standard 1 -3.

i. The ratio of teacher to students in class is not satisfying.

From all the schools we conducted this research. the average ratio of teacher to student in preprimary class is 1:90. This is a very huge load for the teacher to bear plus with this situation it is difficult to ensure that each student has understood what the teacher has taught. One of the teachers, Mwl.Muyengi said “I try my best to ensure that all students understand but still I cannot guarantee that “. It was also noted that the teacher would normally ask the students their names as she was not sure, she could only capture names of those who usually report to her for most of their activities.

ii. Lack of enough teaching resources which would fit all students

Since the start of the enforcement of the “Elimu Bure “policy, the learning situation has been difficult. Parents believed that all requirements would be provided at schools but the truth is the government sets aside not adequate money for the school requirements such as manila papers, scissors, white papers, crayons etc. One of the teachers, Mwl.Nyimbo said “sometimes I have to take money out of my own pocket to buy some resources”, that for the children to understand they need activities, group activities which need resources like papers and crayons. If the school lacks that then a lot of activities would be skipped. The teachers have a guidance book on how to teach life skills to the students but when it comes to content in the books, they said its shallow, for instance a grade one teacher Mwl.Nyimbo was quoted saying “The stories in the reading and writing text book currently are too shallow, I am therefore forced to use the old text books in teaching to better help the students to learn and understand”.

iii. Lack of effective teacher and parent communication.

A child begins to learn and practice what they learn at home, with the parent’s supervision. If at home, there is poor practice of Life Skills then the teacher would have a difficult time imparting Life Skills to students at school. When a child is seen behaving different from the normal expected ways, then the teacher is obligated to contact the parent and have a talk with them but during my visit, one of the teachers, Mwl. Muyengi was quotes saying “Some of the parents would not respond to the call of the

teachers at school “. This makes imparting Life Skills education difficult which leaves us with a question “what is the role of parents in imparting Life Skills education to their children?”.

iv. Policy of no examination for the Life Skills Subjects.

Most of the Life Skills education subjects are not examined at the end of the class terms in primary level of education. This impacts the way both teachers and students take the subjects, as for the students, Mwl. Nyimbo was quoted saying “The students only have the reading, writing and arithmetic exercise books “none for the Health and Sports subject in which life skills topics are embedded within.

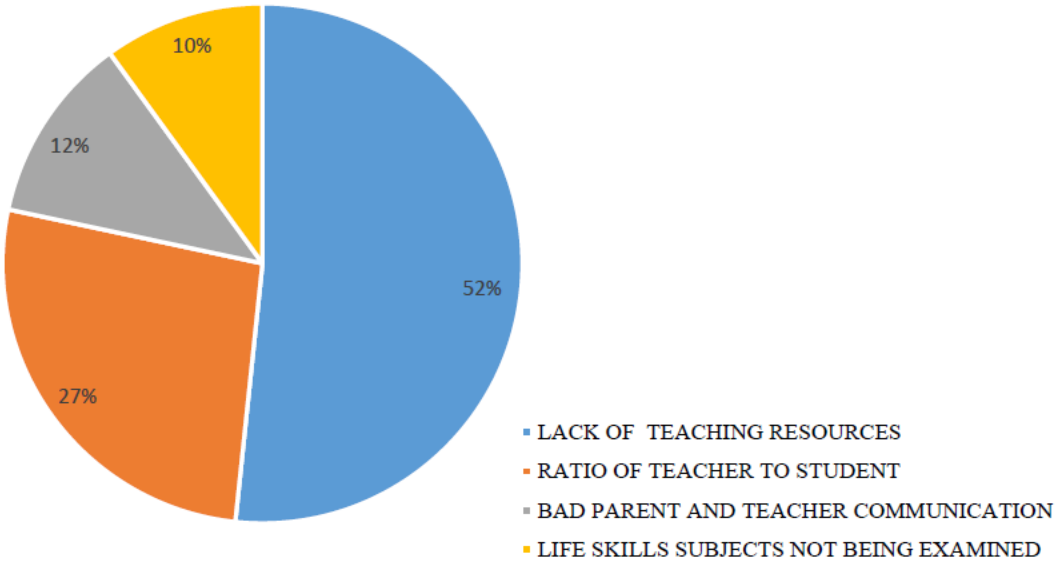


Figure 3.1 Pie chart showing the rate of occurrence of the challenges facing life skills as answered by interviewees.

CHAPTER FOUR
REQUIREMENTS GATHERING AND ANALYSIS

4.1 Requirements Analysis

Requirement is simply a statement of what the system must do or what characteristics it needs to have. It involves the description of what software should do (functional requirements) and what characteristics the system should have (non-functional requirements).

This section explains about identified system requirements based in to two categories, functional and non-functional requirements.

4.1.1 Functional Requirements

These requirements are observable tasks or processes that must be performed by the system under development so as to achieve its main goal. This includes all tasks that will be automated by the system. The following are the functional requirement of the system under development

i. The system must allow any users to browse different Life skills contents available at the site and preview them
ii. The system must allow users to register and update their particulars also authenticate users each time the log in to the system.
iii. The system must allow only registered users(Teachers) to download, rate and comment on any L.S content available in the system
iv. The system must allow only registered users (teachers) to participate in a forum (chat-room for discussing different topics concerning L.S)
v. The system must allow the content administrator to upload contents to the content repository of a system.
vi. The system must allow content administrator to view number of people viewed and downloaded the content.
vii. The system must allow the content advisor/ L.S education specialist to participate in the life skills teaching forum (chat room).

4.1.2 Non-functional requirements

These requirements are qualities or standards that the system under development must have or comply with, but which are not tasks that will be automated by the system. The following is the list of non-functional requirements that the system under development have.

i. The system must display an error message once the password inserted is incorrect
ii. The system must respond to a request as fast as possible
iii. The user must enter the password correctly within 3 attempts
iv. The system must be secure
v. The system must have a backup system to enable recovery of data in case any system failure occurs
vi. The user can post and delete a post at any instance
vii. The user can log in and log out of the system at any instance

4.2 Use case analysis

Use cases refers to the diagrams that used to explain and document the interaction that is required between the user and the system to accomplish the user's task. The following are the use cases according to the user roles

4.2.1 Guest User

Guest user represents the role of the person who is not yet registered into the system, the system intends to give normal user only the ability to browse the content and preview, but in-order to download the content he/she must register and log in.

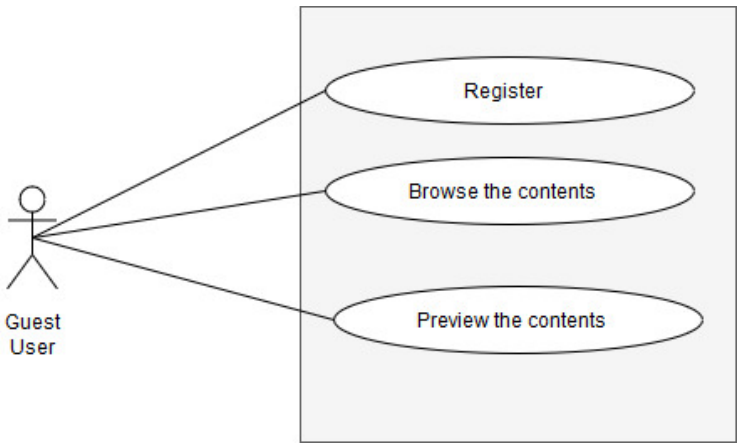


Figure 4.1 Use case diagram for Normal users

4.2.2 Teacher

This role refers to the category of user (i.e Teacher) who have registered in the system and currently has logged in to the system. In this role the system will enable the user to browse and download different life skills teaching materials and as well as participate in the chat room/ forums inside the system

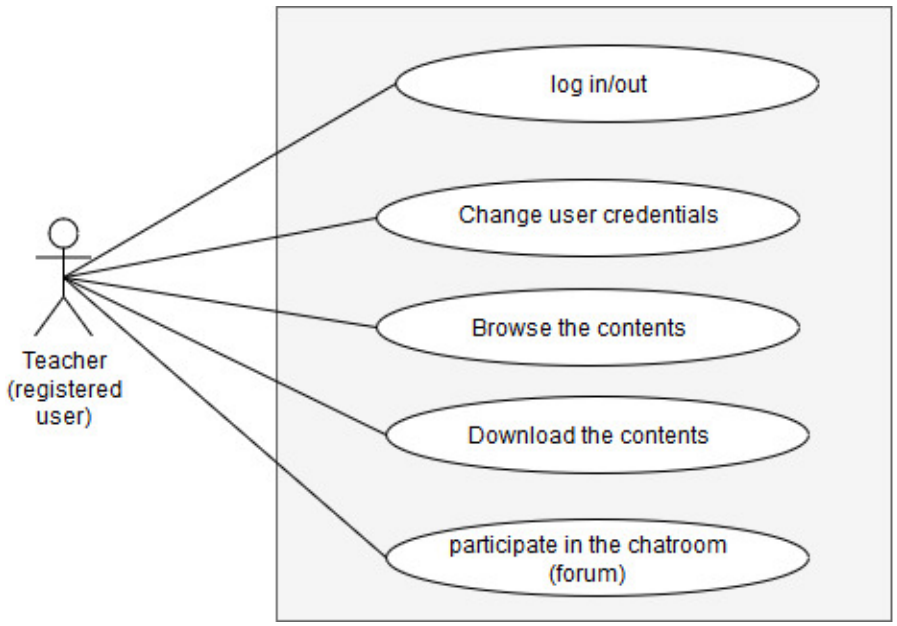


Figure 4.2Use case diagram for Registered user

4.2.3 Life Skills Education Expert / advisor

This role refers to the category of user who have registered in the system as life skills education experts / advisor. The system will enable these users to view different materials available in the repository, participate in chat room as discussion leaders as well as post articles.

