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Presentation of Content

In the first article we present, *Database for electronic schedule for patients of psychological clinic*, by CORTÉS-GARCÍA, Alicia, SANTOS-OSORIO, Rene and PERALTA-HERNÁNDEZ, Guillermo, with adscription in, Universidad Tecnológica de San Juan del Río, as the next article we present, *Optimization system at Vehicle Control Department for the control and management of the company's vehicles*, by SANTOS-OSORIO, René, LÓPEZ-RIVERA, José Armando, LÓPEZ-ÁNGELES, Dora Lilia and RODRÍGUEZ-MIRANDA, Gregorio, with adscription in Universidad Tecnológica de San Juan del Río, as the next article we present, *Emerging technologies and their application in higher education*, by RODRÍGUEZ-PÉREZ, Ivonne, with adscription in Universidad Autónoma del Estado de México, as the next article we present, *The technostress: Its influence in the learning environment related to the use of information technologies*, by ORTIZ-SÁNCHEZ, Pedro Alfonso Guadalupe, SÁNCHEZ-ITURBE, Patricia, ORTIZ-Y OJEDA, Pedro T. and BASAVE-TORRES, Rosy Ilda, with adscription in the Instituto Tecnológico de Mérida and the Instituto Tecnológico de Tuxtla Gutiérrez.

Content

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Database for electronic schedule for patients of psychological clinic

Base de datos para agenda electrónica para pacientes de clínica psicológica

CORTÉS-GARCÍA, Alicia*†, SANTOS-OSORIO, Rene and PERALTA-HERNÁNDEZ, Guillermo

Universidad Tecnológica de San Juan del Río

ID 1st Author: *Alicia, Cortés-García* / **ORC ID**: 0000-0003-1044-9787, **Researcher ID Thomson**: G-5779-2019, **CVU CONACYT ID**: 671816

ID 1st Coauthor: *Rene, Santos-Osorio* / **ORC ID**: 0000-0002-4411-7628, **Researcher ID Thomson**: G-3453-2019, **CVU CONACYT ID**: 619722

ID 2nd Coauthor: *Guillermo, Peralta-Hernández* / **ORC ID**: 0000-0001-5396-7176

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Abstract

This paper presents the development of an application for the management of patients of a psychological clinic through an online database. Nowadays, the use of technology is expanding more and more, integrating itself in different aspects of society, both in everyday life and in the workplace and industry. Businesses that do not apply new technologies or update themselves run the risk of falling behind competitors or exit the market completely. To implement these technologies, such as software, desktop applications, mobile or internet integration, it is not always necessary to invest many resources or hire new personnel to maintain new equipment. With the simple installation of a computer equipment or implementation of a specialized software, business profits can be maximized or ease the workload. The methodology to be used is: 1. Creation of a desktop application based on Java. 2. Integration of the application with online database. This project seeks to update the way the PSM Psychological Clinic stores and organizes the data of its patients.

Desktop application, Database, Learning of IT

Resumen

En este trabajo se presenta el desarrollo de una aplicación para la gestión de pacientes de una clínica psicológica, con una base de datos en línea. Hoy en día, el uso de tecnología se amplía más y más, integrándose en los diferentes aspectos de la sociedad, tanto en la vida cotidiana como en ámbito laboral e industrial. Los negocios que no apliquen las nuevas tecnologías o se actualicen, corren el riesgo de quedarse atrás de competidores que adaptaron nuevas tecnologías o de salir por completo del mercado. Para implementar estas tecnologías, software, aplicaciones de escritorio, móvil o integración del internet, no es siempre necesario invertir muchos recursos o contratar nuevo personal para el mantenimiento de nuevo equipo. Con la simple instalación de un equipo de cómputo o implementación de un software especializado se puede maximizar las utilidades del negocio o facilitar la carga de trabajo de una forma evidente. La metodología a utilizar será en cascada. Con este proyecto se busca la actualización en la forma en que la Clínica Psicológica PSM guarda y organiza los datos de sus pacientes.

Aplicación, Base de datos, Aprendizaje de las TI

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* Correspondence to Author (email: acortesg@utsjr.edu.mx)
† Researcher contributing first author.

Introduction

This article proposes a solution for the management of patients in a psychological clinic with a remote database. In this way, it is intended to contribute to other companies of the same field so that they have a basis to develop their computer systems.

At the time of starting this project, the company still used physical means, that is, paper and pen, to register its clients and patients, having to use a large amount of energy and resources in the management of these records.

As physical means, the records require space to be stored, with the possibility of getting lost or overlapped with the records of other patients, as well as having to search manually if personnel want to review them. The clinic only uses computers to record the sessions of some patients, but these notes have little in common, being as such individual documents.

With this application, not only will psychologists be able to register all patients on a single platform, thus eliminating the use of physical methods for registration, but also all notes, reports and patient sessions will be under one platform, facilitating its creation, use and search in general.

The methodology included the following steps:

1. Research and proposal of programming languages.
2. Analysis of the proposed languages and choosing the most suitable for the project.
3. Development of a desktop application.
4. Integration of the application with online database.
5. Tests
6. Results.

Java

Java is a general-purpose, concurrent, object-oriented programming language that was specifically designed to have as few implementation dependencies as possible.

Its intention is to allow application developers to write the program once and execute it on any device (known as WORA, or “write once, run anywhere”), which means that the code that is executed on a platform does not have to be recompiled to run in another. Java is, as of 2012, one of the most popular programming languages in use, particularly for client-web server applications, with about 10 million users reported. (ictea, 2019)

The Java programming language was originally developed by James Gosling of Sun Microsystems (which was acquired by the Oracle company) and published in 1995 as a fundamental component of the Java Sun Microsystems platform. Its syntax derives largely from C and C ++, but it has fewer low-level utilities than any of them. Java applications are generally compiled to bytecode (Java class) that can be run on any Java virtual machine (JVM) regardless of the underlying computer architecture. (The Computer Magazine, 2015).

Java syntax is largely derived from C ++. But unlike this one, which combines the syntax for generic, structured and object-oriented programming, Java was built from the beginning to be completely object-oriented. Everything in Java is an object (with some exceptions), and everything in Java resides in some class (remember that a class is a mold from which several objects can be created).

Swing is the library for the advanced graphical user interface of the Java SE platform. The import instructions tell the Java compiler that the javax.swing package classes and interfaces are included in the compilation.

Java libraries are the result of compiling the source code developed by who implements the JRE and offers support for Java development. Some examples of these libraries are:

The central libraries, which include:

- A collection of libraries to implement data structures such as lists, arrays, trees and sets.
- Libraries for XML analysis.
- Security.
- Internationalization and location libraries.

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Integration libraries, which allow communication with external systems. These libraries include:

- The API for accessing JDBC databases (Java DataBase Connectivity).
- The JNDI (Java Naming and Directory Interface) for directory services.
- RMI (Remote Method Invocation) and CORBA for the development of distributed applications.
- Libraries for the user interface, which include:
- The AWT (Abstract Window Toolkit) native toolset, which offers GUI (Graphical User Interface) components, mechanisms for using them and managing their associated events.
- Swing Libraries, built on AWT but offer non-native implementations of AWT components.
- APIs for audio capture, processing and playback.

An implementation dependent on the platform on which the Java virtual machine (JVM) runs, which is responsible for the execution of the code of libraries and external applications.

phpMyAdmin

It is a tool written in PHP with the intention of managing the administration of MySQL through web pages, using a web browser. It can create and delete databases; create, delete and alter tables; delete, edit and add fields; execute any SQL statement; manage keys in fields; manage privileges; and export data in various formats. (phpadmin, s.f.)

MySQL

MySQL is the most popular open source database in the world. Despite its powerful features, MySQL is easy to configure and use.
MySQL is widely used in web applications, such as Joomla, Wordpress, Drupal or phpBB, on platforms (Linux/Windows-Apache-MySQL-PHP/Perl/Python), and by error tracking tools such as Bugzilla. Its popularity as a web application is closely linked to PHP, which often appears in combination with MySQL.

MySQL is a very fast reading database when it uses the MyISAM non-transactional engine, but it can cause integrity problems in high concurrency environments in the modification. In web applications, there is low concurrency in the modification of data and, instead, the environment is intensive reading data, which makes MySQL ideal for this type of applications. Regardless of the environment in which MySQL is used, it is important to monitor performance in advance to detect and correct both SQL and programming errors. (MySQL, s.f.)

