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Article

Development of online store systems under a quality practices framework as an integrative activity

Desarrollo de sistemas de tienda en línea bajo un marco de prácticas de calidad como actividad integradora

Sánchez-Pérez, Carolina Rocío * [a], Mora-Lumbreras, Marva Angélica [b], Sánchez-Sánchez, Norma [c] and Portilla-Flores, Alberto [d]

[a] Universidad Autónoma de Tlaxcala/Facultad de Ciencias Básicas, Ingeniería y Tecnología • W-7166-2019 • 000-0002-1659-4429 • 163716
[b] Universidad Autónoma de Tlaxcala/Facultad de Ciencias Básicas, Ingeniería y Tecnología • AFT-7016-2022 • 0000-0001-6505-2205 • 176815
[c] Universidad Autónoma de Tlaxcala/Facultad de Ciencias Básicas, Ingeniería y Tecnología • GRY-1148-2022 • 0000-0002-9991-9206 • 545506
[d] Universidad Autónoma de Tlaxcala/Facultad de Ciencias Básicas, Ingeniería y Tecnología • GRY-0920-2022 • 0000-0001-5915-1661 • X_aportilla4557

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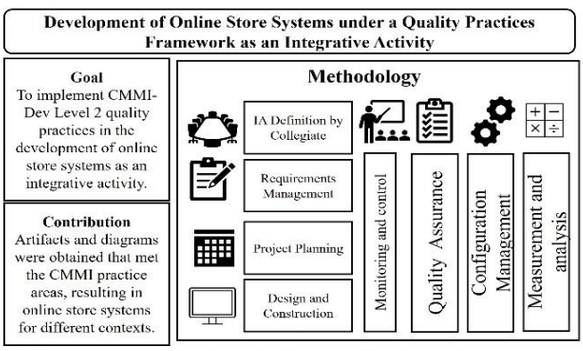
* ✉ [carolinarocio.sanchez@uatx.mx]

Abstract

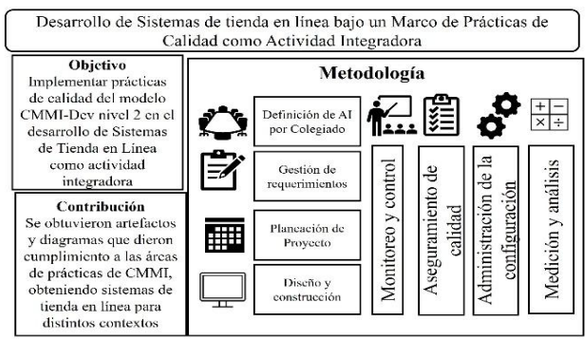
An important challenge faced in the design of projects for the Computer Engineering Integration Activity at the Universidad Autónoma de Tlaxcala is bringing real-life case studies to the students. One such case is the implementation of an online store or e-commerce that allows local businesses to sell products or services online. To this end, a series of quality practices aligned with the CMMI-Dev 2 model are established. Students must follow these practices for the development of the online store. This will allow them to identify real customer needs, plan, propose a design, build the solution, and conduct testing prior to implementation. By following these stages, the goal is for students to integrate the knowledge and skills acquired in different subjects, with the core subjects being those related to Software Engineering, which are Requirements Engineering and Estimation and Software Design and Modeling.



E-Commerce, Quality, Software Engineering

Resumen

Un reto importante que se tiene en el planteamiento de proyectos de Actividad Integradora de Ingeniería en Computación de la Universidad Autónoma de Tlaxcala es el acercar casos reales a los estudiantes, siendo uno de ellos la implementación de una tienda en línea o e-commerce que permita a comercios locales la venta de productos o servicios en línea. Para esto se establecen una serie de prácticas de calidad alineadas al modelo CMMI-Dev 2, que los estudiantes deben seguir para el desarrollo de la tienda en línea, lo cual les permitirá identificar necesidades de clientes reales, realizar una planeación, plantear un diseño, construir la solución y realizar pruebas previo a su implantación. Al seguir las etapas mencionadas se busca que los estudiantes integren los conocimientos y habilidades adquiridas en distintas materias siendo la materia eje las relacionadas con Ingeniería de Software, que son: Ingeniería de Requerimientos y Estimación y Diseño y Modelado de Software.