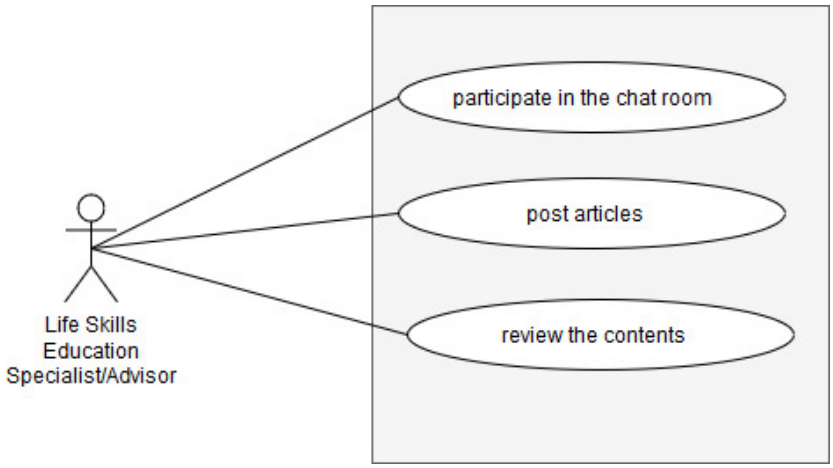


Figure 4.3 Use case diagram for life skills education expert/advisor

4.2.4 Content Administrator

This role refers to the category of the user who is registered in the system as content administrator. The system grants this user an ability to upload different life skills materials to the system as well as deleting them.

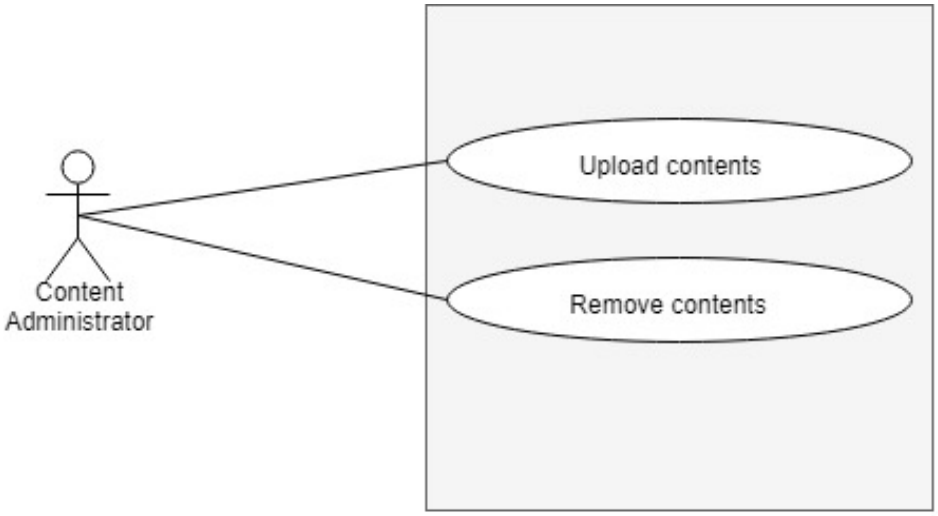


Figure 4.4 Use case diagram for content administrator

4.2.5 Life skills chat room use case

This use case describes the interactions which involve the chat room. This use case includes actors which are the teacher and the life skills platform. It describes how these actors interact with the chat room, that one has to first sign in to register an account in order to view or post the life skills insights.

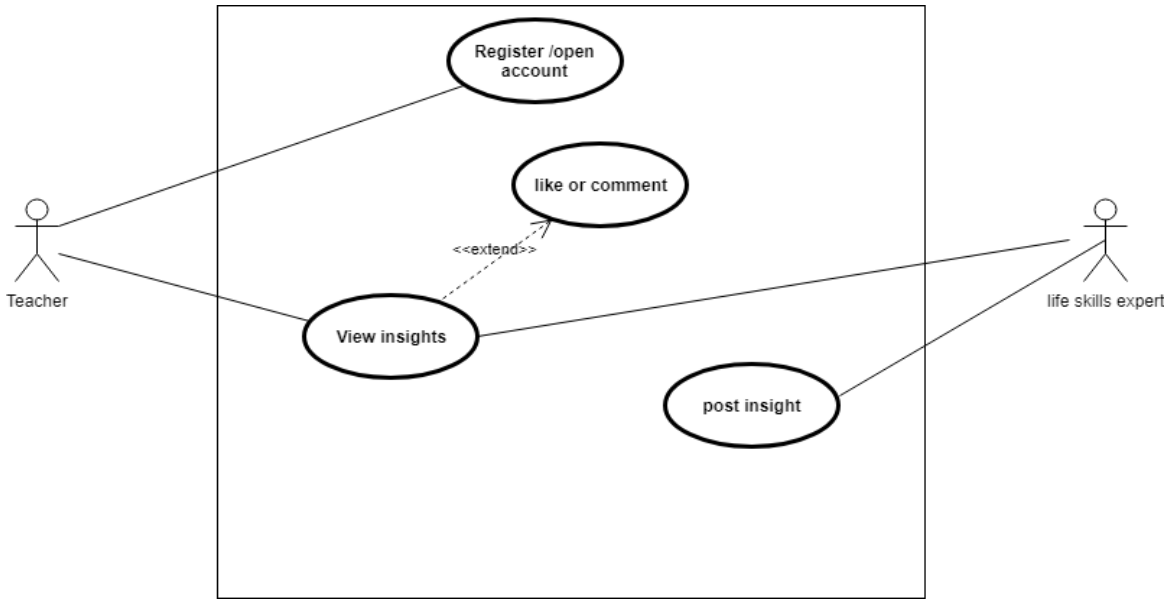


Figure 4.5 Use case diagram for life skills chat room

4.2.6 Use case description

This section gives more description about the above described use cases

4.2.7 Browsing the content use case

Use case Name	Browse the contents
Actors	A guest user, Registered user
Priority	High
Description	This use case describes how the users of the system can browse different contents available in the system.
Pre-Condition	1. Web site is available 2. Content database is online
Normal Course	1. The system displays default homepage 2. The user selects life skills teaching materials section 3. The filter occurs where he/she can filter the content based on grade, topic and type of material 4. The available materials are displayed

Post condition	1. User select content which he/she want 2. User will be required to login to proceed to download
Exceptions	E1. The searched content is not available 1. The system displays the message notifying the user that the content is not available 2. The system suggests relating materials that the user can use instead E2. Un logged in user presses the download button 1. The system displays the message notifying the user that he/she must be logged in 2. Login/ register option pops up for the user to login or register to the system

Table 4.1 Browse the content use case

4.2.8 Downloading the content use case

Use case Name	Downloading the contents
Actors	Registered user
Priority	High
Description	This use case describes how registered users of the system can download different contents available in the system.
Pre-Condition	1. Web site is available 2. Content database is online
Normal course	1. The user displays default homepage 2. The user presses the log in button to login 3. The logged in user browse the available materials 4. Then selects the specific material 5. Then selects download option 6. The content start downloading to the user's drive

Alternative course	1. The system displays default homepage 2. The user selects life skills teaching materials section 3. The filter occurs where he/she can filter the content based on grade, topic and type of material 4. The available materials are displayed 5. The user selects the specific material 6. The user selects download option 7. Then message pops up that he she must be logged in 8. The user login to the system 9. Then selects download option 10. The content start downloading to the user's drive
Post condition	1. User gets the content which he/she want 2. The download instance is recorded for usage statistics.
Exceptions	E1. The searched content is not available 1. The system displays the message notifying the user that the content is not available 2. The system suggests relating materials that the user can use instead

Table 4.2 Downloading the content use case

4.2.9 Entering chat room/forum use case

Use case Name	Entering/using the chatting platform/forum
Actors	Registered user (Teacher), Life Skills Education Specialist/advisor
Priority	High
Description	This use case describes how teachers and life skills specialist can interact through the chatting platform/forum.
Pre-Condition	1. Web site is available
Normal Course	1. The system displays default homepage 2. The user selects chatting forum 3. The user then gets logged in to the chatting platform.

Post condition	1. The user gets to interact with other users who are online or by looking to the previous discussions
Exceptions	E1. Other users are not online 1. The user views the previous discussions 2. The user can post his/her topic or ask question.

Table 4.3 Entering the chatting platform use case

4.2.10 Uploading the content use case

Use case Name	Uploading the content
Actors	Content Administrator
Priority	High
Description	This use case describes how content administrator uploads materials to the system.
Pre-Condition	1. Web site is available 2. Database is available
Normal Course	1. The admin log in to the system 2. The content admin selects upload content section 3. Then fills in the form about the content and upload the materials
Exceptions	E1. Content already existing 1. The content admin may choose to preview the existing content 2. Then he/she may replace the existing content or abort the operation

Table 4.4 Uploading the content use case

4.3 System Components

The life skills teaching canvas is based on main three components: user components, teaching materials and communication. The user component is concerned with the main user with different roles to participate in the system, it includes Teachers, Content administrators and life skills education teaching expert/advisors. The teaching materials component is concerned with all materials available in the system that will be used by teachers in delivering the life skills subject, these materials will be categorized according to the topics covered. Communication component involve chatting platform/forum that will create collaboration among users (i.e. teacher and life skills education experts/advisors).

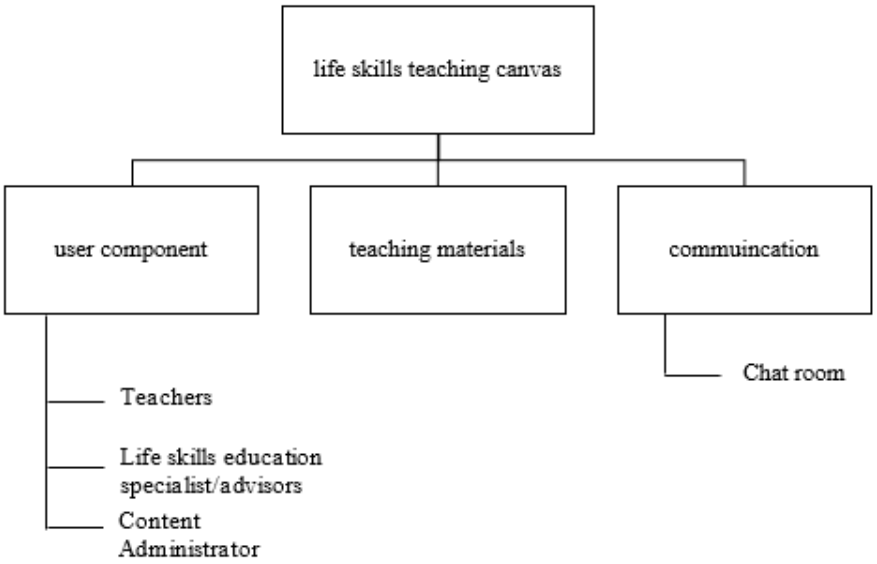


Figure 4.6 Life Skills teaching Canvas System Components

CHAPTER FIVE
SYSTEM DESIGN

5.1 Overview

This chapter explains the design process of the project, Design as the part of the project defines the architecture, modules, interfaces and data flow for the system in order to satisfy the specified system's requirements. This chapter explains about system sequence diagrams, process modelling – Data Flow Diagrams and the architecture of the system.

