



# DEVELOPMENT OF A SCHOOL PLATFORM TO REPORT INFORMATION TO PARENTS USING WEB AND ANDROID APPLICATIONS

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## ABSTRACT

This work is aimed at developing an academic platform to strengthen communication between parents and teachers. The platform is designed along two axes: the first, a web application that has in detail the information from the school, administrative staff, faculty, students and their parents, and the second, an Android app which is oriented to the communication between parents and teachers to facilitate the sending of notifications academic, general or discipline between the parties without the need to access the web application.

**Keywords:** android, web application, mobile application, academy notification, academy platform.

## INTRODUCTION

With the development of communications and the use of the internet for access to information, many educational institutions implement web pages with static content to show the services offered the physical location of the institution, information on vision and mission, among others. This type of content offers the educational community and internet users a minimum amount of information and a low level of interaction with users.

As social development increases, people acquire greater responsibility in a world of constant evolution that demands daily commitment to work and submits to the family that delegates responsibility for the education of their children to teachers. However, there are mechanisms that can provide greater participation of parents in the educational processes of their children, generating immediate and anywhere access to content and interactive tools that help the parent to recognize the educational progress of their children.

For this reason, it is necessary to design and develop an academic platform that allows parents to have a closer look at the academic education of their children through direct and permanent communication with educational institutions making use of new technologies of communication and information.

The academic platform is made up of two parts:

A web application that allows the registration of administrative staff, teachers, students, guardians, and all the detailed information of courses, subjects and notes. The design of the application was made with the HTML-5 and JavaScript tag language along with CSS and Bootstrap for organization and visualization. The format is written with the use of different forms to reuse code and reduce the load of the web browser and giving it the characteristic of being responsive. A responsive web, made with HTML-5 and CSS3, allows it to work on multiple screens and devices using techniques that are not based on the server or backend solutions (Frain, 2012).

And an Android mobile application that is directed only to the access of people and teachers that shows the different notifications and allows the sending of messages in a similar way to the email engines. The design of the application was made using Google's official IDE

for mobile applications, Android Studio, and is aimed to devices that have at least version 2.3 of Android to ensure that 94% of devices can run the application (Developers, 2015).

## BACKGROUND

It has been found that the participation of parents in the education of children is associated with a positive attitude and behavior towards school, greater achievements in reading, better quality homework and better academic performance in general (Navarro, Pérez, González, Mora and Jiménez, 2006, Urías, Márquez, Valdés and Tapia, 2009). Likewise, participation brings benefits to the family, which increases their self-confidence, access to more important information on parental strategies, educational programs and the operation of the school, as well as promoting a more positive view of teachers (Navarro *et al.*, 2006).

Kavanagh and Hickey (2013), in their recent research, have made it possible to identify elements that clarify the relationship of parents with educational institutions in immersion schools. The study emphasizes the importance of parents in the education of their children, affirming that there are factors that prevent and others that contribute for parents to participate in the education of their children. Based on Hoover-Dempsey and Sandler (1995, 1997, 2007, cited in Kavanagh and Hickey, 2013), it is understood that there are internal factors in the family that determine the active or less active role of parents, stories such as personal development of the parents and their roles; your personal sense of effectiveness in helping your children achieve school success; their perceptions about opportunities and demands to be able to get involved; and the variables of the family context.

In March 2015, the Ministry of Education launched the E Day project in which the goal is to make Colombia the most educated country in Latin America by the year 2025. The first stage allowed all schools in the country to reflect on the current state of their institutions through the Synthetic Index of Educational Quality (ISCE). Also, they signed the "Agreement for Excellence" and, from there, they proposed action routes for the



improvement of their Educational Institutions (IE) in four dimensions: current performance, progress in recent years, efficiency and school environment. The project is being supported by the MINTIC and its "Computers for Education" project that encourages the incursion of new communication and information technologies as agents to improve education in the country's schools.

The E Day project lacks the participation of the parents, this is why it is presented an academic management platform that allows to bring even more the parents making use of the great advance of the technology that strengthens the communication between home and school and finally, a more complete and ideal education for the children's community of the Huila region.

For the development of education and generate greater participation between the educational community and teaching processes it has been created tools that allow socialization and, in turn, the use of communication and the delivery of content in a virtual way.

Some platforms that can be found on the web are:

**MOODLE:** It is software designed to help educators create high quality online courses and virtual learning environments.



Figure-1. MOODLE. (<https://moodle.org>).