Tienda en línea, Calidad, Ingeniería de Software

Area: Development of strategic leading-edge technologies and open innovation for social transformation

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Introduction

The development of online store systems or e-commerce is no longer only within the reach of large companies or businesses. As a result of the COVID-19 contingency, a "pandemic effect" has emerged, where growth in Latin American countries in the use of e-commerce since 2020 exceeds that of previous years. [Kung & Katz, 2022], being Mexico one of the fastest growing, faced with this opportunity, local businesses are seeking to integrate online sales systems and, in some cases, inventory control to automate their sales, increase their reach and improve their processes.

In this context, the development of an online sales system is presented as a real need for local businesses in the state of Tlaxcala. Students from the Computer Engineering program at the Autonomous University of Tlaxcala (UATx) can participate in the analysis of their needs and the development of a solution proposal, as part of an Integrative Activity to be carried out over two semesters.

This problem is also considered relevant to complement the students' competencies, since needs can be identified for information registration, updating, deletion, as well as the management of shopping cart and payment information, among other functionalities. Another important aspect is that the different phases of the project will be aligned to the CMMI-Dev 2 maturity model, seeking to integrate quality practices into the different activities.

This paper will address the concepts of Integrative Activity in UATx, Online Store Systems, and the CMMI-Dev 2 Model.

The artifacts that comply with the model's practice area will be described, as well as some application interfaces and their 3D modeling as an example of the implementation carried out.

Integrative Activity at the Autonomous University of Tlaxcala

The Autonomous University of Tlaxcala indicates in its mission the generation of scientific, technological and humanistic knowledge in the context of local, national and international needs, it is in this framework that the Integrative Activity (AI) seeks to support its fulfillment and is defined as:

"a problematizing learning situation (projects, cases, problems) designed by the teachers of the different learning units that make up the college, with the participation of the students, with the purpose of articulating the knowledge, skills and attitudes raised in the graduation profile" [Padilla & Mecalco, 2012]. An important aspect of its fulfillment is that students must be integrated into teams, which is expected to develop in them a collaborative work approach, which is common in software development contexts and which, for the purposes of this project, allows them to adopt different roles, such as requirements analyst, designer, programmer, among others.

Online Store Systems

An online store or e-commerce system is a web or mobile platform that allows for the purchase and shipping of products. It typically includes features for customer registration, shopping cart management, product sales management, payment options with payment platform integration, and, in some cases, order or shipment tracking, as well as some means of contact or support. Among the expected features of an online store are a responsive design and intuitive interaction with potential customers.

CMMI Model

In software development projects, it is essential to establish a methodology that guides the activities that must be followed to transform customer needs into requirements and subsequently into a functional product. Development methodologies, along with process improvement models, seek to balance and maintain cost, effort, and quality during a software development project by establishing activities and practices for this purpose. The Capability Maturity Model for Integrated Management (CMMI) is one of the most widely used and widely implemented quality management and process improvement models in software development organizations. Its objective is to provide a development standard and an approach to process improvement that provides organizations with the essential elements to increase their performance, including the identification of strengths and weaknesses [González, et.al. 2021] CMMI for Development, or CMM-Dev, is oriented toward product development and, through practice areas, defines a set of quality practices that guide the activities a development team must carry out to ensure productivity and quality in its processes.

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The CMMI model seeks to help the organization reach maturity levels by gradually covering practice areas, ranging from levels 1 to 5.

Method Description

Currently, the software development industry requires professionals in the area who know and apply all the phases involved in the implementation of a software system. Proposing the development of an application or online store system in its analysis and planning phases allows the student to discover and apply solutions to problems where its implementation is required, covering all the generic activities of the software life cycle in a real-life context.

Fifth- and sixth-semester faculty members from the UATx Computer Engineering program form a fifth- and sixth-semester collegiate to map out the path students should follow in the Integrative Activity, identifying a real-life situation while integrating the knowledge and skills acquired in the subjects or learning units to solve a posed problem.