5.2 Life skills teaching canvas sequence diagrams

Sequence diagram is an interaction diagram that models a scenario that takes place in the system. In the life skills teaching canvas a number of events needed to be achieved. In this section 3 use cases are used in illustrating modeling of the system sequence diagram. The three use cases are downloading the content, uploading the materials and entering the chat room/forum

5.2.2 Sequence diagram for downloading the content use case

This scenario is first initiated by log in request by the user, then after log in the user search for the material he/she wants the system receive the search call and the query the database, where by the database responds with a result which is formatted by the system and then displayed to the user.

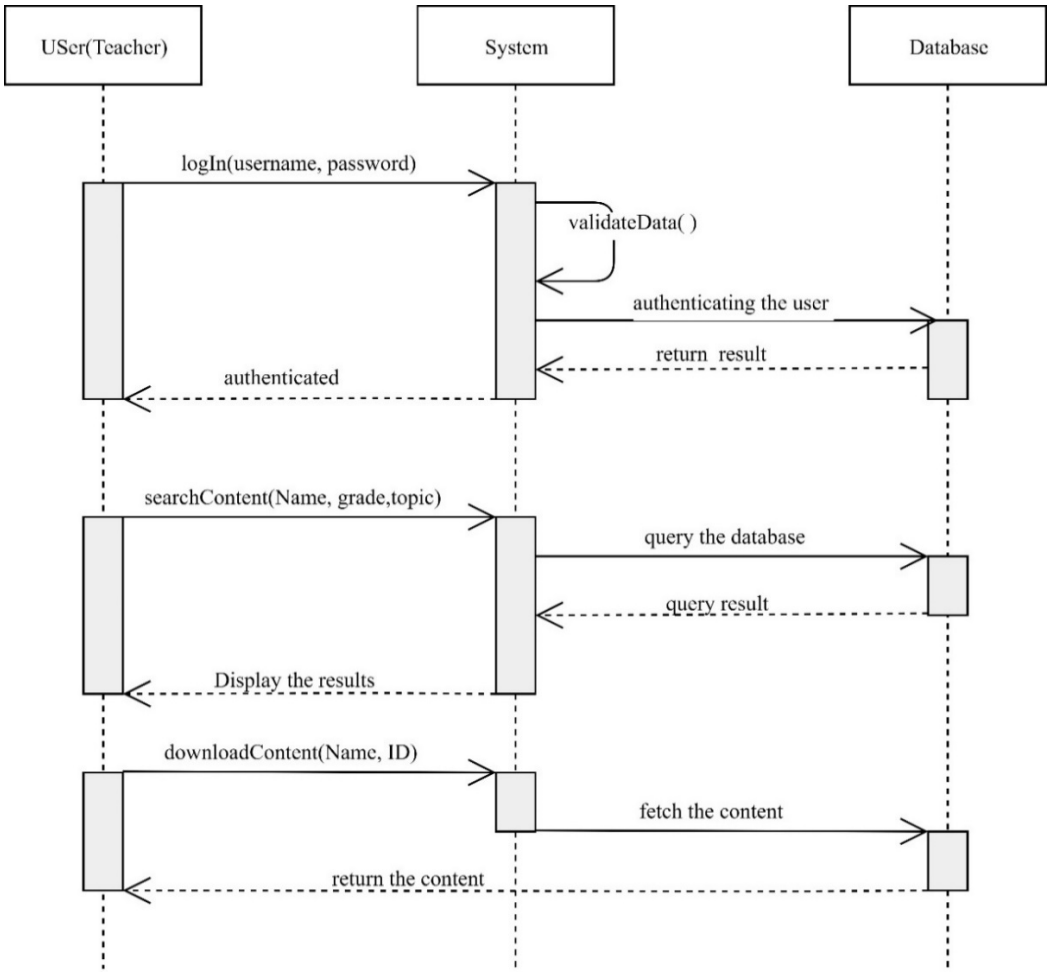


Figure 5.1 Sequence diagram for downloading content

5.2.3 Sequence diagram for uploading the materials

This scenario is first initiated by the content administrator logging into the system, then pressing the upload option where he/she will be required to fill in the form and at the end uploading the material and hit upload button. After hitting the button, the form is verified by the system and then the data is sent to the database then response is sent back to the system whereby it is formatted and then send to the user.

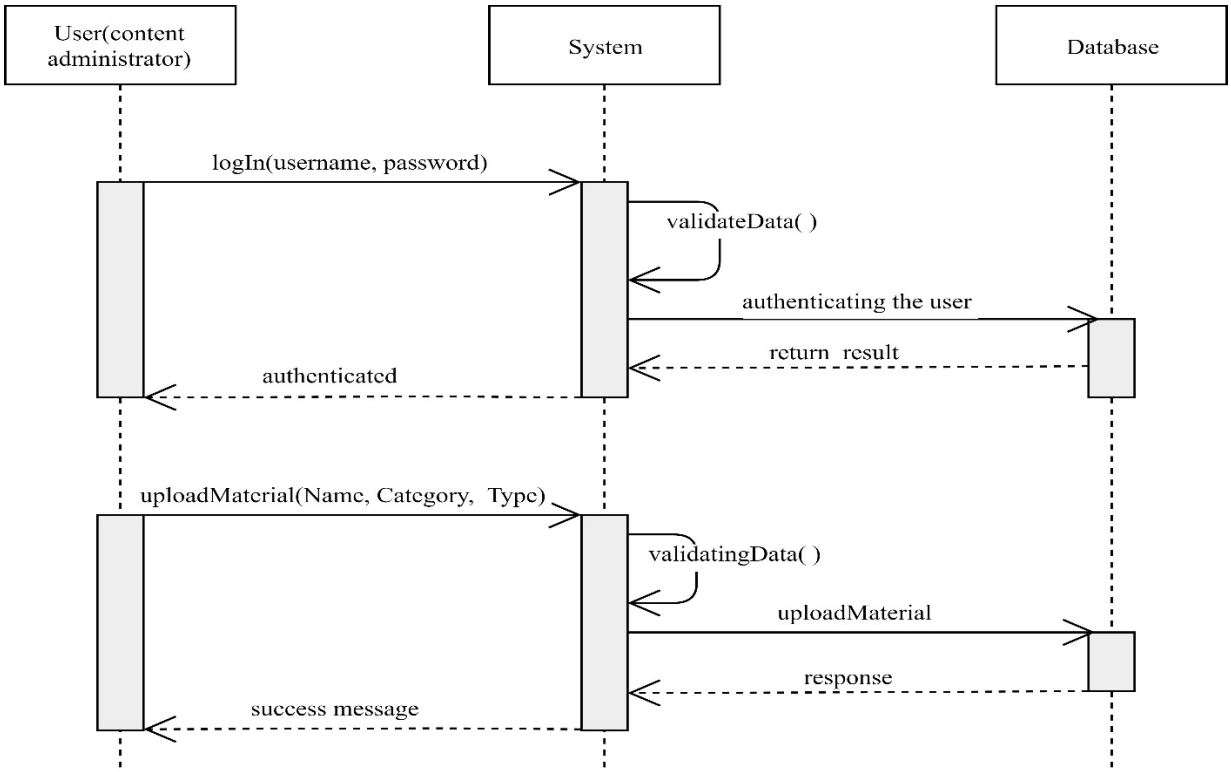


Figure 5.2Sequence diagram for uploading the content

5.2.4 Sequence diagram for entering the chat room/ forum

This scenario is first initiated by user logging as life skills education expert or teacher, then selecting chat room /forum option where a new window will open with an interface to enable communication, then the system receives username and ID then query the database for previous chat information, the database response is then send back to the system which formats the result and then send to the user interface.

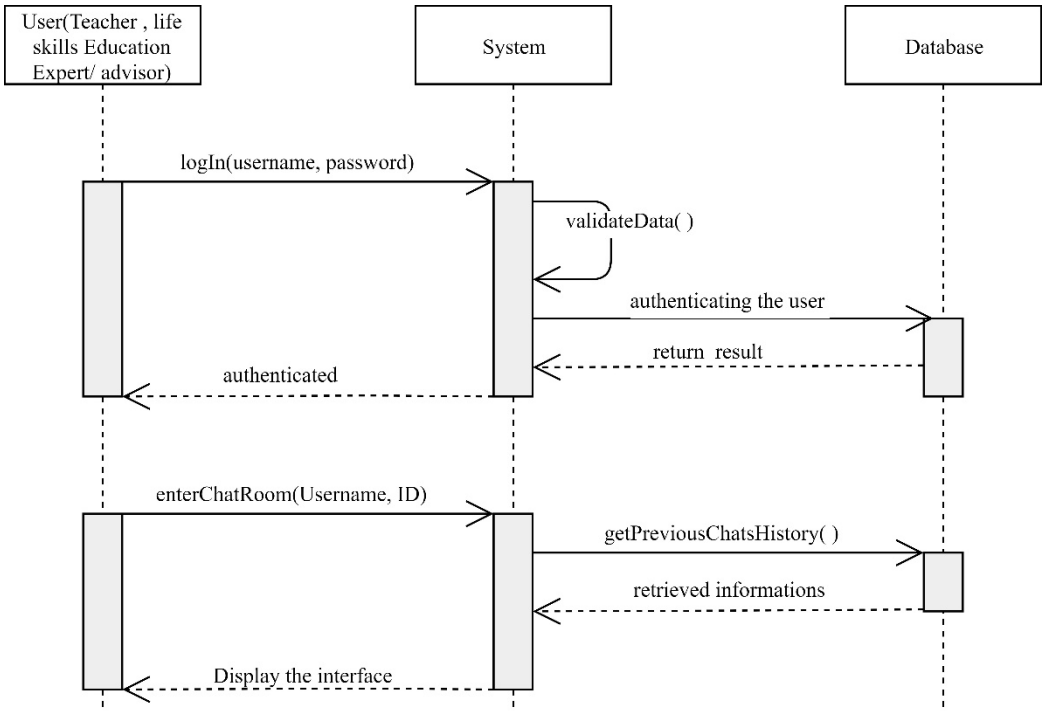


Figure 5.3 Sequence diagram for entering chat room/ forum

5.3 Process Modelling

Process model used to describe business processes – the activities that users do. In this section I have used data flow diagram which is most commonly used process modelling techniques. Data flow diagram(DFD) shows a way in which information flows inside the system. The following figure shows the DFD of the life skills teaching canvas.

