Software Requirements Specification

ISEC-ADE

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ISEC - ADE

Software Requirements Specification for *TeachSpace* Web Application

Result 1: Accessible e-learning web app

Accessible digital education for learners with autism and intellectual disabilities: innovating solutions and enhancing educators' competences (ISEC-ADE)

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1. Introduction

1.1 Purpose

This document provides an overview of the entire Software Requirement Specification (SRS) with environmental characteristics, goal of implementation, functional requirements, non-functional requirements as well as behavioral description of the product. The aim of this document is to gather, analyze and give an in-depth insight of the complete *TeachSpace* Web Application by defining the problem statement in detail. It also concentrates on the behavioral description of the system. The detailed requirements of the *TeachSpace* Web Application are provided in the following sections of this document. The SRS document is intended for members of project consortium and the software developers.

1.2 Overview

The document examines the comprehensive specification of *TeachSpace* Web Application.
Section 2 of the SRS presents the implementation of strategies, guidelines to be followed, and answers important questions such as how many phases does the development process goes under, what will be the input to the specific phases, and what would be the expected output, why it is necessary to go through these phases.
Section 3 presents answers to the questions concerning what is the *TeachSpace* Web Application, what are the functions, which functions make this product useful and different from other, why this product is necessary to be developed, and ultimately who is going to use this system.
Section 4 is a detailed discussion of requirements of functions of perspective users. Next, section is going to deal with the boundaries or limitations and constraints within which this product must perform well. Final Section is a concise study of the behavior of system.

1.3 Environmental Characteristics

1.3.1 Hardware

Server Side:

- Cloud based server, with basic configuration for running web application such as NGINX server is necessary for deploying and testing of this system.

Client Side:

- Computer with speaker, microphone and webcam facility.

1.3.2 Software

Server:

- Operational system: Unix/Linux

Web Server:

- NGINX

Programming language:

- PHP

Database:

- MySQL

Operational system:

- Unix/Linux /Windows

Software:

- Any kind of web browser with JavaScript and HTML 5.0 support

1.3.3 People

1.3.3.1 Teachers

- It targets a significant number of people, such as: teachers, special educators, teaching assistants, speech and language pathologists, and other professionals - therapists, that will have the role of creators of the educational content,
- Interfaces of product like this should be so easy that any person with limited skills of internet, web browser and computer can use this application for their teaching purpose.

1.3.3.2 Students

- The app is intended to be used by learners with ASC an ID in elementary school, with limited digital skills but also considerable cognitive and sensory challenges. For this reason, interfaces will follow specific accessibility guidelines defined in the requirements analysis phase of the development. They are referenced in detail in the Design Specification Document.
- The app is intended to be used by typical elementary school students. This does not require additional accessibility guidelines other than the previously mentioned.

1.3.3.2 Others

- This class includes personal assistants, parents and carers, that support children in the home during online education.
- This audience will not present a distinctive user class, instead they will interact with the app through the student interface.

2. Goals of Implementation

- Follow the guiding principles established for the project.
- Maximize the opportunities and usage of the new system by search engine friendly scripts.
- Develop a comprehensive timeline; and develop work flow and decision making to insure that milestone dates are met and the project is completed within the established timeline.
- Develop and follow decision making structure will insure that required decisions are made within the designated time frame in order to keep the project on time and on budget.
- Manage implementation costs to stay within the established project budget.
- Develop and follow strategies that will result in an orderly and efficient transfer of system knowledge to users.

The glance of the model which is going to be followed during the development phase, will answer of these questions:

1. Development process goes under how many phases?
2. Why it is necessary to go through these phases?
3. What will be the input and output to that phase?

This application development will go through a requirement analysis, design, implementation or coding, testing and evolution phases. The first phase - requirement analysis deals with the gathering of requirement of the application, why the application is needed, who is using the system. The design phase incorporates both high level design and detail design and encapsulates user interface requirement, data structure design, process interaction design and algorithm design. Next phase is mapping of design document into software product by implementing algorithm and configuration methods developed during design phase. Then testing phase start with partially developed codes of application and in evolution phase deployment of application is occurred and some form of maintenance work goes under this phases.
Following this model of software development recues the complexity of software, so developers and client agencies find it productive because it concentrates on one task at a time.

