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Master in Computer science

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Title of the thesis

**Design and Development of Learnify DZ:
An AI-Powered Mobile Platform for Smart and
Interactive E-Learning**

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Abstract:

This project aims to introduce a smart e-learning system called "Learnify DZ," which seeks to enhance digital education in Algerian higher education institutions. The system addresses the challenges of limited digital educational resources, the lack of specialized local platforms, and the scarcity of local electronic payment solutions. It features a structured curriculum, an AI-powered chatbot, and technologies such as Flutter and Firebase. The system assists instructors in managing the educational process and provides students with a personalized learning experience, thereby facilitating access to education in universities today and contributing to the digital transformation.

Keywords: E-learning; Artificial Intelligence(AI); Learning Management Systems(LMS);

الملخص:

يقدم مشروع Learnify DZ منصة تعليم إلكتروني ذكية تهدف إلى تحسين التعليم الرقمي في التعليم العالي بالجزائر. يعالج المشروع مشاكل نقص الموارد التعليمية الرقمية، وغياب المنصات المحلية المتخصصة، إضافة إلى محدودية حلول الدفع الإلكتروني المحلية. يعتمد على مسار دراسي منظم ومساعد ذكي وتقنيات حديثة مثل Flutter و Firebase. يوفر تعلمًا مخصصًا وأدوات للأساتذة مما يعزز الوصول والتحول الرقمي في الجامعات الجزائرية الحديثة في الوقت الراهن.

الكلمات المفتاحية: التعلم الإلكتروني؛ الذكاء الاصطناعي؛ أنظمة إدارة التعلم؛

Résumé:

Ce projet vise à introduire un système d'apprentissage en ligne intelligent, « Learnify DZ », destiné à améliorer l'enseignement numérique dans les établissements d'enseignement supérieur algériens. Ce système répond aux défis posés par la limitation des ressources pédagogiques numériques, le manque de plateformes locales spécialisées et la rareté des solutions de paiement électronique locales. Il comprend un programme structuré, un chatbot basé sur l'intelligence artificielle et des technologies telles que Flutter et Firebase. Le système aide les enseignants à gérer le processus pédagogique et offre aux étudiants une expérience d'apprentissage personnalisée, facilitant ainsi l'accès à l'enseignement supérieur et contribuant à la transformation numérique.

Mots-clés : E-learning ; Intelligence Artificielle ; Systèmes de Gestion de l'Apprentissage ;

Dedications

*"And our final prayer is that all praise belongs to Allah, Lord of the Worlds. Praise be to Allah, by whose grace good deeds are accomplished, and who granted me success and aided me in completing this scholarly work after effort, perseverance, and patience. I dedicate the fruits of this achievement to my dear father, **Saber**, may Allah preserve him, who showered me with his support and was my pillar of strength throughout my journey, and to my beloved mother, **Wahiba ben Yahya**, may Allah preserve her and grant her a long life, whose prayers were the secret to my success and whose tenderness was the source of my strength. I also extend my sincere thanks and appreciation to my brothers, **Amine** and **Riyad**, and my sister, **Imane**, in recognition of their continuous support and constant encouragement. To the first grandson in the family, **Sanad**, I ask Allah to bless him, protect him, and grant him a future filled with success and prosperity. Finally, to myself, who faced difficulties with patience and determination and did not falter despite the challenges, I dedicate this achievement with all pride, as it is the fruit of a long journey of effort and perseverance. Praise be to Allah for reaching the end, and praise be to Allah for the blessing of attainment."*

Berra Nabila

*"And their final supplication is: Praise be to God, Lord of the Worlds. Praise be to God in love, gratitude, and thanksgiving. Praise be to God who facilitated the beginnings, brought me to the end, and enabled me to complete this work after toil and patience. I dedicate the fruits of my labor to the one who was my support and strength in this life, to the one who taught me the meaning of patience and perseverance, my dear father, **Ahmed**, may God preserve him, and to the one whose prayers accompanied me every step of the way, the wellspring of tenderness and source of security, my beloved mother, **Messouada Lounnas**, may God preserve her and grant her a long life. I also extend my sincere thanks and appreciation to my brothers, **Abdelrahim** and **Azzedine**, and my sisters, **Marwa**, **Nour**, and **Ritadj**, in recognition of their supportive presence and sincere love. And to the grandchildren of the family, **Djoudi Arkane** and **Rital El-Wateen**, I ask God to protect them and fill their days with joy and success. Finally, to myself, who persevered, toiled, and continued despite the difficulties, I dedicate this achievement with all pride, in appreciation of a journey of effort and perseverance. Praise be to God for the completion, and praise be to God for the joy of arrival."*

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PART I

**THEORETICAL FRAMEWORK AND
SCIENTIFIC IMPLEMENTATION**

General Introduction

The world in recent years has seen an unprecedented moment of digital transformation, involving many sectors and education is not the exception. The concept of learning has been transformed from the traditional classroom and printed book to modernised digital platforms and smart applications that allow learners to access learning information anytime, anywhere. The proliferation of the internet and mobile devices has pushed the development of new learning models to a rapid pace including e-learning, m-learning and learning management systems (LMS), that can facilitate and organize the learning process. Moreover, artificial intelligence (AI) has emerged as a key component in building the systems, facilitating personalized content delivery, adaptive learning experiences, and virtual assistants to aid learners throughout their educational journey.

Despite these advancements, the higher education space in Algeria is still characterised with a lack of good-quality digital education resources, localised platforms and learning spaces to be contextually relevant and extremely secure, as well as integrated payment solutions that align with the Algerian financial system. The restrictions illustrate the need for a creative, indigenous-based solution, tailored to the needs of Algerian university students.

The Learnify DZ project is introduced here as a smart Educational App which is targeted at university students in Algeria. The platform is designed to offer structured courses that are available on mobile platforms, with an intelligent assistant with AI and payment technologies adapted to the Algerian context. By combining modern technologies such as Flutter, Firebase, Node.js, and Google Gemini, Learnify DZ aspires to bridge the gap between global e-learning standards and local educational needs.

This report includes an introduction, three chapters and a conclusion:

Chapter 1: Presents the background, problem statement, goals, proposed solution, and background research, as well as the functional and non-functional requirements for the system.

Chapter 2: Presenting the system design phase and its use case modeling with UML model, sequence modeling, class modeling.

Chapter 3: Describes the technical study, development tools, and project implementation using some of the key user interfaces.

Chapter 01

Theoretical Foundations of Intelligent E-Learning Platforms

Chapter 01 Theoretical Foundations of Intelligent E-Learning Platforms

1. Introduction

In recent years, the world has experienced a rapid digital transformation across various sectors, and education is among the most affected fields. Learning is no longer restricted to conventional classrooms and printed books; instead, it progressively depends on advanced stages and shrewd applications that permit understudies to get to instructive substance at any time and from anyplace. The spread of the web and smartphones has contributed to the development of modern learning models such as e-learning and portable learning, in expansion to learning administration frameworks that offer assistance organize the instructive prepare. Counterfeit insights has too ended up an critical component in the improvement of these stages by giving personalized substance and virtual collaborators that bolster understudies amid learning.

In this context, the Learnify DZ project is presented as a smart educational application designed for university students., planned to offer courses through versatile phones, along with a intelligent assistant and electronic installment innovations that suit the Algerian context.

2. Digital transformation in education

Advanced technologies in education are a strategic way to enhance the quality of education and access to knowledge. With the tremendous development of information and communication technologies, education is gradually moving from the classroom environment to the digital environment and technological means. This transformation opens up opportunities for more flexible learning, at any time and any place, and enables students to interact with both teachers and classmates over the web. In addition, with the advent of high-speed internet and smart devices, the trend has been intensified, with the creation of more dynamic and responsive learning environments, and a dramatic shift toward access to education and technology [1].

3. E-Learning

3.1. Concept of E-Learning

E-learning means using electronic media and digital technologies to access learning material online or via local networks, and to control the learning process electronically. To offer flexibility in learning, permitting students to learn at their own rate [2].

3.2. The advantages and disadvantages of E-Learning

advantages	disadvantages
- Easy access to educational materials at any time and from any place. -Decrease of instructive costs such as transportation, printed books, and physical facilities. -Possibility for learners to study at their own pace according to their level of understanding. - Accessibility of differing learning assets such as recordings, computerized records, and intuitively activities. -Capacity of advanced stages to adjust to distinctive learning styles and back huge numbers of learners. -Potential to accomplish successful learning results when online courses are well organized and legitimately planned.	-Limited internet connectivity or lack of appropriate digital devices in some regions. -Reduced direct interaction between learners and instructors compared to traditional classrooms. -Need for basic digital skills to use online platforms effectively. -Requirement for strong self-discipline and time management from learners. -Risk of low engagement if online courses are poorly designed or lack quality content.

Table 1.1:The advantages and disadvantages of E-Learning

3.3.Types of E-Learning

E-learning can be categorized into a few types:

-Synchronous e-learning : Real-time interaction between educates and understudies through live sessions or virtual classrooms [3].