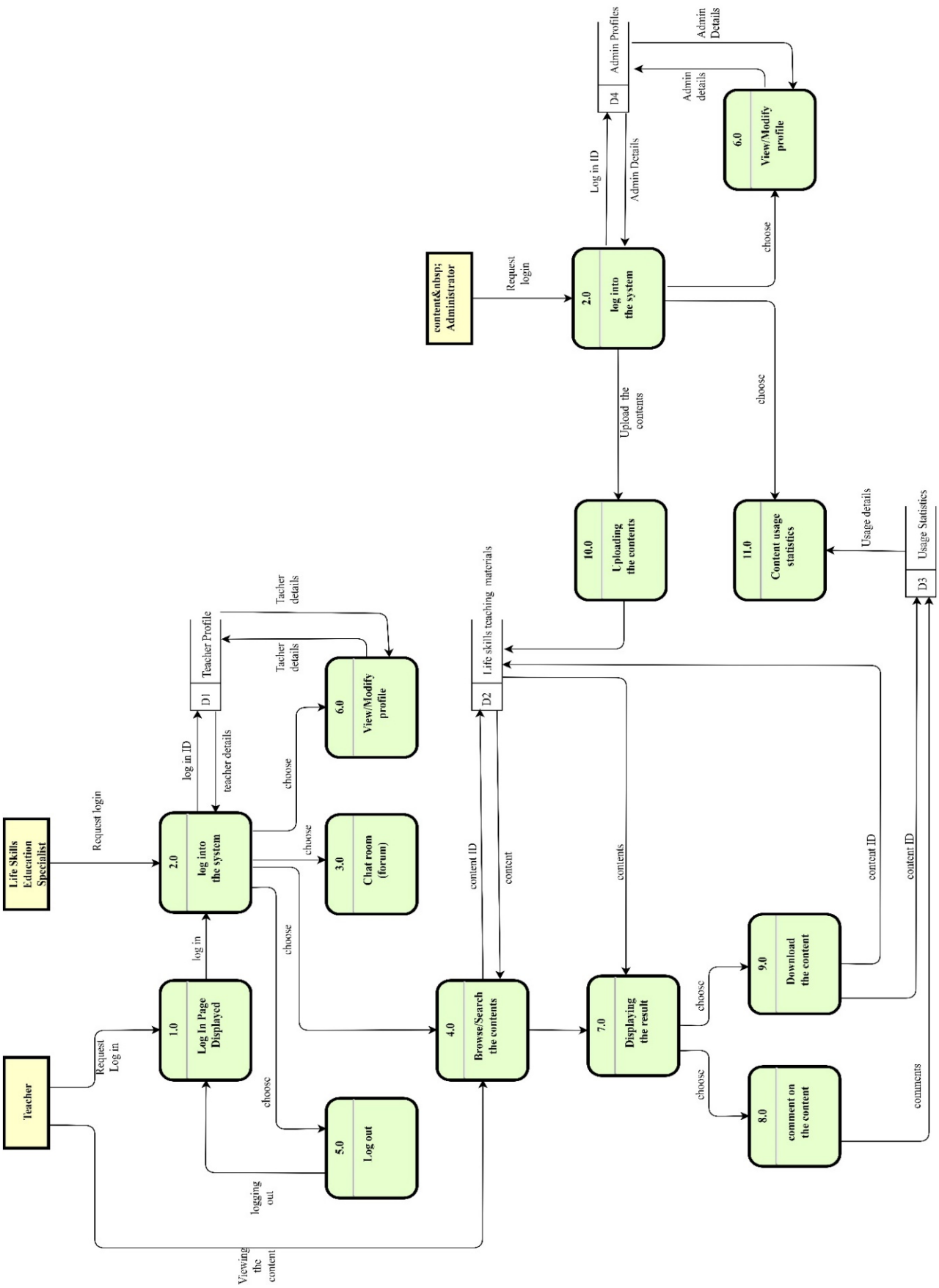


Figure 5.4The data flow diagram for life skills Teaching Canvas System

5.4 Database design

For the system to support the applications that the end-users want, in as efficient manner as possible, requires a suitably structured database. Producing this structure is known as database design. In order to design and implement a NoSQL (Document based) database in which our case is a Mongo Database we need to have a database schema which is derived from a conceptual model.

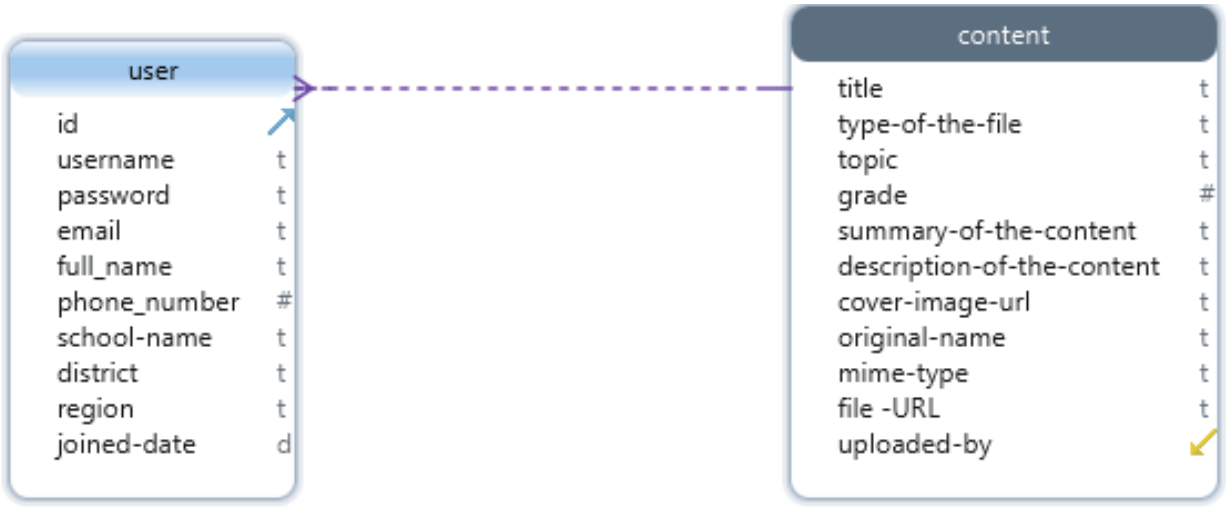


Figure 5.5 A conceptual model for a life skills teaching canvas database

The above conceptual model was used to come up with user and content schema which are presented in the following

5.4.1 User schema

The user schema shows the structure of the user data that will be stored in the database, it includes user full name, username, email, phone number, school, district, region user role and the date he /she joined.

```
var Userschema = new mongoose.Schema({
    username: {
        type: String,
        required: true,
        index: true
    },
    password: {
        type: String,
        required: true,
    },
    email: {
        type: String,
    },
    name: {
        type: String
    },
    phoneNumber: {
        type: Number
    },
    school: {
        type: String
    },
    district: {
        type: String
    },
    region: {
        type: String
    },
    user_role: {
        type: String
    },
    joinedAt: {
        type: String
    }
});
```

Figure 5.6A schema for the user data

5.4.2 Content schema

The content schema shows the structure for the contents that will be stored in the database, it includes content name, type of the file, topic of the content, grade, meta data such as mime type, original name and URL where the file is located.

```
var Contentschema = new mongoose.Schema({
    title: {
        type: String
    },
    fileType: {
        type: String
    },
    topic: {
        type: String
    },
    grade: {
        type: Number
    },
    textSummary: {
        type: String
    },
    textDescription: {
        type: String
    },
    createdAt: {
        type: String
    },
    coverimageURL: {
        type: String
    },
    OriginalName: {
        type: String
    },
    mimeType: {
        type: String
    },
    fileURL: {
        type: String
    },
    uploadedBy: [{
        type: mongoose.Schema.Types.ObjectId,
        ref: 'User'
    }],
    uploaderName: {
        type: String
    }
});
```

Figure 5.7 A schema for the content data

5.5 Life Skills teaching canvas system architecture

Life skills teaching canvas is a client-server, web-based system with three tier architecture. The system consists of three major components: The Mongo Database server for storing all the information and data needed, including the means to link to the teaching content repository, Express web application server that controls the communication (basic system functionality) and

the client that is used by users to access data from the server (web interface accessible via standard web browser). The three components are networked to facilitate communication among them.