Features:

- Large subset of the SQL language. Some extensions are also included.
- Availability in a large number of platforms and systems.
- Possibility of selecting storage mechanisms that offer different operating speeds, physical support, capacity, geographical distribution, transactions...
- Transactions and foreign keys.
- Secure connectivity.
- Replication.
- Search and indexing of text fields.
- Standard: Standard MySQL binaries are recommended for most users, and include the InnoDB storage engine.
- Max (This is not MaxDB, which is a cooperation with SAP): Binaries include additional features that have not been sufficiently tested or that are not normally necessary.
- MySQL-Debug: They are binaries that have been compiled with extra debugging information. It should not be used in production systems because debug code can reduce performance. MySQL is the most popular open source database in the world. Despite its powerful features, MySQL is easy to configure and use.
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Choice of language and MDB.

Due to the benefits and capacity mentioned above with Java, it is the language chosen for the development of this project. The C and C ++ languages, as we have seen, are also good, with the only difference that we do not need to interact with hardware, so it would be a feature that is not necessary in this project.

As DB handler we have chosen MySql for its security and ability to type SQL instructions. It is also very widespread on the net, so is easy to find a good service.

Being the DB on an online server, the clinic avoids having a server within the company; it is also cheaper to hire a server only for the management of the DB than a whole web server.

Development

The system must enter a patient with full profile, photo and complete their file with multiple sessions and images, and then delete all records by only removing the patient, starting with the empty database (Figure 1), so the application does not return any registered patient (Figure 2).

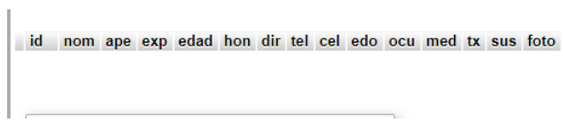

Figura 1 Base de Datos vacía

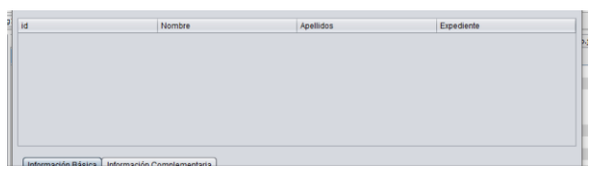

Figura 2 Tabla de Pacientes vacía

The registration of a new patient was successfully created on the Registration screen (Figure 3 and Figure 4), causing the new registration to be on the table of the Patient Consultation screen (Figure 5).

Figura 3 Registro de nuevo Paciente

Figura 4 Base de Datos con el nuevo registro

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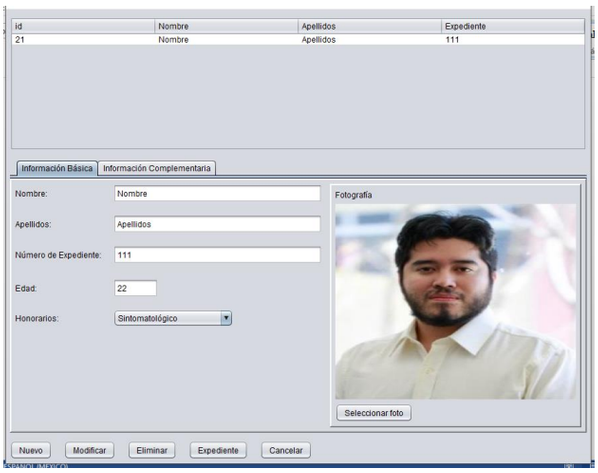

Figura 5 Nuevo Paciente en Consulta

Once the new patient has been selected in the Consultation table (Figure 6), the option to enter File is activated. Once inside, Patient Filiation Data was created (Figure 6), and some fields were subsequently modified to verify the use of the option to modify data (Figure 7).

	idpac	pre	sin	man	lat	dx
rar	21	Pre entrevista	Síntomas	Motivo 1	Motivo 2	Dx

Figura 6 Registro de Datos de Filiación

	idpac	pre	sin	man	lat	dx
rrar	21	Pre entrevista	Síntomas	Motivo manifiesto	Motivo latente	Diagnóstico

Figura 7 Modificación de Datos de Filiación

Subsequently, new sessions were created for the patient, creating two new sessions, and modifying the data of the first one (Figure 8 and Figure 9). Therefore, both sessions are linked to the same patient identification number. And to end the introduction of records, a couple of images were also added, only to demonstrate that it is possible to add images to the database (Figure 10).

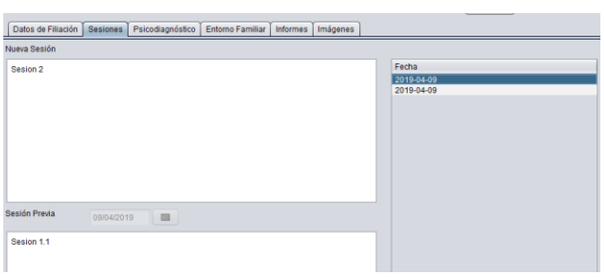

Figura 8 Creación de sesiones

	idpac	sesion	dates	idses
rar	21	Sesion 1.1	2019-04-09	10
rar	21	Sesion 2	2019-04-09	11

Figura 9 Base de Datos de Sesiones

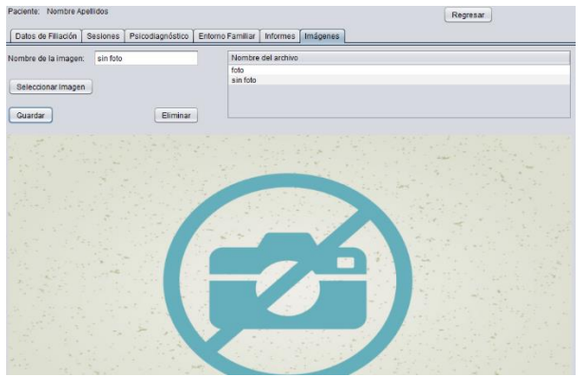

Figura 10 Registro de Imágenes

Once the registration was completed, it was removed from the consultation screen, selecting the patient to be deleted. In response, a dialog screen is activated to confirm the elimination of the patient and all related data (Figure 11).

Once the elimination of the patient is confirmed, all of the data and related records are removed from the database, in this example, the database is empty (Figure 12), as is the session database, since both records are related to the same patient (Figure 13), ending the test successfully.

Figura 11 Confirmación para eliminar paciente

id	nom	ape	exp	edad	hon	dir	tel	cel	edo	ocu	med	tx	sus	foto

Figura 12 Base de Datos después de eliminar al paciente

idpac	sesion	dates	idses

Fiagura 13 Base de Datos de Sesiones después de eliminar al Paciente

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Conclusions

The integration of technology into everyday life and work environments is of utmost importance with each passing day, not only for its convenience, but for the help technology provides to achieve our goals in a more efficient way, giving us the opportunity to do much more than what we initially planned.

We have perceived a great change in the way the psychological clinic organizes information, considering the saving of space to store papers, thus avoiding misplacement.

The software is currently in operation and it has been proven that software development with Java and remote MySql for companies with these characteristics is a good option.

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Article **Journal Journal-Economic Development Technological Chance and Growth**
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Optimization system at Vehicle Control Department for the control and management of the company's vehicles

Sistema de optimización en el departamento de Control Vehicular para el control y manejo de los vehículos de la empresa

SANTOS-OSORIO, René*†, LÓPEZ-RIVERA, José Armando, LÓPEZ-ÁNGELES, Dora Lilia and RODRÍGUEZ-MIRANDA, Gregorio

Universidad Tecnológica de San Juan del Río

ID 1st Author: *René, Santos-Osorio* / **ORC ID**: 0000-0002-4411-7628, **Researcher ID Thomson**: G-3453-2019, **CVU CONACYT ID**: 619722

ID 1st Coauthor: *José Armando, López-Rivera* / **ORC ID**: 0000-0002-3821-3058

ID 2nd Coauthor: *Dora Lilia, López-Ángeles* / **ORC ID**: 0000-0001-7608-9169, **Researcher ID Thomson**: G-3474-2019, **CVU CONACYT ID**: 672135

ID 3rd Coauthor: *Gregorio, Rodríguez-Miranda* / **ORC ID**: 0000-0002-2512-892X, **Researcher ID Thomson**: S-5808-2018, **CVU CONACYT ID:** 246718

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Abstract

This project proposes a solution to an internal problem of an organization when managing its vehicles. A web system will be developed for the control and management of information, procedures and functions of the company's vehicles in an efficient way and thus have a better development optimizing times. The objective is to facilitate the management of information, improving the control of activities, internal functions and support, in order to speed up processes through the use of the computer system. The methodology to be used is Scrum, since it provides optimal options, such as Sprint, work boards at a certain time for the development and proper functioning of the system, as well as constant revision, avoiding errors and improving development times. The Scrum methodology provides an agile process to develop software; it was first applied by Ken Schwaber and Jeff Sutherland, who documented it in detail in the book A*gile Software Development with Scrum*.

