International Journal on Arts, Management and Humanities **6**(2): 226-237(2017)

ISSN No. (Online): 2319–5231

Web Application Design-Implementation of Web-based Career Stream Assessment System (WBCSAS)

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(Received 10 April, 2017, Accepted 22 June, 2017)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: The secondary schools' curriculum has core subjects and elective subjects also. Students choose particular career stream/subjects of study because of subjects' scope, interests in subject and career prospects. The problem arises if a student is not interested in the subject or if the subject is not perfectly matching the student's capability. Students need to understand subject choices to succeed in a future career. This study was aimed at developing such system that declares suitable career stream by measuring factors like Aptitude, Personality, and Interests of high school students. This system is helpful for the school students for guiding them career stream for choosing the RIGHT subjects in class 11th. After successful validity and reliability testing the outcomes revealed that the system is working properly by declaring career stream based on the input which is provided by the students and also provides guidance about the career in that stream.

Keywords: Career, Career Stream, Career Guidance, Aptitude, Personality Interests

I.INTRODUCTION

Education is essential in our life. It makes us independent. It contributes to our mental development and gives the right direction to our thoughts. An educated man develops not only his own but the whole country. A person takes education and develops his career. Career development is important for young people. Young People have dreams, for whom he wants to come true, but dreams are the realities of those who have the desire to realize them and work hard in the right direction [1]. Because if the direction is not correct, then hard work becomes useless. It is essential to be, educated and to be educated in the right direction to realize their dream and to move forward in life. Career planning is necessary to be educated in the right direction. Also, it is very important to retain a career. After the class 10, the career gets a new direction because a child has to pick up a career stream. This is where his career begins, which makes him successful in that direction, but if this direction is not right, then you cannot reach your destination, and you do not get what you deserve. If you are not going in the right direction, then you will have to do more, and you will also have to pay more money. Career planning should start at the high school level to get the right career. A lot of children start thinking about their career after the 12th class, which is not right because if you have taken a decision, later on, you may find it difficult to find a career in your choice. Well, there are many reasons for not getting a career of your choice, but one of the main reasons is that you have not read the base subjects of that career at the secondary level. Few factors are critical to see my own at the time of career decision, *i.e.,* about interests, personality, and aptitude [2]. But it is not possible to know all these factors on your own. So, we take the help of career counsellor. A career counsellor is a professional who gives career guidance to the people of the society. The next step towards career planning is to explore career options. The students should explore the relevant career options in the chosen field. Only after learning about career options we can choose a better career. After getting career information, a child should decide by comparing career options and can move forward to achieve the goal. Interests play a very vital role in career development. People interested in one field can achieve the goals in that field. Similarly, personality also important when it's a matter of career development, as different characters match with a different profession. So, the person should find a related career that suited to his personality [3].
Mental and physical abilities play an important role in person's career development. These abilities of a person may be good for one occupation but may not be suitable for another profession. One can take the help of a career counsellor who can guide the suitable subjects and career as per the aptitude combinations and will also help in

picking the right subjects and planning for future courses [4]. But it is very difficult for a child to do self-analysis about their strength and weaknesses and also reach to the counsellor due to lack of knowledge, resources, money or time or the school counsellor may not have time to guide their students due to workload. Hence, it was desirable to have one system that can be the alternative, which can assess the suitable stream and provide guidance to high school students. The problem determines the inspiration for the research to develop such system called Web-based Career Stream Assessment System (WBCSAS).

There is no career stream assessment system on the internet which assess the child based on personality, interest, and aptitude unitedly. The present research fills this gap. Keeping in view the need for the Design and implementation of web-based Career Stream Assessment System (WBCSAS), the study aims at to design a "Stream Assessment tool" that will be used for assessment in Web-based Career Stream Assessment System and to implement and test the validity of Web-based Career Stream Assessment System.

II. METHODOLOGY

Data required for the designing, implementation,and validation, was collected through survey method. PHP and MYSQL database was used for the implementation of System. In the present study, 9 Educationist, 2 counselors, and 120 Students from Indian school of Dar es Salaam, Tanzania were included in the population of the study by applying purposive sampling technique [5].

A. Phases of Research

The entire methodology is divided into four phases as described in figure 1. Here in this document only phase 3 and phase 4 are described. Other two phases are already described in another paper named "career stream choice among Science, Commerce, and Humanities students**."**

