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Presentation of the content

In the first article we present, *Teaching proposal for the subject of unit operations at the university level through project-based learning (PBL) methodology*, by RANGEL-RUIZ Karelia Liliana, GRANADOS-OLVERA, Jorge Alberto, VARGAS-SOLANO Zaira, with adscription in the Universidad Politénica de Cuautitlan Izcalli and Universidad Tecnológica Fidel Velázquez, in the next article we present, *Methodology for creating applications with augmented reality for education 4.0* by MARTÍNEZ-AGUILAR, Gloria Mónica, MOTA-BARRAGÁN, Martha Elba, MENDIOLA-GARCÍA, Yessica and LUNA-GONZÁLEZ, Glenda Jazmín, with adscription in the Universidad Tecnológica de Torreón, in the next article we present, *Planning a project applying the Scrum framework* by HERNÁNDEZ-CRUZ, Luz María, FLORES-GUERRERO, Mayra Deyanira, MEX-ALVAREZ, Diana Concepción and DIAZ-ROSADO, Martina, with adscription in the Universidad Autónoma de Campeche Instituto Tecnológico Superior de Champotón, in the next article we present, *Development of a Repository of Digital Theses as an Integrative Activity* by MORA-LUMBRERAS, Marva Angélica, SÁNCHEZ-PÉREZ, Carolina Rocío, PORTILLA-FLORES Alberto and SÁNCHEZ-SÁNCHEZ Norma with adscription in the Universidad Autónoma de Tlaxcala.

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Teaching proposal for the subject of unit operations at the university level through project-based learning (PBL) methodology

Propuesta de enseñanza para la materia de operaciones unitarias a nivel Universitario mediante la metodología de aprendizaje basado en proyectos

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Abstract

Several studies have proposed Project-Based Learning (PBL) as one of the most effective methodologies to achieve competency-based education. The objective of this work was to test the PBL methodology in a group of university to meet competencies. This test was applied to 25 students group divided into teams that were tasked with developing a prototype for a different part of a unit operation. The final product was the demonstration of the operation of the prototypes individually and together. In the first part, students were asked to make a design proposal. Once the design was accepted, the construction of the equipment with commonly used materials was prepared. Subsequently, the performance and characteristics of the assembled prototypes were presented to an evaluation committee. Based on the results obtained, it can be concluded that the PBL methodology proposed in this work contributed to the development of competence by students. We believe that the use of the PBL methodology could enrich the learning of Engineering students, as well as bring it closer to real scenarios.

Project-Based Learning, Unit Operations, bioreactor

Resumen

Varios estudios han propuesto al Aprendizaje Basado en Proyectos (ABP), como una de las más efectivas metodologías para lograr una educación basada en competencias. El objetivo del presente trabajo fue probar la metodología de ABP en un grupo de educación superior para cumplir competencias. Esta prueba fue aplicada en un grupo de 25 estudiantes divididos en equipos a los cuales se les encomendó desarrollar un prototipo para una parte diferente de una operación unitaria. El entregable final fue la demostración de la operatividad de los prototipos de manera individual y en conjunto. En la primera parte se le solicito a los estudiantes que hicieran una propuesta de diseño. Una vez aceptado el diseño se dispuso a la construcción de los equipos con materiales de uso común. Posteriormente se hizo la presentación del funcionamiento y características de los prototipos ensamblados frente a un comité evaluador. A partir de los resultados obtenidos, se puede concluir que la metodología de ABP propuesta en este trabajo contribuyo a que los estudiantes pudieran desarrollar la competencia. Consideramos que el empleo de la metodología ABP, podría enriquecer el aprendizaje de los estudiantes de Ingeniería, así como acercarlo a escenarios reales

Aprendizaje Basado en Proyectos, Operaciones Unitarias, Biorreactor

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1. Introduction

It is well known that nowadays some of the qualities that a good engineer must have are: the ability and willingness to learn, extensive knowledge of basic sciences and training in the use of software related to the area, but mainly must be prepared to learn permanently, as well as to communicate assertively and the ability to work in a team, so their education should be more comprehensive. Taking into account the above, several studies have proposed Project Based Learning (PBL) as one of the most effective methodologies to achieve a competency-based education because it can integrate knowledge, skills and values (De los Ríos, et. al., 2015 and Ausin, et. al., 2016).

This innovative methodology bets on a more active role of the student within the classroom and on a modification of the teacher's role (Rodríguez-Sandoval and et. al., 2010). PBL is a methodology that implies a change in the pedagogical paradigm, since it promotes the simulation of a real classroom environment, as well as the integration of acquired knowledge, critical thinking and collaborative work. This methodology is based on students formulating a work plan defined by objectives, which must be periodically fed back, in addition to the presentation of a final product that will be evaluated through a series of standardized evaluation criteria.

Therefore, the university teacher must possess a series of knowledge, skills and aptitudes that allow the generation of significant knowledge through the approach of situations that simulate real life (Martinez Valdes, 2021). According to the curriculum design methodology of the Technological and Polytechnic Universities, competencies are disaggregated into two levels of performance; units by competence and capabilities, we contribute to the achievement of improving the competence of coordinating processes and bioprocesses based on the use of chemical and biological inputs, modeling techniques, scaling and instrumental analysis, to develop methods of control and personnel development, for quality management optimizing human, technological and natural resources that contribute to the transfer of knowledge and productive sectors with a focus on national and international competitiveness (Callejas Torres, et. al., 2017, de la Garza Vizcaya, 2013 and UPCI, 2018).

Thus, the objective of the present work was to test the PBL methodology in a higher education group of Biotechnology Engineering for the subject of Unit Operations to meet the previously described competence.

Methodology to be developed

In the municipality of Cuautitlán Izcalli, State of Mexico, the Polytechnic University of Cuautitlán Izcalli (UPCI) is located (Figure 1), where the Biotechnology Engineering program is taught and which includes Unit Operations as part of its 6th quarter curriculum.
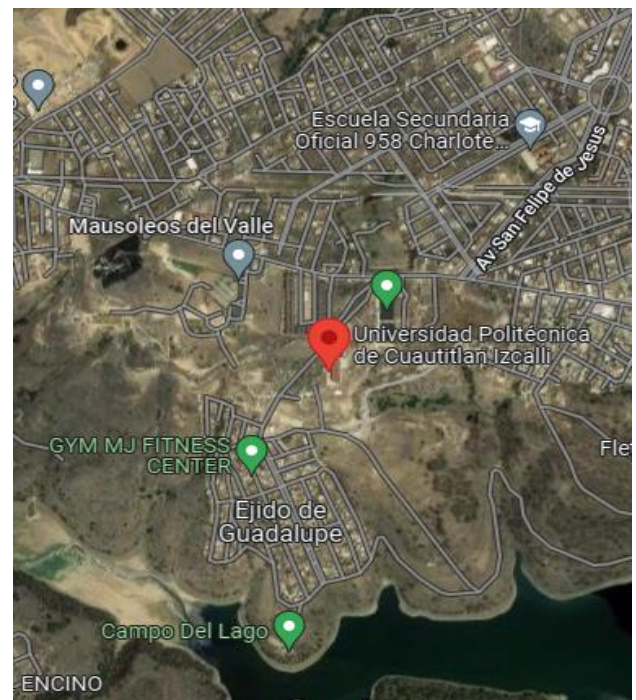
Figure 1 Location of Universidad Politécnica de Cuautitlán Izcalli (UPCI)
Source: Google maps

This test was applied to a group of 25 students between 19 and 23 years old, who were divided into teams of 4 or 5 members, each team was given the task of developing a team for a different part of a unitary operation (milling, maceration, cooling and fermentation), so that the final deliverable was the demonstration of the operation of the prototypes individually and as a whole.

Monthly reviews were made of the progress of each of the teams, which were evaluated by means of checklists.

Design proposal

For this first part the students were asked to make a proposal, through a bibliographic research and specialized software (Lab VIEW, for the design and COCO simulator, for the calculations), about the design of each one of the equipments taking into account that these could be used individually or together with the other equipments assigned in the group, The main objective of this part was for the student to propose a design by analyzing its conditions, parameters, type, operation configuration, mass and energy balances, movement, heat transfer operations and its possible use and application. This part was evaluated by means of heteroevaluation by the teacher.

Assembly and assembly of the prototype

Once the design was accepted, the construction of each one of the equipments with commonly used materials was started. The objective of this part is that the students build their equipment considering their conditions, parameters, type and configuration of the operation. The evaluation of this part was carried out by means of heteroevaluation by the teacher.

Demonstration

Once the different prototypes were built, we proceeded to the demonstration of the operation of the equipment individually and as a whole, this was done by assembling and operating the equipment. For the evaluation of this section, a co-evaluation among the members of the same team and a self-evaluation were requested. Likewise, a hetero-evaluation of the presentation of the prototypes, characteristics, advantages and disadvantages was carried out by an evaluation committee made up of specialists in the process area.

Results

The results obtained from this pilot test are described below:

Design proposal

In this first review, the students presented the designs of the prototypes of the different devices: mill, macerator, cooler and fermenter. Once they were reviewed, the pertinent observations were made and returned to the students so that they could be taken into account.

Prototype assembly and assembly

Once the students attended to the corresponding observations, we proceeded to the construction of the prototypes, in figure 2 you can see the ball mill prototype.

Figure 2 Prototype of a ball mill

Figure 3 shows the macerator built with easily accessible material, this macerator has a temperature control that is visualized through a display located on the outside of the prototype.

Figure 3 Macerator with temperature control, showing the display on the outside of the prototype

Figure 4 shows the cooler built from simple materials and with a copper coil inside the prototype.

Figure 4 Cooler prototype. A: external view of the cooler. B: view of the copper coil inside the cooler

Finally, in Figure 5 we can see the fermenter, also built from simple and easily accessible materials.

Figure 5 Fermenter prototype

Demonstration

Finally, Figure 6 shows the different devices assembled to work together. The performance and characteristics of the assembled prototypes were presented to the evaluation committee.

Figure 6 Unit operation system consisting of: 1: mill, 2: macerator, 3: cooler, and 4: fermenter

Co-evaluation and hetero-evaluation were carried out by means of a Google form for the 25 students who took part in the pilot test.