In the case of the work presented, the board determined that students should identify a local business to find a real customer from whom to obtain specific needs or requirements in their context. This seeks to have an impact on the local environment by supporting businesses in accessing other sales channels.

It is within this framework that the contents of the following learning units or subjects are integrated for the fifth semester:

- Requirements Engineering and Estimation
- Database Query and Optimization
- Human-Computer Interaction

For the sixth semester, the following units are included:

- Software Design and Modeling
- Virtual Environment Design
- Mobile Device Development

Regarding the CMMI-Dev model, it was decided to use Level 2 practice areas since they are highly aligned with a classic development lifecycle. These are:

- Requirements Management (REQM)
- Project Planning (PP)
- Project Monitoring and Control (PMC)
- Configuration Management (CM)
- Process and Product Quality Assurance (PPQA)
- Measurement and Analysis (MA)

The deliverables expected as part of the CMMI-Dev 2 Model implementation are as follows:

- Software Requirements Specification
- Project planning
- Interface prototypes
- Analysis and design document
- Source code aligned with coding standards
- User and operating manuals

Although these are the deliverables, the team must create other artifacts internally to comply with other model practices, such as:

- Traceability Matrix
- Audit Reports
- Verification and Validation Reports
- Test Plans
- Progress Reports

Development of an Online Sales System aligned with Quality Practices

The integrative activity was carried out in teams of three or four members, with fifth-semester students assuming the roles defined in a software development team to complete the activities outlined in the project plan.

A total of 10 teams were formed from two fifth-semester groups, each with distinct contexts.

The contexts that were worked on were the following:

1. Online model car store
2. Online tennis store
3. Online toy store
4. Online jewelry store
5. Online hardware store
6. Online office supplies store
7. Online computer components store
8. Online cell phone store
9. Online electrical products store
10. Online video game store

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Requirements management

The teaching college defined in the AI planning that all systems had to meet a series of minimum requirements, which were: inventory control and replenishment, customer registration, administration of user roles and profiles, product display, shopping cart and payment methods, based on these initial requirements each team had to establish with the client the specific requirements according to their context, since the product data and information will depend on it.

The students developed an interview guide, which they used to elicit requirements for the project, initially defining functional requirements for the project. Figure 1 shows an example of functional requirements for the online office supply store. In this case, the functional requirements define what the system will do.

Box 1

Functional Requirements List

Modul	User	Functional requirement	Folio	Entry Date	Priority
User Registration	All users	The system will allow users to register, the data required for this are the following: *Name *Last Name *Mother's name *Email *Password	RF01	16/2/2023	Essential
Login	All users	The system will allow users to log in, the data required for this are the following: *Email *Password	RF02	6/9/2023	Essential
Inventory and Stock Management	Administrators	The system will allow the administrator to enter articles, the required data for this are the following: *Product name *Category *Stock *Product description *Price *Image. *Brand *Dimensions. *Specifications	RF03	6/9/2023	Essential
	Administrators	The system will allow you to edit store items	RF04	6/9/2023	Useful
	Administrators	The system will allow the administrator to delete items from the catalog	RF05	6/9/2023	Essential
Product Catalog	All users	The system will display a list of products organized by categories (stationery, furniture, offers and electronics)	RF06	6/9/2023	Essential
	All users	The system will allow users to search for products by name or keyword.	RF07	6/9/2023	Useful
	All users	The system will allow you to display product details (image, description, stock, dimensions, category, brand and price).	RF08	6/9/2023	Essential

Figure 1

Functional Requirements

Source: Own elaboration

Based on the Requirements List and once it has been validated, the Requirements Specification is defined. This is a technical document that generally defines: System scope and constraints, Use cases (Figure 2) and their narratives, Non-functional requirements, Design and Interface requirements, as well as a first version of interface prototypes.

This document allows the project team to have a detailed context of how the interaction with the system is expected to be, design constraints and details of necessary interfaces, being the basis for its design.