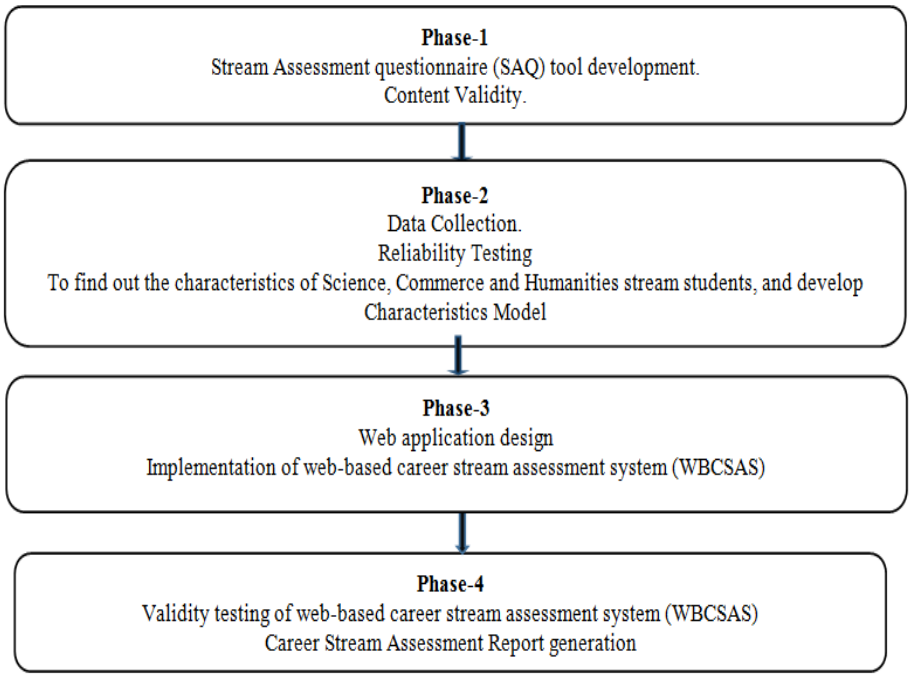

Fig. 1. Research Phases and its contents.

III. WBCSAS DEVELOPMENT PROCESS

The process of student's assessment declares Career Stream/Subjects by assessing student's Interest, Personality,and Aptitude, through Stream Assessment Questionnaires [5,6]. The Web-based assessment has the following functionalities.

- Collect student's data through a "Stream Assessment questionnaire".
- Match the characteristics of Science, Commerce, and Humanities stream Students for the factors ie. Personality, Aptitude, and Interests with the criteria.
- Declare suitable stream.

- Guide students about careers in that particular stream.

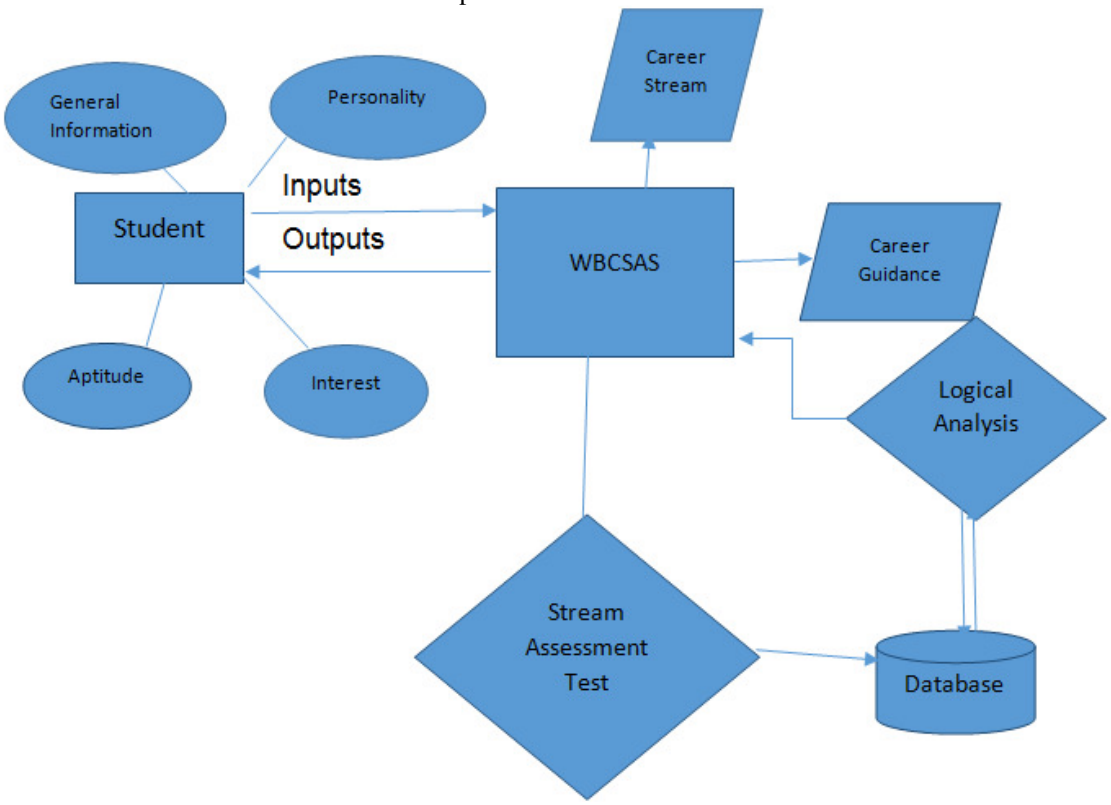

Fig. 2. WCSAGS-Data Flow Diagram.