Conclusions

From the results obtained, it can be concluded that the PBA methodology proposed in this work contributed to the students of Unit Operations of Biotechnology Engineering to cover the competence of coordinating processes and bioprocesses based on the use of chemical and biological inputs, modeling techniques, scaling and instrumental analysis, to develop methods of control and personnel development, for quality management optimizing human, technological and natural resources that contribute to the transfer of knowledge and productive sectors with a focus on national and international competitiveness, in a satisfactory manner.

Some of the areas of opportunity that could be observed throughout the implementation of this pilot test were: to have a greater specificity in the requirements that are reflected in the checklists, the application of a relevant evaluation instrument to know the opinion of students about the implementation of this type of methodologies and the impact on their learning and seek to optimize the time in the application of each of the stages to add the part of production at the test level.

We consider that the use of the PBL methodology could enrich the learning of engineering students, as well as bring them closer to real scenarios that they will face during their professional career.

References

Ausín, V., Abella, V., Delgado, V., y Hortigüela, D. (2016). Aprendizaje Basado en Proyectos a través de las TIC: Una Experiencia de Innovación Docente desde las Aulas Universitarias. Formación universitaria, 9(3), 31-38. Recuperado el 15 de diciembre de 2022 de: https://dx.doi.org/10.4067/S0718-50062016000300005

Callejas Torres, J. C., Carballo Ramos, E., Lujan López J. E. y Callejas Sabatés J. C. (2017). METODOLOGÍA DEL DISEÑO CURRICULAR BASADO EN COMPETENCIAS PROFESIONALES. Epistemia. 1 (1). Recuperado el 15 de diciembre de 2022 de: https://doi.org/10.26495/re.v1i1.573 de la Garza Vizcaya, E. L. (2003). Las universidades politécnicas. Un nuevo modelo en el sistema de educación superior en México. Revista de la Educación Superior. 126 (32). Recuperado el 15 de diciembre de 2022 de: http://publicaciones.anuies.mx/pdfs/revista/Revista126_S2A5ES.pdf

De Los Rios, I., Rodriguez, F. y Pé, C. (2015). Promoting Professional Project Management Skills in Engineering Higher Education: Project-Based Learning (PBL) Strategy*. International Journal of Engineering Education. 31. 1-15. Recuperado el 15 de diciembre de 2022 de: https://www.researchgate.net/publication/272723431_Promoting_Professional_Project_Management_Skills_in_Engineering_Higher_Education_Project-Based_Learning_PBL_Strategy

Google (2022). Universidad Politécnica de Cuautitlán Izcalli. Recuperado el 15 de diciembre de 2022 de: https://www.google.com.mx/maps/place/Universidad+Polit%C3%A9cnica+de+Cuautitl%C3%A1n+Izcalli/@19.6414917,-99.2702413,638m/data=!3m1!1e3!4m5!3m4!1s0x85d21e89aaaaaaab:0xaef3351bbce3add3!8m2!3d19.6415119!4d-99.2705202

Martinez Valdés, Martín Gerardo. (2021). Aprendizaje basado en proyectos como estrategia de formación profesional. RIDE. Revista Iberoamericana para la Investigación y el Desarrollo Educativo, 12(23), e053. Recuperado el 15 de diciembre de 2022 de: https://doi.org/10.23913/ride.v12i23.1093

Rodríguez-Sandoval, E., Vargas-Solano, E. M. y Luna-Cortés, J. (2010). Evaluación de la estrategia «aprendizaje basado en proyectos». Educación y Educadores, 13(1), 13-25. Recuperado el 15 de diciembre de 2022 de: https://www.redalyc.org/articulo.oa?id=83416264002

UPCI. 2018. Programa de Ingeniería Biotecnología. Gobierno del Estado de México. Recuperado el 15 de diciembre de 2022 de: https://upci.edomex.gob.mx/programa_biotecnologia

Methodology for creating applications with augmented reality for education 4.0

Metodología de creación de aplicaciones con realidad aumentada para la educación 4.0

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Abstract

The rise of industry 4.0 (I4.0) technologies increases with the passing of days, as well as their permeability in areas of other kinds, such as education. Currently the term coined for this is Education 4.0 (E4.0) which can be seen as a paradigm and can be conceived as an educational approach that uses the technological axes of I4.0 to optimize the teaching-learning process. One of the technologies that have been implemented the most in E4.0 is augmented reality (AR). However, this technology generally requires a high degree of expertise, which is why this paper proposes a methodology for the creation of applications (app) with AR that can be used as teaching resources in different subjects and educational programs of an affordable and intuitive way. Which is ad hoc to the objective pursued, allowing the creation of apps with AR where the use goes hand in hand and the creativity of the user who will insert it in the pedagogical process corresponds to him and allows students to enter the E4.0.

Education 4.0, App, Augmented reality

Resumen

El auge de las tecnologías de la industria 4.0 (I4.0) aumenta con el paso de los días, así como su permeabilidad en áreas de otras indoles, como lo es la educación. Actualmente el término acuñado a esto es Educación 4.0 (E4.0), la cual puede ser vista como un paradigma y puede concebirse como un enfoque educativo que utiliza los ejes tecnológicos de la I4.0 para optimizar el proceso de enseñanza-aprendizaje. Una de las tecnologías que más se ha implementado en la E4.0 es la realidad aumentada (AR, por sus siglas en inglés). Sin embargo, esta tecnología por lo general requiere un grado de expertís alto, es por eso que en este trabajo se plantea una metodología para la creación de aplicaciones (app) con AR que puedan usarse como recursos didácticos en distintas asignaturas y programas educativos de una manera asequible e intuitiva, la cual es ad hoc al objetivo que persigue permitiendo la creación de apps con AR donde el uso va de la mano y creatividad del usuario que lo insertará en el proceso pedagógico que le competa y permite adentrar a los estudiantes en la E4.0.

Educación 4.0, App, Realidad aumentada

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Introduction

Industry 4.0 (I4.0) is growing rapidly, leading to new educational models in universities, since, if the educational process does not adapt to the pace of evolution in industry, it can lead to a rupture in the industry-academia relationship [1]. The permeability of I4.0 in education allowed the emergence of E4.0, which can be conceived as an eclectic educational approach that encourages the use of disruptive technologies to optimize learning and thus provide innovative solutions to real and complex problems aiming to train a comprehensive and multifunctional being to achieve their self-realization permanently [2].

The skills and knowledge that students develop through technology-enhanced learning environments can be developed more effectively through AR technology. The immersion and interaction offered by AR motivates students to engage in learning activities [3].

Technological advances in E4.0 require adapting methodologies within the teaching-learning process to the new trends. For this reason, it is important to have the tools, training and updating of teachers in RA convergence.

1. Theoretical framework

1.1 Augmented reality in education 4.0

Augmented reality (AR) is a direct or indirect view of a real-world physical environment whose elements are "augmented" by a computer or sensory information extracted from the real world, such as sound, video, graphics, haptics, or GPS data [4]. It is the interaction between virtual environments and the physical world, making it possible for both to intermingle through a technological device such as webcams, cell phones, tablets, etc.

The opportunities posed by the use of AR in teaching have been widely reported [5-7], describing the advantages and challenges of its use in teaching and its application in different scientific disciplines [8], as well as the comparison of the impact that the use of AR versus conventional learning has on students.

In the teaching-learning process the use of AR is an advantage that facilitates the work of the teacher. When AR applications are used in a laboratory, for example, it is not necessary to explain the components used by the student, this information is available in real time on the students' smart devices leading them to greater autonomy in training.

1.2 Unity 3D

Unity 3D is a multiplatform developed by Unity Technologies to create video games and simulations for computers, consoles and mobile devices. Games with Unity 3D can be operated through a web browser without any installation process thanks to the Unity Web Player plug-in. In addition, Unity offers game creators the possibility to compile games with different platforms (PC, Mac, Web, IOS, Android and Windows Phone) without any infrastructure changes. The Unity 3D platform has support for the Vuforia SDK add-on to develop AR applications and games [9].

1.3 Vuforia

Vuforia is a software development platform for mobile devices from Qualcomm for creating AR applications. Developers can easily add advanced computer vision features to any application that allows them to recognize images and objects or reconfigure real-world environments. Vuforia SDK supports 2D and 3D object types, including multiple target configurations, images with some symbols, and frame labels [10].

1.4 Tinkercad

It is an "open source" simulation platform, created by the Autodesk company. In which 3D models can be created, in addition to simulating the operation of electronic circuits and allowing programming by code blocks. Within the electronic circuits section you can simulate analog and digital electronic circuits, as well as circuits with microcontrollers such as Arduino UNO. In addition, it allows debugging the code, executing the programs step by step, something that can only be done in this simulator and not in a real Arduino UNO board [11].

2. Statement of the problem

The challenge for teachers will always be to innovate, using technologies to meet the demands of students, applying new pedagogical strategies for access to knowledge and information [12]. Regarding the use of AR in classroom applications, teachers have doubts due to technological limitations and their expertise in the subject [13-14]. There is complexity in choosing the elements and approach to programming AR environments (gamification) due to the lack of information on these issues. The attitude of teachers of educational institutions towards gamification is an area little studied so far, likewise the actual use of this learning methodology in classrooms is minimal as a cause of a gap in terms of teacher training [15]. In other words, there is a significant lack of methodological and technical support in the application of gamification [16].

3. Methodology

The exposed methodology is designed so that any teacher can create an app with AR as an educational resource for their classes without the need for extensive knowledge of advanced programming. It is divided into three stages: software installation, configuration of AR elements and app creation.

