# Intelligent web platform for vocational guidance

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**ABSTRACT**

The vocational guidance process helps students in their career choices, it provides a better understanding and motivates to them to do it themselves. The lack of trained professionals to provide career guidance and the need of organized register system to help them to manage the guidance process, all this allowed the creation of Computer Assisted Career Guidance Systems (CACGS) as a part of the solution, however many of these systems have been developed for people in contexts with different characteristics as Colombian and is difficult to use their outcomes either to give guidance by counselors and to be interpreted by the students specifically from Popayan city. This paper presents a web platform designed to support vocational guidance process taking into account the students expectations on their career elections. In this research's stage the use of the intelligent web platform for vocational guidance is evaluated using a web search which includes usability metrics, and their answers help to measure the web interfaces acceptance and improve the learning process about realistic, investigative, artistic, enterprising and conventional (RIASEC) environments of the Holland's theory and how the web platform helps the students in their self-knowledge process.

**Index Terms:** Vocational guidance, usability, data mining, web platform

## 1 INTRODUCTION

'The vocational guidance' is an activity aimed at finding, the profession for a person that would bring it satisfaction and provide it optimal performance. It is carried out through a scientific process that would give students feedback in order to select the area of knowledge in which they could be successful thereby favoring the whole society. The career guidance must be offered by a specialist who should help the student chose their career based on their personality, interests, and abilities. [1].

According to the Organization for Economic Cooperation and Development (OECD) [2], there is a shortage of professionals able to implement an adequate vocational and career guidance, in many cases, they neither have enough skills to work with secondary school students nor availability to pay attention to each of them.

In order to resolve this problem of vocational guidance shortage, several computational tools have been developed, such as MBCD (Making Better Career Decisions) [3], Discover and ONET (Occupational Information Network) [4], Jeu Serai [5] and MyWaypass [6]. The professional interest in [4] and [5] are supported by the Holland's RIASEC theory of careers which is authoritative vocational guide theory [7] based on different profiles (realistic, investigative, artistic, social, enterprising, and conventional) others [8] and [9] using gamified mechanisms to guide the interaction with students help them choose the optimal career, but most of them are academic/research or commercial solutions and they had not been used in Colombian educational context.

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The aim of this paper is to describe the steps followed in the development

of the Intelligent Web Platform for Vocational Guidance which uses SCRUM methodology [11] to describe its components, architecture and functionality emphasizing how an intelligent classification model [12] supports the platform and helps students to discover their professional interests, also the paper shows the results of a usability survey which allows to improve aspects of user interface.

This paper is structured as follows: Section 2 gives a summary of the related works. Section 3 introduces methods, participants, measures and research design. Section 4 describes the web platform development and description. Section 5 shows the platform's usability evaluation. Finally, Section 6 presents the conclusions and future work..

## 2 RELATED WORK

There are many approximations proposing tools to help vocational guidance process using artificial intelligence [13] with Fuzzy Logic, Artificial Neural Networks [14], Ontologies [15] and [16] Expert Systems, some others approximations using serious games which propose a design as in [8] and [9] or implementations as in [5] using micro games to simulate different actions on Holland's ambient, and using physical devices as in [17], by means a speech based interface and a career guidance boot.

In [6] web platforms are described, one uses different scenarios and storytelling to motivate players. The purpose is to analyze the information gotten from the interaction with students, the platform uses a motivational gamification strategy to guide the process of vocational guidance, another web platform is described and how it manage information about interests, personality, and academic background, it provides professional options as feedback.

The approaches mentioned before have in common the use of algorithms to classify students as well as they suggest a profession, however they didn't consider students´ context and their own expectations, the goal is to help them to discover the optimal professional area upon their ideas and compared them with others students using their professional interest profile with similar results.

In [18] it has been identified some important elements involve in the career guidance process in several researches, some of them include mainly: i) professional interest, ii) personality and iii) skills as main characteristics in the proposals founded, besides in this research social, economic, academic and familiar aspects are adopted, in however these investigations is presented ,.in a systematic review in [7] the Holland's theory is validated as a useful tool to identify professional interest, besides in [12] is identified "Bayesian networks" as a good technique to help the vocational guidance process in professional classification, all this characteristics were adopted in the "intelligent web platform for vocational guidance, in following sections it will be explained its development and test process.

## 3 WEB PLATFORM ACEPTANCE EVALUATIONS

In This section shows the steps and outcome of the web platform development process showing it, by means of the description of the modules that compose it and the technological platform that supports it through its architecture.

### 3.1 Web platform development process

Using a data set gotten from students by a survey, the computational model was identified and it was adopted to develop the web platform, in this process it was used SCRUM [19] as primary methodology.