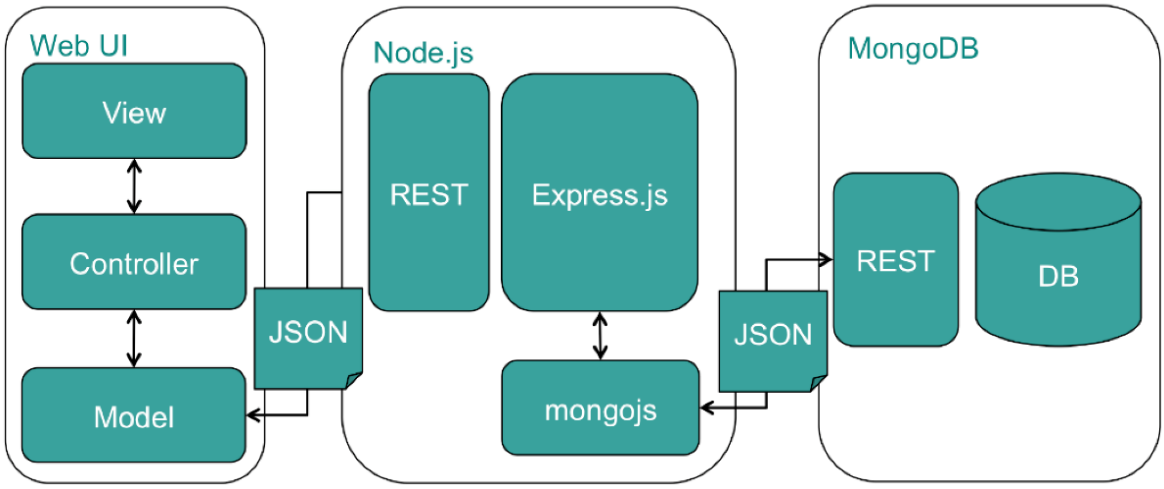


Figure 5.8 Life Skills teaching canvas system architecture

As illustrated in the figure 4.9, the architecture consists of the following

i. The client Tier: also known as the user interface layer runs on the end-user's computer. This layer is the Web User Interface(UI). It is also referred to a front end. It consists of model view and controller. Where by the model defines what the app should contain, the view defines how the app's data should be displayed and the controller contains the logic that updates the model and/or view in response to input from the user of the app.

ii. The application tier: also known as business logic and data processing layer is responsible for interacting with the client on one side and the database on the other side. Thus the application layer receives and process information from the client, retrieves information (data) from the database. Express web server is used to manage all activities in this tier, this server is asynchronous and non-blocking thus making the server performance effective. This server operation uses REST API, which is the application programming interface that uses HTTP requests to GET, PUT, POST and DELETE data. Also data between these tiers are exchanged through JSON (JavaScript Object Notation) which is easier to manipulate compared to other means such as XML.

iii. The database Tier: This is the place where data is stored. The database server maintains the data needed for the web application, it stores data including links to the teaching content

repository and controls basic functionality. This part resides on a separate server known as a database server. The MONGO database is used in this tier; MONGO DB is a cross platform document oriented database program. It is classified as NoSQL database. It uses JSON like schemas. The advantage of using MONGO DB is that it is very scalable and also provides fast response time.

CHAPTER SIX
SYSTEM IMPLEMENTATION

6.1 Overview

The implementation is entirely divided into two parts, the front end development and a backend development, the front end development is main implemented using HTML, CSS and JavaScript and the backend is implemented using Node Js and Express which are frameworks based on Java Script.

The database is implemented using MongoDB which is a cross-platform document-oriented database. Classified as a NoSQL database, MongoDB uses JSON-like documents with schemata.

6.2 Implementation Strategy

For the system to work first, the user must be able to enter the homepage and be able to navigate to different directories except chatting forum which requires the user to be logged in first and being authenticated. To do so a user registration and authentication must be developed that should work across the whole system. Also the user should be able to browse different materials available in the content repository and after log in he/she should be able to download the corresponding material. And finally the logged in user should be able to enter life skills forum and be able to participate in the forum.

6.3 System Implementation

The system is divided into 4 main modules, the registration and authentication module, contents repository module, chatting module and database module All these modules work together to achieve the project specific objectives.

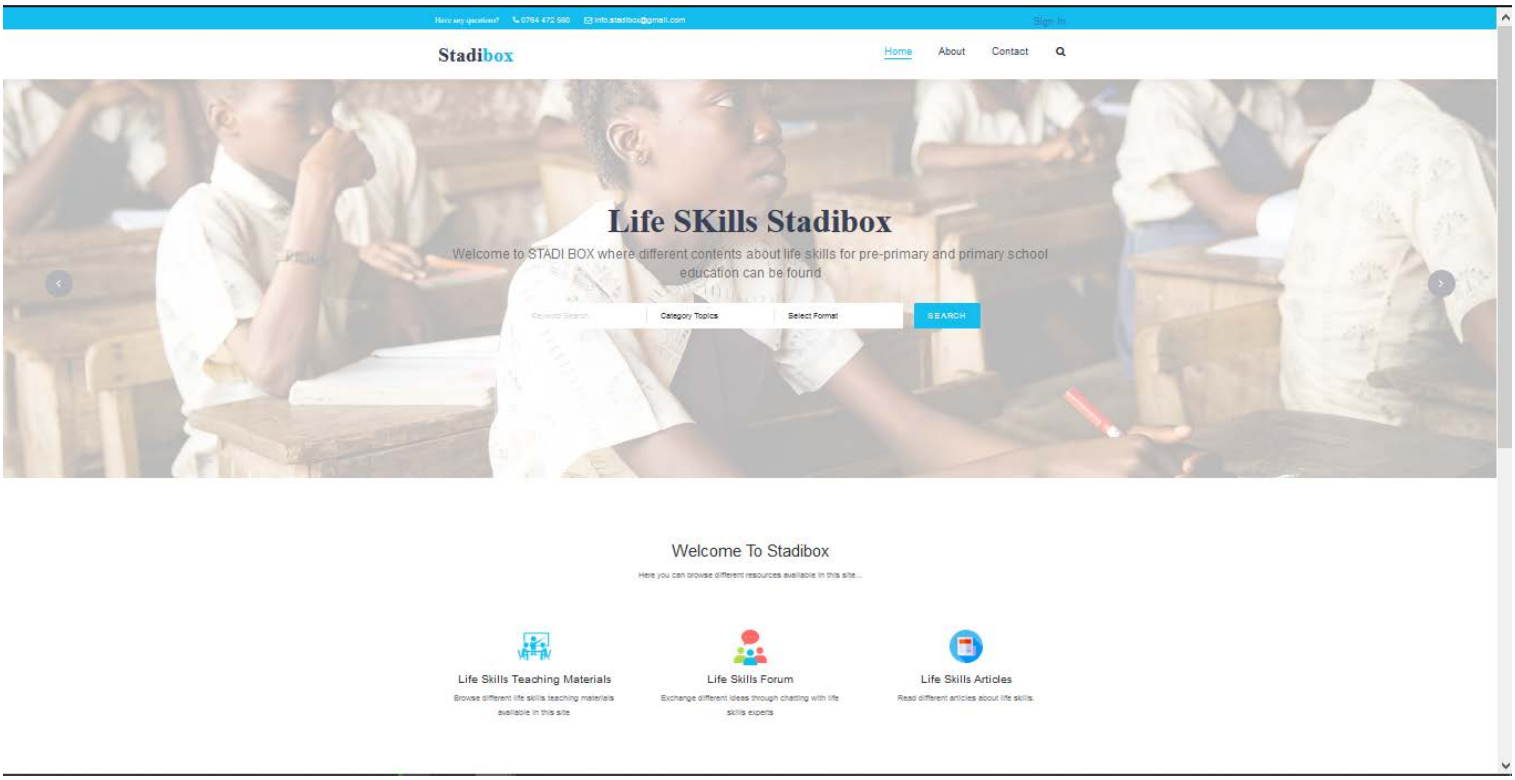


Figure 6.1 Life skills teaching canvas home page

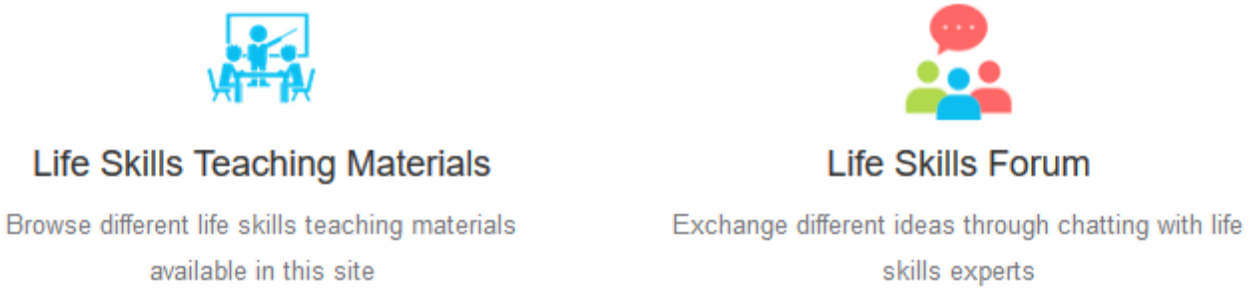


Figure 6.2 Teaching materials and life skills forum tabs

6.3.1 Registration and authentication module

This module is responsible for managing the registering process and authentication operation inside the system, it is divided into three parts, first the registration and login forms in front end, transaction processing unit which is responsible for formatting the information and providing interface to the database server and finally the database server which stores the data.

The registration and log in operation can be accessed at the home page, where the user can decide to first register and log in before starting browsing the site, this will enable him/her to navigate the entire site without the need to be authenticated, the other way around is for a user to continue to navigate inside the site and decide to register and log in after being satisfied with what is being offered inside the site.

The login and authentication module is implemented using node js and passport authentication library which is java script based, which creates a session for each user logged in the system, also maintain the session throughout until the user logs out.

When the user register, his/her information is transmitted from the form (client) to the server through the POST request, when the content reach the Express server, first it is being verified and if there is error in the information, the server will return error to the user and give the user a chance to correct the mistake, if there is no any error then the information will be send to the database server and before being saved the password information is hashed to ensure the security of the user account whenever the database server security is breached.