Box 2

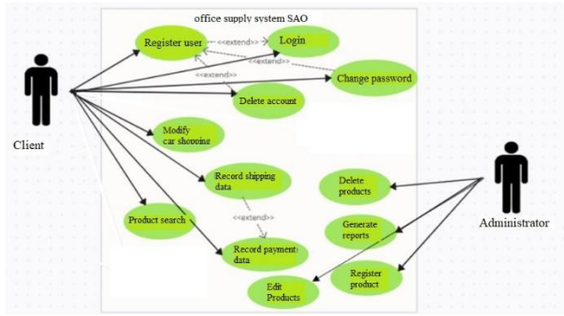

Figure 2

Uses Case Diagram

Source: Own elaboration

Project Planning

Once a first version of the use case narratives has been completed, an estimation tool is defined so that students can use it to develop detailed project planning. This fulfills the Project Planning Practice area. Figure 3 shows an estimation tool based on use cases and implementation hours, considering project complexity and defining hours per phase.

Box 3

Project effort

Phase	%	Hours	(+10%)
Requirements	15%	270.65	297.715
Project Planning	5%	90.2	99.2
Analysis and Design	25%	451.1	496.2
Construction	30%	541.2	595.4
Integration and Testing	20%	360.9	397.0
Closing	5%	90.2	99.2
TOTAL	100%	1804.3	1984.8

Length

Concept (Methods)	Small		Medium		Large	
	Length	hours	Length	hours	Length	hours
Formal logic	3	7.2	14	3	8	10
Simbolic Logic	2	3	8	2.5	7	2
User inteface	6	4.5	14	6	15	3
Data storage	4	3	3	5	12	5

Programming hours in SAO	Formal logic			Simbolic Logic			User intfface		
Use Case	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
CU 01 Users Registry		4		2			2		
CU 02 Login	2			3			2		
CU 03 Product Registry		3				2		2	
CU 04 Product Deletion		1		1			3		
CU 05 Product Edit		1		2			3		
CU 06 Product Search			3			4			2
CU 7 Modify car shopping	4			4				3	
CU 8 Register Shipping Data		5		1			3		
CU 9Register Payment Data			1		3			6	
CU 10 Change Password	1					2			2
CU 11 Suspend Account	1			5				5	
CU 12 Reports		6			3		4		

Figure 3

Project Estimation tool

Source: Own elaboration

Based on the effort hours obtained in the estimation tool, the team can establish a Comprehensive Project Plan, which integrates the following elements: Risk Management Plan, Work Breakdown Structure (WBS), Schedule, Communications and Data Plan, Infrastructure Plan, Measurement and Analysis Plan, Configuration Management Plan, Human Resources Definition, and Repository Structure.

The project schedule is shown in Figure 4.

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Box 4

Activity Number	Description	Responsible	Effort asigned	Planned Date		Real Date	
				Start	End	Start	End
	Requirements specification		219				
1	Task allocation meeting	APE-GAH	3	05/09/2023	05/09/2023	05/09/2023	06/09/2023
2	Conduct requirements gathering (on-site with the client)	ANALISTA-AILM	4	05/09/2023	06/09/2023	06/09/2023	07/09/2023
3	Conduct BPMN business rules	ANALISTA-AILM	9	07/09/2023	07/09/2023	07/09/2023	08/09/2023
4	Create project directory structure in the repository	CRO-CRSP	4	08/09/2023	08/09/2023	08/09/2023	08/09/2023
5	Establish access permissions to repository folders	CRO-CRSP	45	09/09/2023	09/09/2023	09/09/2023	09/09/2023
6	Create requirements list	ANALISTA-AILM	23	09/09/2023	15/09/2023	10/09/2023	15/09/2023
7	Validate requirements list	APE-GAH, CLIENTE-RCH	2	16/09/2023	16/09/2023	16/09/2023	16/09/2023
8	Correct requirements list	ANALISTA-AILM	4	17/09/2023	17/09/2023	17/09/2023	17/09/2023
9	Create requirements specification	ANALISTA-AILM	12	19/09/2023	22/09/2023	19/09/2023	23/09/2023
10	Define delivery protocol	APE-GAH, CLIENTE-RCH	3	23/09/2023	23/09/2023	23/09/2023	23/09/2023
11	Develop initial user interface prototype	DISEÑADOR-ACA	20	24/09/2023	29/09/2023	24/09/2023	28/09/2023
12	Verify requirements specification	REVISOR-ET PENDIENTE	3	30/09/2023	30/09/2023	30/09/2023	30/09/2023
13	Correct requirements specification	ANALISTA-AILM	1	01/10/2023	01/10/2023	02/10/2023	02/10/2023
14	Validate/Accept requirements specification	APE-GAH, CLIENTE-RCH	1	01/10/2023	01/10/2023	02/10/2023	02/10/2023