This system must integrate a development strategy.This strategy is known as a process model.Our system follows the waterfall model.The steps of Waterfall Model are:

1. Requirement collection and Analysis
2. System Design
3. Implementation
4. System Testing
5. Operation and Maintenance

Requirement Collection and Analysis

Requirements document was prepared for the design of Web-Based Career Stream Assessment System.This document includes general requirements, functional and nonfunctional requirements [5].

The system requirements are classified here:

- Functional Requirements
- Nonfunctional requirements

Functional Requirements: Different types of users are allowed to interact with the system based on given privileges. There are two main users of the system: Administrator, Student, as shown below in Fig. 2. This system provides some facility to the system administrator to manage the information of the system.

Non-functional Requirements: In this part, few system aspects were verified and proved, such as performance, and security, Extensibility and maintainability, Feasibility, operational Feasibility,Technical Feasibility, Economic Feasibility.

System Design

The system design consists of preparing data model that deals with what data is stored in the database and process model that focuses on the processing of the data [7,8]. A web-based system should have a user-friendly graphical user interface(GUI). The interface of the system should be tested and updated whenever necessary.

- **System Architecture:** As the system is entirely Web-based, so it doesn't require any technical skills from the users.the user and the administrator are two types of users as shown in fig. The WBCSAS is appropriate for all the high school students who want to know his relevant career stream for class 11^{th}.

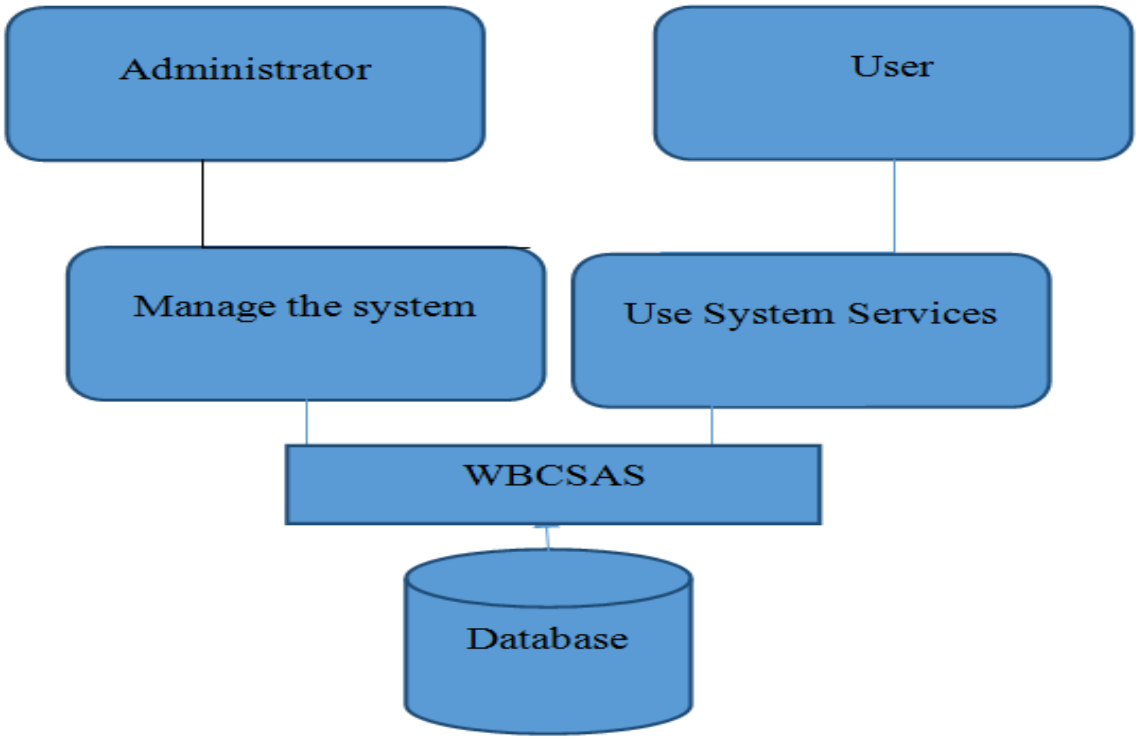

Fig. 3. The main users of the system.