**DOKEOS:** It is a learning management system, that is, an e-learning platform, which allows teachers and students the administrative and academic functions of the training.



Figure-2. DOKEOS. Fuente: <http://www.dokeos.com/>.

**SAKAI:** it is a portal used by professors. It allows creating a work environment according to the needs of each project or research course



Figure-3. Sakai. (<https://sakaiproject.org>).

## STAGES OF DESIGN

For the design of the platform, the pattern model view controller or MVC was used. It separates the user's interaction of data processing, allowing each party to be treated independently (Leff *et al.*, 2001).

The model, also called data layer, consists of the behavior and information of the domain of the application, as well as the direct interaction with the database engine. The view presents the program to the user, the presentation layer handles all the interfaces required for the user's interaction as well as making visible the content of the model sent by the logical layer. And the controller also known as logical layer, in this layer all the rules are defined so that the application has a correct execution, it contains all the classes that are in charge of manipulating and processing the actions of the user that require a request to the model layer, in other words it is the bridge between the user and the database.

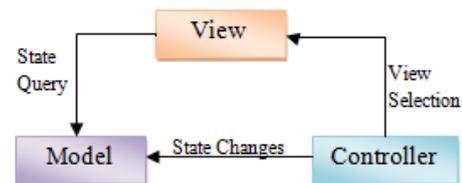


Figure-4. MVC (Curry *et al.*, 2008).

## Database

In the realization of the project, a database was designed using the MySQL Workbench software in its commercial license (MySQL, 2015). This software has the facility to develop, maintain and compile relational databases making use of the basic functions of creating, reading, updating or eliminating data entries of the different tables, better known as CRUD.

Pérez, 2007 tells the following advantages of the MySQL database manager:

- Speed in performing operations on the data.
- Support a large number of data types for the columns.
- High security for user management.
- Portability in different Operating Systems.
- Low cost in Software requirements.

## Web application

For the development and deployment of the application, the Servlet/JSP Tomcat container was used (Apache, 2015).

Access to the database by Tomcat is done through the JDBC driver with the Connector/J extension. The connection is made through the creation of a Java class that uses the sql library and its get Connection method together with the parameters defined to enter the MySQL database.



The design of all web pages containing the project was made with the IDE NetBeans in its version 8.0.2.

The project consists of two axes. The first one where the backend design is concentrated, the part that connects and communicates with the database for the transfer of data between the user and the server. In order to maintain the system and improve the security of the database information, each data is treated as an object using the persistence of data provided by the Java Persistence API (Oracle, 2013) that allows relating a correlation between Servlets and our relational database.

The front-end is based on the open source framework for responsive applications: Bootstrap (Bootstrap, 2015). The initial screen (Figure-5) has an access table for users of the platform that has a script that makes the request of type Post to the server and redirects according to the person requesting the login.

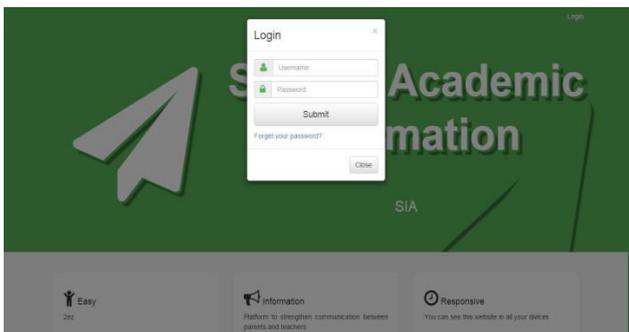


Figure-5. Initial screen web application.

When starting with a new profile of an academic institution, the first user is a default administrator who will be presented with the page (Figure-6) where you can add:

- School Information: Name, phone number, address, mission, vision, day.
- Users: Teachers, students, parents, secondary administrators.
- Academic information: Academic calendar, courses, subjects.

The page also has a quick access bar for the entry of each item of the academic platform and a personal profile menu where you can log out or review the help documentation.



Figure-6. Main administrator initial screen.

Each registered item is based on forms that are reconstructed in each view to reduce the load of the browsers.

The interface for teachers (Figure-7) provides information on the subjects assigned and related students, it also allows you to add the notes and define the percentage of each one in the different periods. Finally, the teacher can create a new task that will be sent as notification to each student.