1)   Software installation. It should be noted that the software required for the creation of the app is free and should be installed in the following order:

a)   Unity Administrator. The Unity platform has an administrator from which you can download the desired and/or necessary elements for the creation of games and apps, called Unity Hub (available at https://unity3d.com/es/get-unity/download).

b)   Unity. From Unity Hub the desired Unity editor is downloaded, it is important to have the compatible versions in all the development environments, for this case the recommended version is 2019.4.35f1.

c)   Unity modules. The Unity Hub after installing the editor offers a list of modules that can be installed according to the user's needs, for this case see Figure 1.
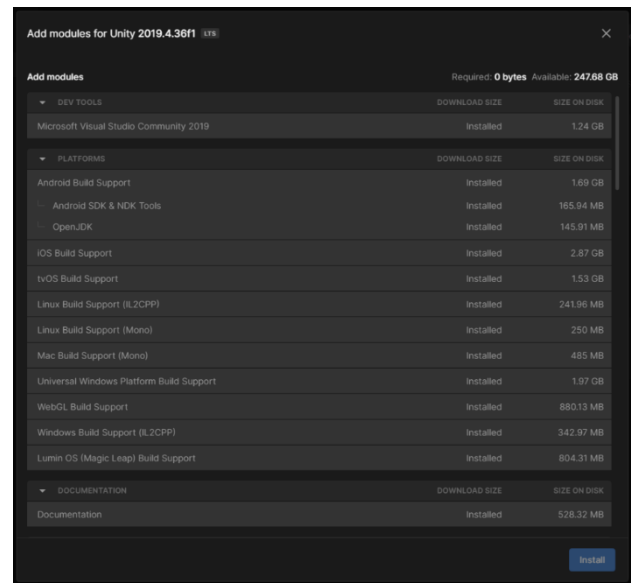
Figure 1. Required Unity modules
Source: Own Elaboration.

Up to this point, the necessary software is already in place and the next step is the next one.

2)   Configuration of AR elements. Create an account and log in to the Vuforia website (https://developer.vuforia.com/), then download the Vuforia add-on for Unity in the Downloads tab (Figure 2).
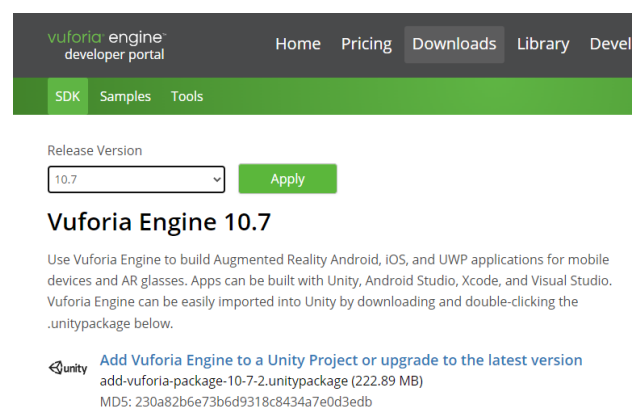
Figure 2. Vuforia add-on for Unity
Source: Own Elaboration

In this page everything necessary to load the AR in the app is created in the following order:

a)   In the Develop tab in the License Manager submenu click on Basic, to generate a license (Figure 3). On the next page assign a name to the license, check the Terms and Conditions box and click on confirm (Figure 4). The license is added to the License Manager, selecting it you can see the license code that will be used in the app.
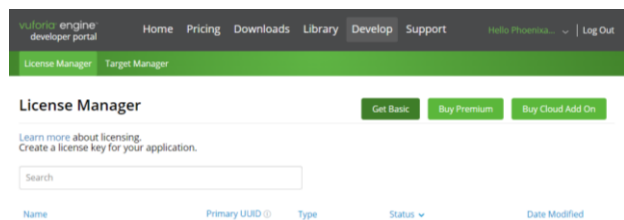
Figure 3 License Manager.
Source: Own Elaboration
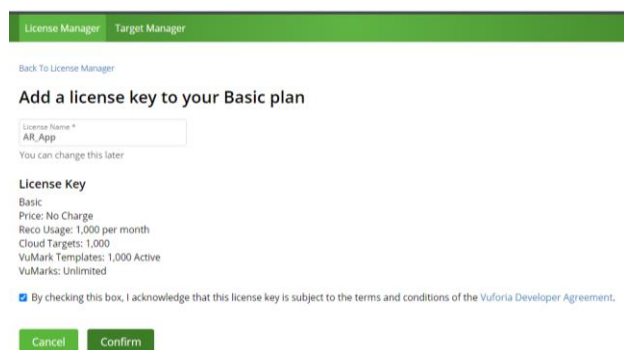
Figure 4 License creation
Source: own elaboration

b)   In the Target manager submenu click on Add Database, assign a name, select Device and click on Create (Figure 5).

Figure 5 Database creation
Source: Own Elaboration

c)   The Database is added in the Target Manager, it is selected with a click to add Targets by clicking on Add Target. This element is an image that is in charge of calling the 3D object of the app, thus creating an AR that is displayed above the Target. The images must have .jpg or .png extension of maximum 2MB, to guarantee a good recognition of the Target it must have well defined contours and objects.

The Width refers to the size it will have in the app. Once the Target image is loaded and defined, click on Add. Vuforia assigns a rating depending on how good the Target is (Figure 6), then download the database by selecting Download Database and the Unity editor option.
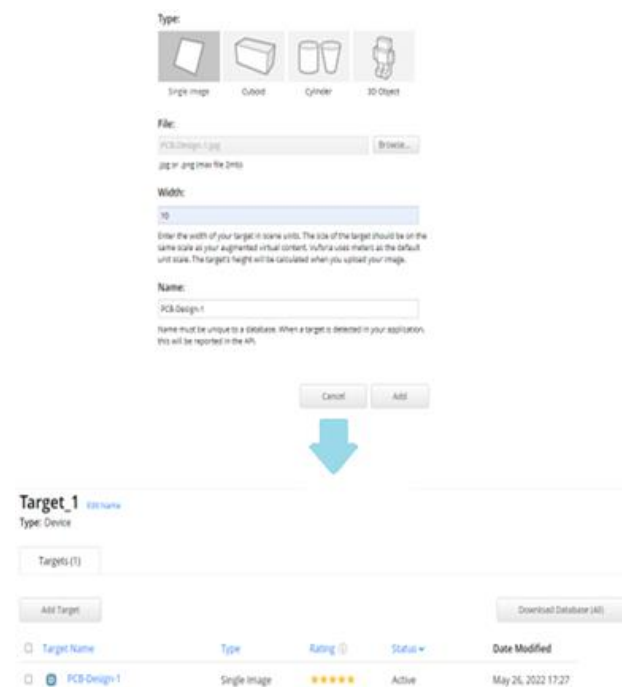
Figure 6. Creation of Targets
Source: Own Elaboration

d)   The 3D object to be displayed is created. It should be noted that there are libraries with several free AR objects. In this case, Tinkercad (https://www.tinkercad.com/) is used, due to the versatility it offers for object creation. Create an account and log in. Select 3D Design and on the right side in the library menu choose the type of object you want to create or insert (Figure 7). Once the object is created, it is exported with an .obj extension. Unity supports two types of extensions, .fbx and .obj (Figure 8).
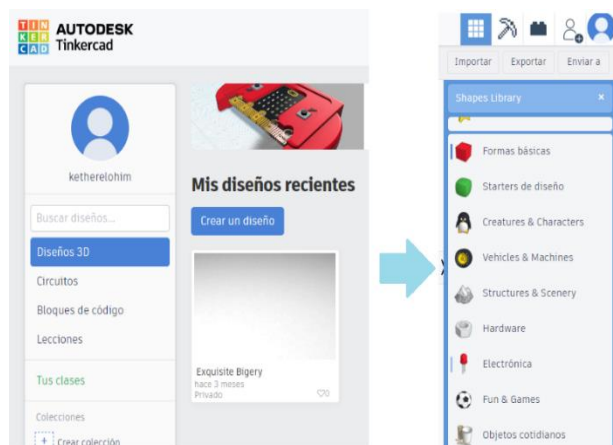
Figure 7 Object creation
Source: Own Elaboration
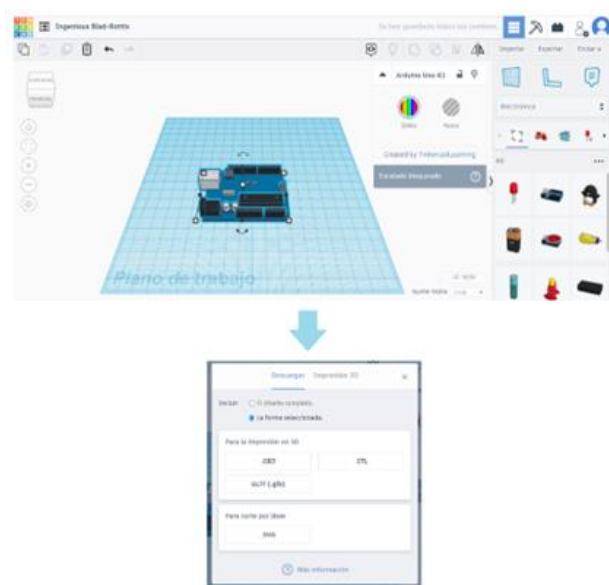
Figure 8 Tinkercad object export
Source: Own Elaboration

With this we now have the necessary elements for the AR of the app and proceed to the next step.