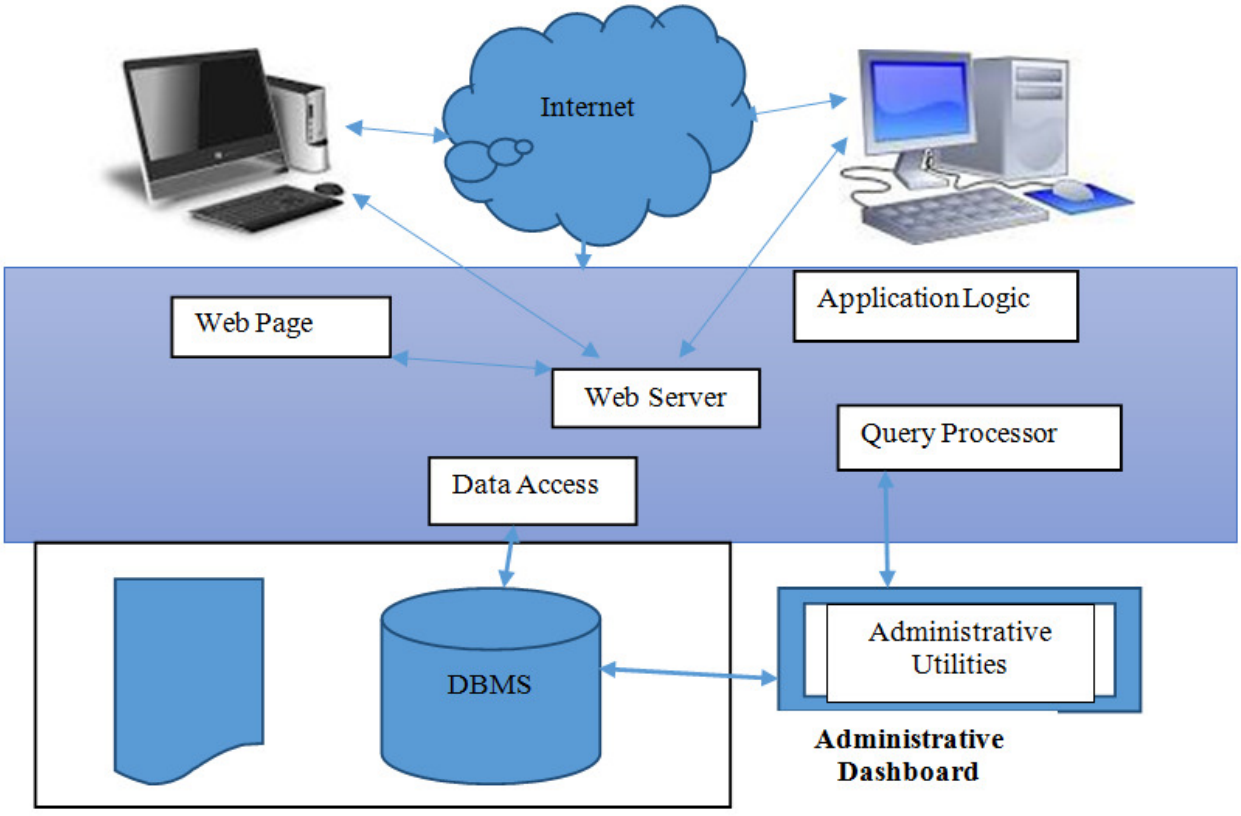

Fig.4. System Architectural Diagram.

●**Input Design:** The input of the system is users action on the bases of the functions which make up the system, these pages will be implemented by using HTML(Hypertext Markup Language), CSS(Cascading Style Sheet),

JQuery, PHP.The user will interact with the Web-Based Career Stream Assessment System (WBCSAS) by clicking on the given menus on the website.The test answer options were implemented using radio buttons whereby only one option can be picked.

●**Storage Design:** The proposed system will have a dynamic and functional database. The following data about the student will be collected and stored in the database.

1. Full Name
2. Age
3. City
4. Country
5. Email id
6. Password

The career stream test questions will be stored in the database and retrieved using PHP and SQL commands, the results of the career stream test will also be stored in the database and user can retrieve career stream report immediately after the test as well as any time whenever the user revisits the website.

●**Database Design:** Database design is the important part of the system design process. The researcher has used MySQL database as RDBMS.The database stores user registration information, the Career Stream Test (CST)questionnaire, CST results as user personality, interest and aptitude score, system generated career stream, basic information about the administrator, CMS content details. The researcher has designed an Entity-Relationship diagram to represent the database design [7].

System Implementation Technologies

The System design was implemented using the following technology.

The following technology will be used for the implementation of Career Stream Assessment System are

- Core PHP
- MySQL database
- jQuery
- Ajax
- HTML 5
- CSS 3

PHP

PHP means PHP: Hypertext Pre-processor. It is an open source widely used a scripting language. The execution of PHP scripts is done on the server. It is mostly enough to run the largest social network like Facebook, and it is best for dynamic website development. The connection to the database is effortless, and PHP encourages to create dynamic websites. PHP code can be inserted into an HTML page. PHP is compatible with the most operating system like Microsoft Windows, Unix, Linux, Mac OS X, RISC OS, and probably others. PHP has also held up for most of the web servers now. It includes Apache, IIS, and lots of others and this includes any web server that can utilize the Fast CGI PHP binary. PHP works as either a module or as a CGI processor. For developing this system researcher used Core PHP. It is used to create dynamic web pages. Core PHP is very basic PHP. It works without any extra library. So, it is essential to learn core or principle PHP programming to create dynamic web applications. Core PHP and PHP are same. PHP frameworks are built on top of core PHP. In layman terms, PHP is a scripting language used for web development, so a programming language needs basic syntax, types, variables, control structures, constants, expressions, operators, functions, classes and objects, error handling, etc. Core PHP is basic PHP. Core PHP is used to create dynamic web pages. It is essential to learn core PHP to make dynamic web applications. Core PHP is like a brain calculator while frameworks are artificial/scientific calculators. It helps developers to write their logic. It helps developers to learn the logic behind the framework. A developer's logical thinking gets improved by studying Core PHP. When a user visits a PHP made a web page, the web server processes the code, analyze the needed part to display to the visitors and translates PHP into HTML. In this way, The web server sends the webpage to the web browser. PHP have functionalities, i.e., faster processing, higher security, more efficient memory allocation and extensive documentation.