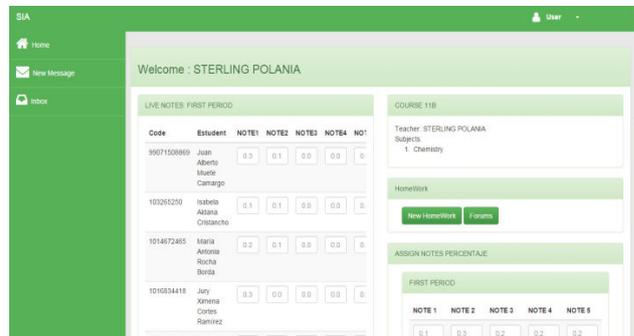


Figure-7. Course screen for teachers.

For the students, the platform presents them, in an orderly manner, all the information related to tasks, messages, absences, academic progress and events at the level of the institution (Figure-8).

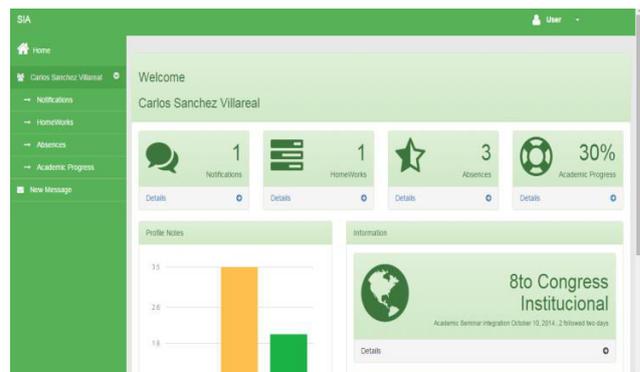


Figure-8. Platform interface for students.

The application provides quick access to any item by means of the action bar on the left side to facilitate navigation and improve the student experience.



When entering new tasks, the student will obtain more detailed information in which they will be able to know the status and if one of them contains a forum to start participating (Figure-9). The notifications will contain messages sent by teachers type e-mail with the possibility of answering.

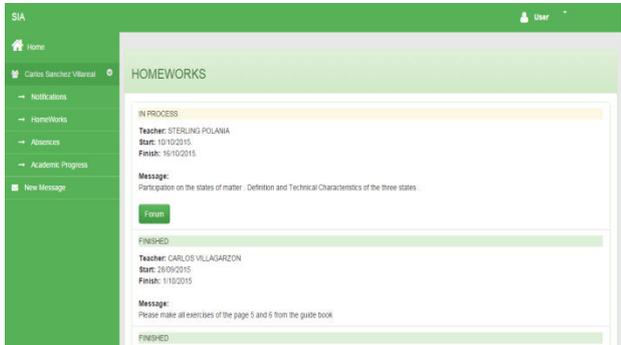


Figure-9. List of student tasks.

The entrance of the visitors to the platform allows them to choose among the students related to it (Figure-10). When selecting a student, the same screen of Figure-8 will be presented, only that it will be read-only, this as a follow-up to the academic performance, offering the possibility of participating in the different activities and/or tasks left by the institution.



Figure-10. Visitors interface.

### Android application

The environment of the mobile application was designed using the new Google guidelines (Lake, 2015) that includes new interfaces and tools to present a more eye-catching and interactive design to users.

The Android application, like the web application, is composed of two axes. The first is the backend design that are Servlets made in Net Beans that communicate with the database, said Servlets are responsible for receiving requests from the mobile device and send a response with information that requires a query on the database. For the exchange of data, it was decided to use the JavaScript Object Notation format (JSON, 2015), since it is easy to write for the developers and easy to interpret by the machines.

All Servlets created receive Post-type requests to provide security while browsing the users in the

application. The treatment of the information that is in the database is done through external Java classes, in some cases, which use the persistence of information to treat the data as objects and facilitate the manipulation and maintenance of the system.

The request for information to the database is made with SQL statements for JAVA (Gilfillan, 2003), the result is converted to JAVA objects that are passed back to the Servlet which in turn converts those objects to the JSON format using the external library Gson in its version 2.2.2 (Study Trails, 2014) and printing them back to the application.

In order for the application to communicate with Servlets, a Java class is created that we call JSON.java in the main project in the Android Studio. This class is called by different activities or fragments that send data within an HTTP request to the server that contains the database.

In the JSON class it was implemented the java.net library recommended by Android to implement applications that connect to external servers and the java.io library for data input and output. The parameters that are sent and received during the requests are encoded and decoded using the ISO Latin 1 standard (ISO, 1998).

The welcome screen (Figure-11) of the application provides access to parents or teachers through a login system.



Figure-11. Welcome interface.