3)   App creation. The steps for the creation of the app are:

a)   Open a new 3D project from Unity Hub.

b)   In File>Build Settings select Android and click on switch platform, when finished exit (see Figure 9).
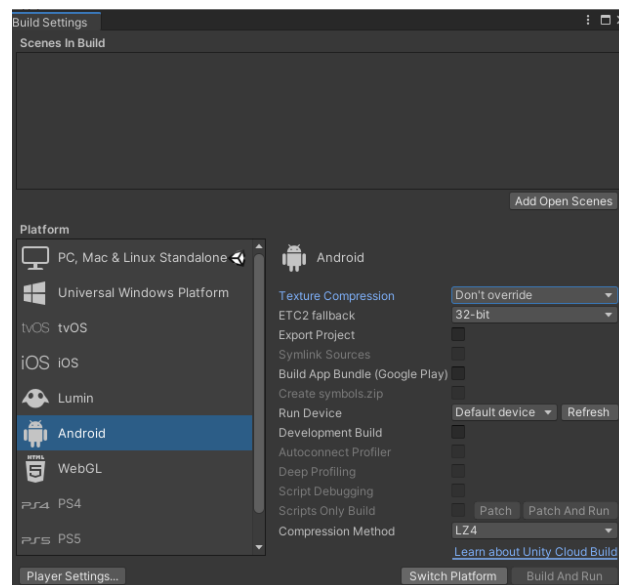
Figure 9 Build Settings options
Source: Own Elaboration

c)   Select the Vuforia plugin for Unity to add it to the project (follow the video https://www.youtube.com/watch?v=2BJ mOMgZCE0). In Windows>Package Manager look for Vuforia engine and install version 8.1.12 (see Figure 10) and close when finished.
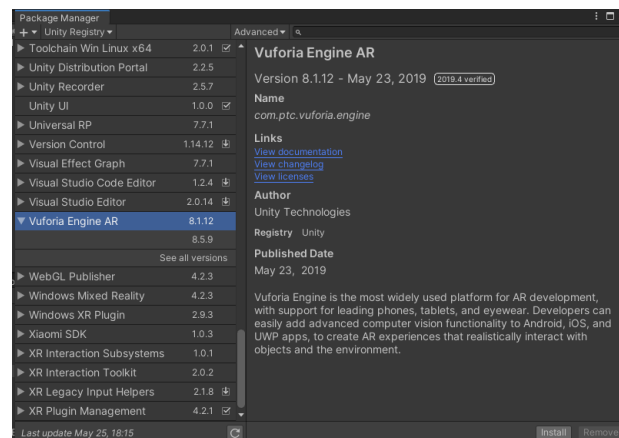
Figure 10 Vuforia engine in Package manager
Source: Own Elaboration

d)   From the page of https://assetstore.unity.com/?orderBy=1 look for the Lean touch add-in, click on Open in Unity, Package Manager opens (see Figure 11). Select import, this will show all the elements of the plug-in, select import again and close when finished. Lean touch allows to perform functions such as moving, rotating objects, among others in a tactile way in the apps with AR.

Figure 11 Lean touch complement
Source: Own Elaboration

e)   The Targets Database is added by clicking on the file previously downloaded from the Vuforia page, the Package manager is opened and the import button is clicked (see Figure 12).
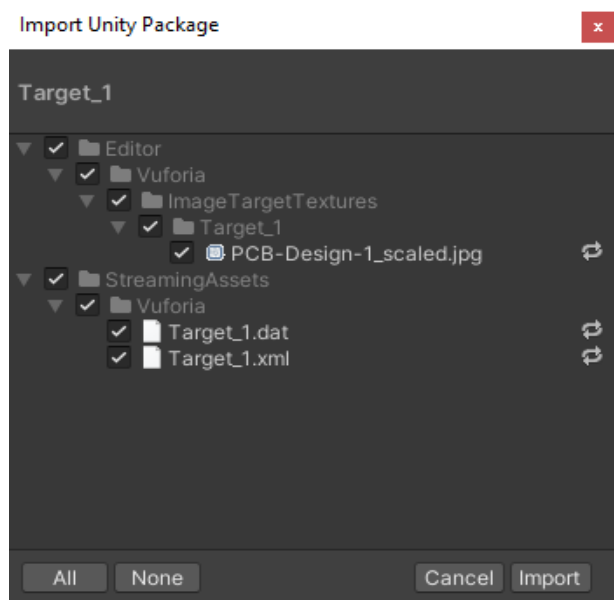
Figure 12 Targets Database import.
Source: Own Elaboration

f)   With the previous steps the app environment is ready to configure the AR elements. The Main camera is removed from the scene hierarchy by selecting it and with a right click an options menu is opened and Delete is selected. Then add an AR camera from the Vuforia engine in the same menu (see Figure 13).
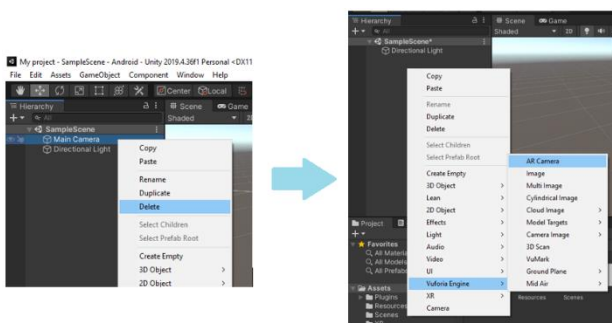
Figure 13 Creation of AR camera
Source: Own Elaboration

g)   Select the AR camera and in the property inspector select Open Vuforia Engine configuration, in the Global option the Vuforia license is attached (see Figure 14).
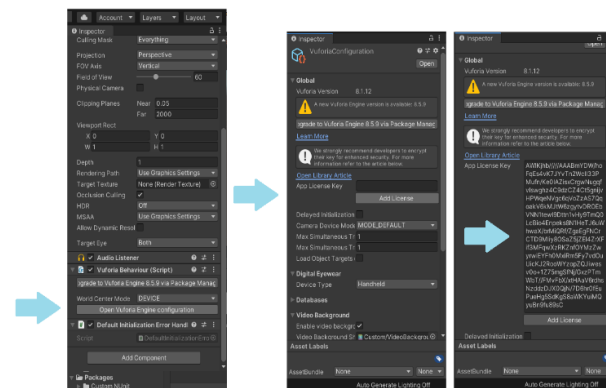
Figure 14 Vuforia license configuration
Source: Own Elaboration

h)   In the AR camera an Image is added, when doing so the Target created is automatically loaded in the scene (see Figure 15).
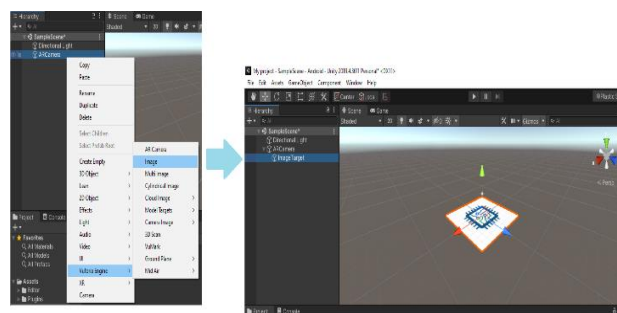
Figure 15 Image of AR camera with Target in scene
Source: Own Elaboration

i)   The object is added by dragging it to the Resources folder (see Figure 16).
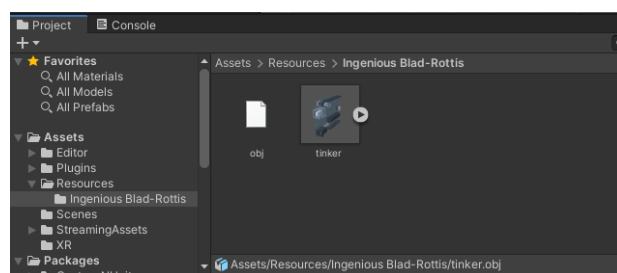
Figure 16 Object insertion in Unity
Source: Own Elaboration

j)   Then place the object on the Target by dragging it into the scene, modifying the size, rotation and scale with which you want it to be displayed in the app (see Figure 17). This can be done from the property inspector or from the tools menu at the top left. The object must be left inside the Image Target menu in the hierarchy.
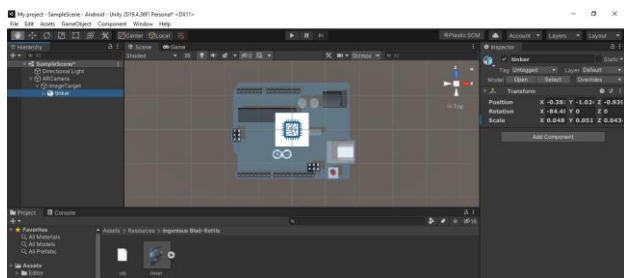
Figure 17 Insertion of object on Target
Source: Own Elaboration

k)   A Lean complement is added in the scene hierarchy (see Figure 18).
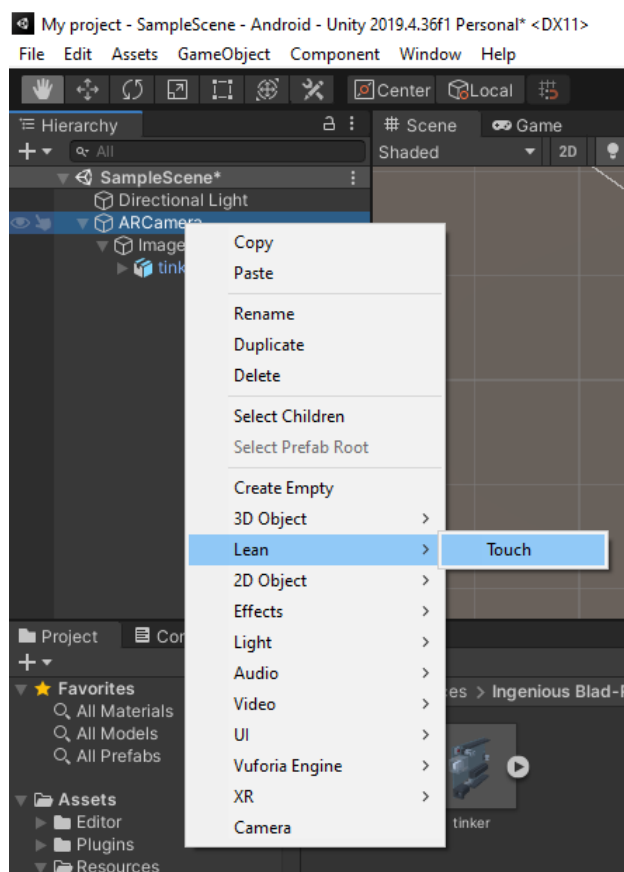
Figure 18 Insertion of Lean Touch add-on
Source: Own Elaboration

l)   Selecting the object (tinker), in the inspector add components in Add Component, in the menu that opens select Lean>Touch and look for the components Lean Drag Translate, Lean Pinch Scale and Lean Twist Rotate (see Figure 19).
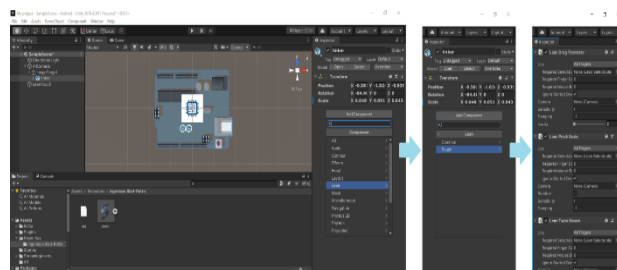
Figure 19 Insertion of complements
Source: Own Elaboration