1. To analyze and investigate the different development tools.
2. To select the tools that generate the greatest advantages for the project.
3. To make a work plan for the implementation of the System.
4. To perform tests and carry out adjustments for the final implementation.

Vehicle control, Computer system, Automation

Resumen

El presente proyecto propone una solución a un problema interno de una organización al momento de administrar sus vehículos. Se elaborará un sistema web, para el control y manejo de información, procedimientos y funciones de los vehículos de la empresa, de una manera eficaz y así tener un mejor desarrollo optimizando tiempos. El objetivo es facilitar el manejo de información, mejorando el control de actividades, funciones internas y de apoyo para con ello poder agilizar procesos mediante el uso del sistema informático. La metodología a utilizar es Scrum, ya que proporciona opciones óptimas, como los Sprint, juntas de trabajo en determinado tiempo para el desarrollo y buen funcionamiento del sistema, constante revisión, evitar errores y mejorar tiempos de desarrollo. La metodología Scrum proporciona un proceso ágil para desarrollar software que fue aplicado por primera vez por Ken Schwaber y Jeff Sutherland., quienes lo documentaron en detalle en el libro Agile Software Development with Scrum.

1. Analizar e investigar las diferentes herramientas de desarrollo.
2. Seleccionar las herramientas que generen mayores ventajas para el proyecto.
3. Realizar un plan de trabajo para la implementación y puesta en función del Sistema.
4. Realizar pruebas y llevar a cabo los ajustes para la implementación definitiva.

Control vehicular, Sistema informático, Automatizacióz

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* Correspondence to Author (email: rsantoso@utsjr.edu.mx)
† Researcher contributing first author.

Introduction

The primary objective of the research was the benefit of the company, specifically, by proposing a solution to an internal problem of organization regarding the administration of its vehicles, such as expediting and facilitating the work of the Vehicle Control Department. Web systems, also known as web applications, are created and installed on a platform or operating systems (Windows, Linux), or they can be hosted on an Internet server or on an intranet (local network) (Web, 2019).

Web systems have very powerful functionalities that provide answers to particular cases; they can be used in any web browser (Chrome, Firefox, Internet Explorer, etc.) regardless of the operating system. To use the web applications it is not necessary to install them on each computer, since users connect to a server where the system is hosted.

Web applications work with databases that allow processing and displaying information dynamically for the user, saving costs, time and human resources.

There are currently several software development tools that allow the implementation of a Computer System. Therefore, it was necessary to determine the most appropriate option for the company that needs to manage its vehicles efficiently and in an organized manner.

Methodology

According to the Scrum methodology, the activities to be carried out were:

Analyzing and investigating the different development tools.

a. Java

It is a general purpose, concurrent, object-oriented programming language that was specifically designed to have as few implementation dependencies as possible. Its intention is to allow application developers to write the program once and execute it on any device, which means that the code that is executed on one platform does not have to be recompiled to run on another.

Java is, as of 2012, one of the most popular programming languages in use, particularly for client-web server applications, with about ten million users reported.

Renowned for its readability and simplicity, Java is one of the most adopted programming languages: more than 9 million developers use it and it is present in 7 billion devices worldwide. Since 2001, it remains in the top positions, reaching second place as the lowest in March 2015. (Java, 2019)

b. C

It is a programming language originally developed by Dennis Ritchie, between 1969 and 1972, at Bell Laboratories, 1 as an evolution of the previous B language, in turn based on BCPL. Like B, it is a language oriented to the implementation of operating systems, specifically Unix. C is appreciated for the efficiency of the code it produces and is the most popular programming language for creating systems software, although it is also used to create applications.

It is a language of static data types, weakly typified, of medium level, since it has the typical structures of high-level languages but, in turn, it has language constructions that allow very low level control. Compilers often offer extensions to the language, which provides the possibility to mix assembly code with C code or directly access memory or peripheral devices. (C, 2019)

c. C++

C++ is a programming language designed in 1979 by Bjarne Stroustrup. The intention was to extend the programming language C with mechanisms that allow the manipulation of objects. In that sense, from the point of view of object-oriented languages, C++ is a hybrid language.

Subsequently, generic programming facilities were incorporated, which added to the paradigms of structured programming and object-oriented programming. This is why it is often said that C++ is a multiparadigm programming language.

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There is currently a standard, called ISO C++, to which the most modern compiler manufacturers have adhered. There are also some interpreters, such as ROOT.

A particularity of C++ is the possibility of redefining operators, and of being able to create new types that behave as fundamental types. The name "C++" was proposed by Rick Mascitti in 1983, when the language was first used outside a scientific laboratory. The name "C with classes" had been used before. In C++, the expression "C++" means "increase in C" and implies that C++ is an extension of C. (C++, 2019)

d. Python

Python is an interpreted programming language, the philosophy of which emphasizes a syntax that favors readable code. It is a multiparadigm programming language, since it supports object orientation, imperative programming and, to a lesser extent, functional programming. It is an interpreted language which uses dynamic typing and is multiplatform.

It is managed by the Python Software Foundation. It has an open source license, called Python Software Foundation. (Python, 2019)

e. JavaScript

JavaScript (commonly abbreviated JS) is an interpreted programming language, dialect of the ECMAScript standard. It is defined as object-oriented, prototype-based, imperative, weakly typed and dynamic.

It is mainly used in its client-side form, implemented as part of a web browser allowing improvements in the user interface and dynamic web pages, although there is a form of server-side JavaScript (Server-side JavaScript or SSJS). Its use in external applications to the web, for example in PDF documents, desktop applications (mostly widgets) is also significant. Since 2012, all modern browsers fully support ECMAScript 5.1, a javascript version. Older browsers support at least ECMAScript 3. The sixth edition was released in July 2015.5 JavaScript was designed with a syntax similar to C, although it adopts names and conventions of the Java programming language. However, Java and JavaScript have different semantics and purposes. (Javascript, 2019).

f. PHP

PHP, recursive acronym for Hypertext Preprocessor, is a general-purpose programming language of server-side code originally designed for dynamic web content development. It was one of the first server-side programming languages that could be incorporated directly into an HTML document, instead of calling an external file that processed the data. The code is interpreted by a web server with a PHP processor module that generates the resulting HTML.

PHP has evolved, so it includes now a command line interface that can be used in separate graphic applications. It can be used on most web servers, as well as on many operating systems and platforms for free. (PHP, 2019)

g. Laravel

Laravel is an open source framework for developing web applications and services with PHP 5 and PHP 7. Its philosophy is to develop PHP code in an elegant and simple way, avoiding “spaghetti code.” It was created in 2011 and has a great influence of frameworks.

Laravel aims to be a framework that allows the use of an elegant and expressive syntax to create code easily and allowing a multitude of functionalities. It aims to take advantage of the best of other frameworks and the features of the latest versions of PHP.2

Much of Laravel is made up of dependencies, especially Symfony, this implies that Laravel’s development also depends on the development of its dependencies.

Characteristics

- Routing system, also RESTful
- Blade, Template Engine
- Fluent Petitions
- Eloquent ORM
- Composer based
- Cache support
- MVC support
- Uses Symfony components

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Selecting the tools that generate the greatest advantages for the project

We chose to work with PHP and its development tool Laravel since it is a development framework that offers great benefits because it already brings developed code and methods; it also adapted to the type of system that was required in the department.

Laravel adapts to the development of complex projects and must be developed in a short time, works with the view-controller model, Model, Controller and View web that will be shown to the User. Besides, Laravel already includes its own template engine (Blade) with which it is easier to make forms and web design of the system. (Laravel, 2019)

Work plan for the implementation and commissioning of the System (SICOVE)

In January 2019, we identified that the company did not have a computer system that expedited and facilitated the work of the Vehicle Control Department, so the project titled "Vehicle Control System" (SICOVE, for its acronym in Spanish) was put into operation. It began with the planning stage, in which the people of the department discussed about the exact and precise requirements of the system.