Figure 4

Project Schedule

Source: Own elaboration

Project Design

As part of the Monitoring and Control activities, the activities specific to the methodology involved in system design are followed up. Figure 5 shows the database diagram that is part of the contributions of the learning unit on Database Queries and Optimization, where an initial business model is performed, the functional requirements are reviewed, and from this, the system data dictionary is established.

Figure 6 shows the Component Diagram made in UML, which defines the architecture of the system. In addition to these diagrams, sequence diagrams are made and in some cases class and state diagrams to obtain different views of the system's behavior and be the basis for construction.

Box 5

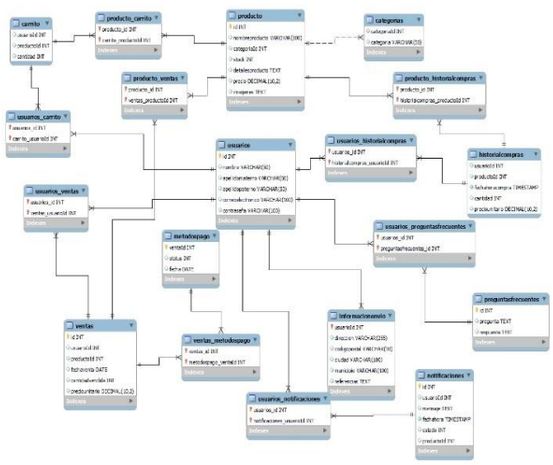

Figure 5

Database Model

Source: Own elaboration

Box 6

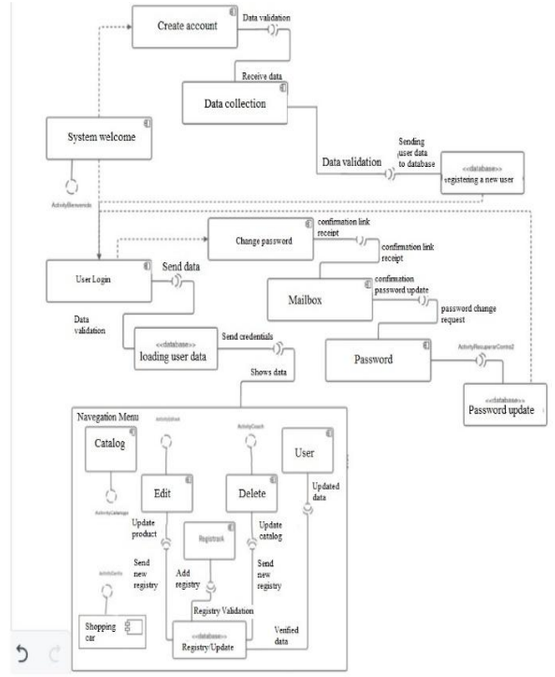

Figure 6

System Component Diagram

Source: Own elaboration

Project Construction

During the Construction phase, the functionalities were programmed, ensuring compliance with the functional and non-functional requirements defined in the first phase.

Based on the Human-Computer Interaction Learning Unit, it was determined that the design must be intuitive and accessible to all users, including those with disabilities.

This entailed complying with web accessibility guidelines, such as WCAG (Web Content Accessibility Guidelines), to ensure that the site was usable by people with different abilities.

The site also had to be compatible with mobile devices, tablets, and desktop computers. In this example, the development was carried out in React Vite, and a Coding Guide was established to peer review the source code and ensure its quality.

Figures 7, 8, and 9 show the implementation interfaces.