m)   This completes the programming of the AR app. Before packaging it for installation, its behavior can be simulated by pressing Play at the top of the scene (see Figure 20), in case it is necessary to make any changes.
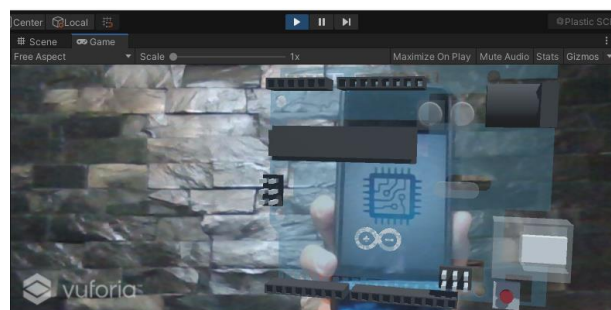
Figure 20 App simulation
Source: Own Elaboration

n)   To package the app in File>Build Settings, select Build, name and address where the .apk file will be saved (see Figure 21).
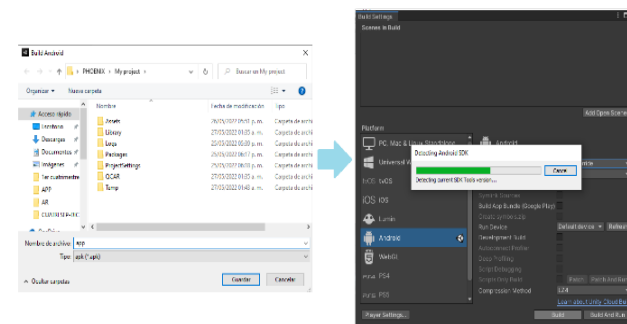
Figure 21 App packaging
Source: Own Elaboration

This concludes the stages of the methodology.

4. Results and discussion

The .apk file resulting from following the methodology described above is installed on a device to verify the functionality of the app created (see Figure 22).
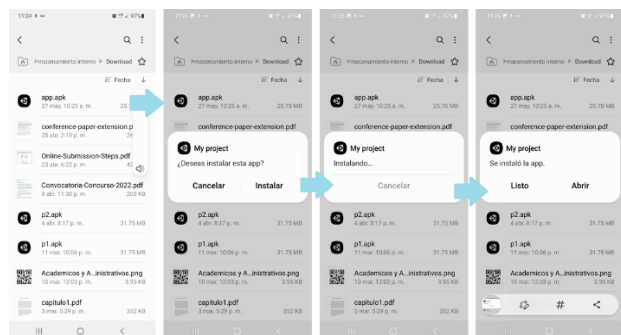
Figure 22 App installation on cell phone
Source: Own Elaboration

When passing the cell phone camera over the Target, the AR object unfolds and the user can manipulate it with his fingers through the cell phone screen (see Figure 23). This demonstrates that it is functional and meets the proposed objective.

Figure 23 App operation
Source: Own Elaboration

E4.0 is a set of technological innovations and pedagogical transformations in education that promote a combination of man and technology to improve and adapt the teaching-learning process where learners are the architects of their learning, in a flexible, dynamic and adaptive way [17]. With this type of methodologies, relevant tools are provided to teachers to create educational environments with AR and to introduce students to E4.0. In addition, the teacher has creative freedom according to the need of his pedagogical resource.

Conclusions

The implementation of AR technologies in E4.0 stimulates students to be self-taught, capturing their interest, motivating them to discover new possibilities, in addition to having the advantage of being able to replace expensive laboratory equipment with multimedia models. The real objects can be complemented by adding context information and visualization of the learning material, which increases the level of perception and interest of the students and in turn the quality of professional training through the use of didactic resources with AR.

The teaching-learning process becomes more interactive and more productive. The application of this technology in E4.0 opens new horizons in the training of students in educational institutions of different levels through appropriate methodologies that allow the insertion of teachers in this technological axis. Therefore, the methodology proposed in this work is pertinent and contributes to this end.

Referencias

[1] Sánchez Guzmán, Daniel. (2019). Industria y educación 4.0 en México: un estudio exploratorio. Implicaciones de la industria 4.0 en la educación superior. Innovación Educativa 81. Instituto politécnico Nacional. Vol 19. Gobierno de México. Recuperado de: https://biblat.unam.mx/hevila/Innovacioneducat iva/2019/vol19/no81/2.pdf

[2] Flores, Dulce & Alvear, Elvira & Cruz, Erick & Barragán, Yolanda & Guzmán Games, Francisco. (2020). Educación 4.0, origen para su fundamentación.

[3] Khan, T., Johnston, K., & Ophoff, J. (2019). The impact of an augmented reality application on learning motivation of students. Advances in Human-Computer Interaction, 2019, 1–14. https://doi.org/10.1155/2019/7208494

[4] Martin, J. & Bohuslava, J. (2018). Augmented reality as an instrument for teaching industrial automation. Cybernetics & Informatics (K&I). doi: 10.1109/CYBERI.2018.8337535

[5] Dunleavy, M., Dede, C. & Mitchell, R. (2009). Affordances and Limitations of Immersive Participatory Augmented Reality Simulations for Teaching and Learning. J Sci Educ Technol 18, 7–22. https://doi.org/10.1007/s10956-008-9119-1

[6] Boyles, B.D. (2017). Virtual Reality and Augmented Reality in Education.

[7] Martin, J. & Bohuslava J. & Igor, H. (2018). Augmented Reality in Education 4.0. 2018 IEEE 13th International Scientific and Technical Conference on Computer Sciences and Information Technologies (CSIT). doi:10.1109/STC-CSIT.2018.8526676

[8] Nesterov, A., Kholodilin, I., Shishkov, A., & Vanin, P. (2017). Augmented Reality in Engineering Education: Opportunities and Advantages. Communications - Scientific letters of the University of Zilina, 19(4), 117-120. doi: 10.26552/com.C.2017.4.117-120

[9] Glover, J. (2018). Unity 2018 Augmented Reality Projects: Build four immersive and fun AR applications using ARKit, ARCore, and Vuforia.
https://books.google.com.mx/books?id=aO1mD wAAQBAJ

[10] Liu, X. & Sohn, Y.H. & Park, D.W. (2018). Application Development with Augmented Reality Technique using Unity 3D and Vuforia. International Journal of Applied Engineering Research, vol. 13, no. 21, pp. 15068–15071.

[11] Bryant, S. C. (2018). Tinkercad For Dummies.
https://books.google.com.mx/books?id=4g5MD wAAQBAJ

[12] Hidalgo, B., Rivera, L., & Delgadillo, R. (2019). Virtual Communities of Learning: New Challengesin Teaching Learning Process in Higher Education. Indian Journal of Science & Technology. Recuperado de: https://doi.org/10.17485/ijst/2019/v12i10/13988 2

[13] Okimoto, M. L. L. R., Okimoto, P. C., & Goldbach, C. E. (2015). User Experience in Augmented Reality Applied to the Welding Education. Procedia Manufacturing, 3, 6223–6227. doi:10.1016/j.promfg.2015.07.739

[14] Önal, N., İbili, E., & Calışkan, E. (2017). Does Teaching Geometry with Augmented Reality Affect theTechnology Acceptance of Elementary School MathematicsTeacher Candidates?

[15] Martí-Parreño, J., Seguí-Mas, D., & Seguí-Mas, E. (2016). Teachers' Attitude towards and Actual Use of Gamification. Procedia - Social and Behavioral Sciences, 228, 682–688. doi:10.1016/j.sbspro.2016.07.104

[16] García, F., Pedreira, O., Piattini, M., Cerdeira-Pena, A., & Penabad, M. (2017). A framework for gamification in software engineering. Journal of Systems and Software, 132, 21–40. doi:10.1016/j.jss.2017.06.021

[17] Gueye, M., & Exposito, E. (2020, October). University 4.0: The Industry 4.0 paradigm applied to Education. In IX Congreso Nacional de Tecnologías en la Educación

Planning a project applying the Scrum framework

La planeación de un proyecto aplicando el marco de trabajo Scrum

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Abstract

Currently, Scrum is one of the most recognized and used methodologies in agile project management. The main objective of this article is to analyze the planning phase in an agile project, integrating the life cycle of the Scrum framework and the Deming cycle that allows to identify, define and specify the processes and techniques to be managed during said phase. An applied research is proposed, under a case study according to the nature of the disciplinary area. On the other hand, in addition to this, the opportunity to apply this framework in daily life has been identified. Contributing, mainly as a contribution to the line of knowledge generation in the scientific field of applied research of agile methodologies in life projects. In the same way, a path is left in the scientific study to integrate continuous improvement in the implementation of the Scrum framework.

Scrum, Planning, Product Backlog

Resumen

En la actualidad, Scrum es una de las metodologías más reconocidas y utilizadas en la gestión ágil de proyectos. El presente artículo tiene como objetivo principal analizar la fase de planeación en un proyecto ágil integrando el ciclo de vida del marco de trabajo Scrum y el ciclo Deming que permita identificar, definir y concretar los procesos y técnicas a manejar durante dicha fase. Se plantea una investigación aplicada, bajo un caso de estudio de acuerdo con la naturaleza propia del área disciplinar. Por otro lado, además de ello, se ha identificado la oportunidad de aplicar este marco de trabajo en la vida cotidiana. Contribuyendo, principalmente como un aporte a la línea de generación de conocimiento en el campo científico de la investigación aplicada de metodologías ágiles en proyectos de vida. De igual manera, se deja un camino en el estudio científico para integrar la mejora continua en la implementación del marco de trabajo Scrum.

Scrum, Planeación, Product Backlog

† Researcher contributing as first author.