Figure1.1: Synchronous e-learning [3]

-Asynchronous e-learning : Learning that happens at the student's possess pace utilizing pre-recorded addresses, discourse gatherings, and advanced materials [3].

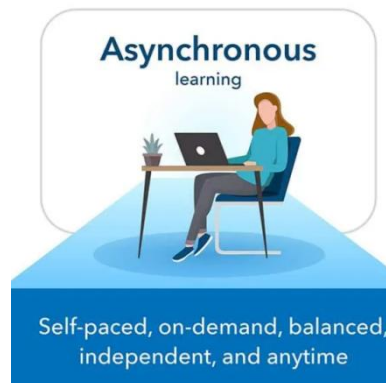


Figure1.2: Asynchronous e-learning [3]

-Blended learning : A combination of conventional face-to-face instruction and online learning components.

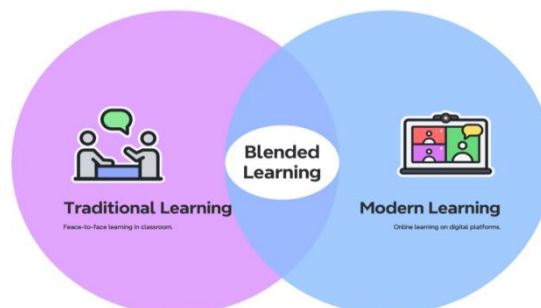


Figure1.3: Blended learning [4]

4. Learning Management Systems (LMS)

4.1. Concept of LMS

A Learning Management Systems (LMS) is a software application or web-based platform planned to arrange, provide, oversee, and assess instructive courses and preparing programs. An LMS permits instructors to make and organize course substance, transfer lessons and appraisals, encourage intuitive, and screen learner advance, whereas empowering understudies to get to learning materials, total assignments, and track their scholarly execution electronically [5].

4.2. Core functions of LMS

Learning Administration Frameworks incorporate a few key capacities that back the successful administration of online education:

-User administration: Creation of accounts and task of parts (understudies, educates, directors) with controlled get to rights.

-Course organization: Organizing courses into modules or units to guarantee clear and consistent substance delivery.

-Content conveyance: Uploading and sharing learning materials such as archives, recordings, and introductions. **Assessment Tools:** Creating quizzes and assignments, with options for grading and feedback.

-Communication highlights: Giving gatherings, declarations, and informing devices to back interaction.

-Progress following and announcing: Checking understudy interest, entries, and scholastic execution.



Figure1.4: Core functions of LMS[6]

4.3.Role of LMS in higher education

Learning Management Systems (LMS) are vital to higher education institutions in both the classroom and online education. They provide a system that allows students to see the coursework, upload assignments and interact with the teachers. All academic activities are integrated in one system, thus facilitating access to it, coordinating and overall learning management [7].

5. Mobile Learning

5.1. Concept of mobile learning

Mobile learning alludes to the utilize of convenient gadgets such as smartphones and tablets to get to and bolster instructive exercises anytime and anywhere.

5.2. Importance of mobile learning for students

Mobile learning is vital for understudies since it:

- Allows simple and speedy get to to instructive content.
- Enables learning at any time and from any location.
- Helps understudies survey addresses and materials at whatever point needed.
- Supports nonstop observing of scholastic progress.
- Encourages more noteworthy duty and free learning.

6. Artificial intelligence in education

6.1. Concept of AI in education

systems within the educational context to improve the process of education and learning is known as Artificial Intelligence (AI) in education. These systems have the capability of analysing large amounts of student data to identify student learning patterns, performance and needs. Moreover, with AI, it is possible to create adaptive learning environments where educational content will be dynamically tailored based on the learner's pace, level, and learning style. This makes learning more efficient, interactive and centering on the learner [8].

6.2. Advanced AI technologies in education

AI's use in education involves various sophisticated technologies contributing to intelligent learning systems and automation:

-Machine Learning (ML):Data is analysed to detect learning patterns, student performance and offer individual learning path.

-Deep Learning (DL):A subset of machine learning that uses neural networks for interpreting data that is more complex, such as in speech, images and videos. It can be applied in the education industry for speech recognition, automated content analysis and intelligent video-based learning.

-Natural Language Processing (NLP): Is the ability of a system to recognize and communicate with humans in their natural language. It is quite a common feature in chatbots, virtual assistants and automated feedback systems.

-Learning Analytics:Is about gathering and analyzing learning data to enhance learning outcomes and teaching practices.

-Recommender Systems:Suggest the most relevant course and material suggestions based on learner behavior and preferences

-Predictive Analytics:Can recognize students who may be in jeopardy and intervene early.

6.3. Applications of AI in learning

AI is applied in education through several intelligent systems, including:

-Course recommendation systems that provide individual learning trajectory.

-Intelligent tutoring systems with the simulation of one-to-one teaching.

-The facility to automatically assess and to mark and feed back instantly.

-AI chatbots and virtual assistants to help students throughout the process.

-Speech and image recognition systems using deep learning.

6.4. Role of the intelligent assistant

An brilliantly accomplice capacities as a virtual back gadget interior computerized learning stages. It contributes to overhauling the learning inclusion through the taking after roles:

- Answering educational questions:** Giving incite responses to students' inquiries.
- Explaining complex concepts:** Clarifying troublesome focuses in a direct and sensible way.
- Providing learning recommendations:** Suggesting critical materials or works out based on students' needs.
- Encouraging self-directed learning:** Supporting understudies in directing their have learning handle and moving forward their independence.
- Offering ceaseless offer assistance:** Ensuring ceaseless back, which makes a contrast make a more scholarly people and solid learning environment.

7. Advancement of E-Learning platforms

E-learning stages have created significantly over the past a long time. In the starting, these stages were basically utilized to transfer and share learning materials in a fundamental computerized arrange. Their part was restricted to substance dissemination, with small interaction between educates and learners.

Today, in any case, e-learning stages give total and coordinates learning situations. They incorporate intelligently video addresses, tests and appraisals, certificates of completion, dialog gatherings, and communication instruments that bolster collaboration between understudies and educates. This advancement reflects the developing require for adaptable and open education.

Among the most well-known worldwide stages are :

- Coursera:** which offers university-level courses and proficient certificates in organization with universal institutions.
- Udemy:** a commercial center stage where educates make and offer courses on a wide run of themes.
- edX:** which gives scholarly and proficient courses created by driving colleges and organizations.

These stages have contributed altogether to the spread of self-learning around the world by making high-quality instructive substance available to millions of learners. In any case, in spite of their worldwide victory, they do not continuously completely react to nearby needs,

especially in terms of dialect choices, social setting, or installment strategies reasonable for particular locales.

8. Electronic payment systems in educational platforms

8.1. Concept of electronic payment

Electronic payment refers to the process of conducting financial transactions through digital systems instead of using physical cash. It depends on electronic apparatuses such as bank cards, online exchanges, and computerized wallets. This sort of installment has ended up progressively common due to its speed, comfort, and security, particularly in online administrations. Electronic installment frameworks permit clients to pay for administrations remotely, which makes them especially reasonable for computerized stages, counting instructive stages that give online courses and learning materials.

8.2. Payment methods in educational platforms

Modern educational platforms usually offer several payment options to facilitate access to courses and digital services. These strategies may incorporate installment by bank cards, advanced wallets, and subscription-based frameworks. A few stages too permit installment or occasional installment models for long-term courses. Giving different installment strategies makes a difference clients select the most helpful alternative concurring to their needs and money related conceivable outcomes, making the obtaining handle smoother and more available.

8.3. Electronic payment in the algerian context

In Algeria, electronic payment has developed gradually with the introduction of national digital payment tools. These devices permit clients to perform online exchanges safely and encourage the utilization of computerized administrations such as e-learning platforms.

One of the most broadly utilized installment strategies is the **Edahabia Card** issued by Algérie Poste. This card permits clients to pull back cash from ATMs, pay online through Algerian websites, and exchange reserves utilizing postal administrations. The Edahabia card plays a critical part in growing electronic installment among Algerian citizens.

Another important payment method is the **BIS bank card**(Interbred Card), given by diverse Algerian banks. It permits clients to make online installments through the national

electronic installment framework and get to managing an account administration safely. The accessibility of these installment strategies contributes to empowering the utilization of online administrations by giving secure and helpful installment arrangements adjusted to the Algerian context.

9. The State of E-Learning in algeria

E-learning in Algeria has seen recognizable advancement in a short time later a long time, especially in the middle of the COVID-19 distant coming. In the middle of this period, colleges depended on advanced stages of acceleration to pass on courses remotely and keep up instructive development. The Advantage of Higher Instruction played an essential part by inducing and supporting online frameworks for colleges over the country.

Despite these endeavors, a few challenges continue to affect the ampleness of e-learning in Algeria, including:

- Weak web framework in a few districts, which limits access to online education.
- Limited neighborhood instructor substance, lessening the openness of materials adjusted to the Algerian scholarly context.
- Reduced interaction inside certain stages, which may unfavorably impact understudy engagement and communication.

These challenges diagram the centrality of making adjoining educator applications particularly organized for Algerian college understudies. Such courses of activity ought to take into account the creative environment, cash-related conditions, and reasonable installment strategies open inside the national setting.