The project started in the month of January, it was formally established at the end of the same month with the exact requirements and it was until the end of March when the first tests of the developed system we conducted, along with the Database.

Tests and adjustments for final implementation

The SICOVE was installed on a DELL server with the following characteristics:

CentOS 7 64-bit operating system, processor speed of 2.40Ghz, 4Cores per processor, 12Gb of DDR3 RAM, and an Apache server. The CentOS 7 operating system is used professionally in the industry and in different projects, the current version 7.0 of CentOS (January 2017) is based on the Linux 3.10.0 kernel, including the security extension mentioned above, SELinux, and has implemented GCC (GNU Compiler Collection).

This collection contains the compiler for the most important programming languages, such as C, C++ and Java.

This Linux distribution is also compatible with Hyperthreading (splitting a processor into two virtual processors to increase performance), Plug and Play, Bluetooth and the sixth version of the Internet protocol (IPv6). For previous versions of CentOS 5 and 6 there are compatibility libraries. The standard distribution package also includes the following software components:

- Web server: HTTP 2.4.6 (Apache)
- LAN Manager: Samba-4.1.x
- Database: MariaDB 5.5.x, PostgreSQL 9.2.x
- Script language: PHP 5.4, Python 2.7, Perl 5.16.3
- Desktop interface: Gnome 3.14, KDE 4.14
- Screen server: X.org 7.7
- Email client: Evolution 3.12, Thunderbird 45
- Web browser: Firefox 45
- Office Suite: LibreOffice 4.3.7

As a web server, we have Apache Tomcat Glasfish, among the best known, and with its own technologies. But the one that best suits this project and the most appropriate technologies is Apache Tomcat.

The SICOVE documentation for the development and implementation of the Vehicle Control System states that tests were carried out during the development of the system to verify its operation and thus be able to continue advancing in the system.

A first test was conducted verifying that there was a connection between the system development environment (Laravel) and the database (MySQL), to be able to use, handle and manipulate information correctly in the system, obtaining a good connection between the two parties.

A second test was carried out to verify the user validation functionality (LOGIN) at the time of logging into the system with email and password; for this purpose, manual information was filled out in the respective user database, so that they could access or test their access to the system.

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The third test was to verify that the insertion, edition and elimination of users worked correctly, saving and making changes in the database, from the execution of the system, obtaining correct results. The next step was to assess the correct operation of the vehicles with the other related categories; in order to control its functions, insertion, modification and elimination were evaluated.

The following test was to verify that the correct insertion and upload of the files was carried out in the different models related to vehicles and users, such as circulation cards, invoice letters, insurance policies, driver's licenses among other models, in order to show the files correctly. Once the test was conducted correctly, the next stage was the elimination and modification (Changing the file) of the models and the information update into the database.

The final test was carried out once the system was implemented on the server with the CentOS 7 operating system and connected to the company's internal network, in order to access the system from any part of the company. We checked that the system worked correctly and executed all the functions without presenting any error.

Results

The system was completed to 85%, since it correctly executes all the functions specified in the requirements and does not present any more execution errors; however, the remaining 15% corresponds to design adjustments and to the addition of other options that will facilitate the interaction with the user. The system is able to control and manipulate information from Users, Driver's Licenses, Vehicles, Suppliers, Business Units, Types of Vehicles, Sub Types of Vehicles, Holdings, Circulation Cards, Invoice Letters, Insurance Policies and Vehicle Conditions without errors.

The system was finished until the implementation within the company network; the result of the implementation is reflected in the internal address of the company: http: // dquserver02: 8585 / psycho /.

Conclusions

With the implementation of the Vehicle Control System (SICOVE), it was found that the proposal for the solution to the internal problem of organization to manage vehicles achieved its purpose by expediting the handling of vehicle information. The system is quite functional and reduces the time for the administration of vehicles, it helps the Vehicle Control Department to carry out its activities and functions with greater order, and in a more efficient way.

The development of this system was quite good, because it not only benefited the area of Vehicle Control, but also the different departments of the company. In addition, many activities were implemented, which increased the knowledge and experience in the development of a project or system. As a result of the development of this project, other outcomes were obtained for the benefit of the people involved.

For example, we mentioned that new things were put into practice and that had to be investigated, analyzed and tested in order to use them. The people involved also learned to provide solutions to some processes that originated within the company's facilities, as well as to develop, implement and manage systems or application software that meets quality standards in order to support the productivity and competitiveness of organizations for good efficiency.

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Emerging technologies and their application in higher education

Tecnologías emergentes y su aplicación en la educación superior

RODRÍGUEZ-PÉREZ, Ivonne*†

Universidad Autónoma del Estado de México

ID 1st Author: *Ivonne, Rodríguez-Pérez* / **ORC ID**: 0000-0003-2982-2676, **Researcher ID Thomson**: B-2499-2016, **CVU CONACYT ID**: 57736

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Abstract

The usefulness of Information and Communication Technologies (ICT) as pedagogical tools have been widely studied, where the need for didactic planning arises so that they become resources for improving educational quality. Emerging technologies are new creations, scientific innovations that can create a new industry or transform an existing one with new technologies, or also allow the use of existing ones mixed with new ones, or improve them based on new requirements. These technologies have some tools such as those listed below: Cloud Computing, Collective Intelligence, Nashua Data, Collaborative Web. The aim is to identify the knowledge that the teachers of the UAEM Valle de México University Center have, regarding emerging ICT, describe the uses that they give to some of these tools and determine their level of updating. We used a mixed methodology, to know, how are they integrated in teaching? What cognitive skills have been promoted with them?

Emerging technologies, Higher education, Strategies, Learning

Resumen

La utilidad de las Tecnologías de la Información y la Comunicación (TIC) como herramientas pedagógicas han sido ampliamente estudiadas, en donde surge la necesidad de una planificación didáctica para que se conviertan en recursos de mejora para la calidad educativa. Las tecnologías emergentes son nuevas creaciones, innovaciones científicas que pueden crear una nueva industria o transformar una existente con tecnologías nuevas, o también permite el uso de las existentes mezcladas con las nuevas, o bien, mejorarlas a partir de nuevos requerimientos. Dichas tecnologías cuentan con algunas herramientas como las que se enlistan a continuación: Cómputo en la nube, Inteligencia colectiva, Nashua de datos, Web colaborativa. Se pretende identificar el conocimiento que tienen los docentes del Centro Universitario UAEM Valle de México, referente las TIC emergentes, describir los usos que le dan a algunas herramientas de éstas y determinar su nivel de actualización. Se utilizó una metodología mixta, para conocer, cómo se integran en la enseñanza? qué habilidades cognitivas se han promovido con ellas?

Tecnologías emergentes, Educación superior, Estrategias, Aprendizaje

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* Correspondence to Author (email: irodriguezperez@yahoo.com)
† Researcher contributing first author.

Introduction

Today, there is no doubt that emerging technologies are called to profoundly modify teaching. But for this to happen, there will have to be an authentic review of the pedagogical use that is currently being given.

Modern organizations demand people with skills for problem solving, decision making, collaborative work capacity and flexible adaptation to rapid changes that occur in the knowledge society. Technology-supported education offers opportunities to renew content and teaching methods that allow developing those skills.

The new training scenarios are influenced by three relevant factors: the presence of the Internet, with Web 2.0 and 3.0, networks and the cloud promote and develop new ways of thinking, producing, communicating, researching, knowing, working, learning and teach; in parallel there is a growing availability of free-use technological resources (simulations, remote laboratories, videos, blogs, podcasts, forums, etc.) and along with it, a growing access to technologies by potential students (Internet, iPod, netbook, tablet, smart phone, among others).

Education requires fulfilling its functions with quality, generating spaces that lead to an appropriate pedagogical relationship between the teacher and student, establishing a type of link that channels the best of their strategies, capacities and intentions. The National Association of Universities and Institutions of Higher Education (ANUIES) made public a proposal of Higher Education for the 21st Century, where some of the challenges that universities have to face to develop the professional profiles demanded by today's society are exposed. Among these are:

Turn the University into a gateway to the knowledge society.

Attend with quality a student population in constant growth, as a result of the demographic dynamics of the country and the expansion of higher education enrolment.

Offer high quality educational services that provide students with humanistic and cultural training, with a solid technical and scientific training.