MYSQL

MySQL, an RDBMS (relational database management system) that is used to store data. It is a popular open source database used for building web applications. MySQL is very useful and in demand because of its high reliability, fast performance, and ease of use. MySQL can store a huge amount of data, supports various platforms and many scripting languages, and works with many compilers. MySQL has a huge set of functions. It supports several libraries and client programs, application programming interfaces and administrative tools. It is also a standard interactive programming language. It is good managing and organizing large amounts of data. It allows making

queries along with data selection, insertion, and updating. This research project uses MySQL for storing information about the user and the website content.

MySQLi Extension:

PHP MySQLimeans PHP MySQL improved. MySQL improved is a relational database driver used in the PHP scripting language. It provides interphase with MySQL database and works with MySQL version 4.1.13 or higher. Its functions allow us to access MySQL database servers and it works very well with many programming languages like C, PERL, C++, JAVA, and PHP. Other than this due to its web application development capability, it is the most popular.

Following example shows a syntax of PHP call to the MySQLi function.

```
<html>
<head>
<title> PHP and MySQLi</title>
</head>
<body>
<? php
$retval1=mysqli_function (value, [value,…]]);
If(!$retval1) {
Die (“Error: an error message”);
}
// otherwise PHP or MySQLi Statements
?>
</body></html>
```

HTML

HTML is the hypertext markup language for creating web pages. It describes the structure of web pages using markup. HTML can embed JavaScript, PHP, and CSS code which affect the content and behavior of web-pages.HTML consists of several components, including those called tags, character references, character-based data types and entity references. Most commonly HTML tags comes in pairs like <title></title>. Although some tags represent empty elements, so are unpaired e.g. <img> The following is an example of classic “welcome” program. This example has the nine source lines of code.

```
<!! Doctype html example>
<html>
<title>Title of the page</title>
</head>
<body>
<p>Write Welcome message here!</p>
</body>
</html>
```

The visible page contents are written between <body> and </body>. The browser page title is defined by <title> My title page</title> markup text. <!! Doctype html> is a document type declaration to avoid revert to “quirks mode” for rendering.

CSS:

CSS, the Cascading Style Sheetsdescribes how HTML elements are displayed on paper, screen, or in other media. For developing this system researcher used CSS 3. The multiple web pages layout can be controlled in CSS. External style sheets are stored in CSS files. With the help of CSS selectors, the HTML elements are “find” based on their element id, name, attribute, class, etc. The syntax of CSS file is:

```
Selector        Declaration
hI                    {  color: green; font-size: 10px;};
                          Property     Value
```

The selector is pointing to the element you want to style, and the declaration block is consisting of declarations separated by semicolons.

Each declaration includes a CSS property name and value. A colon separates that.

The declaration of CSS always ends with a semicolon and the declaration blocks are always surrounded by curly braces.

In the following example all <p> elements will be center-aligned, with a red text color:

The browser reads a style sheet, and after reading it, formatting of the HTML document starts according to the style sheet information. The style sheets can be inserted in the following ways.

External Style Sheet: External style sheets change the look of the entire website by just changing one file.
The<link> element is used to include reference to the external style sheet on the web page.
The <link> element works inside the <head> section:

```
<head>
<link rel="stylesheet" type="text/CSS" href="mystyles.css">
</head>
```

The style sheet file must not contain any HTML tags. The file must be saved with an extension ".CSS"

jQuery:

jQuery is a lightweight, JavaScript library. It becomes easier to use JavaScript on your website with the help of jQuery. jQuery takes common tasks that need many lines of JavaScript code to complete and wraps them into methods that can be called with one line of code. The jQuery simplifies many complicated things like DOM manipulation and AJAX calls. The jQuery library has the following features:

- CSS manipulation
- HTML/DOM manipulation
- Effects and animations
- HTML event methods
- Utilities
- AJAX

The jQuery syntax is used for selecting HTML elements and performing some action on the element(s).
The Basic syntax of the jQuery is: $(selector). action ().
A $ sign is used to define jQueryA selector is used to finding HTML elements, and a jQuery action () is used to perform on the element. Examples:
$(this). hide () -> This statement hides the current element.
$("p"). hide () - -> This statement hides all <p> elements.
$(".test1"). hide () -> This statement hides all elements with class="test1".
$("#test1"). hide () -> This statement hides the element with id="test1".
jQuery selectors allow us to choose and manipulate the HTML element.
jQuery selectors are used to selecting HTML elements based on their id, classes, attributes, name, values of attributes, types, etc. jQuery is based on the CSS Selectors, and it also has own custom selectors.
All selectors are represented as $(), It starts with the dollar sign and parentheses.