10. Conclusion

The analysis presented in this study shows that e-learning is no longer simply an alternative method of education, but an essential component for the development of the educational system in Algeria. In spite of the fact that imperative advance has been accomplished in later a long time, a few challenges stay, especially those related to computerized foundation, the accessibility of nearby instructive substance, the level of interaction in online situations, and the openness of appropriate electronic installment arrangements. These confinements highlight the require for a locally created cleverly stage able of reacting to the needs of distinctive categories of learners. In this setting, the Learnify DZ extend speaks to a down to earth step toward moving forward get to to learning assets,

upgrading the in general quality of advanced instruction, and making a more adaptable and learner-centered instructive environment.

Chapter 02

Analysis and design

Chapter 02 Analysis and design

1. Introduction

This chapter will outline the design of the Learnify DZ platform based on UML diagrams. It consists of three diagrams: the use case diagram, the class diagram, and the sequence diagram. The use case diagram illustrates the interactions between the system and actors. The class diagram specifies the relationship and structure which is static. The sequence diagram describes the dynamic behaviour of processes that are important. All the diagrams have a text description. This design is a guideline towards the implementation stage.

2. Definition of UML

Unified Modeling Language (UML) is an industry-neutral visual modeling language applied to software engineering to design, visualize, build and document the structure and behavior of a system. It offers standardized diagrams, which allow the developers and stakeholders to comprehend, design, and convey system architecture and functionality. UML has various categories of diagrams like structural and behavioral diagrams that combine to give a detailed perspective of the system [9].

3. UML diagrams

UML diagrams are standardized graphical models employed in software engineering to model, visualize, and document various facets of a system. They give a systematic means of depicting system architecture, behavior and interrelations amongst system components. UML diagrams are useful in simplifying the complex software system as they present various views, such as structural and behavioral views, which aids in system analysis design and communication between the stakeholders [10].

UML diagrams are divided into three categories: Functional, Static and dynamic diagrams.

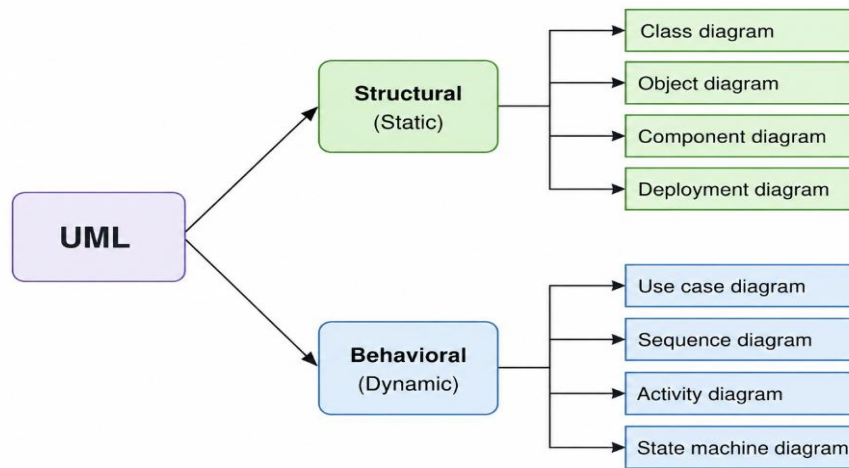


Figure 2.1: UML diagrams

3.1. Use case diagram

3.1.1. Definition

A use case diagram in the Unified Modeling Language (UML) is a behavioral diagram, which shows the functional requirements of a system by showing the interaction between external actors and the system. It explains how users (actors) interface with the system in order to attain certain goals, giving a high-level overview of how the system works. Use case diagrams are mostly employed during the initial phases of the software development process in order to model and convey system requirements to the stakeholders and the developers in an understandable manner [10].

3.1.2. Admin use case diagram

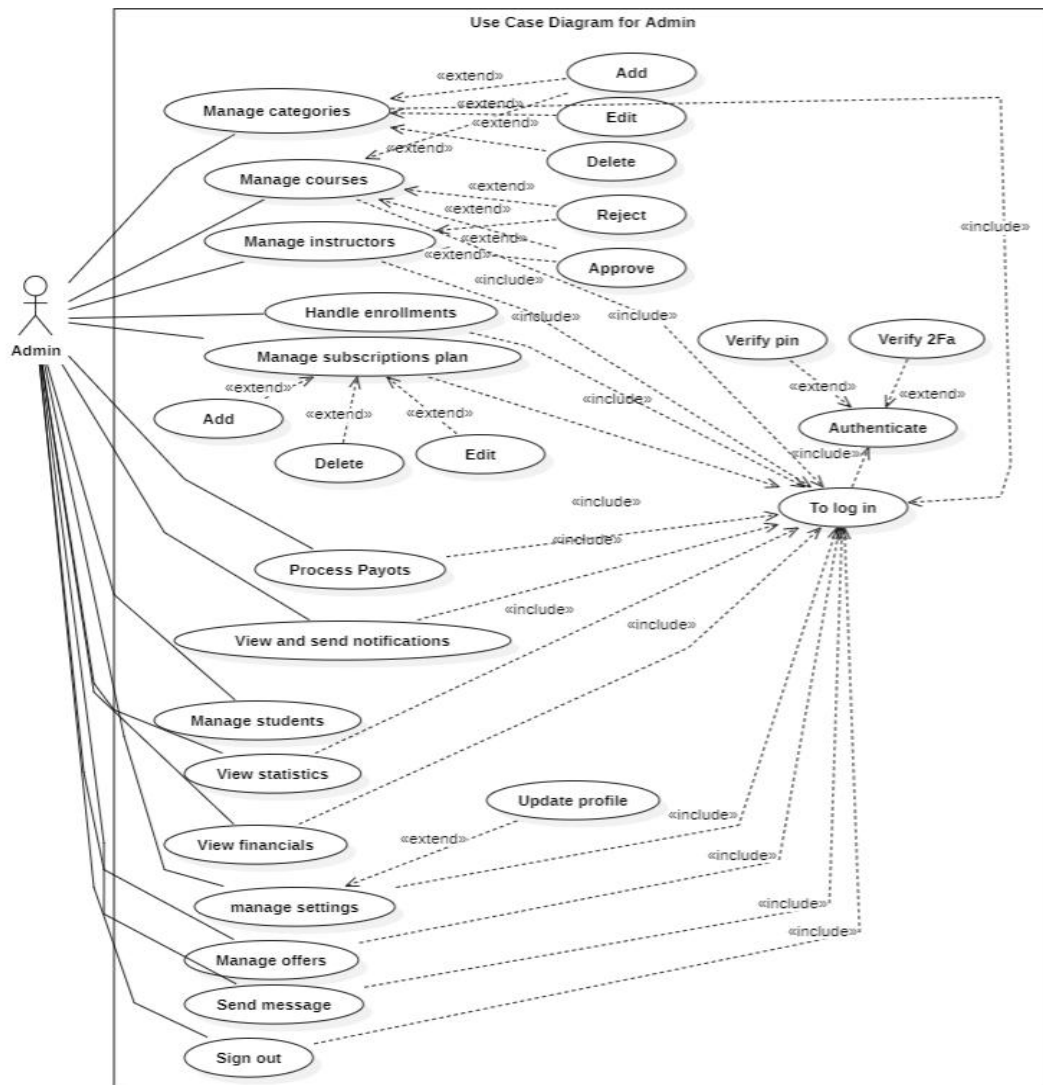


Figure 2.2: Admin use case diagram

Textual description of use case diagram for admin :

Actor:

-Admin: In charge of the system resources, users and operations.

Use Cases :

1. Login :The system is authenticated by the admin using credentials (PIN/2FA should it be turned on).
2. Manage Categories :The categories can be added, edited and deleted by the admin.
3. Manage Courses :The admin develops, modifies, gives or refuses courses.
4. Manage Instructors :The instructor accounts are reviewed by the admin and approved or rejected.
5. Manage Students :The admin adds, modifies or removes student accounts.

6. Handle Enrollments :Student enrollments are verified and confirmed by the admin.
7. Manage Subscription Plans :The admin adds, modifies or removes subscription plans.
8. Process Payouts :The administrative is in charge of financial transactions and payments.
9. View Reports and Statistics :The admin tracks performance of the system and financial reports.
10. Manage Offers :Promotional offers are created and managed by the admin.
11. Manage Settings & Profile :The admin updates system settings and personal information.
12. Notifications & Messaging :The admin sends notifications and messages to users.
13. Logout :The admin securely logs out of the system.

3.1.3. Student use case diagram



Figure 2.3: Student use case diagram

Textual description of use case diagram for student:

Actor:

-Student: A user who engages with the system to search, enroll and access courses. **Use**

Cases :

1. Sign In: The student logs in, and the system authenticated access (PIN / 2FA / fingerprint if enabled).
2. Browse & Search : The student is surfing the categories and finding courses or mentors.
3. View & Follow Mentors The student sees the mentors, follows them.
4. View Offers :The student checking available provides offers and discounts.
5. Enroll in Courses :The student registers in courses and makes the registration.
6. Make Payment :The student makes payment as and when necessary.
7. Access Courses: The student perceives course information, lesson, and learning materials.
8. Track Progress & Take Quiz: The student monitors the learning process and does quizzes.
9. AI Tutor Interaction :The student interacts with the AI tutor by asking questions.
10. Messaging & Notifications:Student sends messages and gets notified.
11. Manage Profile :The student reads and changes information in personal accounts.
12. Subscribe to Plan :The student subscribes to a plan as required.
13. Logout :The student securely logs out of the system.