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Box 7

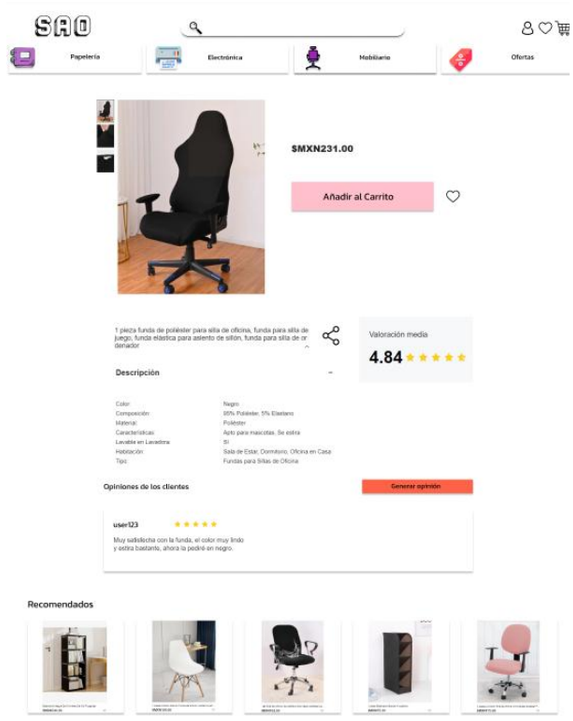

Figure 7

Product View Interface

Source: Own elaboration

Box 8

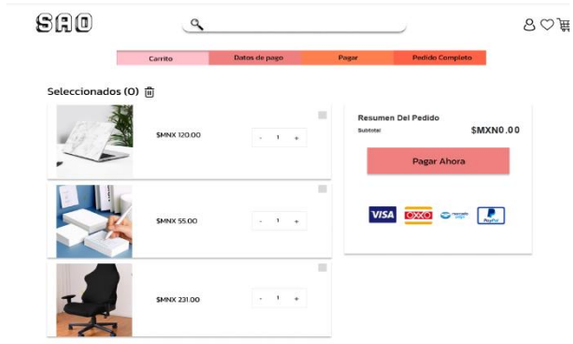

Figure 8

Shopping car interface

Source: Own elaboration

As part of the implementation and in compliance with the Virtual Environment Design learning unit, a 3D modeling of the project's products was proposed. This allowed for the integration of another product view into the online store, thus providing a more personalized experience for the customer.

Figure 10 shows the steps for modeling and texturing a keyboard. This was done using Blender.