AJAX

AJAX means Asynchronous JavaScript and XML. It is a technique for creating faster, interactive, and better web applications by using HTML, CSS, JavaScript, and XML.
Ajax uses CSS for presentation, XHTML for content, and JavaScript for display of dynamic content.
Conventional web applications use synchronous requests to transmit information to and from the server. It means you fill out a form, click submit, and gets a new page with new information when you hit submit, a request goes to the server with the help of JavaScript, the server interprets the results, and change the current screen. The user would never know that anything is transmitting to the server.
XML Format is commonly used to receive server data, although any format can be used to obtain data. AJAX is a web browser technology that does not depends on the web server.
AJAX is a developer's dream because they can read data from the web server after the page loaded, update a web page without reloading the page, and also can send data to a web server.

```
<! DOCTYPE html>
<html>
<body>
<div id="demo">
  <h2>change the text</h2>
  <button type="button" onclick="loadDoc()">Change the Content</button>
</div>
</body>
</html>
```

Web Server:

Apache is a Web Server application software. This software is the widely used Web Server application in Unix-like operating systems but can be used on almost all platforms such as OS X, Windows, OS/2, etc. It is a modular web server application that creates a new thread with each connection. It supports some features; many of them are compiled as separate modules and extend its core functionality and can provide everything from server-side

programming language support to the authentication mechanism. The Apache web server application is a modular application that facilitates the administrator to choose the required functionality and also allow to install different modules as per his/her requirement.

IV. RESULTS AND DISCUSSION

The output of the system is typically the result of the Web-Based Career Stream Assessment System (WBCSAS) Website.

User Interfaces:

Below figures show screenshots taken by running the application. All the functionalities are explained accordingly.

When the user types the web addresshttp://onlinecareerstream.com in the browser, the main page of the application is displayed which is shown in Figure given below:

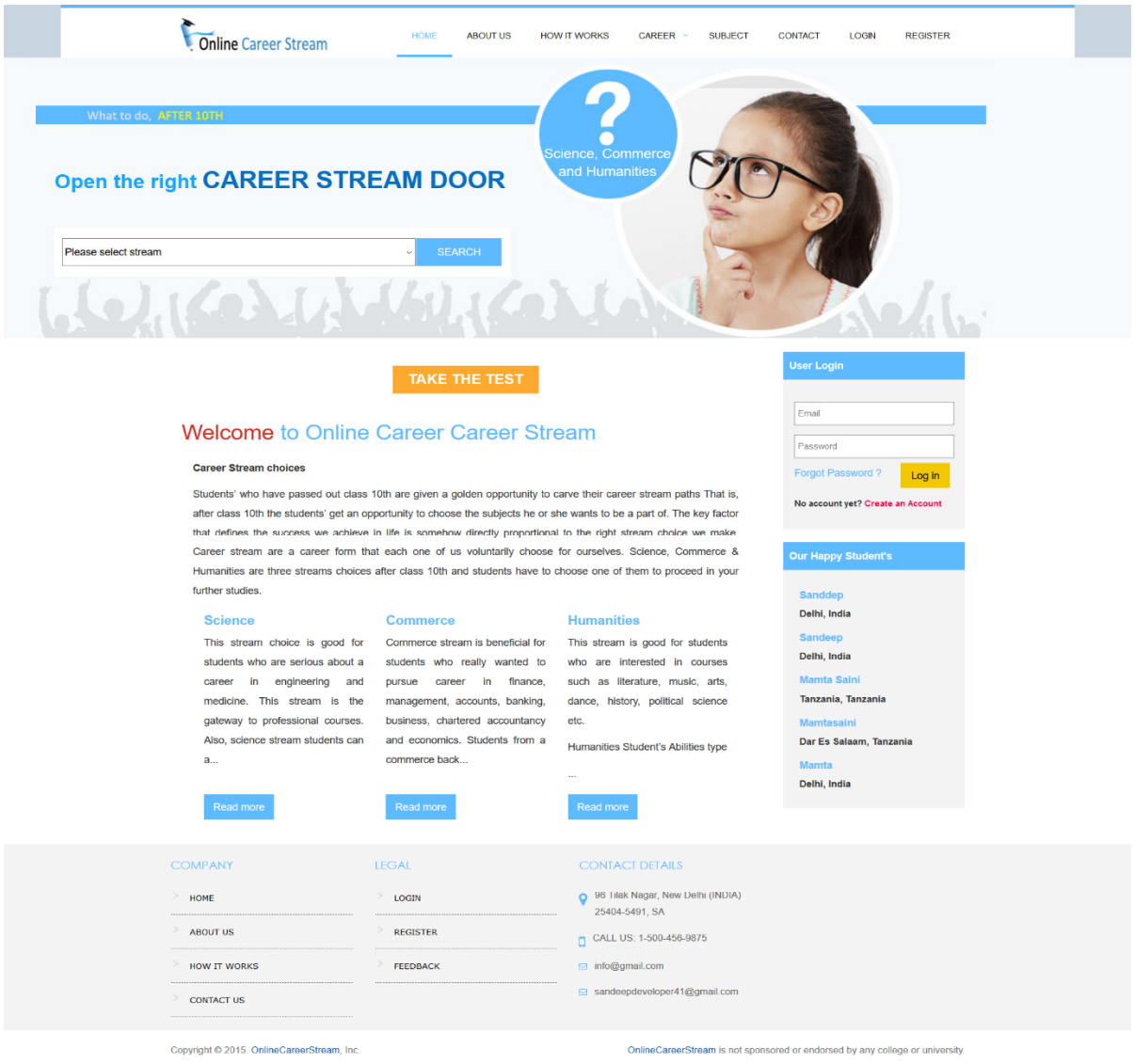

Fig. 5. Screenshots of the first Page that display after entering a web address.