Introduction

Agile methodologies are adaptive methodologies, which arise to carry out software development projects, adapting it to changes as an opportunity to improve the system and increase customer satisfaction, considering change management as an inherent aspect of the software development process itself and, thus, allowing a better adaptation to the environment, maximising investment and reducing costs, either to vary part of its functionality, add a new one, or for example, adapt the system to a new application domain (Navarro, *et al*, 2018). In addition to this, there have been multiple studies on how to apply the Scrum framework in everyday life. The general objective of this study is to carry out an analysis of the Planning phase by applying the Scrum methodology and correspondence with the Deming cycle to manage an agile project, in such a way that the efficiency and effectiveness of the process is optimised and its quality is increased.

Development

Gradually, over time, programmers noticed that traditional methods of software manufacturing were less efficient than expected. So they began to look for more effective frameworks for what they did every day. No one wanted to waste time, or money (Majchrzak, Pietrzkiewicz, & Scislak, 2018).

Scrum is an agile development model characterised by (Navarro Cadavid, Fernández Martínez, & Morales Vélez, 2013):

–   Adopting an incremental development strategy, rather than complete product planning and execution.
–   Basing the quality of the result more on the tacit knowledge of people in self-organised teams than on the quality of the processes used.
–   Overlapping of the different phases of development, instead of carrying them out one after the other.

Scrum is an agile project management methodology, founded on the principles of a learning organisation. The principles of a learning organisation are systems thinking, personal mastery, mental models, shared vision and team learning (Harrison & Thackeray, 2020).

Scrum is grounded in the empirical theories of process control or empiricism. Empiricism asserts that knowledge comes from experience and from making decisions based on what is known. It also uses an iterative and incremental approach to refine foresight and risk control (Noriega Martínez, 2017).

The Scrum process identifies the project lifecycle divided into three phases: Pre-game, in some other texts as Planning, Game "Development" or Development and Post-game or Completion (Chimarro Chipantiza, Mazón Olivo, & Cartuche Calva, 2015). Figure 1 shows the Scrum life cycle.

Figure 1 Life cycle of the Scrum process
Source: Taken from (Chimarro Chipantiza, Mazón Olivo, & Cartuche Calva, 2015).

On the other hand, Scrum is also based on continuous improvement processes, which can be summarised from the Deming cycle or PDCA (Plan-Do-Check-Act) cycle:

–   Plan: what to do, how to do it?
–   Execute (Do): do what has been planned.
–   Check: was it possible to do what was planned?
–   Act: how do we improve for the next cycle?

W. Edwards Deming's PDCA cycle states that each of the company's activities must follow a cycle that is repeated uninterruptedly, which is why it is known as the "spiral of continuous improvement".

The steps in the cycle are as follows (González Gaya & Domingo Navas, 2013):

–   Plan. Before starting an improvement action, it is necessary to carry out a diagnosis of the current situation to ensure that the methods used are documented and standardised. Based on the data collected to identify and define the problems, a plan of actions to be undertaken during a fixed period of time is made. This plan should include the quality improvement techniques to be analysed later.

–   Execute. This consists of implementing the proposed plan.

– Check. The data recorded during the execution phase are evaluated to check for deviations from the planned schedule.

– Act. Depending on the results obtained during the verification phase, the appropriate measures are taken. If the plan is working as planned, changes are instituted, if new standards are set, the affected personnel are informed, the necessary training is provided to those who require it, and the change is implemented. If the plan has not been successful, the cycle is repeated.

The Deming/Shewhart/PDCA cycle and Scrum are iterative methods that focus on Continuous Improvement. The objective of the present study is to perform and apply a correspondence analysis of the Pre-Game Phase of the Scrum life cycle and the Plan Phase of the PDCA cycle applied to a project. Table 1 shows the correspondence analysis of the Pre-Game Phase of Scrum and the Plan action of the Deming Cycle (PDCA).

Scrum Lifecycle	Planning in the PDCA cycle (What and How?)
Business Vision	Business Vision
Product Backlog List	Product Backlog List – User Stories – Prioritise User Stories – Estimate User Stories
Software Architecture	A purpose-built software tool for agile project management using the Scrum framework (Jira Software)

Table 1 Correspondence of the Pre-Game Phase of Scrum with Planning of the Deming Cycle (PDCA)
Source: Own Source

Methodology

Based on the previous section, the present study is conducted as an applied research. The case study is divided into the following steps:

1. Drafting the project statement.

2. Create the Product Backlog (Product Stack).
a. Define User Stories
b. Estimate User Stories
c. Prioritise User Stories

Results

As an added value, a case study coined from the Scrum for Life stream is credited. The life project is A Wedding.

The business vision states in a concrete and specific way the main requirement or benefit that the project brings. Table 2 shows the project vision statement of the case study.

Project vision
To plan a Wedding including the religious ceremony and social reception making it an unforgettable day for the couple.

Table 2 Definition of the project vision
Source: Own Source

Next, the Product Backlog is created, which defines the general requirements aligned to the vision of the project. The Product Backlog is a dynamic and publicly visible list for all those involved in the project. In it, an up-to-date list of requirements is maintained.

The entries in the Product Stack are written in the form of User Stories. These are a tool that streamlines requirements management, reducing the amount of formal documents and time needed. They are part of the functionality capture formula defined in 2001 by Ron Jeffries of the Three C's:

– Card: each User Story is reduced until it is easy to memorise and synthesise on a card or post-it.

– Conversation: the Team and Product Owner add acceptance criteria to each Story shortly before implementation.

– Confirmation: the Product Owner confirms that the Team has understood and correctly captured its requirements by reviewing the acceptance criteria.

In this sense, Table 3 below details the User Stories defined for the case study including, firstly, their id, title and description.

ID US#	User Story Title	Description of the User Story
01	Choose a date	as a fiancée I would like to find an ideal date for the celebration of my marriage, which should suit our needs.
02	Define a budget	as a fiancée I would like to define the maximum budget in order to have a correct distribution of the investment within the established economic limit.
03	Choose the place and time	as a fiancée I would like to specify the place and time of the religious ceremony and the social reception in order to correctly define the other aspects to be organised.
04	Analyse the option of hiring a Wedding Planner	as the fiancée I wish to analyse the economic feasibility of hiring a wedding planner to be responsible for managing all the details of the wedding and to avoid any kind of inconvenience in the event.
05	Choose the main suppliers: invitations, banquet, photographer and others.	as siblings I wish to consult and define the providers of the services required to obtain a quality service and cost according to the budget.
06	Prepare the documentation for the formalities	as mothers of the bride and groom I wish to collect the required documentation from the bride and groom to carry out the marriage legally and religiously.
07	Drawing up a guest list	as the fiancée I wish to specify the guest list according to the budget in order to share this important event with the people closest to the bride and groom.
08	Find the wedding dress and groom's suit.	as a fiancée I wish to choose my wedding dress and that my fiancé chooses his suit accordingly to look as we wish on the wedding day.
09	Defining the colour palette and decorations for the wedding	as a fiancée I wish to choose the colour palette, as well as the decorations for the wedding so that I feel satisfied and can enjoy my wedding as I imagine it to be.
10	Wedding trip	as a fiancé I wish to organise a wedding trip to share with my wife the first weeks of our union and enjoy a beautiful, comfortable destination, according to our common interests.

Table 3 Product Backlog of the project establishing User Story
Source: Own Source

Once the Product Backlog with the User Stories has been defined, the next step is to estimate the effort for each of them. The technique used for the estimation is known as Planning Poker.

This technique is one of the most effective and well known agile estimation techniques. Planning Poker is played with a pack of cards numbered according to the Fibonacci series, which is composed of a logical series where each number is the sum of the two previous ones: 1, 1, 2, 3, 5, 8, ... The lower the number, the less effort a User Story requires, and the higher the value, the greater the effort. The Poker deck also has two additional cards:

− A cup of coffee, which means "I'm done! Let's take a break".
− A question mark, which can mean "I'm not sure how much effort it takes" or "I didn't quite understand the requirements".

The Planning Poker technique is applied to define the value of the effort for each User Story in the Product Backlog. Table 3 shows the summary of applying the Planning Poker Technique for the estimation of User Stories in the case study.

ID US#	User Story Title	Planificación del póquer
01	Choose date	First round Fiancée card chosen: 3 Promised card chosen: 1 Father of the bride card chosen: 1 Mother of the bride card chosen: 2 Father of groom card chosen: 1 Mother of groom card chosen: 1 Best man card chosen: 2 Godmother of the Mass chosen letter: 3 argues the fiancée, godmother of the bride and fiancé. Second round Fiancée card chosen: 1 Fiancé chosen letter: 1 Father of the bride card chosen: 1 Mother of the bride card chosen: 1 Father of groom card chosen: 1 Mother of groom card chosen: 1 Best man card chosen: 1 Godmother of the Mass card chosen: 1 Estimated value: 1

Table 4 Use of the Planning Poker Technique to estimate the User Stories of the case study
Source: Own Source

Estimated value

The next step is to prioritise the Product Backlog, using the basket or bucket estimation technique. This technique is a derivation of the Delphi technique and consists of giving all the cards to each member of the team. Baskets or buckets are then placed where the inside cannot be seen. Each basket will have values relative to the difficulty: 1, 2, 3, 4, 5, 8, 13, 20, 30, 50, 100, 200. The User Stories, which each member has in their hands, should be placed inside the baskets that they consider to represent their difficulty. The contents of each basket are then revealed, and if the baskets reveal too much disparity, discussion follows, ending with consensus on each task. Table 5 shows the use of the basket estimation technique to prioritise the User Stories in the case study.

ID US#	Baskets				
01	**1**	**2**	**3**	**4**	**5**
	0	0	1	1	6*
* The priority of this User Story is 5 by majority and subsequent consensus..					

Table 5 Use of the Basket Estimation Technique to estimate the User Stories in the case study
Source: Own Source

In this way, at the end, an estimated and prioritised Product Backlog is obtained, as shown in Table 6.