3.1.4. Teacher use case diagram

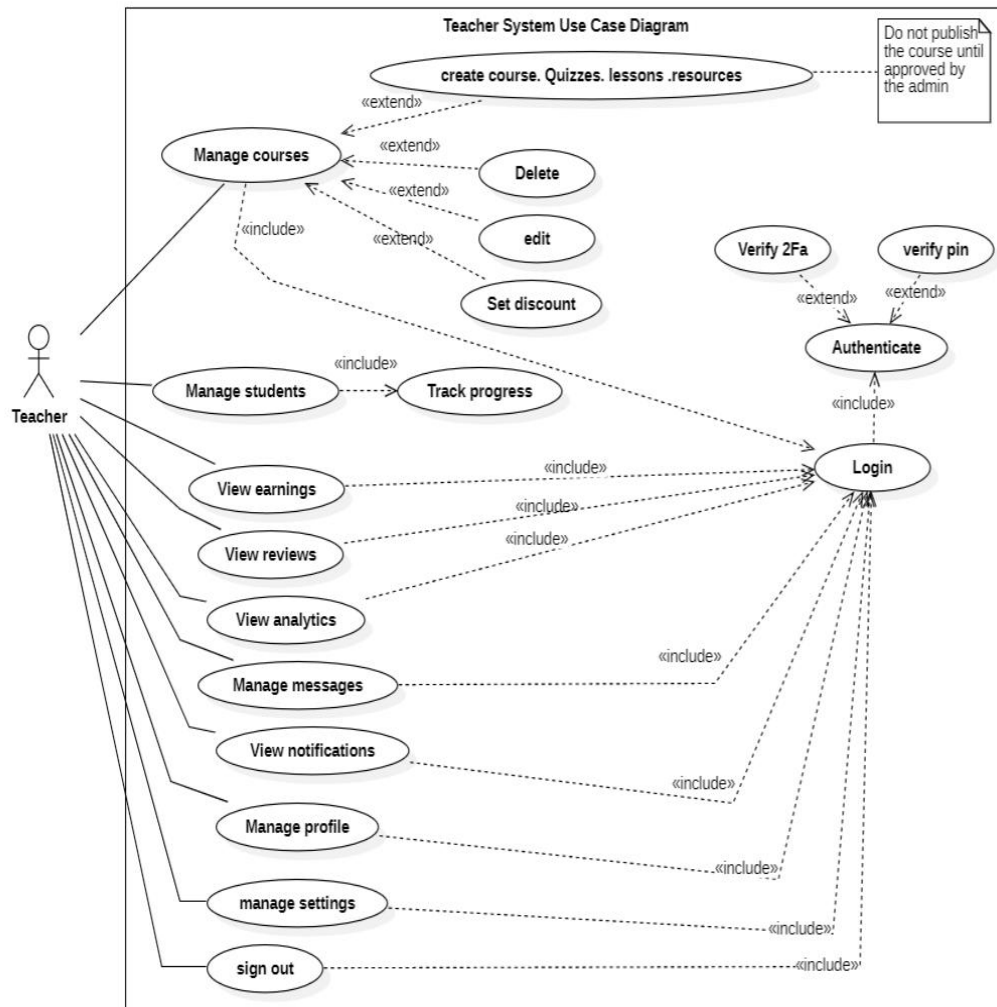


Figure 2.4: Teacher use case diagram

Textual description of use case diagram for teacher:

Actor:

-Teacher: A user who creates, maintains, and provides courses, communicates with the students and monitors the performance.

Use Cases :

1. Login : The teacher types in credentials and access is verified by the system (email/password with optional 2FA or PIN).
2. Manage Courses : The instructor will create, edit or delete courses. They are also able to offer discounts when developing courses. Published: (Courses are only published after administration approval).
3. Manage Students : The instructor operates registered students and monitors their progress.

4. View Earnings : The instructor views earnings and payout information.
5. View Reviews : Feedback is read out by the instructor.
6. View Analytics : The teacher examines performance in terms of enrollments, success rate and revenue.
7. Manage Messages : The instructor gets in touch with students or the administration.
8. View Notifications : The teacher gets information regarding courses, payments ,student activity and security alerts.
8. Manage Profile : The teacher changes his/her personal data (name, bio, profile photo).
9. Manage Settings : The preferences are set by the instructor, including notifications and security.
10. Logout : The instructor securely logs out of the system.

3.2. Sequence diagrams

3.2.1. Definition

A sequence diagram is a graphical representation of a system's operations and processes from a chronological perspective. It is a dynamic view containing symbols of objects (class instances), actors and the messages they exchange. The vertical dimension is the temporal axis: messages are represented in chronological order [10].

3.2.2. Student registration & login sequence diagram

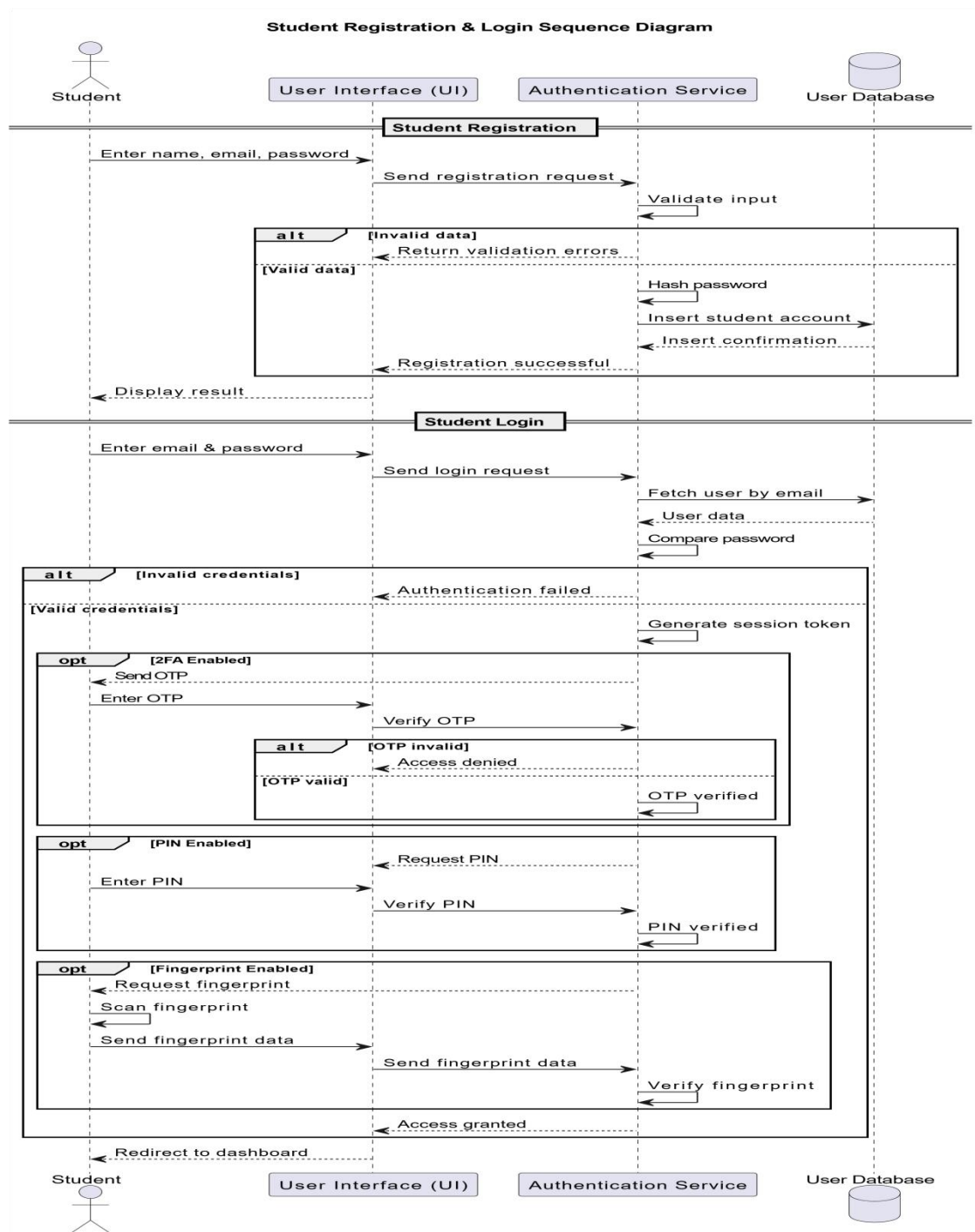


Figure 2.5: Student registration & login sequence diagram

Text description: Student registration and log in process starts when the student communicates with the system via the user interface. The student includes personal details (name, email address, password, etc.) during the registration stage along with other necessary information. This data is transferred to the authentication service through its user interface

where it is authenticated to achieve accuracy and completeness. When the data that is sent is invalid, an error message is sent to the user. Otherwise, the system safely runs a hash operation on the password and registers the details of the student account in the database. After the registration is successful a confirmation message is shown. In the process of log in, the student uses the user interface to input his email address and password. The system forwards an authentication request to the authentication service which fetches the respective user record in the database. The password entered is hashed and compared to the hashed password stored. In case the credentials do not correspond, the system rejects the access, and an error message of authentication is shown. In the event that the credentials are valid, a session token is created to uphold the user session. Also, optional security mechanisms can be used, depending on the system configuration(enabled or disabled). These are Two-Factor Authentication (OTP) that involves the sending and verification of a verification code, PIN verification, and fingerprint authentication. All the enabled methods are checked and access is granted. Lastly, after all necessary checks have been made, the system will allow the student to gain entry into the system and redirect them to the dashboard where they can navigate courses, see content and their enrolled resources.