Registration

A new user can register in the site website by clicking on the" My Account" option on the menu at the top of the page. The user has to go through the registration process by entering the following details.

1. Full Name
2. Age

3. Email
4. City
5. Country
6. Password

The registration details of the user will be stored in "user" table, and the user accounts will be created. Once the registration process is done, the user can assess their career stream. After registration or login process user can give the Career Stream Test (CST), for CST user has to click on the "start online test. After clicking on "start the online test," A test with 68 questions will be displayed. After completion of the test, the user will get his **career stream report**. This report will not only show career stream but also show the information about the **suitable optional subjects** for the student. The screenshots of the career stream with suitable optional subjects is shown in figure 6. Careers can be searched based on the stream. By choosing one stream option from the combo box, given on the home page as **search career for stream.** The detailed profile information of the user who is currently logged in, is displayed by clicking on **"My Account**" menu on home page. Here the users can change their profile except for member type, email-id, password and these details will be reflected in the database only when the Update button is clicked. The user can also change the password if he/she wants to change. After getting registered, the user can assess his career stream, but once the user is logged out the system, he has to click on the "**Login**" option. Log in to the system will be done by entering the username and password details. The user can see the contact details by clicking on the **contact** option.

Fig. 6. Screenshots to show suitable optional subjects.

Evaluation of WBCSAS

Research Question9: Is the system evaluated well and give accurate results?

The ninth research question considered the evaluation of the system to check the system performance.

Evaluation of the system:

The web-Based Career Stream Assessment System was evaluated. The students were made to access the system website(www.onlinecareerstream.com) online.The performance evaluation of the system was tested on 120 already counseled students as shown in the table. Three statements were asked for system's performance evaluation. The motive behind evaluation was to check

a) Is the system user-friendly?
b) Is the system beneficial for school students?
c) Is the system give accurate career stream that matches with student's present career stream?

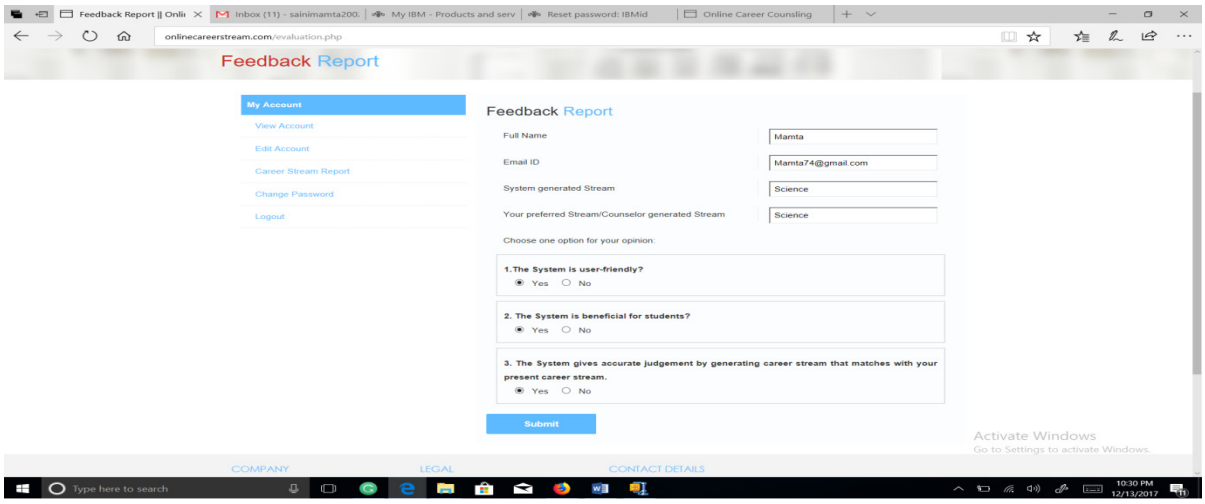

Fig. 7. Students Feedback page.

Student's record showing the feedback responses

The responded questions were saved in the database automatically. Fig. 8 below shows the WBCSAS user's feedback page.