ID	User Story Title	Effort	Priority
01	Choose a date	1	5
02	Define a budget	5	5
03	Choose the place and time	8	4
04	Analyse the option of hiring a Wedding Planner.	1	1
05	Choose the main suppliers: invitations, banquet, photographer and others.	5	4
06	Prepare the documentation for the formalities	8	5
07	Draw up a guest list	13	4
08	Find the wedding dress and the groom's suit.	13	3
09	Defining the colour palette and decoration for the wedding	5	4
10	Wedding trip	8	3

Table 6 Estimated and prioritised product backlog of the case study
Source: Own Source

Finally, as an essential part of User Stories, their acceptance criteria must be established. Acceptance criteria are additional descriptions, examples of use, rules to be followed or any information that helps to understand the functionality of the User Story. The general format for writing assignment criteria includes: "given [scenario] when [behaviour] then [result]". Table 7 shows the specific acceptance criteria for the User Stories in the case study.

ID	Acceptance Criteria (Acceptance Testing) of the User Story
01	Given a tentative date for the religious celebration and the social reception of the wedding in agreement of the bride and groom when I have confirmed the availability of that date and time by all the main participants of the event (bride, groom, parents and godparents) then it is established that the date for the event is confirmed.
02	Given an estimated financial budget for the event when the scope of the event is established then the definition of a budget is concluded.
03	Given the date of the event when the place and time for the religious ceremony and social reception is confirmed by agreement of the bride and groom then the place and time for the wedding is established.
04	Given a budget when the possibility of hiring a person to be in charge of the details of the wedding is analysed. If solvency allows it and it is decided by mutual agreement of the bride and groom then this service is added to the wedding organisation.
05	Given the definition of a budget when you define the places where you will get the services you will need based on the services offered, quality, price and availability then you end up choosing the main suppliers for the wedding.
06	Given a date when the documentation required to conduct the marriage legally and religiously is compiled, then you have completed the preparation of the paperwork for the formalities.
07	Given a date when the guest list is specified when a list of the number of guests is obtained in agreement with the bride and groom and according to the established number of guests then the number of attendees at the event is known.
08	Given the definition of a budget when the wedding dress is chosen with all the characteristics required by the bride, then the bride and groom's attire is determined.
09	Given the venue and the budget when you choose the colour palette and decoration for the wedding in agreement with the bride and groom then you have completed this Task.
10	Given a budget when you decide on a destination for the wedding trip and all the organisation of the wedding trip then you have a planned wedding trip.

Table 7 Acceptance criteria for the User Stories in the case study
Source: Own Source

Conclusions

Agile methodologies gained popularity because of their flexibility and the reduction in documentation at the beginning of the project. However, that does not mean that the Planning stage is less important when managing an agile project. This study allowed contrasting the fundamentals of the Scrum lifecycle and the Deming cycle to make the planning work (Planning) efficient at the beginning of an agile project.

Through the case study, it was possible to apply the fundamentals of the Scrum framework, identifying two products to be created during the planning phase: the project vision and the Product Backlog.

By using our own specific techniques and elements in the implementation of the two mentioned products, we contribute to optimise the implementation of Scrum and, in the same way, ensure the quality of the products.

Furthermore, as an added value, the proposed research line of study and application of projects under the Scrum for Life approach remains as an added value.

References

E. Navarro, M. P. Moreno, J. Aranda, L. Parra , J. R. Rueda y J. C. Pantano, «Selección de metodologías ágiles e integración de arquitecturas de software en el desarrollo de sistemas de información,» de XIX Workshop de Investigadores en Ciencias de la Computación, 2017

Majchrzak, P., Pietrzkiewicz, L., & Scislak, J. (2018). How to outsource scrum projects. https://www.future-processing.com/documents/make_agile_work_i n_outsourced_projects.pdf

Navarro Cadavid, A., Fernández Martínez, J. D., & Morales Vélez, J. (2013). Revisión de metodologías ágiles para el desarrollo de software. Prospectiva, 11(2), 30-39.

Harrison, N. B., & Thackeray, L. R. (2020). Teaching Systems Thinking as a Foundation of Scrum. 2020 Intermountain Engineering, Technology and Computing (IETC), 1-6. doi:10.1109/IETC47856.2020.9249111

Chimarro Chipantiza, V. L., Mazón Olivo, B., & Cartuche Calva, J. J. (2015). La usabilidad en el desarrollo de software. Universidad Técnica de Machala.

González Gaya, C., & Domingo Navas, R. (2013). Técnicas de mejora de la calidad. Editorial UNED.

Noriega Martínez, R. (2017). El Proceso de Desarrollo de Software (2 ed.). IT Campus Academy.

Ingeniería, Ingeniería en Sistemas, Sistemas de Información

Development of a Repository of Digital Theses as an Integrative Activity

Desarrollo de un Repositorio de Tesis Digitales como Actividad Integradora

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Abstract

The purpose of generating a digital theses repository is to organize and store theses in digital format so that users can have access to them in an open manner, resulting in knowledge being disseminated locally, nationally, and internationally. The presentation of this article details the organization of the development of a Digital Theses Repository, carried out during the Integrative Activity that is taken in the fifth, sixth and seventh semesters. For this, it is supported by different subjects, having as guiding subjects the three subjects of Software Engineering, where the full software development cycle and the CMMi dep Level 2 model are used.

Digital theses repository, Software development, programming teaching, CMMi

Resumen

La generación de un repositorio de tesis digitales tiene como finalidad organizar y almacenar tesis en formato digital para que los usuarios puedan tener acceso a ellas de manera abierta, dando como resultado que el conocimiento pueda difundirse de manera local, nacional e internacional. La presentación de este artículo detalla la organización del desarrollo de un Repositorio de Tesis Digitales, llevado a cabo durante la Actividad Integradora que se toma en los semestres quinto, sexto y séptimo. Para ello se apoya de diferentes materias, teniendo como materias rectoras las tres materias de Ingeniería de Software, en donde se usa el ciclo de desarrollo de software completo y el modelo CMMi Nivel 2.

Repositorio de tesis digitales, Desarrollo de software, enseñanza de programación, CMMi

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1.Introduction

Currently technology has led to the generation of knowledge can reach faster from one place to another, one way to share knowledge is through the development of digital theses open to the general public, so this article will show the organization for the development of a Digital Thesis Repository also aligned to the process of thesis development in the career of Computer Engineering at the Autonomous University of Tlaxcala, for them was used an Integrating Activity proposed in three semesters.

2. Repositories

Repositories are information systems whose purpose is to organise, preserve and disseminate in Open Access mode the scientific and academic resources of institutions and scholarly resources of institutions. The aim of the development of these systems is to guarantee easy, controlled and standardised access to certain information resources [1].

3. Traditional teaching and Inclusive activity

Traditionally, the organisation of university courses is a theoretical explanatory lecture, where the teacher transmits to the students the knowledge that they have to develop, followed by a practical implementation of this knowledge, it can be said that this strategy is not very recommendable [2].

That is why the Autonomous University of Tlaxcala decided to integrate Integrating Activities in its degree courses. An integrative activity at UATx implies teamwork between students and teachers, to integrate learning from different subjects in an interdisciplinary work, which generates socially relevant learning [3].

In we can see that the Integrating Activity is a pedagogical strategy that favours active learning through the combination of different disciplines, processes and procedures, and the application of knowledge and learning of students to solve a problem situation in the national context [4].

4. Distributed Systems Academic Body

The Autonomous University of Tlaxcala manages Academic Bodies, in the Bachelor's Degree in Computer Engineering there is the Academic Body of Distributed Systems, which has 2 Lines of Generation and Application of Knowledge (LGAC): Software Technology, as well as Virtual Reality and Educational Software.

The LGAC of Software Technology considers that currently the development of systems, design, re-engineering and maintenance of software requires the application of methodologies and models that allow the development of quality software.

While the LGAC of Virtual Reality and Educational Software considers that technology has evolved and that technologies such as virtual and augmented reality are necessary to enrich software, whether educational or in any other area.

5. Description of the Method

In the Bachelor's Degree in Computer Engineering in the fifth, sixth and seventh semesters, the development of software is carried out with the participation of the 4 members of the academic staff. The Software Engineering subjects are the axis of the Integrating Activity, in this subject the software development life cycle and the CMMi level 2 model are studied. [5], resulting in the production of quality software.

CASD Subjects Involved:

In fifth semester:
–   Requirements Engineering and Estimation
–   Database Query and Optimisation
–   Human Computer Interaction

In sixth semester:

–   Software Design and Modelling
–   Virtual Environment Design
–   Development of Mobile Devices
–   In the seventh semester
–   Software Testing and Implementation

6. Digital Thesis Repository

6.1 Fifth semester:

In this semester the requirements were established, the planning of the System, the database and the interface for the control and repository of digital thesis, aligned to the activities that Computer Engineering carries out for the elaboration of thesis, prototypes and memories, it includes: elaboration of the document, revision of versions of the document, academic process of titling and repository of digital thesis.

In this Integrating Activity 15 teams participated, belonging to two groups: 5A and 5B, each one developing a different digital thesis repository.

The project started with the survey of functional and non-functional requirements that the system will have to fulfil, as well as a detailed description of the behaviour of the system to be developed. As an example, the use cases of the Digital Thesis Repository project are shown below.