On requirements gathering there were identified some characteristics which could be desirable on the platform proposed by example personality, social and economic aspects and student performance and their opinions on academic development about different study's topic [18], on design process were students involved to produce an online prototype besides with their feedback select best images to be included in the survey module, and fixing them taking into account some design practices [20], [21].

At the development it was proposed an online backlog to interact in the different sprints to review the advances and it was used a Model View Controller (MVC) as software architecture [20] in a collaborative way, finally the tests were made with 112 students to identify some aspects to improve at application and network level. Finally The Figure 1 presents the result of the web platform described in five modules: i) Registration module, ii) Survey Module, iii) Statistic module, iv) Data mining module, and v) Data administration module.

### 3.2 LModules description.

The registration module let to users create a new user using social networks or making a new register on the web platform, also the data's users can be registered by the administrator's platform in the educative institution this module lets to the students their registration on system giving personal, location, social, familiar and economic information, after this the user is guided to the survey module.
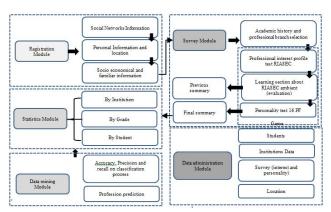


Figure 1: Interpro, modules description.

The survey module is used mainly in the professional profile identification, by means four sections: i) academic information and selection of profession desired, ii) professional interest profile which has 180 statements by means of images, one evaluation inside it with 6 questions about RIASEC environments, and image classification, both let them gain points as a game iii) personality profile with 32 dual statements to select and iv) summary section where a feedback is provided to the user with interest profile, evaluation, game and personality scores and results.

After students did use the survey module, the platform feedbacks them with the statistics module which helps them to summarize their results and to compare their results with other students in their groups, and the data mining module providing them predictions on professions upon the underlying Bayesian model using the naïve Bayes algorithm to classify and predict the following professions updating the model with new data[12], finally the Data Administration Module helps to the web platform manager the data base administration letting him make changes (Create, Read, Update and Delete) on students, grades, institutions, edit the surveys, and locations registers.

### 3.3 Architecture overview

The deployment was achieved using a JDK as development environment, Glassfish as web server, MariaDB as data base management system and JSF as development Framework, the server was installed on Linux system and it can be accessed by different kind of computational devices using a local network. The system has a client server in architecture at service level, and an MVC in the software pattern.

The data mining model was created using a java application it is connected to the web application using the registers of student's answers on data base besides when a new student register their answers from web site a new entry is registered on data set model and it help to improve it in terms of accuracy and recall parameters to predict the suitable area knowledge and professions for students.

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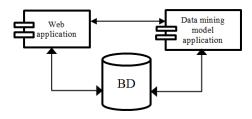


Figure 2: Web platform architecture

TESTS AND DATA ANALYSIS

## 4 Test and data analysis

In [19] five aspects are described to measure usability: i) learnability, ii) efficiency, iii) memorability, iv) reliability in use, and v) acceptability or satisfaction of use. The questions for each metric respectively were: 1) it is required to long time to change some decision make in the web platform? 2) The web site is understandable for you? 3) If you return to use the web site, do you remember how to use it? 4) The web site shows to you messages if you make a mistake? 5) The web site is easy to use?, all these questions were implemented in a free web survey. Each student gave its answer using a binomial possibility besides the answer justification; this was a good tool to feedback the development process. In total were 112 students from 8 to 11 grades, who recorded their answers and suggestions the following were their results.

Table 1: Usability's metrics results

| Acceptance | YES | NO |
|---|---|---|
| % Efficiency | 30.2 | 69.77 |
| % Satisfaction | 90.7 | 9.3 |
| % Memorability | 93 | 6.98 |
| % Errors | 94.2 | 5.81 |
| % Learnability | 90.7 | 9.31 |

Seeing the table 1, is needed to review the quality on network connection because it was latency when the images were showed on a local network and it was decide to move the web platform to a cloud compute service, to improve its efficiency, also as some students give feedback some images don't be compressible then it is necessary change or let their sentence at bottom and get better satisfaction, and improve the error messages to help them in get a better results to find their profiles and learn about their personality and make the best professional selection.

## 5 CONCLUSIONS AND FUTURE WORK

The use of usability metrics as: satisfaction, memorability, error messages, and learnability, allows verifying the web platform acceptance. However by means of some of the recommendation recollected from the free online survey, so far it is known that the interface lacks some details to present it in a more friendly way, although the latency was decreased when the web platform was installed in cloud computing service, it is necessary to improve its performance.

In a next work, the web platform will be evaluated in its following components: i) professional interest profiles, ii) personality, iii) economic, social, academic and geographical characteristics, in a statistical way and using the RIASEC profile, sex, and age it will be evaluated with the data mining model.

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