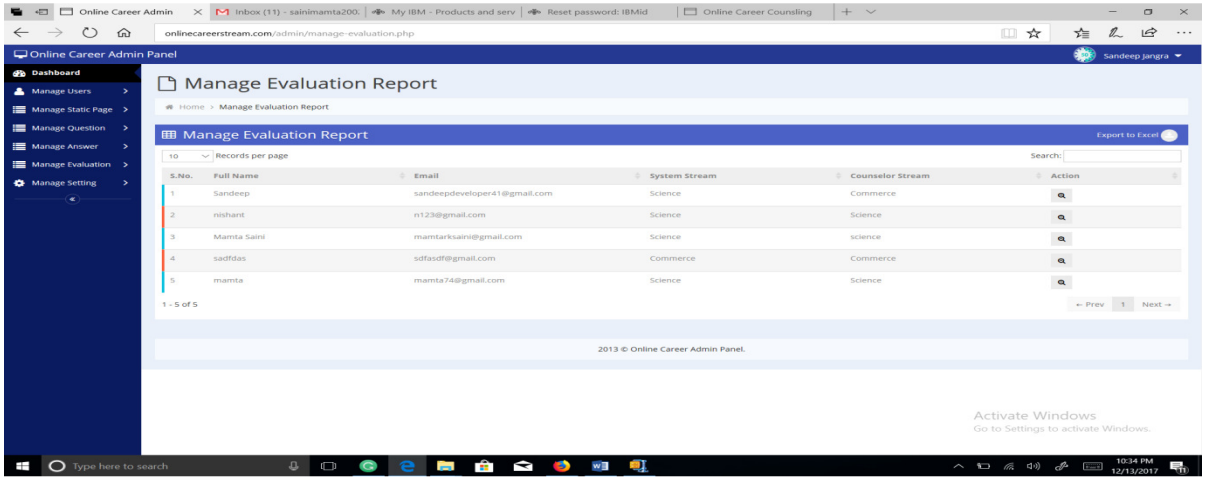

Fig. 8. Student's record showing the feedback responses.

Interpretation of Results:

The system was checked for each and every response of the 120 students. The collected responses were interpreted, and the results are shown in Table 1.

Table 1: Performance Evaluation results.

Feedback	Yes	Percentage	No	Percentage
User- friendliness	108	90	12	10
Beneficial	114	95	6	5
Accuracy of result	102	85	18	15

The student's rating for the performance of the system can be seen from the table that the

► The system is 90% user- friendly.
► The system is 95 % beneficial for high school students.
► 85% accuracy of the recommended stream for class XI by the WBCSAS.

These results show the reliability and effectiveness of the web-based career stream assessment system.

Validation of WBCSAS

Concurrent validity: The **Concurrent Validity** of the instrument check that whether the system generated stream matches with the counsellor's decision about the stream.

Testing of hypothesis $H0_4$: Web-based Career Stream Assessment System will not provide valid and reliable measures.

The ninth research question considered the validity of the instrument. The correlation was checked, and it is found that the correlation is significant at the 0.01 level (2 tailed).

Table 2: counsellor and system declared mean and standard deviation.

	Mean	Std. Deviation	N
Counselor_declared_stream	2.00	.820	120
System_declared_stream	1.99	.835	120

Table 3: Descriptive Statistics for counsellor declared stream and system generated a stream.

		Counselor_declared_stream	System_declared_stream
Counselor_declared _stream	Pearson Correlation	1	.822**
	Sig. (2-tailed)		.000
	N	120	120
System_declared_stream	Pearson Correlation	.822**	1
	Sig. (2-tailed)	.000	
	N	120	120
Note: **. Correlation is significant at the 0.01 level (2-tailed).			

Based on the above findings Researcher can conclude that the null hypothesis, "The system will not give valid and reliable measures. Based on the findings of the current study." is rejected. After successful validity testing and Evaluation, the outcomes revealed that the system is working properly by declaring career stream based on the input which is provided by the students and also provides guidance about the career in that stream.

V. CONCLUSIONS

The purpose of this research was to design and develop web-based stream assessment system that can be used to assess students' career stream for class 11^{th}. The made the following conclusions:

1. The Web-Based Career Stream Assessment System (WBCSAS) website was developed which provides the facility of career stream assessment and generates career stream reports. This report shows the suitable career stream and suitable optional subjects for the child to opt-in class XI.
2. The WBCSAS was tested for validity, and it was found that system is working accurately with valid results.
3. The system was evaluated on thesample of the target populationand for 85 % of the students, the system gave appropriate results as per their counselor decisions.

VII. SUGGESTIONS

It is suggested to widen the scope of this research so that it could be useful for the first-degree graduates, students of master's level and doctoral students as well. It is suggested that the scope of present research be widened to career assessment. Career stream assessment becomes the basis for the career assessments. Career stream assessments are useful not only for secondary school students but also for degree students and masters' students. While the current study provides usefulness of the system by declaring career stream, there are many other research points to pursue. It is highly recommended to improve this research work by including the career guidance with career assessment, as this will be extremely useful to the society. Career search based on Personality, Activity Interest and aptitude could be provided. A student who will go ahead in his career-life with his choice of career will grow and help in the growth and development of the society. This system could be made available for the school as well as for the counsellor to work as a separate application. This could be helpful for school to keep their students record and maintain them accordingly. Counsellors can also use this application for keeping their clients record regarding career stream.

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