N°	Nombre del Caso de Uso	Prioridad	Complejidad
1	CU_01 Registrar Usuarios	Esencial	Complejo
2	CU_02 Registrar Docente	Esencial	Complejo
3	CU_03 Iniciar Sesión	Esencial	Medio
4	CU_04 Asignar titular de materia	Esencial	Medio
5	CU_05 Elegir método de Titulación	Esencial	Complejo
5	CU_06 Asesorías	Esencial	Complejo
7	CU_07 Revisar Capítulo 1	Esencial	Medio
8	CU_08 Validar Capítulo 1	Esencial	Medio
9	CU_09 Controlar Tramite de titulación	Esencial	Medio
10	CU_10 Solicitar Aceptación	Esencial	Medio
11	CU_11 Concluir Asesoría	Esencial	Medio
12	CU_12 Validar de los Revisores	Esencial	Complejo
13	CU_13 Descargar Cuartillas	Esencial	Complejo
14	CU_14 Aprobar Cuartillas	Esencial	Complejo
15	CU_15 Informar técnicas de investigación	Esencial	Complejo
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17	CU_17 Evaluar Tesis	Esencial	Complejo
18	CU_18 Cargar evaluación de tesis	Esencial	Complejo
19	CU_19 Cargar Tesis Prototipo o Memoria	Esencial	Complejo
20	CU_20 Actualizar Tesis, Prototipo o Memoria	Esencial	Complejo
21	CU_ 21 Autorizar Tesis, Prototipo o Memoria	Esencial	Medio
22	CU_22 Descargar Tesis, Prototipo o Memoria	Esencial	Medio
23	CU_ 23 Biblioteca	Esencial	Complejo
24	CU_ 24 Notificar	Esencial	Complejo
25	CU_25 Recuperar contraseña	Esencial	Complejo

Table 1 Digital Thesis Repository Use Case

The team realised the standardised E/R model for the Digital Thesis Repository, the database and related smart search queries.
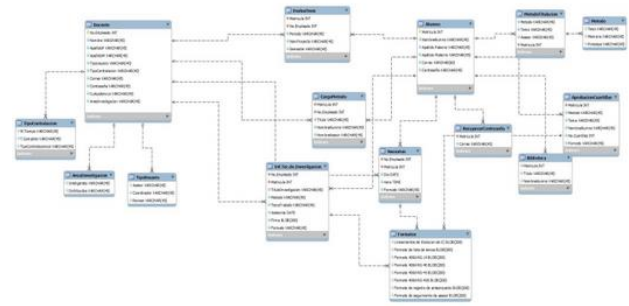

Figure 1 Model E/R

In addition to the fact that an institutionalised interface was made, as well as considering the interface design qualities of [6] which are:

– Reliability
– Multidimensional
– Usability
– Accessibility
– Consistency
– Consistency
– Interactivity
– Hypermediality
– Adaptability

The following are the different interfaces that have been developed.

Figure 2 Digital Theses Repository project main screen

Figure 3 Digital Thesis Repository project login screen

MORA-LUMBRERAS, Marva Angélica, SÁNCHEZ-PÉREZ, Carolina Rocío, PORTILLA-FLORES Alberto and SÁNCHEZ-SÁNCHEZ Norma. Development of a Repository of Digital Theses as an Integrative Activity. Journal Schools of economic Thought and Methology. 2022

Figure 4 Project Degree Method screen Digital Theses Repository

6.2 Sixth Semester

For the sixth semester it was established to design and develop a Digital Thesis Repository System, to develop a virtual library and to make the system responsive.

Due to the importance of having a well-detailed software the modules of the Thesis Repository System are presented.
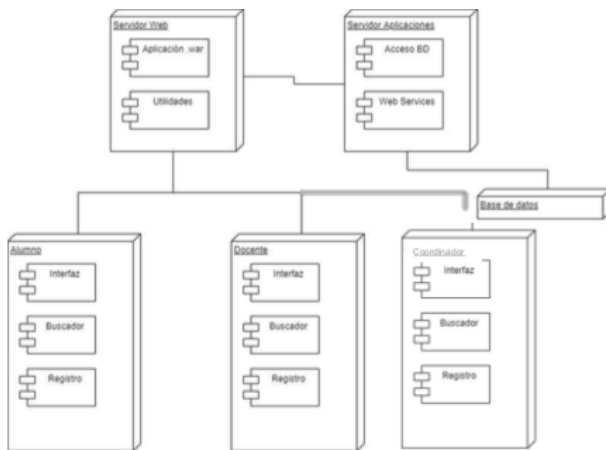

Figure 5 Thesis Repository System Modules

As well as outlining some of the software's functionalities, the following are presented.

Figure 6 Digital Thesis Repository Project Screen

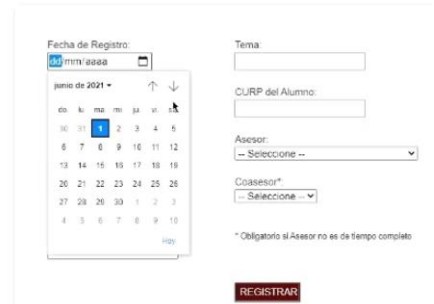**Figure 7** Registering a theme in the repository
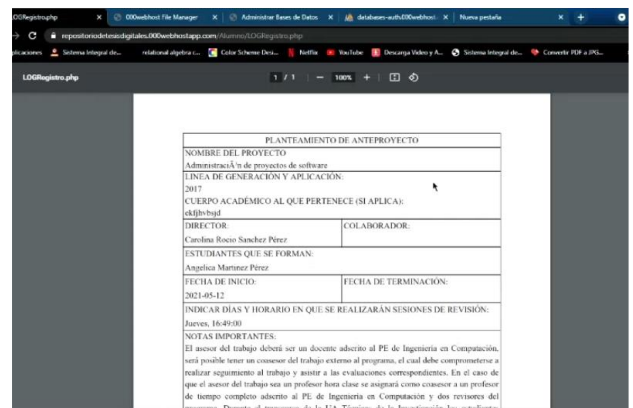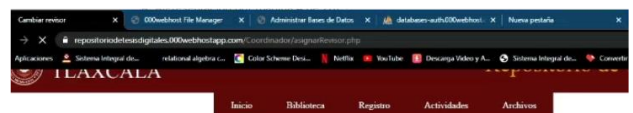

Figure 8 Topic discussed with the advisor

Figure 9 Drafting of the preliminary project

Figure 10 Assign reviewer

Figure 11 Form for the conclusion of a consultancy

Figure 12 Commencement of the titling process

For the construction of the virtual library we used the methodology of [7], which has five phases: Analysis, Modelling, Ambient, Interaction and Testing. Figures 13, 14 and 15 show three of the steps of the methodology.

Figure 13 Sketch of a library

Figure 14 3D Modelling

Figure 15 Virtual library

For the responsive system, an example of a different working team is presented.

Figure 16 Responsive system

6.3 Seventh semester

In the seventh semester, user, operation and maintenance manuals were produced. A letter of completion of the system and a letter of satisfaction and recommendation to the work team.

7. Conclusion

The Digital Thesis Repository streamlines the process of revising a thesis/prototype or report. The completion of a thesis/prototype or report requires constant revisions, before using the technology each revision was given to the advisor in hard copy, nowadays the revision could be done digitally, so printouts are reduced. In addition, when the thesis writer could not attend the advisor, he/she would fall behind, if technology is used, the thesis can be followed up remotely. Nowadays it is possible to find digital theses anywhere in the world, which makes knowledge more accessible and allows students who need to read a thesis to do so from their computer.

8. Funding

9. Acknowledgements

10. References

Importance of repositories for preserving and recovering information, Duperet Cabrera Elaine, Pérez Martínez Denis Gabriel, Cedeño Rodríguez Mirtha Yris, Ramírez Mustelier Adrian y Montoya Acosta Luis Alberto (2015), MEDISAN vol.19 no.10, Santiago de Cuba oct. 2015, *versión On-line* ISSN 1029-3019.
http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S1029-30192015001000014

[1] Fernandez, J. M., Matuk, R., Rodriguez, M., & Quiroga, M. Aplicación del modelo pedagógico Flipped Learning para el aprendizaje de programación. In XVII Congreso de Tecnología en Educación & Educación en Tecnología (TE&ET 2022) (p. 121). http://sedici.unlp.edu.ar/bitstream/handle/10915/139928/Documento_completo.pdf-PDFA.pdf?sequence=1&isAllowed=y

[2] Cuatepotzo Díaz Diana Itzel, Pérez Pérez Cynthia Vanessa, La actividad integradora: una estrategia pedagógica para lograr la integración, Debates en Evaluación y Currículum/Congreso Internacional de Educación: Evaluación 2018 /Año 4, No. 4/ septiembre de 2018 a agosto de 2019, ISSN: 2448 – 6574. https://posgradoeducacionuatx.org/pdf2018/A190.pdf

[3] Mantilla Gilma, Moreno Socorro, Ariza Liany Katerine, Santamaría Andrea Actividad Integradora, Manual para docentes, Editorial Pontífica Universidad Javeriana, Bogotá. ISBN digital: 978-958-781-427-9 DOI:
https://doi.org/10.11144/Javeriana.9789587814279

[4] Software Engineering Institute (2010) Software Engineering Institute Releases Version 1.3 of CMMI Product Suite. Carnegie Mellon University. Recuperado 19 de septiembre de 2022, de https://insights.sei.cmu.edu/news/software-engineering-institute-releases-version-13-of-cmmi-product-suite/

[5]Morejòn Labrada, S. (2020). Principios del proceso de diseño de interfaz de usuario. *Revista Cubana De Transformación Digital*, *1*(3), 143–155. Recuperado a partir de https://rctd.uic.cu/rctd/article/view/96

[6] Mora Lumbreras Marva Angélica (2017), Libro: Realidad Virtual: Estudio y Aplicaciones, Difusión, Museos, Cultura, Tradiciones y Educación por medio de Realidad Virtual, Editorial Académica Española EAE, ISBN-10: 6202252103, ISBN-13: 978-6202252102

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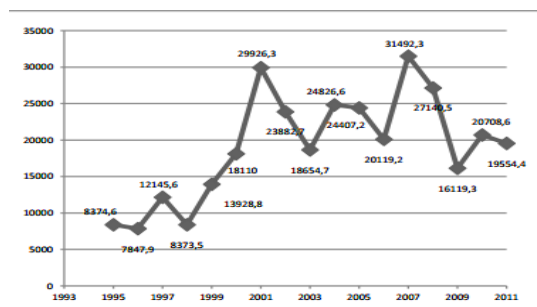
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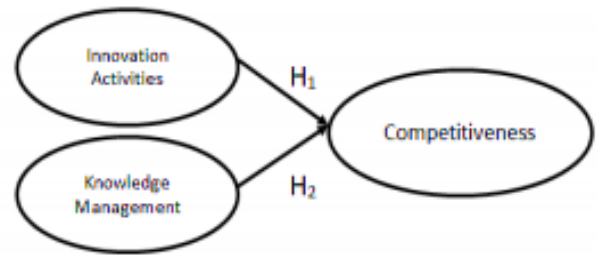
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