3. Overall Description

3.1 Product Perspective

TeachSpace Web Application is a tool for creating interactive and accessible digital educational content. The content in the form of lessons, exercises and activities will enable access to digital education for learners with autism. It will enable educators to create accessible interactive digital educational resources, and will enable students to interact effectively with the learning content.
The web based approach makes the app accessible from any device via the device's internet browser, without the need for downloading and installing locally, requiring only an internet connection. The app will allow for versatile use regardless of the type of educational setting (inclusive or one to one support) academic subjects, or developmental and educational curriculum goals. It will have functional features to cover several areas of difficulties for autistic learners: academic skills, social skills, behavior and communication. Various types of education professionals in primary education, such as teachers, special educators, teaching assistants, school based speech and language therapists can utilize the tool for remote or in-class education and/or teletherapy.
On the other hand, the app will be simple enough and accessible to learners with autism. The app will available in English, Macedonian, Greek and Bulgarian.
TeachSpace Web Application incorporates several innovative elements:

- The exercises/activities/lessons produced with the app are self-grading, providing immediate feedback to students, to ensure errorless learning (teaching strategy widely used by autism and SEN education specialist), and to save time on progress tracking and grading for teachers.
- The educational content is gamified and interactive, features that keep learners engaged and help with motivation;
- The app can be used by all people who are in direct or indirect support of pupils with Autism and therefore it offers a holistic approach in the overall aim of having self-dependent autistic learners.
- Participative user-centered design methodology. The practical/ hands on experience and accumulated knowledge of all type of stakeholders are taken into consideration during the development of the guidelines for app development and testing.

This product has the capability to be used as a digital learning tool in the classroom or for remote e-learning. *TeachSpace* Web Application can help teachers to use their ability to maximum extent by providing them a virtual interface where they can manage their classroom, prepare their teaching content, distribute among students. *TeachSpace* Web Application can help students to access digital learning adapted for their specific needs.

3.2 Product Functions

The main purpose of the TeachSpace Application is to provide accessible digital education by applying a teaching and learning approach easy to use for the teachers and accessible to learners with ASC and ID. Some advance features are mentioned below:

- Registration module
- Login section for each type of users
- Dashboard for every user type, with associated functions
- Section of news, FAQ, information and administration of those announcements
- Setting up classroom and students module
- Studio module for creating learning content
- Library module for keeping and organizing shared and created learning content
- Grading and Progress Reports module for each type of user
- Playing module

3.3 User Classes and Characteristics

There are essentially two classes of users for *TeachSpace* Web Application, first one is the learner, who can complete an interactive task or assignment, submit a completed assignment and view grades and progress report.
The second one is the teacher who can create, print, assign tasks to individual student or students, share tasks/assignments with colleagues, view grades and progress reports. and manage classrooms.

4. Functional Requirements

4.1 User Class Teacher

A Teacher is an upper class user who can create student users.

4.1.1. Student management module

The student management module will allow teachers to create and manage student profiles.

4.1.1.1 Create User

The system will allow creation of two types of users as mentioned above. Only teacher will be allowed to create users. Teachers will only be allowed to create students for his/her classrooms that he/she is managing. When a user is created, he/she will be activated by default. If need be, the teacher will be given the option to deactivate the student user. Deactivation will disallow the user to logon to the application. External users will not be allowed to log on to the learning portal.
Teacher will be able to generate and share with the student a sign-in link.

4.1.1.2 Modify User

This option will allow teachers to modify user profiles. Teachers will be allowed to modify the profiles of only those users (students) that belong to his classroom. For instance, Teacher A will not be allowed to modify the profile of a Teacher B user and vice versa. Also teachers and will be able to view the user details.

4.1.1.3 Delete User

Teacher user will be allowed to delete those users that belong to his classroom. Once a user is deleted from the system, he/she will not be able to login to the app. If a deleted user needs to be given access to the portal, he/she will need to be recreated. Only teachers will be allowed to delete/disable users.

4.1.1.4 Search Users

The system should allow teacher user to search for other users. The search string from the Graphical User Interface (GUI) will be collected and matched against the user name. The system should allow the users to search users within existing accounts. If the user name is not known, the system should allow a generic search and list all the users. There will be a search filter that will let users set their search criteria. A user will be allowed to search for the following types of users.

- Active Users
- Disabled Users
- All Users

4.1.2 Authentication

After a user submits his credentials at the login page the credentials will be collected and validated against security repository, which is store on database. If user is found to be matching, the user will

be allowed access to the learning portal. The authentication module will not allow disabled/deleted users and expired users to log on to the portal.

4.1.2.1 Authorization

Teachers will be able to see all classrooms that he created, and all classrooms that he is added in to. Teachers will only be able to manage classrooms that they created, and not classrooms that they were added in to.

4.1.2.2 Password Policies

When a user is created, he/she will be asked to create a password. A password policy is one in which the system does not allow the user to create a password that is less than 6 characters long and the password should be a mix of alpha numeric characters. Only characters and numbers will be accepted.

4.1.2.3 Session Expiration

Only one instance of user will be allowed to login with the same user ID. If a user with login ID XYZ is currently logged on and another user tries to log on with the same user ID i.e. XYZ, the session for the first user should expire and the user will be requested to re-login.

4.1.2.4 Idle Timeout

Each time a user logs in, he/she will be associated with a user session. This session will have an idle time out period of 60 minutes. This means that if the user's browser is idle for 60 minutes or more, the session for the user will be expired and the user will be requested to re-authenticate himself/herself. The session time out value will be a configurable parameter.