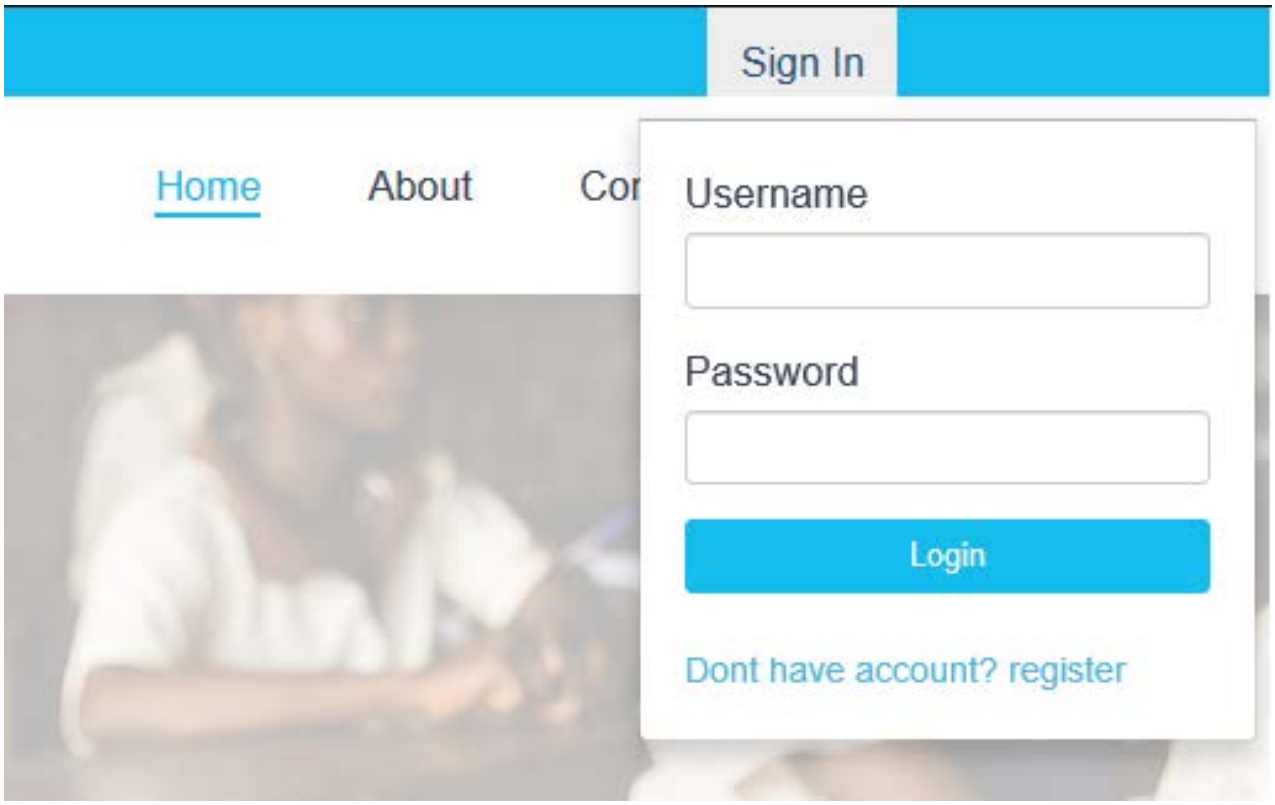


Figure 6.3 Log in tab of the platform in the homepage

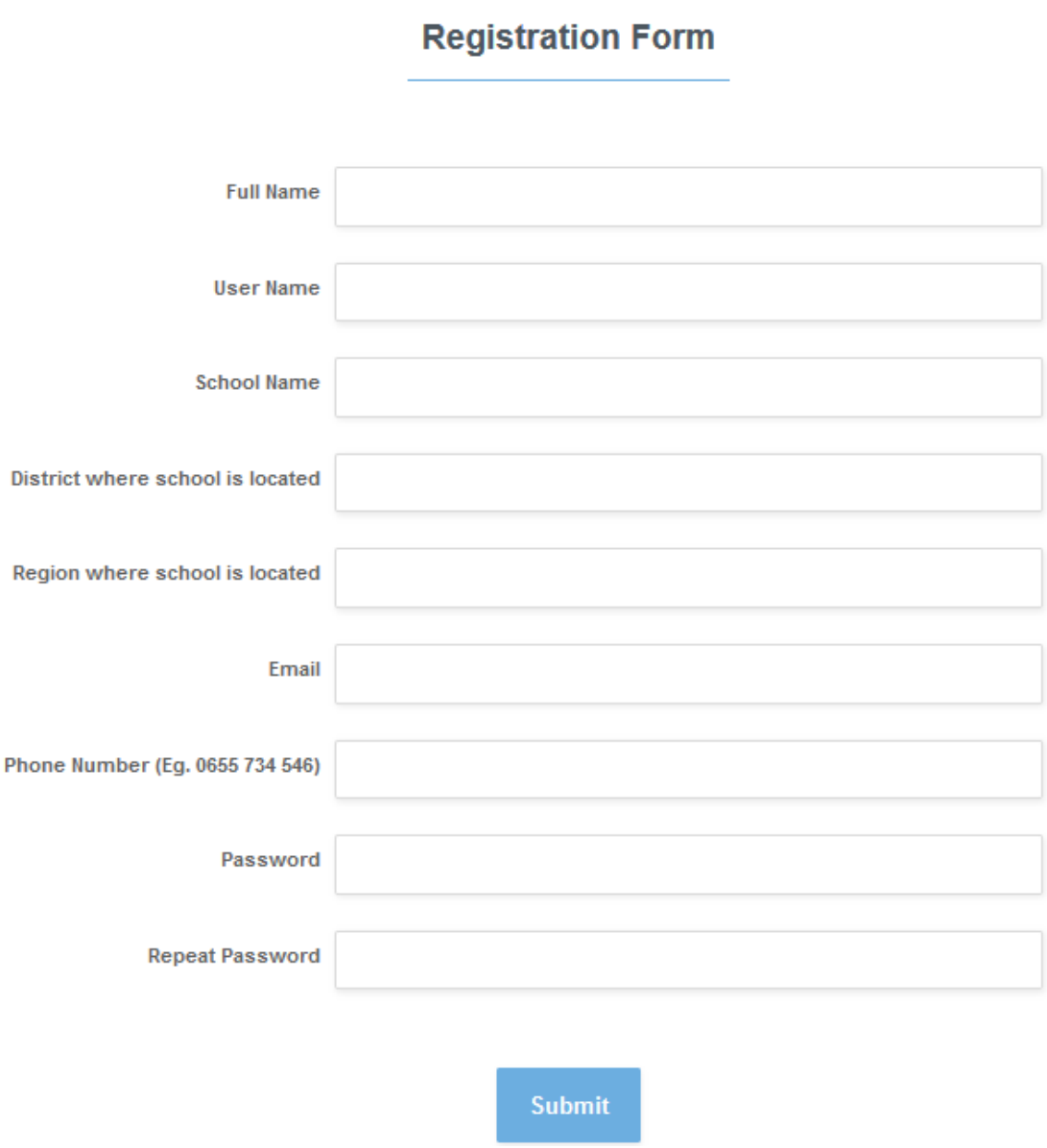


Figure 6.4 User Registration Form

6.3.2 Contents repository module

This module is responsible for handling content browsing, downloading, uploading, updating and deleting, this module is divided into three parts the first part is the front end which is responsible for rendering contents to the user and capturing user's inputs, the second part is express server which handles all transactions (i.e uploading, downloading, updating, deleting). The content uploading handles the uploading operation which takes data from the user (client) and saves them to the database server and uploads the corresponding files to the repository in the express server. Content Downloading is responsible for taking the stored files and send them to the client for downloading, Content updating updates the already stored data in the database server and content

deleting handles delete operation of the materials. In this system only content administrator has privilege to uploading, updating and deleting of the contents

In order for a user to access the life skills teaching materials in the repository he/she must enter the homepage first, from the home page he/she has to click the life skills teaching material tab and being redirected to the materials page where he/she will be able to search and view the results depending on the searched keyword, after the user has viewed the material he/she can select on the material to preview the content and get more information based on the material.