2.3.3. Teacher registration & login diagram

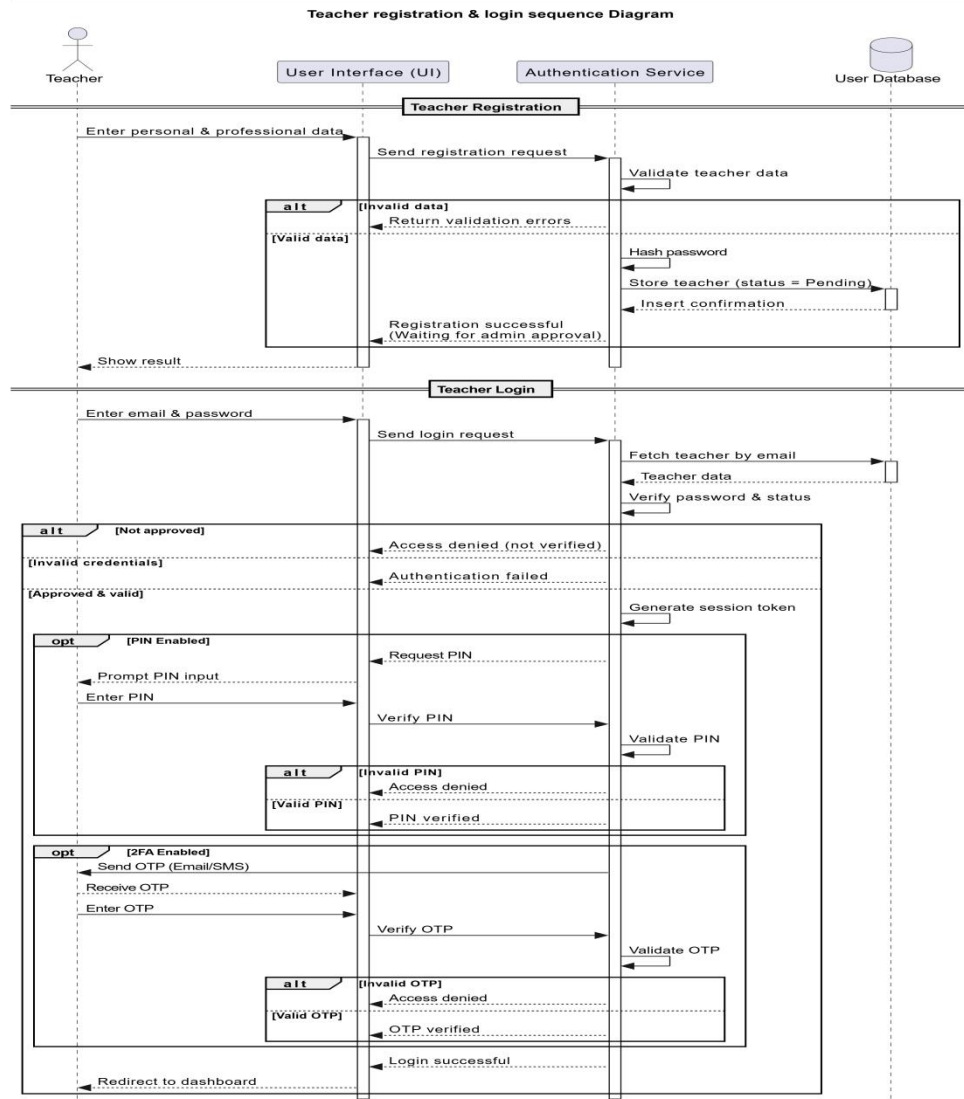


Figure 2.6: Teacher registration & login sequence diagram.

Text description: The following diagram is a representation of the entire procedure of a teacher account, including registration and authentication up to the point where permission to the system is granted. It starts with the registration of the teacher where the teacher provides his/her personal and professional details using the user interface. This information is then sent to the authentication service, which checks its validity and completeness. In case of incorrect or incomplete data, it sends the user error messages. Otherwise, the password is safely hashed and the information about the teacher is stored in the database in the “Pending” state, i.e. the account cannot be used until it is approved by the administrator. A teacher is then notified that his/her request is under consideration. This is followed by the process of logging in. The teacher inputs the email and the password via user interface and the authentication service

receives the request and the corresponding data is retrieved in the database. The system checks the password (in hashing comparison) and account status. In case of the falsity of the credentials, the attempt to log-in is denied. In case the account has not been approved, the access is denied and a relevant message is given too. But in case the credentials are legit and the account is given the green light, the system moves on to create a session token to create a secure connection. Moreover, the system can also demand additional security measures depending upon the settings. As an example, the teacher can be requested to enter a PIN, which is checked and then proceeded. In the same way, with Two-Factor Authentication (2FA) on, the teacher will receive a one-time password (OTP), which he will have to enter to finish the verification process. In case any of these extra checks are not satisfied, access is denied, otherwise, the authentication is successfully accomplished. Lastly, after validation of all the necessary steps, the teacher is redirected to the dashboard where he/she is granted access to the system and begins utilizing it.

3.2.4. Admin verification of teacher accounts sequence diagram

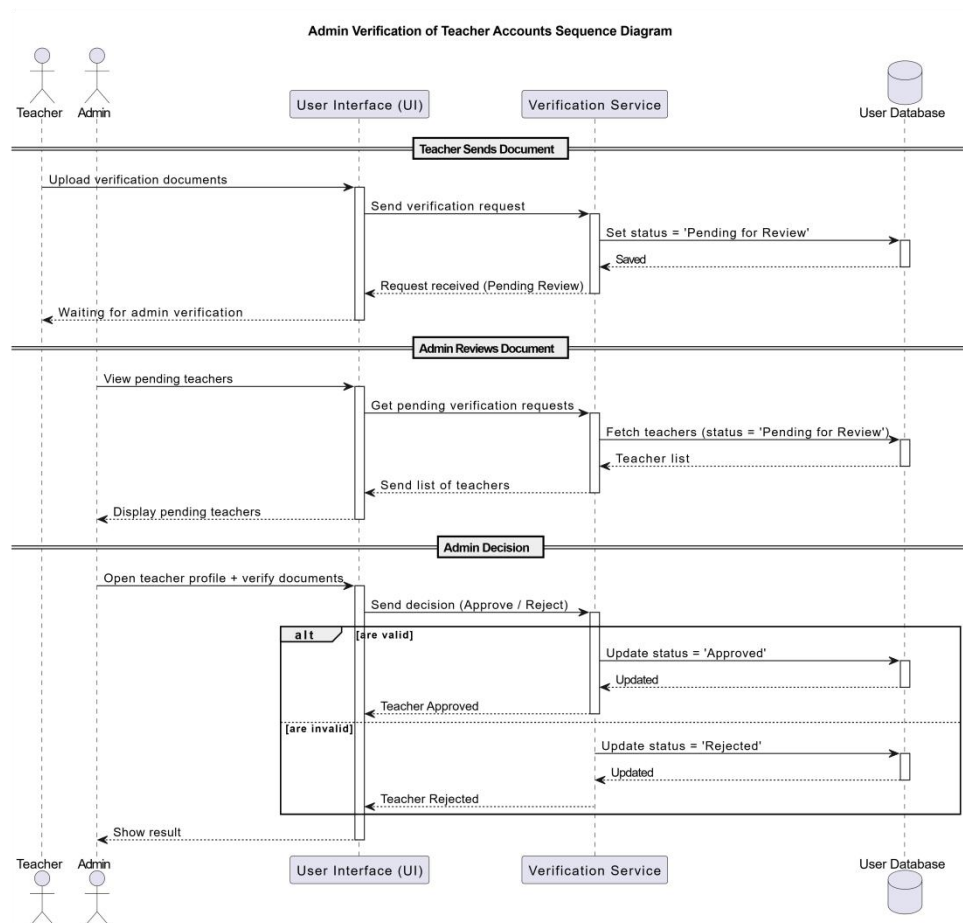


Figure 2.7: Admin verification of teacher accounts sequence diagram

Text description: This sequence diagram depicts the verification of the teacher in the system. It starts with the verification documents uploaded by a teacher via the user interface. These records are forwarded to the verification service that changes the account status of the teacher to "Pending for Review" and records the data in the database. Once submitted, the teacher goes to a wait state until verification is done. The administrator then pulls up the list of the teachers whose accounts are awaiting review and using the system, access the documents submitted by teachers. The admin takes its time to go through the profile of every teacher and ensure that he or she has the authenticity of his or her documents. In case of the documents being valid and satisfying the necessary requirements, the administrator accepts the request and the status of the teacher is changed to "Approved" in the database. In case of invalidity or incompleteness of the documents, the administrator disapproves the request and the status is changed to "Rejected". Lastly, the system informs the teacher of the outcome. This diagram will provide a secure and controlled verification, where only verified teachers can access the platform.