Box 9

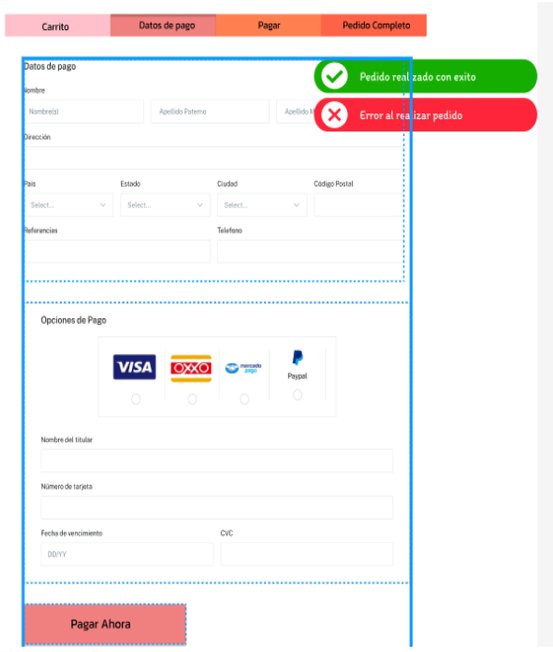

Figure 9

Payment and shipping data interface

Source: Own elaboration

Box 10

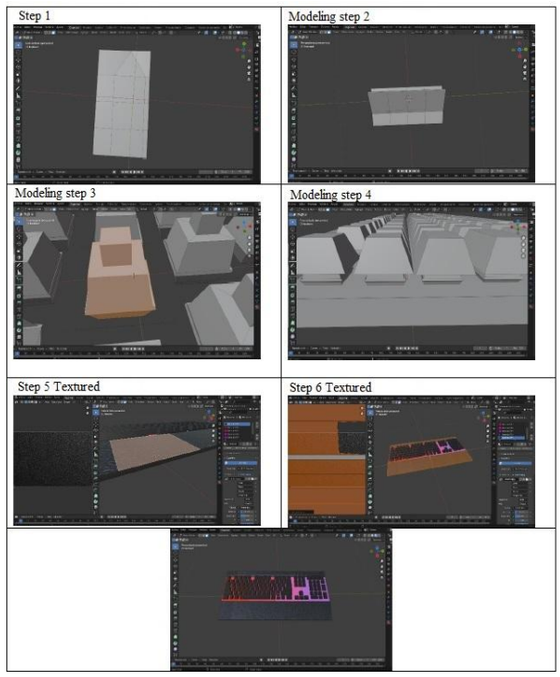

Figure 10

3D keyboard modeling

Source: Own elaboration

For the Mobile Devices Learning Unit, an Android version was implemented, where the responsive interface design was maintained, which can be seen in Figure 11.

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Box 11

Figure 11

Mobile application with responsive design

Source: Own elaboration

Process and Product Quality Assurance

To comply with the Process and Product Quality Assurance Practice Area, verification and validation reports are prepared for the various documents generated throughout the process, as well as audits of the different project phases.

Figure 12 shows an example of the verification of the Traceability Matrix document. Verification allows the project reviewer to internally verify that the document is free of defects and meets its intended purpose.

Validation is considered an external quality assurance activity since it is performed with the client to ensure compliance with each deliverable.

Box 12

4. System Test Plan Verification Results

Software Development and Maintenance Verification Report 1 System Test Plan		
Date: 0/0/2023	**Location: Apizaco, Tlaxcala, México**	**Duration: 2 hours**
Participants:		
Name		**Rol**
Alejandra Itzel López Medina		Revisor
Alejandro Calderón Aguilar		**Project Management**
Geraldin Arenas Hernández		Quality Control
Brian Michel Hernández García		Programmer leader
Item to check	**Defects found**	
Document Format	Correct the document, the information has not yet been updated.	
Document Name	Complies with the requirements.	
Document Spelling	Complies with the requirements.	
System Test Case Name	Complies with the requirements.	
Functional Requirement	Complies with the requirements.	
Use Case	Correct the document.	
Use Case Name	Correct the document, the information has not yet been updated.	
Test Case	Verify that the results match the case.	
Expected Result	Complies with the requirements.	
Date	Pending date.	

Figure 12

Example of Verification Report

Source: Own elaboration

Figure 13 shows the application of auditing to the design phase, aimed at ensuring that the activities defined in the project schedule are being carried out and that the defined process is being followed. To ensure objectivity and neutrality, a cross-audit mechanism was defined, where team members from the fifth "A" review the documents of teams from the fifth "B" auditing phase. This ensured that no bias was present in the auditing process.

Box 13

Analysis and Design	Yes	No	N/A	
1.Is there an analysis and design document?	■	□	□	
2. Is there traceability between the analysis and design models and the ERS document?	■	□	□	
3. If changes were made, were all affected products affected?	■	□	□	
4. Is the traceability matrix completed, including the corresponding design references?	■	□	□	
5. Has the analysis and design document undergone the corresponding revisions?	■	□	□	
6. Are the sequence diagrams complete and correspond to UML nomenclature?	■	□	□	
7. Is the system architecture documented with a deployment or component diagram using UML?	■	□	□	
8. Were the interfaces fully documented in the analysis and design?	■	□	□	
9. The integration test plan document defines the various components to be integrated.	■	□	□	
10. The integration test plan document has been verified.	□	■	□	The integration test plan document is not verified. Only the template is available, but the file is not fully completed.
11. The analysis and design document has been fully verified.	■	□	□	
12. The analysis and design document has been validated.	□	■	□	The analysis and design document has not been validated.

Figure 13

Audit of the analysis and design phase

Source: Own elaboration

Configuration Management

As part of Configuration Management, students defined project folders using Google Drive to keep information available to team members. The elements that would be included in the project folders, as well as the file access mechanisms, were defined during planning. Throughout the project, instructors reviewed the nomenclature of the generated documents, as well as reviewed them during physical audits.