Life Skills Teaching Materials

Browse different life skills teaching materials available in this site

Figure 6.5 Life Skills Teaching Material Tab at the home page

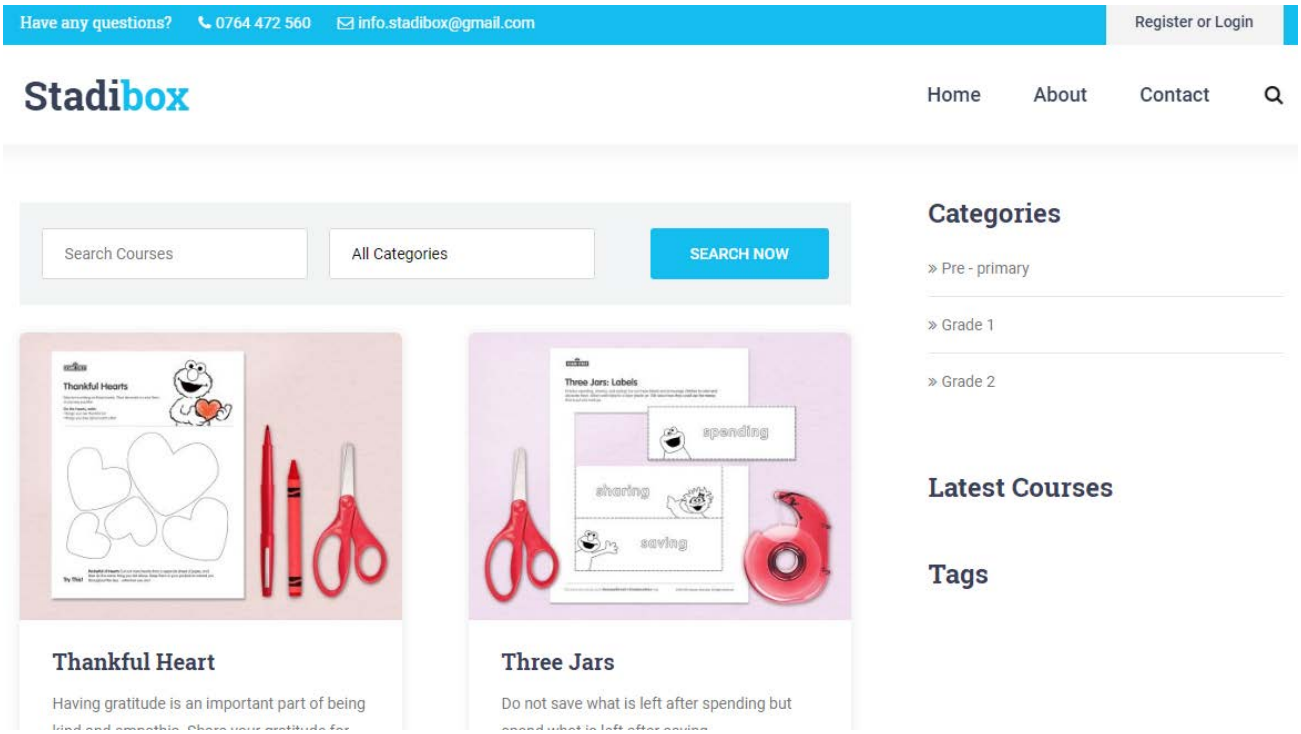
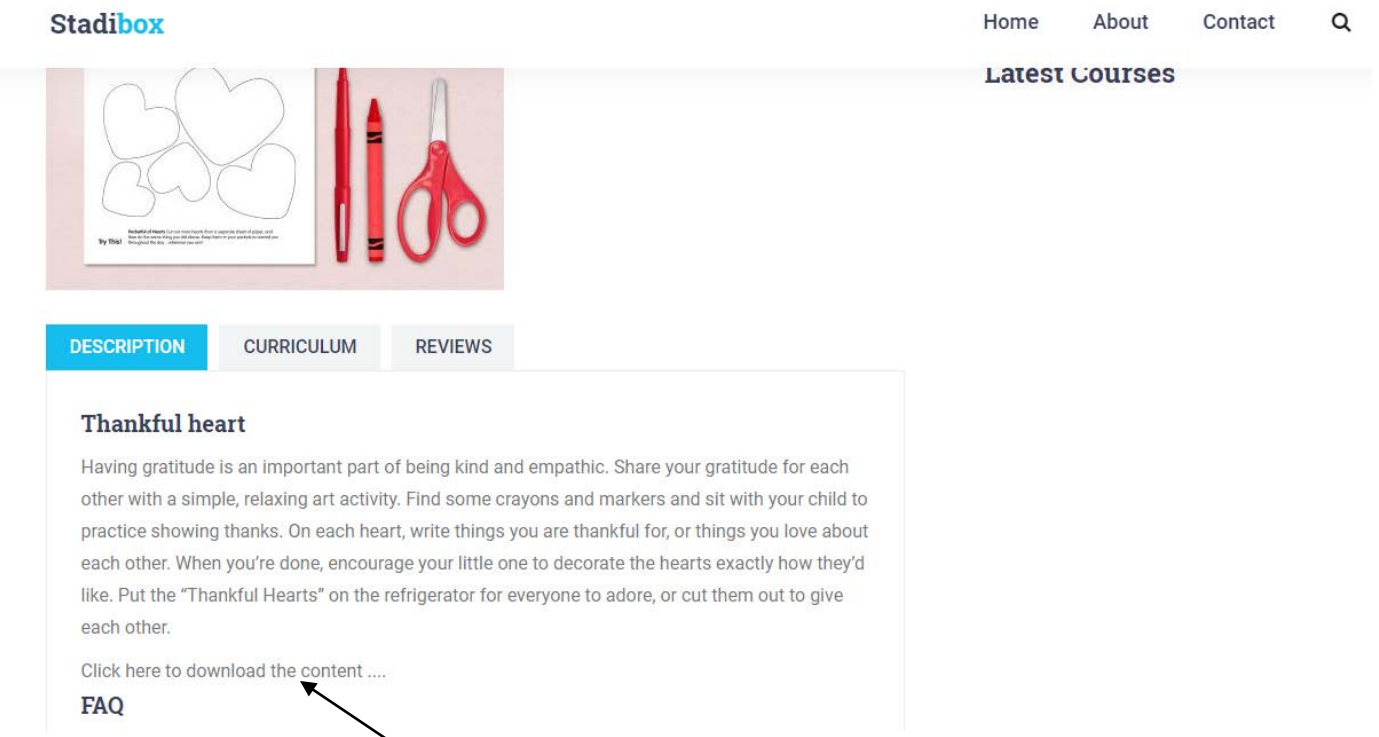


Figure 6.6 Life Skills Teaching materials section after selecting life skills material tab from home page



Downloading Option for the content, works only if the user is logged in

Figure 6.7 Previewing the content after selecting it from the material section showed above

6.3.3 Chatting module

This module is responsible for handling live chatting between different users that are currently logged in to the system, this module requires a user to be logged in before access it, therefore the user must be authenticated before log in to the chat forum. To achieve its functionality, this module uses socket.io which is a fast and reliable real time engine. Socket.io works hand to hand with express server to create this real time environment. It works in client and server side, at client event listeners have been implemented to handle all incoming messages and be able to render the messages to the user in a nicer format. Also event emitters have been implemented so as to enable a user to be able to reply messages. At the server side the similar implementation has been done so as to handle all input/output transactions, such as handling all incoming messages and redirecting them accordingly. Also handling all outgoing messages and redirecting them accordingly. The chat forum interacts with the user database and be able to fetch users' information and therefore display the information as an ID of a person who enters the forum.

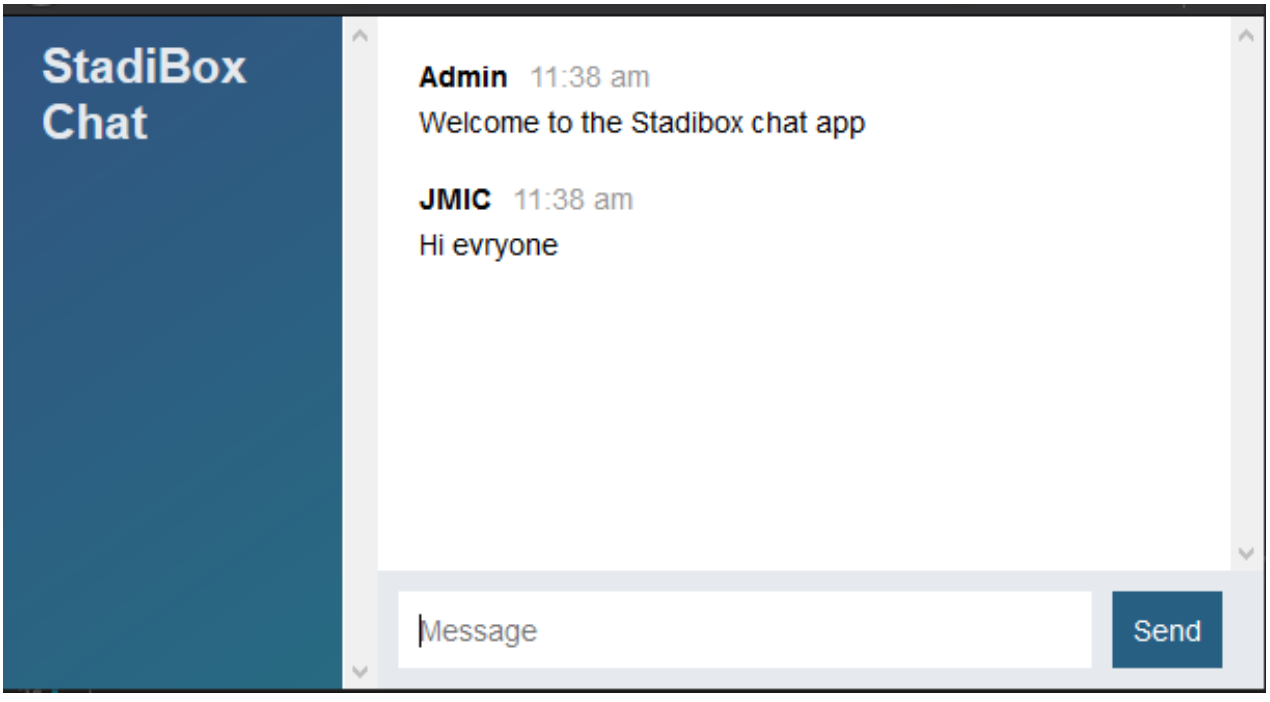


Figure 6.8 A chat interface for life skills teaching canvas chat forum.

6.3.4 Database module

This part of the system is where all the data needed for the operation of the system are stored, it includes user information and life skills materials information, the user information comes from registration operations done by users in the front end and the life skills materials information comes from uploading and updating operation performed by content administrators. Other information stored in the database are materials downloads data, rating and comments. The data are stored in the database as collection (resembles tables in SQL database) in which they contain documents (resembles rows in the SQL database).

The user collection include name, username, password, user role, joined date which shows when the user joined the platform, email address, phone number, school name and location (district and region). The password is hashed so as to ensure that the users passwords are securely stored inside the database.