3.2.5. Two-Factor authentication (Activation & Deactivation) sequence diagram

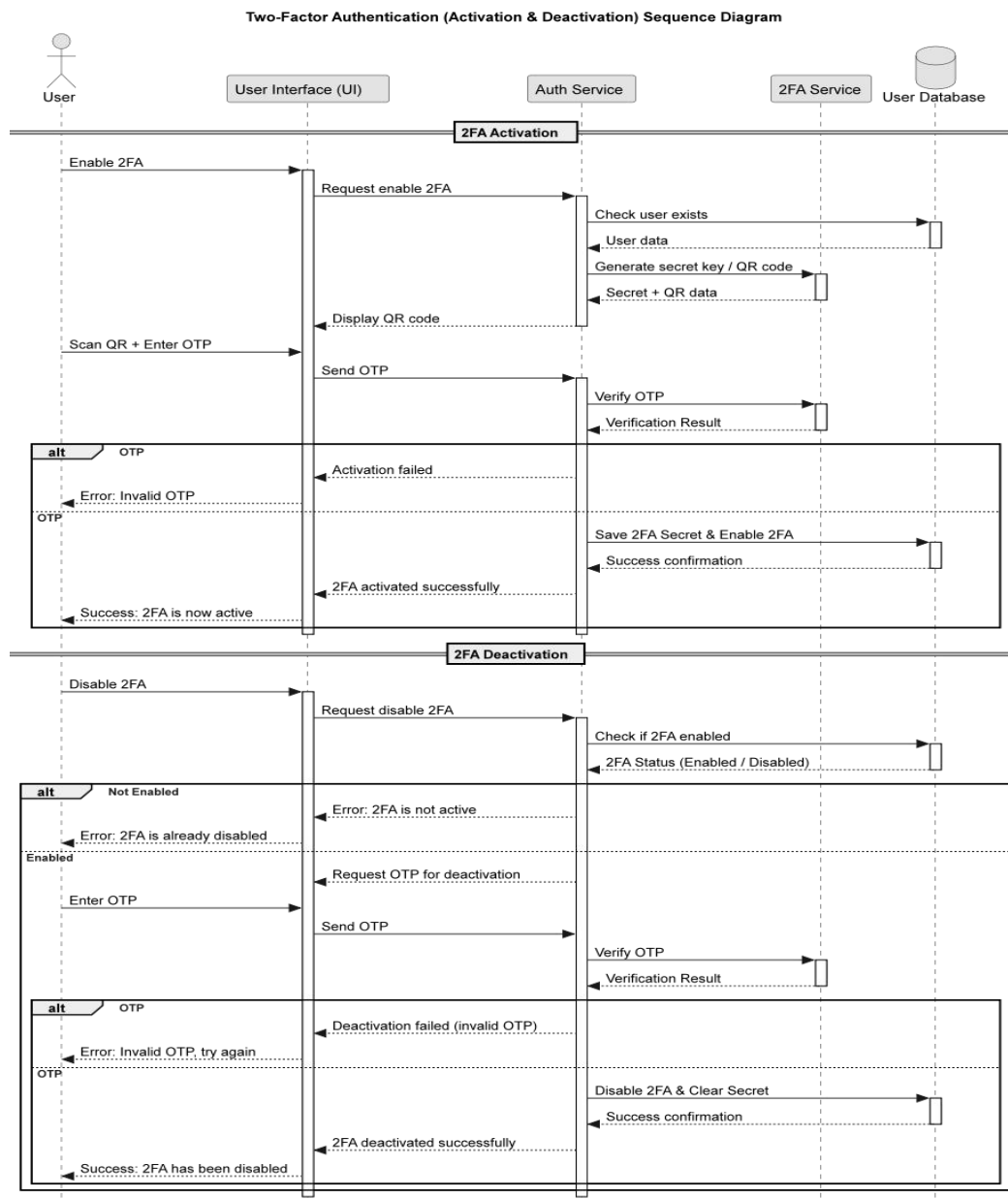


Figure 2.8: Two-Factor authentication (Activation & Deactivation) sequence diagram

Text description: This sequence diagram shows the 2 factor authentication activation and deactivation processes. During activation, the user requests to enable 2FA via the user interface. The auth service will verify the existence of the user, and request the 2FA service to create a secret key and a QR code. The user is shown the QR code which he/she scans and types in a one-time password (OTP). This OTP is authenticated by the auth service using the 2FA service. In case of an invalid OTP, activation will fail; in case valid an OTP secret is stored in the database and 2FA is activated successfully. To deactivate, the user requests to

turn off 2FA. The auth service initially authenticates 2FA. When yes, it asks the user to enter an OTP. Once the user enters the OTP, the system checks it. In case of an invalid OTP, it fails to deactivate, in case it is valid, the system checks off 2FA in the database and verifies successful deactivation.

3.2.6. PIN management (Set & Change PIN) sequence diagram

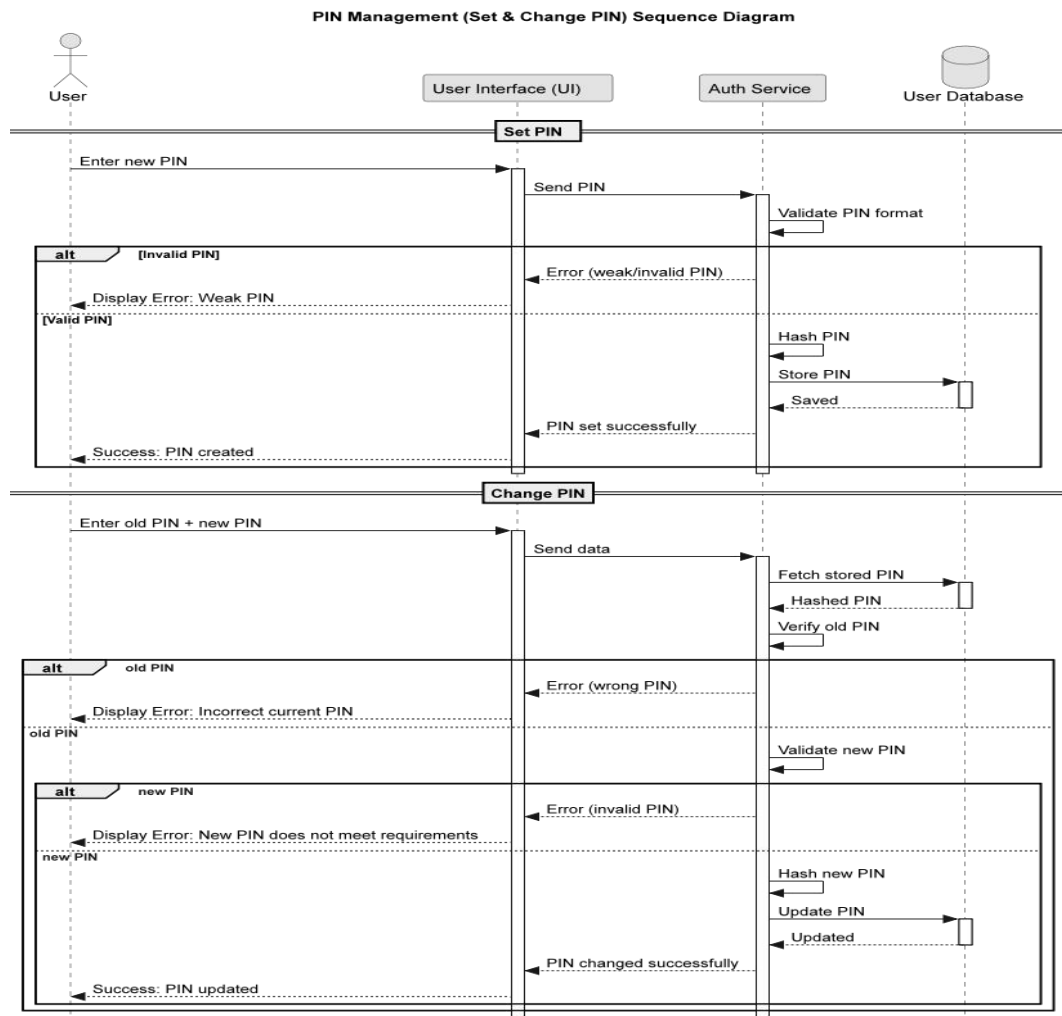


Figure 2.9: PIN management (Set & Change PIN) sequence diagram

Text Description: This sequence diagram demonstrates the ability of the users to set a new PIN and modify an existing PIN in the system. The process starts in the PIN setup stage where the user will key in a new PIN via the user interface. The entered PIN is forwarded to the authentication service where it is initially checked to confirm that it is in the correct format and security guidelines. In case the PIN is found weak or invalid an error message is sent back to the user. Otherwise, it safely hashes the PIN and stores it in the database. When this is done, a success message is produced that the PIN has been set. During the PIN change

step, the user will give the old PIN and a new PIN. This is sent to the authentication service by the system which gets back the stored hashed PIN in the database. The PIN typed in is then checked against the stored hashed PIN. In the event of the wrong PIN, the system declines the request and gives an error message. In case the correct old PIN has been entered, the system will then verify the new PIN as per the stipulated security regulations. In case the new PIN fails to comply with the requirements, an error message is displayed. Otherwise, the new PIN is hashed and changed in the database. Lastly, the system ensures that PIN has been modified successfully.