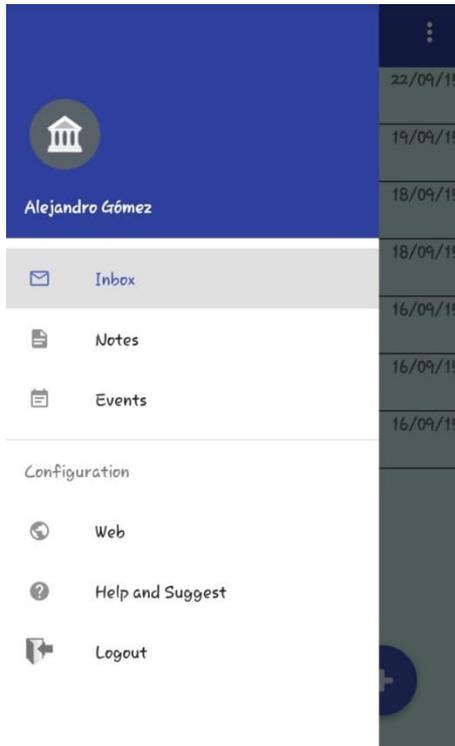
The interface has a button that when pressed gathers the data of the fields and calls the JSON class to send them in the body of an HTTP request to the Servlet associated with the login, by recommendations and behavior of the application the operations of Connection to external servers is done in a thread other than the main one, this is achieved using the AsyncTask class that executes tasks in the background allowing the user to continue interacting with the application (Gargenta, 2011).

When the Servlet sends a successful logon response, the application reads the information and opens



a new startup activity according to the user who is doing the process, whether parent or teacher.

For parents (Figure-12), there is an easily accessible and fully interactive navigation menu.



**Figure-12.** Navigation menu for parents.

The first option of the menu presents the input messages (Figure-13) showing basic information such as the sender and the date of sending, when pressed each message opens a new screen with the detailed content and allows to answer or delete the message by means of buttons located in the action bar (Figure-14), the delete action launches a dialogue box to receive confirmation, if it is positive it sends the request to the server to eliminate the message from the database, when the process is completed the server sends the notification of elimination to the application and presents it by means of a Snackbar in the current interface.



**Figure-13.** Inbox messages screen.



**Figure-14.** Message detail screen with action bar.

Pressing the answer button (Figure-15) opens a new window where the recipient already appears and it is only necessary to enter the body of the message and send it by means of another HTTP request to the server so that it enters the message to the database and send a



notification with the result if it is a message stored in the database or there was some kind of irregularity, the notification is read by the application and printed using a Snackbar in the current interface.



**Figure-15.** Message answering interface.

In the message section also have the possibility to write a new message by pressing the floating button located at the bottom that opens a new interface (Figure-16) where the parent must enter the first name and the first surname of the teacher who will be sent the message, this to facilitate interaction to parents who only need basic information to send a message, also select the type either Academic, General or Discipline that assigns an indicator to differentiate and improve the experience in front of the application.



**Figure-16.** New message interface.

Once the data is filled, it is sent encoded in an HTTP request to the server pointing to the Servlet that is responsible for making the connection to the database and the insertion of messages, either the success or failure occurs, the server sends the return notification in response to the application, it is shown to the user indicating the status of the request.

The score screen (Figure-17) presents the names of the students that are related to the parent, the interface has some navigation buttons that shows each related child to have the possibility of displaying the scores.



**Figure-17.** Student scores interface.

Both the name of the students and the scores, are requested with a request to the server that relates the parent to the students according to the relationships of tables in the database.

The mobile application presents an interaction between parents and teachers, while the user has logged in the application starts a secondary thread that constantly checks if there are new messages in the database and sends a notification in the status bar of the mobile device, the thread is performed using the Android Service class that executes processes when the application is in the background or another application is deployed on the device.

The classes Task Stack Builder and Notification Compat were used to create the notification, which work together allowing the display of personalized notifications.

## CONCLUSIONS

The academic management platform and the full functionality of the web and mobile application were successfully implemented.

The use of HTML5, CSS3 and JAVASCRIPT for the development of the web application facilitates maintenance and reduces the load on the browser, also allows viewing on different screens and bringing users closer to the platform.

The choice of the Android operating system as a mobile application makes it possible to upload the application to the Google Play Store for free and be downloaded to be executed on more than 94% of current mobile devices.

The use of MySQL as a database management system improves the security of the system as well as allowing the MVC pattern to be used in different applications.

The impact of the platform on caregivers presents an improvement in participation to improve the academic performance of students making use of new information and communication technologies as a tool to strengthen the home-school relationship.

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