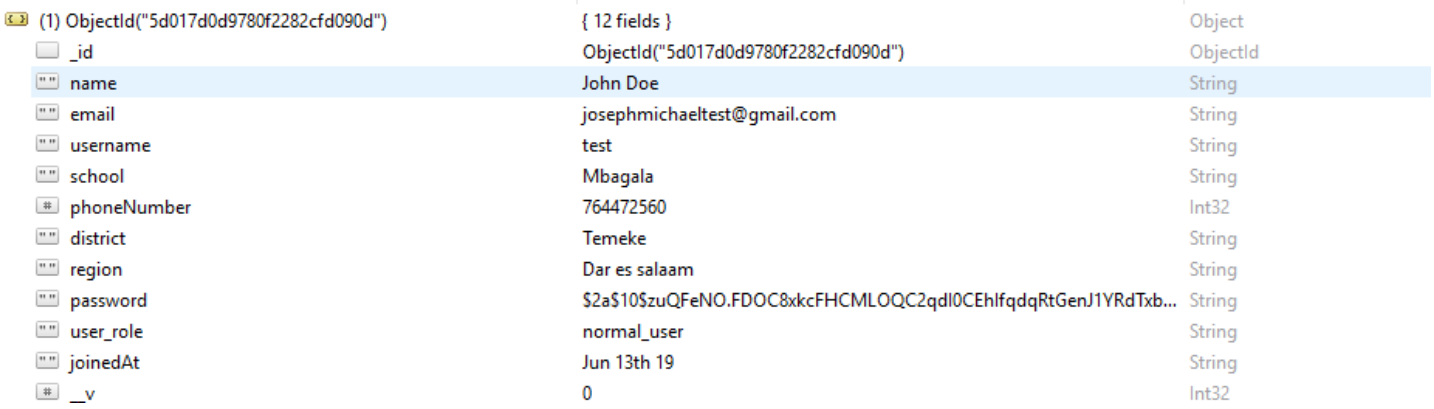
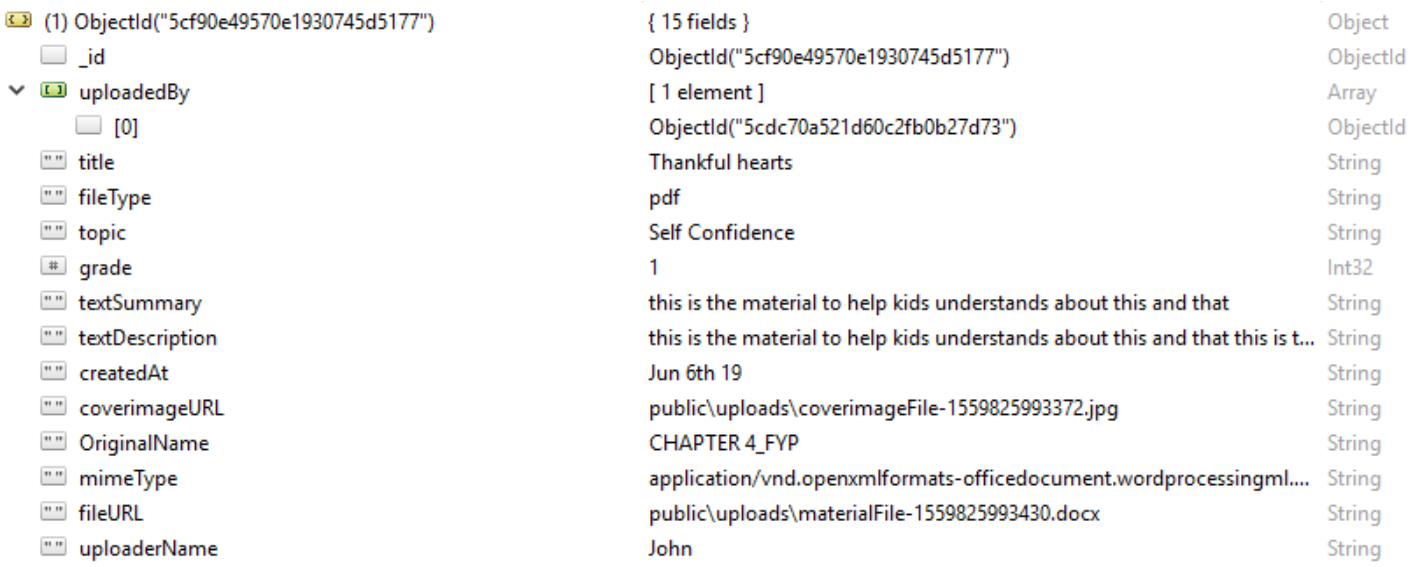


Figure 6.9 The snapshot of the users' information in the database

The content collection includes content name, file type of the content, topic, grade, description, date created, URL to the file location and name of the uploader, the content collection has reference to users' collection where more information about the uploader cab be queried.



(1) ObjectId("5cf90e49570e1930745d5177")	{ 15 fields }	Object
_id	ObjectId("5cf90e49570e1930745d5177")	ObjectId
uploadedBy	[1 element]	Array
[0]	ObjectId("5cdc70a521d60c2fb0b27d73")	ObjectId
title	Thankful hearts	String
fileType	pdf	String
topic	Self Confidence	String
grade	1	Int32
textSummary	this is the material to help kids understands about this and that	String
textDescription	this is the material to help kids understands about this and that this is t...	String
createdAt	Jun 6th 19	String
coverimageURL	public\uploads\coverimageFile-1559825993372.jpg	String
OriginalName	CHAPTER 4_FYP	String
mimeType	application/vnd.openxmlformats-officedocument.wordprocessingml....	String
fileURL	public\uploads\materialFile-1559825993430.docx	String
uploaderName	John	String

Figure 6.10 The snapshot of the content information in the database

CHAPTER SEVEN

CONCLUSION AND RECOMMENDATION

7.1 Conclusion

This report gives a detailed report of the designing and implementation of Life Skills Teaching canvas, this project will create a bridge between teachers and access to teaching materials, hence it will enable them to enhance their teaching techniques and knowledge which will help them deliver a required and quality life skills knowledge that will help students excel in academic and other spheres of life.

7.2 Challenges

During the implementation of this I encountered different challenges which includes

i Limited time, the semester schedule was limited and as a result time to perform more research was minimal.

ii Acquiring digitalized life skills teaching materials, the concept of using digitalized copies of different teaching materials at primary schools in Tanzania is still new, and as a result there are few stake holders working in this field, this situation poses a difficulty in acquire relevant materials.

7.3 Recommendation

This project takes advantage of fast growing Information Technology (IT), which comes with many advantages includes flexibility and accessibility, hence I recommend government institutions such as TIE, Ministry of Education and other private sectors to adopt this system as an alternative way of providing teaching materials and necessary knowledge on how to use them, since it uses much resources (low cost) and it is very easy to share and update the materials.

7.4 Future Work

From where I have ended, this work can be further improved by adding offline usage functionality, where the user of the system could be able to use the system offline when he/she has no internet access, this could help those users who are located in places where there is a challenge in network coverage.

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APPENDIX

Project Budget

RESOURCE	COST (TSH)	TOTAL (TSH)
Field Visits	**8,000/= per week @each member**	**290,000/=**
Stationary (8 reports)	**100,000/=**	**100,000/=**
Software and Hardware	**150,000/=**	**150,000/=**
Total Costs		**540,000/=**

Gantt Table

ID	Task Name	Start	Finish	Duration
1	Final Changes to project title	05-Nov-18	09-Nov-18	1w
2	Establish statement of the problem	12-Nov-18	16-Nov-18	1w
3	Set objectives and specific objectives	19-Nov-18	30-Nov-18	2w
4	Prepare research plan (tools and questions to answer during the project)	03-Dec-18	14-Dec-18	2w
5	Prepare mid-semester report	17-Dec-18	21-Dec-18	1w
6	Present progress report	01-Jan-19	01-Jan-19	1d
7	Conduct requirement gathering (interview and observation)	07-Jan-19	18-Jan-19	2w
8	System design and annalysis	21-Jan-19	01-Feb-19	2w
9	Architecture design	04-Feb-19	05-Feb-19	2d
10	Prepare first semester report	06-Feb-19	14-Feb-19	1w 2d
11	Presentation of my progress report	28-Feb-19	01-Mar-19	2d
12	User interface design	25-Mar-19	29-Mar-19	1w
13	Implementation	01-Apr-19	31-May-19	9w
14	Mid-semester 2 report preparation	09-May-19	17-May-19	1w 2d
15	Testing and evaluation	03-Jun-19	07-Jun-19	1w
16	Implementation (changing from suggestions from users)	10-Jun-19	21-Jun-19	2w
17	Final report preparation	24-Jun-19	05-Jul-19	2w
18	Final presentation (semester 2)	18-Jul-19	19-Jul-19	2d

Figure: Gantt Table

Gantt Chart

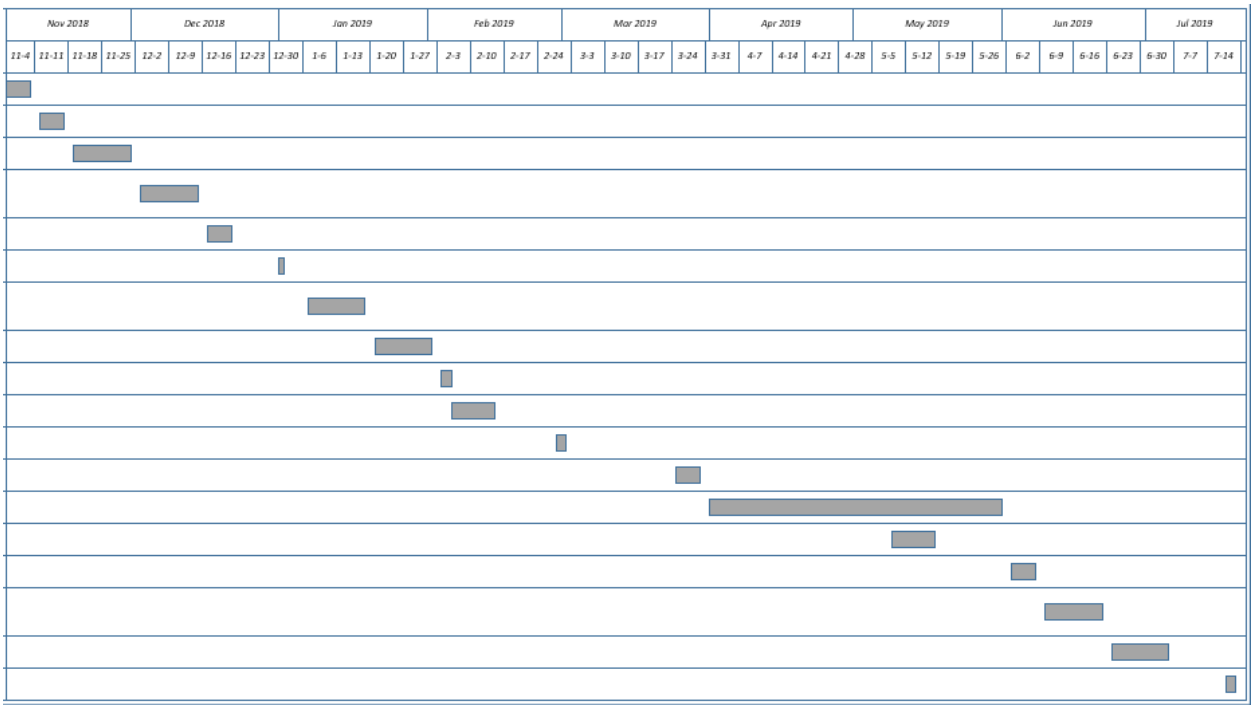

Figure: Gantt Chart