ICTs constitute a social phenomenon of great importance, especially in education, where different tools are increasingly used to support research, teaching and learning.

In this case, emerging technologies are being incorporated into education. But how do they integrate into teaching? The development of what cognitive skills have been promoted with them?

The general objective of this work is to identify the knowledge that teachers of the UAEM Valle de México University Centre have, referring to emerging ICTs, in addition to describing their uses and determining their level of updating, since these technologies have been incorporated as teaching resources and resources. The methodology used is mixed, since qualitative and quantitative data were handled.

The article has the following sections, Emerging technologies, cloud computing, data mashup, collaborative web, collaborative intelligence, emerging technologies and education, research methodology used, results and conclusions reached.

Emerging technologies

Emerging technologies are new creations, that is, scientific innovations that can create a new industry or transform an existing one with new technologies, or that also allow the use of existing ones mixed with new ones, or, improve them from new requirements.

What are emerging technologies? There are many definitions in this regard, but here two will be considered. First that of Gregory Day and Paul Schoemaker (2011) in the book Management of emerging technologies, they define them as “scientific innovations that can create a new industry or transform an existing one. They include discontinuous technologies derived from radical innovations, as well as more evolved technologies formed as a result of the convergence of previously separated branches of research”.

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The second is from Pomeda Rodríguez. J. (2008), defines emerging technologies as "modern techniques to more efficiently manage the operations-logistics binomial and have had an evolution over time directly to the advancement of information technologies".

The previous definitions indicate that the development of man includes tools and innovations that will allow the human being to live in an easier way every time he has to undertake a task. This situation will become repetitive, that is, technology changes and the human being adapts to it, evolves again from it, and man must learn to unlearn and so on, always providing a simpler and safer life.

These technologies have some tools such as those listed below: cloud computing, collective intelligence, data nashua, collaborative web.

Each of them will be explained below:

Cloud computing

Cloud computing is itself a platform that eliminates hardware and software limitations by using easy-to-use Internet resources. (Uden,2016)

This means that it is no longer necessary to worry about having a computer or mobile device with a large processing or storage capacity. It is enough to have a good amount of memory when you want to modify a document and an intermediate processing capacity.

The above is thanks to the fact that files of all kinds can be uploaded in the cloud, as providers support various formats.

When uploading files, documents are in a safe place away from malware infections or attacks of this type.

Some examples: Google applications (office automation), Dropbox, Apple ICloud, Mega, Copy, Box and MediaFire, Amazon, WebServices, Google Cloud Platform, Windows Azure, Dataprius, among others.

Collective intelligence

Collective intelligence is seen as a set of ideas, action or product for a common purpose. (Vilchis,2019)

Collective intelligence allows you to evaluate tools and take the best ones for a particular case, it is also a support to create projects or works together within a multidisciplinary working group or the same discipline. Those involved are enriched by the proposals of their peers to obtain a better result.

Examples: Google, Wikipedia, YouTube, Pinterest, Canva, etc.

Data mashup

Data Mashup is considered a hybrid Web application. (Arroyo,2014)

In other words, it is a personalized Web environment that reuses existing network technology features from many sources in order to take the best features of each technology and join them to solve a problem or reach a solution in less time and with better quality.

A data mashup is a mix of customized technologies according to the needs of the work team or perhaps of a single person.

It can have a technology or more than two. The number of technologies involved depends on the needs of the work team and what you want to solve or investigate. Some examples: quSquidoo, Panoramic, Tagzania, Ugato, Googlemark, Pixagogo Maps, etc.

In this case we find Tagzaia, which allows us to add routes, areas and polygons of places that are visited, Squidoo is a communal publishing platform that allows you to consult flyers, bookmarks or overview articles.

Collaborative Web

The collaborative website consists of groups of people who develop a theme to generate collective knowledge and solve the greatest number of problems. (Vilchis, 2019) This can be confused with collective intelligence, but in reality, both tools can be used together.

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With the collaborative web you can give life to the brainstorm generated by means of tools found on the Web. In fact, the four tools allow team work and together they can generate knowledge and help exploit the advantages of the Web.

Some examples: Facebook, MySpace, Skype, Wikipedia, Google Documents

In summary, these emerging technologies serve as support between them for various activities and can be tailored to various needs.

Emerging Technologies and Education

Emerging technologies have been proposing since its inception, a paradigm shift in education, where teachers must develop new skills and abilities in a digital environment, and education institutions must be periodically revaluing their curricula and teaching schemes and methods of evaluation, with all that this implies in operational, technical and technological terms, in such a way that they guarantee an ideal preparation of the teachers to their students.(Day, 2011)

Emerging technologies have allowed educational institutions to take advantage of the various tools available on the web, incorporating them into their activities, tending to improve the apprehension of knowledge in the student, in which certain indicators are generated, which are the metric to establish the viability of these tools in and out of classrooms, which will subsequently be used in the reformulation of future curricula and educational policies.

In order to manage and / or administer web tools of emerging technologies, it is essential that the teacher researches and is constantly updated in this regard, in order to acquire sufficient knowledge and skills to understand and manage the new applications and technologies of the ICT, where the learning environment has been migrating from analogue classrooms, to digital classrooms, in which there is an ideal medium for student and even teacher learning.

Methodology to develop

Considering all of the above, the Autonomous University of the State of Mexico is constantly transforming academic programs in accordance with the guidelines of the flexible model based on constructivism and incorporating the use of technology in the teaching-learning process and developing digital skills, where teachers have a constant commitment to be updated as they will collaborate in the formation of new generations. From this situation, the Valle de México University Centre is interested in identifying the emerging technologies that the teacher uses in the classroom, as support to facilitate student learning.

The research approach is mixed cut. This process collects; analyse and link quantitative and qualitative data in the same study, or a series of investigations to respond to the problem statement. Also, the mixed approach can use both approaches to answer different research questions (Galeano, 2007). The instrument that was used to collect the information was a questionnaire, which was divided into two sections, in addition to making an interview with teachers. The total population of teachers of the University Centre is 210, but only 100 (10 of each educational program) were considered since it is a bit difficult to find them to give them the questionnaire to respond personally.

The questionnaire was provided when they attended to teach their classes, they were not sent by mail since they wanted to ensure that they will answer them. The professors belong to the different ones by careers that are taught in the space, being in total 10 educational programs, Accounting, Administration, Administrative Informatics, Actuary, International Economic Relations, Economics, Computer Engineering, Systems and Communications Engineering, Industrial Engineering and right.

The procedure that was carried out for the collection of the information was to apply a questionnaire to the teachers, which was divided into two sections, the first would allow to know the teacher's profile, the next to know the degree of knowledge and management of the emerging technologies that they used in class and an interview, in which qualitative information was obtained regarding the use of emerging technologies.

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Results

Next, the analysis of the data obtained from the application of the questionnaire will be given.
As the sample has teachers from each of the educational programs, there are: accountants, administrators, lawyers, economists, actuaries, engineers and computer scientists.

Regarding gender and age, the percentage of men is slightly higher than that of women, the percentage of women is 43% and that of men is 57%, as shown in table 1. The ages are in the range 30-63 years old. The data obtained are shown in table 2.

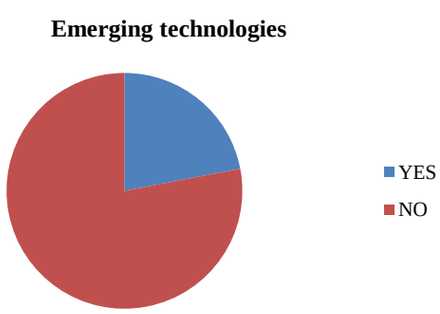
	Frequency	Percentage
Male	57	57%
Female	43	43%
Total	100	100%

Table 1 Genre
Source: Own Elaboration

	Frequency	Percentage
30-40	15	15%
40-50	37	37%
50-60	28	28%
More than 50	20	20%
Total	100	100%

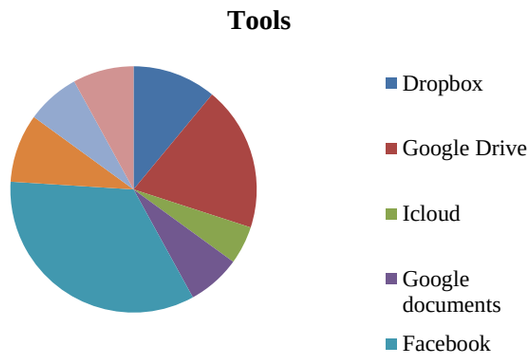
Table 2 Age
Source: Own Elaboration

When asked if they knew about emerging technologies, 78% of the teachers answered no and 22% did. The results are shown in graphic 1.