3.2.7. Course creation & validation sequence diagram

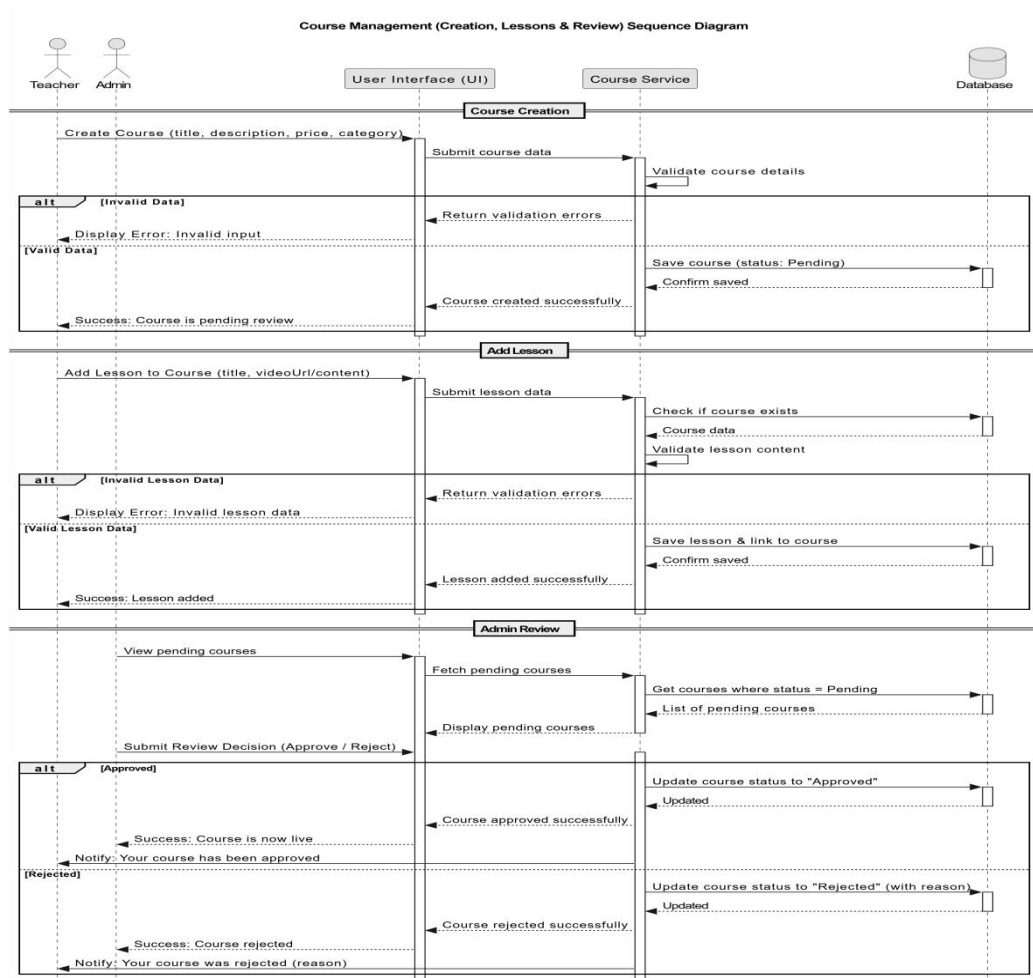


Figure 2.10: Course creation & validation sequence diagram

Text description: The following sequence diagram depicts the Course Creation and Validation Workflow in the system. The process starts with User interface, where the Teacher must input the course information, such as title, description, price, and category into the UI. This data is sent to the UI, which transfers it to the CourseService, which will handle the main

business logic of the system. The CourseService is the first to check the input to make sure that the needed fields are properly filled. In case the data is invalid, the error messages will be returned to the UI and they will be shown to Teacher. In case the input is valid, the course is stored in the database and its initial status is assigned as Incomplete, which means that no learning content is added. Once the course has been created, the Teacher can add lessons via the UI. The CourseService processes each lesson and stores it to the database. The system verifies automatically the number of lessons that are related to the course. When there is at least one lesson, the course status is automatically changed to not Incomplete but Pending. This is automatically updated within the system and only classes with real content will be allowed to go into the review stage. After the course has passed the review stage, the Admin can use the CourseService to pull back all the courses in the state of Pending. The system retrieves the course information in the database and presents it to the Admin. The Admin then makes a decision to either approve or reject the course. When approved, course status is changed to Approved, and is ready to publish and Teacher is notified by the system. In case of rejection, the status is changed to Rejected with a reason and the Teacher is also informed.

3.2.8. Course content management (Lessons, Resources, Quizzes) sequence diagram

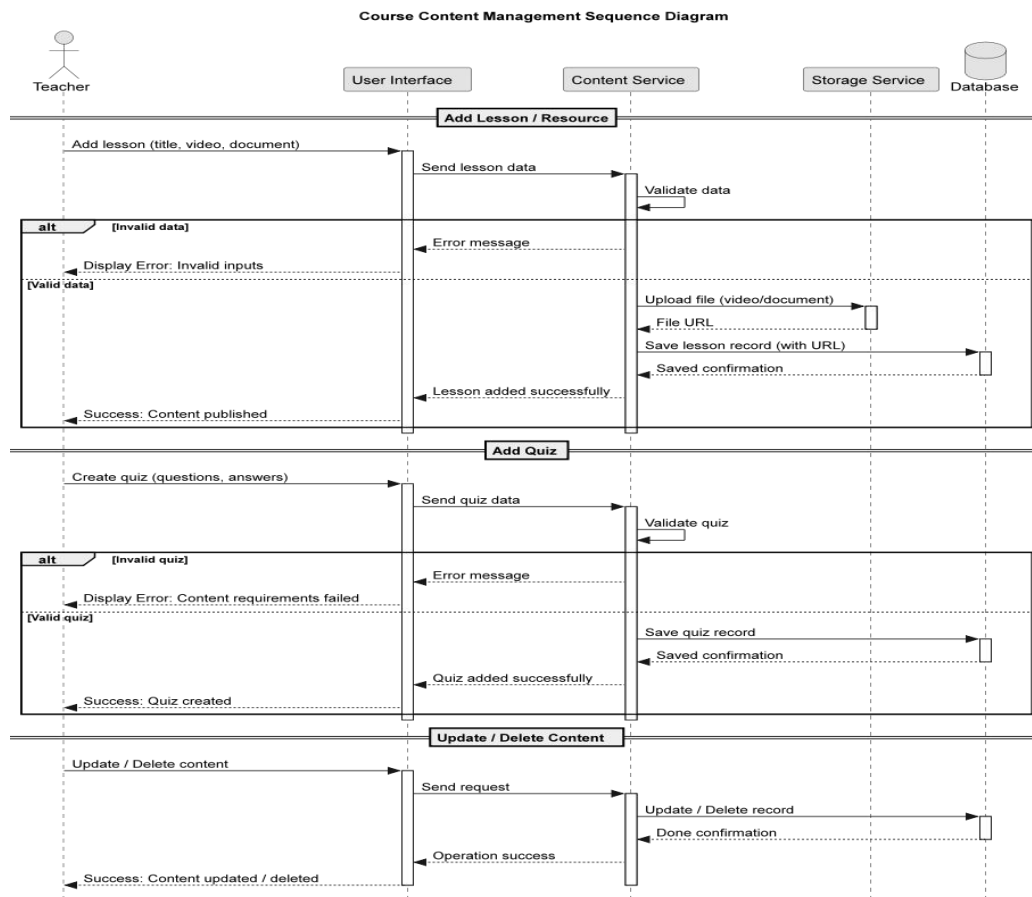


Figure 2.11: Course content management (Lessons, Resources, Quizzes) sequence diagram

Text description: The sequence diagram below shows how a teacher can deal with course material, such as the addition of lessons and resources, quizzes, and the modification or removal of existing materials. During the lesson and resource creation phase, it begins with the teacher inputting lesson information into the user interface, like the title, video or document. This information is forwarded to the content service where it is checked to make certain that all the necessary information has been presented and formatted properly. In case of the invalidity of the data, then the system sends out an error message. When the information is valid, the content service uploads the file under the data to the storage service which provides a file URL. This URL is then added to the database together with the lesson. After the operation has been done, a teacher is shown a success message. During the quiz creation stage, the teacher develops a quiz where by questions and answers are typed in. The quiz structure and content is validated by the content service. In case the quiz is invalid, an

error is returned. Otherwise, the quiz is saved in database and a confirmation message will be displayed. During the content management stage, the teacher will have the option of updating or deleting the lessons, resources or quizzes already created. The request is forwarded to the content service which handles the operation and makes updates on respective records in the database. Once the operation is achieved, the system confirms the achievement of the action.