4.1.2.5 Forgotten Password

All Users will be provided the "Forgotten Password" facility, which allows users to reset their own password once they are able to provide answers to the secret question that is challenged to them. The users' email ID will be used as user name. Once the users provide correct secret answer, a system- generated password will be mailed to their mail ID.

4.1.4. Classrooms module

4.1.4.1 Create classroom

Classrooms are nothing but a collection of users who have the same level of security. Only Teachers can create one or more classrooms.

4.1.4.2 Delete classroom

The system will allow deletion of classroom. When a classroom is deleted, all students and teachers will be deleted from the classroom.

4.1.4.3 Manage classroom

Teachers will be possible to modify the classroom description, add students (max. 30) and other teachers (max. 2) to a classroom that they manage.

4.2.1 Studio module

Teachers will be able to create learning content in the form of slides and sets of slides containing interactive tasks.

4.2.1.1 Create slides

Teachers will be able to create task slides with elements such as pictures, videos, sound, answer boxes, that student users can click/tap on, drag around, listen to, or type an answer into.

4.2.1.1 Publish slides

Teachers will be able to publish created slides.

4.2.1.2 Edit slides

Teachers will be able to modify the content of created slides.

4.2.1.3 Un-publish slides

Teachers will be able to un-publish created slides.

4.2.1.4 Delete slides

Teachers will be able to delete created slides.

Processing logic of above function points will be described in the Design Specification Document.

4.2 User Class Student

Student is a user with least privileges among the users. Student users belong to their learning course and will have access to the assigned content. Each function of the Student has been explained in detail below.

4.2.1 Authentication

After a user submits his credentials at the login page the credentials will be collected and validated against security repository, which is store on database. If user is found to be matching, the user will be allowed access to the learning portal. The authentication module will not allow disabled/deleted users and expired users to log on to the portal.
Students will be able to authenticate using a simple sing-in link, generated by the teacher.

4.1.2.1 Authorization

Students will be allowed to play, submit finished work, and access submitted work, and report/score on submitted assignments.

4.1.2.2 Password Policies

When a user is created, he/she will be assigned with a default password.

4.1.2.3 Session Expiration

Only one instance of user will be allowed to login with the same user ID. If a user with login id XYZ is currently logged on and another user tries to log on with the same user ID i.e. XYZ, the session for the first user should expire and the user will be requested to re-login.

4.1.2.4 Idle Timeout

Each time a user logs in, he/she will be associated with a user session. This session will have an idle time out period of 60 minutes. This means that if the user's browser is idle for 60 minutes or more, the session for the user will be expired and the user will be requested to re-authenticate himself/herself. The session time out value will be a configurable parameter.

4.1.2.5 Forgotten Password

Student user will not be allowed to change password. Forgotten passwords can be retrieved or changed by the teacher.

4.2.2. Modify User

Student users will not have an option to modify their user profiles.

4.2.3 Play *TeachSpace* slides

This module will allow user to work on assigned slides or set of slides and view scores. There can be different elements on a slide that users can click/tap on, drag around, listen to, or type an answer into.

4.2.3.1 Submit slides

The user is allowed to submit completed slides.

4.2.3.2 View reports

Students get instant feedback as they play through the set of slides. As soon as they select an answer, they'll find out if it was the right one or not. They can also see their scores on any set of slides that is currently assigned to them. The user is allowed to view general scores and progress reports

4.2.3.3 Replay slides

The user is allowed to re-play slides finished slides as many times as they want until the teacher un-assigns it.

5. Non-Functional Requirements

This software should perform the same way irrespective to its Operating System environments. Time taken for importing files and publishing the multimedia presentation should be minimum.
Safety Requirements:

- This requirement does not apply for our software as this is can't pose a threat in no way.

Security Requirements:

- As all the operations are to be done within a single system security is not an issue for this software.

Quality requirements:

- Quality has a number of attributes some of the important attributes for this software are

Portability:

- As this software is to work on multiple platforms portability is an essential attribute and we ensure this by using PHP as our programming language.

Testability:

- As a basic characteristic the software needs to be testable to ensure correctness.

5.1 External Software Interfaces

We need to take in consideration that our system will interact with external devices like microphone, so interaction with their driver will be necessary. Interface with the microphone driver with JavaScript to enable communication between cloud based server and studio module.
The *TeachSpace* Web Application will communicate with *TeachHub* Web Application to allow teacher users to share learning content (slides/set of slides). This will be done through an API (application programming interface) with end points that will accept data, store in database and keep in library. Token protection for this function is required.

5.2 User Interfaces

To make this application useful for maximum reach of user we have to create very user friendly interfaces so that any kind of user with minimal computer skills can use this system.
User interface for students will comply with specific accessibility recommendations defined in the requirements analysis phase of development (please see Focus Groups Discussion Report).