Graphic 1
Source: Own Elaboration

When they were explained what the emerging technologies were, the teachers said that they knew them, but not with that name. So, he provided them with a list of some tools belonging to this category and they were asked which ones they used, the results are shown in Figure 2:



Graphic 2
Source Own Elaboration

It is observed that the most used tool is Facebook with 34% for personal use only, not as a didactic tool. Google drive and Dropbox use it to store personal documents and, in some cases, to share information about their classes with students. YouTube uses it as a didactic tool, since they look for videos referring to their subjects they teach and for students to make videos. The other tools presented to them are for personal use only.

The devices where they use these tools are your cell phone or your personal computer. As you can see, teachers do not use emerging technologies as a teaching tool and are not very up-to-date in their use.

Conclusions

Technologies are considered to be advancing at high speed, while didactics, pedagogy and ways of teaching do not do so at the same pace. Today, backward systems are used to understand learning and to understand the new ways of learning of students, which do not allow an improvement in the learning experience and do not understand that the tools to educate are transformed day by day. Teachers teach as they were taught and lack a better level of training so that they can be on par with their students, that is, lack of pedagogical versatility.

There must be a radical change in tools, pedagogies, didactics and student-oriented practices. It should be noted that ICTs are born with very different purposes than educational ones, in general, they are directed to industry, commerce and then they return to education, and when they begin to be used in this field, technologies change again, causing education is one step back from technological advances.

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A very thorough study on the integration of ICT in teaching-learning processes must be done and new ways to implement the pedagogy that technology uses in new educational strategies, with the change of mentality, attitude and culture by teachers , because although emerging technologies by themselves do not improve teaching-learning they do facilitate the process and make students more creative and as a result collectively build new knowledge.

Much of the information and knowledge has been digitized, and anyone can create, transform and share information with another or group of people. This has had an impact on education, and that is that technologies have become an educational tool. Emerging technologies are instruments to improve learning, student engagement, and the education system in general.

Using emerging technology to address educational objectives makes it necessary to develop theories, pedagogies and learning approaches in accordance with these.

Digital technologies are tools at the service of pedagogy, and that are integrated in education through teaching practice, not in the use of ICT. The integration of technology from this approach, open, participatory and autonomous teaching-learning processes can be achieved.

It is essential that, from university classrooms, new media can be integrated with new ways of making educational work not obsolete but innovative, that responds to the current context, to train future professionals to function competently in a technological world of work , where knowledge is shared, from a participatory culture that promotes collective intelligence and the generation of learning communities.

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The technostress: Its influence in the learning environment related to the use of information technologies

La tecnostress: Su influencia en el entorno de aprendizaje relacionado con el uso de las tecnologías de la información

ORTIZ-SÁNCHEZ, Pedro Alfonso Guadalupe[1]†*, SÁNCHEZ-ITURBE, Patricia[2], ORTIZ-Y OJEDA, Pedro T.[2] and BASAVE-TORRES, Rosy Ilda[2]

[1]*Instituto Tecnológico de Mérida*
[2]*Instituto Tecnológico de Tuxtla Gutiérrez, TecNM*

ID 1st Author: *Pedro Alfonso Guadalupe, Ortiz-Sánchez* / **ORC ID**: 0000-0002-2466-1837, **Researcher ID Thomson**: G-5253-2019, **CVU CONACYT ID**: 803273

ID 1st Coauthor: *Patricia, Sánchez-Iturbe* / **ORC ID**: 0000-0001-9245-3725, **Researcher ID Thomson**: G-6132-2019, **Open ID**: 11667006

ID 2do Coauthor: *Pedro T., Ortiz-y Ojeda* / **ORC ID**: 0000-0001-6153-4194, **Researcher ID Thomson**: G-6959-2019. **CVU CONACYT ID**: 205520

ID 3er Coauthor: *Rosy Ilda, Basave-Torres* / **ORC ID**: 0000-0002-7305-3897, **Researcher ID Thomson**: G-5880-2019, **CVU CONACYT ID**: 720064

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Abstract

This educational research is carried out to know and rate the level of technostress that the students of bachelor degree may have in order to analyze the presence of this factor of psychosocial risk and its relation to the degree of dropping out and failing that is currently presented. This is accomplished with the objective of the TecNM, of being an institution for the integral formation of competent professionals, and for the implementation of the necessary learning strategies for its achievement. A questionnaire (Cronbach's alpha: 0.913) was designed and administrated to students of 2 different programs, one of them with the obligatory use of ICT (Information and Communication Technologies), who during their training use ICT in almost all their subjects. The other was the control group composed of students who use ICT not that often. The applied survey tries to find out positive and negative aspects related to the use of technologies such as attitude, efficiency and anxiety. The initial results show little differences between the two programs, high level of addiction and anxiety which could be a matter to be considered within options to improve or design alternatives to avoid its development, so that it doesn't influence the raising of indicated rates.

Techno stress, Strategies, Learning, ICT

Resumen

Esta investigación educativa se lleva a cabo para conocer y calificar el nivel de estrés técnico que pueden tener los estudiantes de licenciatura para analizar la presencia de este factor de riesgo psicosocial y su relación con el grado de abandono y fracaso que se presenta actualmente. Esto se logra con el objetivo de TecNM, de ser una institución para la formación integral de profesionales competentes y para la implementación de las estrategias de aprendizaje necesarias para su logro. Se diseñó y administró un cuestionario (alfa de Cronbach: 0.913) a estudiantes de 2 programas diferentes, uno de ellos con el uso obligatorio de las TIC (Tecnologías de la Información y la Comunicación), que durante su formación utilizan las TIC en casi todas sus asignaturas. El otro era el grupo de control compuesto por estudiantes que usan las TIC con poca frecuencia. La encuesta aplicada intenta descubrir aspectos positivos y negativos relacionados con el uso de tecnologías como la actitud, la eficiencia y la ansiedad. Los resultados iniciales muestran pequeñas diferencias entre los dos programas, alto nivel de adicción y ansiedad, lo cual podría ser un tema a considerar dentro de las opciones para mejorar o diseñar alternativas para evitar su desarrollo, de modo que no influya en el aumento de las tasas indicadas.

Estrés tecnológico, Estrategias, Aprendizaje, TIC

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* Correspondence to Author (email: portiz130@gmail.com)
† Researcher contributing first author.

Introduction

The use of technology can be convenient because it allows to be constantly connected and communicate at all levels, the incommunication can produce a sense of anxiety that attacks the individual, which makes him intensely desire to be reconnected (1)

The presence of new pathologies derived from the inadequate use of new technologies manifests itself in debates, questions and concerns in all educational and social environments. Regardless of accepting its great advantages such as the ability of global communication, training and belonging to groups, public or social reporting, instant communication, the possibility of buying or selling, etc., and its own disadvantages such as identity theft, fraud, depersonalization, false information traffic, waste of time and productivity, feeling of helplessness, intellectual exhaustion in its absence (3) and cyberbullying among others, and despite considering that virtual technologies represent innovative strategies for learning and teaching, it is recognized that students of the new generations, to incorporate these practices and customs are developing some personality disorders such as anxiety, addiction and stress. It is a fact that the problems mentioned above, influence student performance and academic and social development (2).

Technostress is a concept coined by the American psychiatrist Craig Broad in 1984, and later by Rosen y Well, in 1997(4), who defined it as *"Any negative impact (direct or indirect) of technology in the aptitudes, thoughts, behaviors o physiology of the human body"* it is a social phenomenon that has been little studied and that emphasizes a current issue for the society and educational institutions, which are expected to propose alternative to reflect on the damage caused by the excessive and uncontrolled use of technology to avoid its development, to prevent its occurrence and the affectations that may be generated. Some authors consider that the problem is not the new technologies themselves but its pathologic use that can create addiction and anxiety(2), Salanova et al. (2003) focuses on the need of understanding the importance of its correct use as well as the prevention of its addiction in family and academic contexts due ICT allow the agile transmission of knowledge and information.