Figure 14 shows the structure of the Requirements folder as an example. All teams were required to maintain a common structure throughout the project.

Box 14

1. Repository Structure

LOCATION	NOMENCLATURE
1_Requirements	
ValidationReports	
Validation Requirements Report	SAOValidationReportXXX_#
VerificationReports	
Verification Requirements Report	SAOVerificationReportXXX_#
Requirements List	SAORequirementsList
System Planing Test	SAOSystemTestPlan
Trazability Matrix	SAOTrazabilityMatrix
2_Planning	
ValidationReports	
Validation Planning Report	SAOValidationReportXXX_#
VerificationReports	
Verification Planning Report	SAOVerificationReportXXX_#
Project Plan	SAOProjectPlan
Estimation Tool	SAOEstimationTool
3_Design	
ValidationReports	
Validation Design Report	SAOValidationReportXXX_#
VerificationReports	
Verification Design Report	SAOVerificationReportXXX_#
Analysis and Design Document	SAOAnalysisDesign
Integration Test Plan	SAOIntegrationTestPlan

Figure 14

Folder structure

Source: Own elaboration

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Conclusions

The development of online sales systems or e-commerce presents a series of functionalities that can be properly implemented under the quality practices of the CMMI-Dev 2 model.

In this way, Computer Engineering students applied requirements management, planning, monitoring and control, configuration management, measurement and analysis, and quality assurance practices in the different phases of software development. In this case, 10 development projects were obtained, in which, through the elaboration of deliverable documents, UML diagrams, and internal artifacts, the students were able to follow the step-by-step process toward the construction of an online store.

Through the definition of artifacts and the application of verifications and validations, as well as audits, compliance with the requirements defined by the client was guaranteed from the beginning. As future work, a maintenance phase could be established for the implemented projects to ensure adequate evolution aligned with the client's needs.

Declarations

Conflict of interest

The authors declare no interest conflict. They have no known competing financial interests or personal relationships that could have appeared to influence the article reported in this article.

Authors' Contribution

The contribution of each researcher in each of the points developed in this research, was defined based on:

Sánchez-Pérez Carolina Rocío: Contributed to the project idea. She contributed to the guide for the implementation of the model in the different phases of the project, as well as to the review of the artifacts obtained, and writing the article.

Mora-Lumbreras Marva Angélica: Contributed to the project idea and technique, supported the phase design of the project and the verification of the prototypes. She also contributed to the implementation of the 3D Models and the writing of the article.

Sánchez-Sánchez, Norma: contributed to the research design, the verification of the Mobile application with responsive design, the implementation of the 3D Models, and the writing of the article.

Portilla-Flores, Alberto: worked on the business data analysis for the projects, and the verification of the database model. He contributed to the verification of the obtained artifacts, also worked on the writing of the paper.

Availability of data and materials

The data obtained in the investigation are available in the final report of integrative activity reported to the Computer Engineering Coordination.

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Abbreviations

IA	Integrative Activity
CMMI	Capability Maturity Model Integration
CMMI-Dev	Capability Maturity Model Integration for Development
UML	Unified Modeling Language
UATx	Autonomous University of Tlaxcala
WCAG	Web Content Accessibility Guidelines

References

Antecedents

Juan Kung & Raúl Katz, (2022). Impacto del COVID-19 en la digitalización de América Latina, Documentos de Proyectos (LC/TS.2022/177/Rev.1), Santiago, Comisión Económica para América Latina y el Caribe (CEPAL), versión on-line.

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https://doi.org/10.35429/JCT.2025.9.21.4.1.9

Padilla, B. y Mecalco, M. (2016). Recursos pedagógicos y didácticos: enfoques de enseñanza y aprendizaje México: UATx.

Basic

William González Obregón, Yordani Cruz Segura, Ailía Parra Fernández y Yaimí Trujillo Casañola (2021). Buenas prácticas en el empleo de CMMI en empresas desarrolladoras de software, Serie Científica de la Universidad de las Ciencias Informáticas Vol. 14 Núm. 4 Pag 215-225.

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