And also involves the possibility of exchanging information, data, notes, readings, etc., among physically distant people, and that in turn represent important and useful academic and social advances. There are few studies are related to the knowledge of technostress in students, some research has been applied to university professors, Bondac, Ilie and Sinisi (2019) point that the use of technologies increases stress among teachers; Conducting a comparative study of the use of Tic´s between professors of public and private universities, Tapasco and Giraldo (2017) showed differences in their preference between both groups, such as a high level of stress between those who do use them as a teaching support.

Previously and as a part of the research project, they have been evaluated some motivational aspects related with the risk of generating failing, dropping out and school lag (Ortiz-Sánchez et al, 2018). One of these aspects identified as a possible factor of risk, is technostress which, for the anxious or negative response that can generate, and its impact with the academic development, is an interesting aspect to analyze and propose solution alternatives to those scholar issues. As a result of this research there was a close approach to the concept of technostress perceived by Engineering in Computer Systems and Engineering in Biochemistry students (TecNM), in order to find if they have experienced it, and if this one may represent a cause of dropping out and school lag, which it was an issue in both majors.

Methodology

Through a stratified random sampling process, 108 out of a total of 363 students from the two majors were selected: Computer Systems Engineering (CSE) and Engineering in Biochemistry (EB), from the first, second, eighth and ninth semesters enrolled in the program during the term Aug-Dec 2018. The age range of the students of the early semesters are from 19 to 20 years, the senior students are between 23 and 24 years of age; in BCE program 47% and in CSE 28% of students are women, the difference to 100% are male student who are students of undergraduate level in Engineering of the Technological Institute of Tuxtla Gutiérrez (TecNM).

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Although 9 different programs of Engineering are taught at the Institution, this time the students of these two majors were chosen because they were the people of interest for the research. Surveys were applied to groups of students of very different majors in the use of technology, the application was made in the first semesters because they are the ones with the highest propensity to fail (approximately 22%), lag and drop out (9%) according to data from the Department of School Control of the Technological Institute of Tuxtla Gutiérrez, TecNM (2017). Likewise, the answers of 8th and 9th semesters students were taken into consideration due they are the young people who are about to graduate from the bachelor's degree and represent a comparison group to estimate as objective to know if they manifest a greater or lesser degree of technostress.

For the sampling, it was taken in to consideration the total population of enrolled students in the indicated semesters and term. In the absence of previous proposals referred to the evaluation of technostress in engineering students, the survey to be applied was prepared and validated with the support of teachers from the faculty in Educational Research of the TecNM. Initially a proposal of 60 questions was generated, which was later adapted through the personal assessment of professors from the Department of Computational Systems Engineering and Biochemical Engineering of ITM and ITTG (TecNM), who reviewed the wording and the topic of interest. 17 questions were eliminated, which in their opinion are not related or were repetitive, leaving the survey with a total of 43 questions.

Prior to the application of the survey, an explanation was given to the students of interest about the importance of the research, the knowledge on technostress, the meaning of the ICT and the Likert scale used in values from 1 to 5 (from less to more) to express the degree in which someone will or will not agree on the questions of different aspects related to performance, attitudinal responses and frequency of use of ICT. Through a preliminary test applied, the survey obtained a high degree of reliability (Cronbach's alpha equal to 0.913). The survey included topics related to frequency of use, conditions and attitudes to determine the activity and use of technostress, grouped into 3 dimensions:

The use of ICT, which could be conducive to A) Failing, B) Dropping out, and C) stress and school support. Later, the application of the survey it was determined the average values and various statistical responses. The comparison of means was made between students of the same semester, between students of the first and last semesters of the same bachelor's degree and also of the 2 different majors (SPSS), also a comparison analysis of the media was applied (ANOVA , F of Fisher). The quantitative evaluation in this research shows the prevalence and / or the manifestation of technostress and perceive some relation between the high degrees of failing, lag and / or the dropping out of the students.

Results

There are few studies conducted to measure the presence of stress among engineering students. Among these studies, says Castillo Pimienta et al. (2016) those applied to health careers. There are another studies in which has also been evaluated among workers and users of technology, applying specific scales to measure anxieties and attitudes towards technology (5), or in university teachers (Tapasco and Giraldo, 2017)

According to the established objectives, the answers to know within the 3 dimensions indicated in the methodology were evaluated, the average values obtained, if there was or no difference between the means inter and intra groups of the students that use in a greater or lesser way ICT in their school performance using a Likert-type scale that oscillates between 0 and 5. Thus, high ratings in these dimensions are considered techno stress indicators.

1. Analysis of the general answers of all students (CSE vs EB)

In the data analysis made using the general sample of students, the tendency of the answers is observed in Graph 1. The students coincided to respond with certain similarity: engineering Computational Systems engineering and engineering in biochemistry, answered the questions in the scales given in a similar way though, as can be appreciated, there are significant differences in the averages of some answers.

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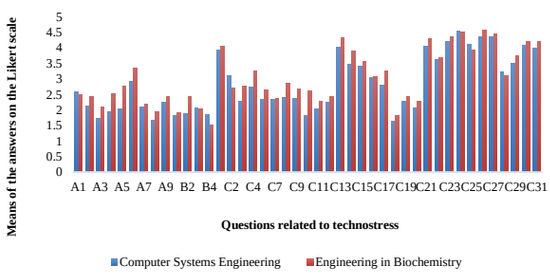
In 11.63% of the questions: the A4 ("I despair if I do not have access to the Internet", A5 ("I get desperate when someone does not answer me quickly"), B2 ("The frequency of the use of ICT generates great stress"), C3 ("I find it difficult to relax after a day of work using ICT") and C10 (Working with ICT makes me feel uncomfortable, irritable and impatient). There was significant statistical difference of means, the answers did not exceed the value of 3 ("It is indifferent to me".) In 3 questions, which represent 9.3% of the survey, in 3 of them, the C13 ("I have several windows open in the browser to perform multiple tasks at the same time"), C14 "(Upon awakening, I review the time and notifications on my cell phone") and C15 ("I despair if I do not have access to the Internet"), with an approximate average of 4, a certain degree of technostress is registered.

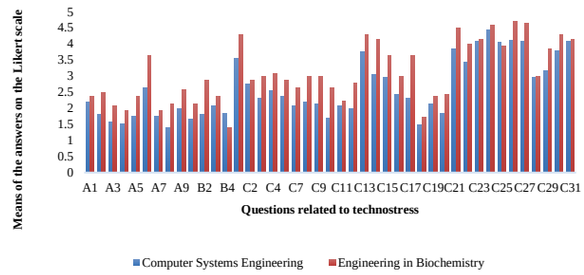


Graph 1 Means of Computer Systems Engineering and Engineering in Biochemistry
Source: Own Elaboration

2. Analysis of the answers of the first semesters (CSE vs EB)

When comparing the answers of the first semesters of both bachelor's degree, in most of them are observed higher averages in the students of Engineering in Biochemistry (see Graph 2), denoting values close to 3 ("I am indifferent") and in some cases higher than 4 (Fairly agree) especially in the questions of group C. In the graph it is shown that there is greater degree of stress in EB students. In analysis by ANOVA, it can be differentiated significantly in 13.96% of the answers: A6 ("I feel very tired after using the computer or the device for several hours that I do not want to continue with my activities"), B2 ("The frequency of use of ICT generates great stress for me), C12 ("Whenever I can avoid the use of ICT"), C14 ("When I wake up I check the time and notifications on my cell phone"), C17 ("When I use my device, I can spend hours without realizing it") and C26 ("We sent homework by social networks"), perceiving differences in personality, formation and vocation.

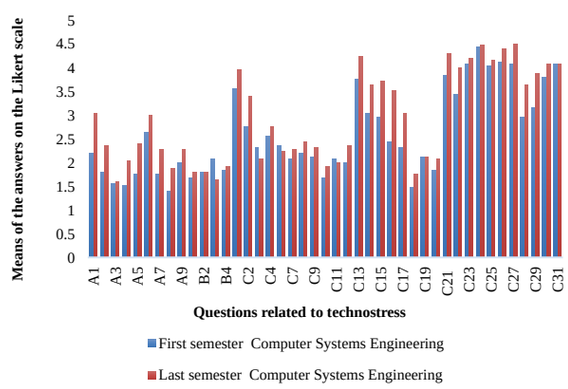
Just in the means of communication of questions C14 and C26 show values close to 4 (Fairly agree).



Graph 2 Means of first semesters in Computing Systems Engineering and Engineering in Biochemistry
Source: Own Elaboration

3. Analysis of the responses of the intermediate semesters (CSE vs EB)

Similarly, when comparing the answers of the students from both groups (see Graph 3), intermediate semesters are found in EB students who normally respond with higher scores, notably in 17 questions (C12 to C16, C20 to C27 and C29 to C31) close to 40%, the means have values higher than 4. There is also a significant difference between the groups in the questions B2 ("The frequency in the use of ICT generates me higher stress"), C10 ("Working with ICT I feel uncomfortable, irritable and impatient"), C12 ("Whenever I can I avoid to use ICT"), and C17 ("When I am in my device, I spend hours without realizing it") of which only the last one exceeds the value of 3.5, manifesting between groups, a different way of facing stress.



Graph 3 Means of First and Last semester of Computer Systems Engineering
Source: Own Elaboration

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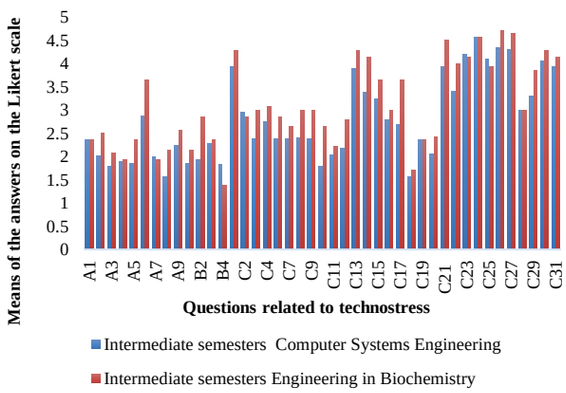
4. Analysis of the responses of the first and last semester of CSE

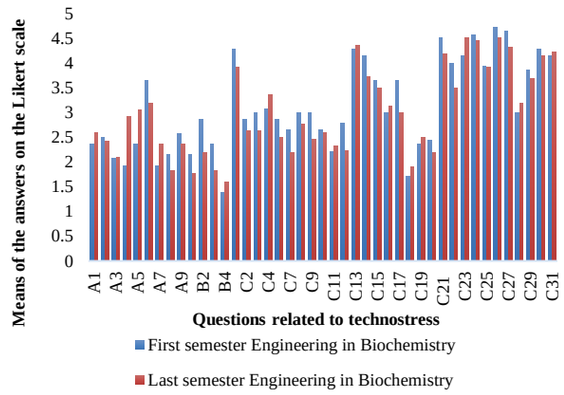
The answers given between students of first and eighth semester of Computer Systems Engineering follow the trend of lower values in the answers to categories A and B and higher in items C (see Graph 4), in this comparison only in the question C16 ("There are so many things to see on the Internet that I spend hours and I do not get bored") there was a significant difference, with all the answers being much higher than the average number of students next to graduate**.**



Graph 4 Means of intermediate semesters of Computer Systems Engineering and Engineering in Biochemistry
Source: Own Elaboration

5. Analysis of the answers of the first and last semester of EB

In this comparison, the general tendency to show higher values in the scale in the students of the last semester and also in the C responses continues (see Graph 5). The comparison of means in this group does not show any significant difference. In the responses from C21 to C26 as well as from C29 to C31, all show means higher than 4, some have averages very close to 5 (representing approximately 21%).



Graph 5 Means of first and last semesters of Computer Systems Engineering and Engineering in Biochemistry
Source: Own Elaboration

Something notorious is that in all the different comparisons made inter and intra groups, the sample of students answered question C1 ("I would not like to have technostress when practicing my profession"), always with average values between 4 and 5, between fairly and totally agree. In the comparisons of responses from the first semesters to question C18 ("When I finally leave the device I feel very anxious or nervous and sometimes even angry") obtained the lowest average 1.6.

In the comparison in the question A3 ("I used to delay in the accomplishment of academic tasks due to the need to update my social networks in a short period of time"), A4 ("I have wanted to damage a technological device due to the desperation of not obtaining things on the computer or device"), A8 ("I get bad after using the computer or mobile for many hours") B1 ("The stress of using ICT could lead to my dropping out"), C12 ("Whenever I can I avoid the use ICT") and C10 ("Working with ICT makes me feel uncomfortable, irritable and impatient"), all the averages were values between 1.5 and 2, representing 16.37%, in general, the overall results of the application of this survey indicate the variable presence of technostress among students.

As indicated in the introduction, the irregular use of Information and Communication Technologies can generate different degrees of technostress, academic demands are varied, are present in students and are associated with certain psychological costs perceived as anxiety when they do not have access to the Internet.

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The stress perceived by the frequency of the use of ICT, manifested by irritability and even impatience and anger. The students uniformly declare in all the comparisons made that the techno stress is not a cause of their dropping out. Both the initial, intermediate and final semesters, accept that they would not be able to leave their studies under this type of pressure. It is observed that the CSE students from the first semesters have a higher degree of technostress compared to those of EB, but at the end of the bachelor degree, this trend is reversed: EB students showed higher values in their answers.

The foregoing may indicate some ignorance of what the challenges that could be presented throughout their academic preparation. It also shows some degree of adaptation due to the high use of ICT that the CSE students require for their training. However, it cannot be ignored that the ignorance of the structure of the educational program, and the lack of information of the demands of the academic environment, are part of stress factors that can negatively influence the student. Even more, than the quality of teachers as a predictor of the perception of stress (Nerdrum et al., 2009). Undoubtedly, the presence of stress is a factor of vulnerability among students, in addition, some authors (Ortega Dias et al, 2017; Kember and Leung, 2006) agree that there is a certain correlation between the perception of stress and the use of superficial approaches of learning, even associating with slow learning and with errors.

Due to the above, it is important to consider techno as a stressful factor that, although it does not seem to favor dropping out of school, there is the possibility of explaining the high rate of lag and failing, and even to suggest alternatives for proper management, such as the reduction of the academic load through a review and curricular planning of the courses, extracurricular courses related to the learning of resilience and relaxation (Francos-Cabreros, 2015), in order to achieve a personal adaptation to the use of ICT or even provide technical support through training courses for the correct and proper use of different programs (software) of their interest.

Conclusions

The knowledge of the technostress was novel and interesting in our institution, since many teachers and even students did not know the term and its meaning, nevertheless and according to different authors, it must be taken into account as a factor from which psychological pathologies could be derived, social and academic and therefore avoid it or look for alternatives to reduce it.

The students who represented the sample of this study despite being of two bachelor's degree with very different application approaches, responded in a similar way. They indicated in their answers that the aspects related to the use of ICT and failing and dropping out are the least stressful, that is to say that they are not an immediate cause of a high level of technostress, but they state that they do require, that is, they need use of computers, internet, cell phones, etc. to be able to establish their social networks that allow them to communicate, work as a team and properly develop their tasks, thus, the questions "Without the ICT I could not do my academic work" and "When I use ICT for my classes or activities everything it is much better than not using them" were the ones that in all cases got the highest rated answers, with means close to 5 (totally agree).

Also, in general, students present higher levels of technostress at the end of their studies. This is an initial investigation, so it is suggested to continue investigating these levels of stress shown by students of the last semesters and conduct a study to determine if there are greater long-term consequences, when they are developing their professions. On the other hand, it is suggested to conduct research that allows to relate the variables studied here with others, such as academic benefit and satisfaction with what they are studying, despite these stressors.

It is to be considered that the level of technostress is still low among our students, although according to its definition it prevails and depends on various factors such as its ability to adapt to avoid damage due to the extensive use of ICT.

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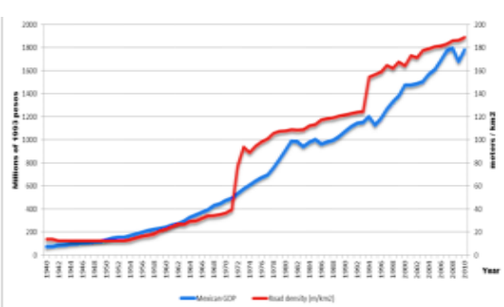

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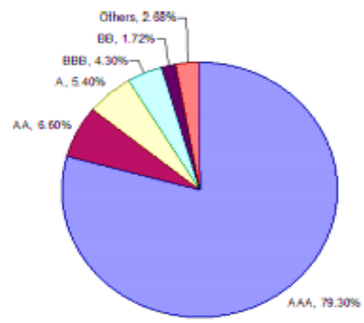

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