3.2.9. Course enrollment and payment sequence diagram

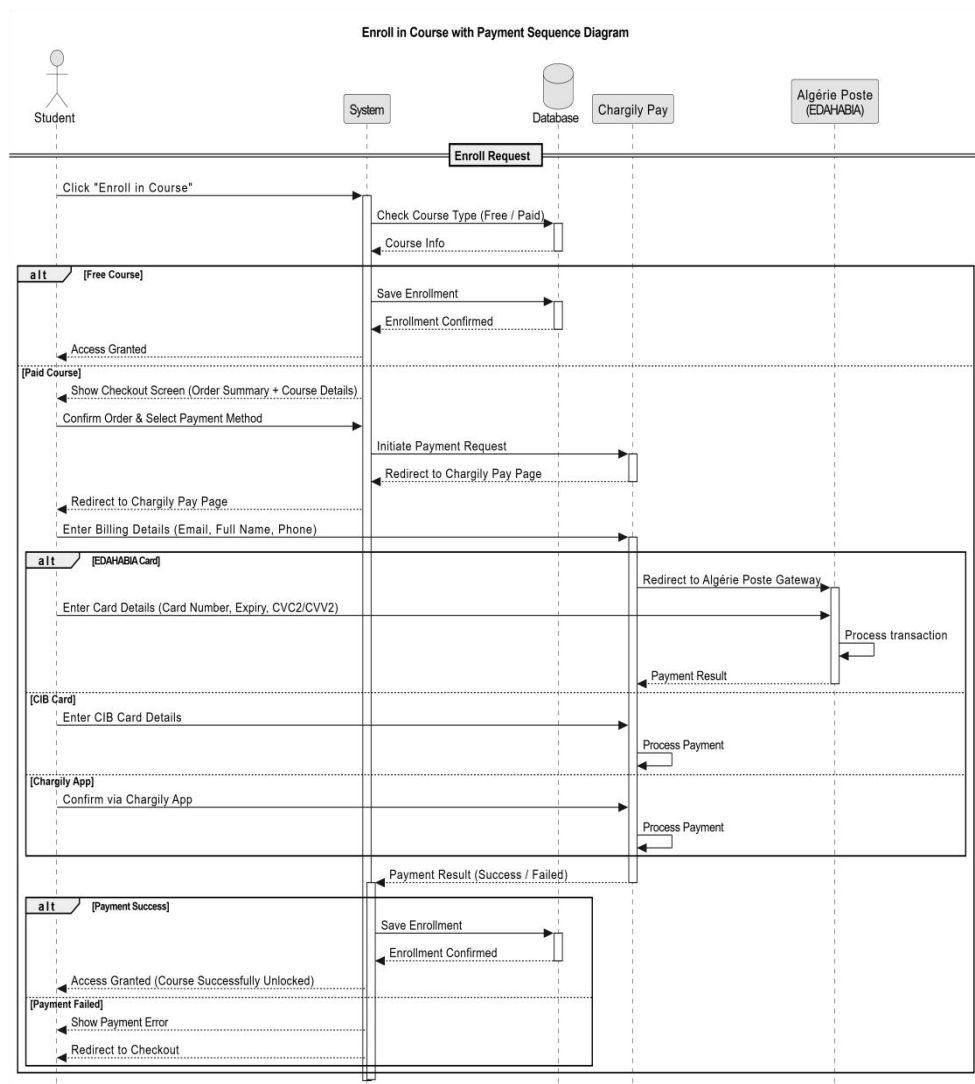


Figure 2.12: Course enrollment and payment sequence diagram

Text description: This sequence diagram will show you the complete enrollment process in learnifyDZ from when the student clicks on enroll in course till the system checks if the course is free or paid. Free courses have their enrollments recorded directly and access granted instantly. On paid course, the student is taken to the Checkout screen and then to the Chargily Pay screen where they provide billing details and select a payment method either

from EDAHABIA Card or CIB Card or Chargily App. For EDAHABIA, the student is then forwarded to the Algeria Poste gateway where the completion of the card transaction is done securely. Lastly, if the payment is successful, the enrollment is stored and the course is unlocked for the student, and if the payment fails, the student is taken back to the Checkout screen, with an error message.

3.2.10. Access course content sequence diagram

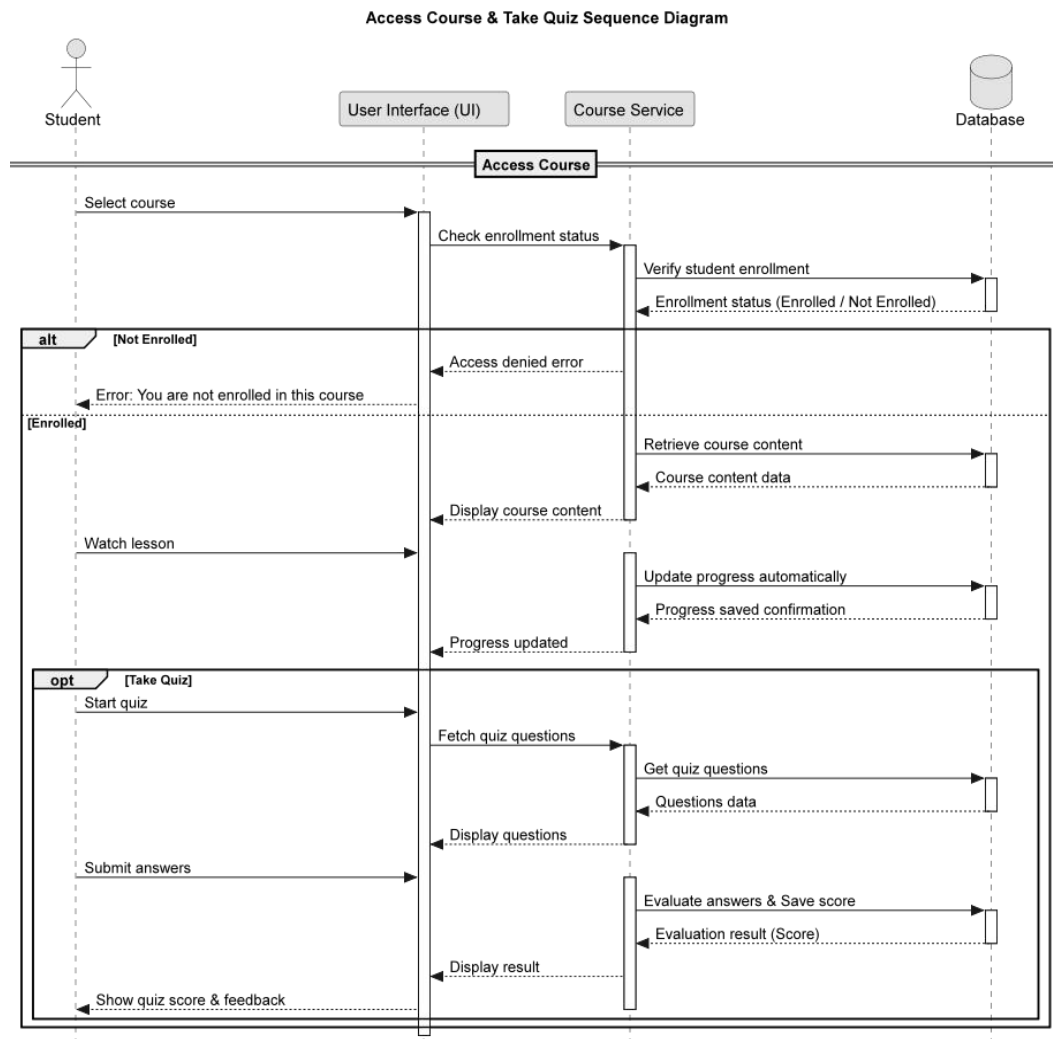


Figure 2.13: Course access sequence diagram

Text description: Accessing a course begins with the student choosing a course from the User Interface (UI) and ends with obtaining the Course ID. The Course Service then queries the database for the status of the enrollment. If the student is not registered, the system will refuse to enroll the student to the course. When the student is enrolled, the Course Service loads and shows the course material from the Database. On watching a lesson, the student's progress is tracked and updated automatically in the Course Service's database. Further, as

soon as the student launches a quiz, the Course Service retrieves the questions from the database, validates the answers submitted by the student, stores the score and shows the student the result.

3.2.11. Category management sequence diagram

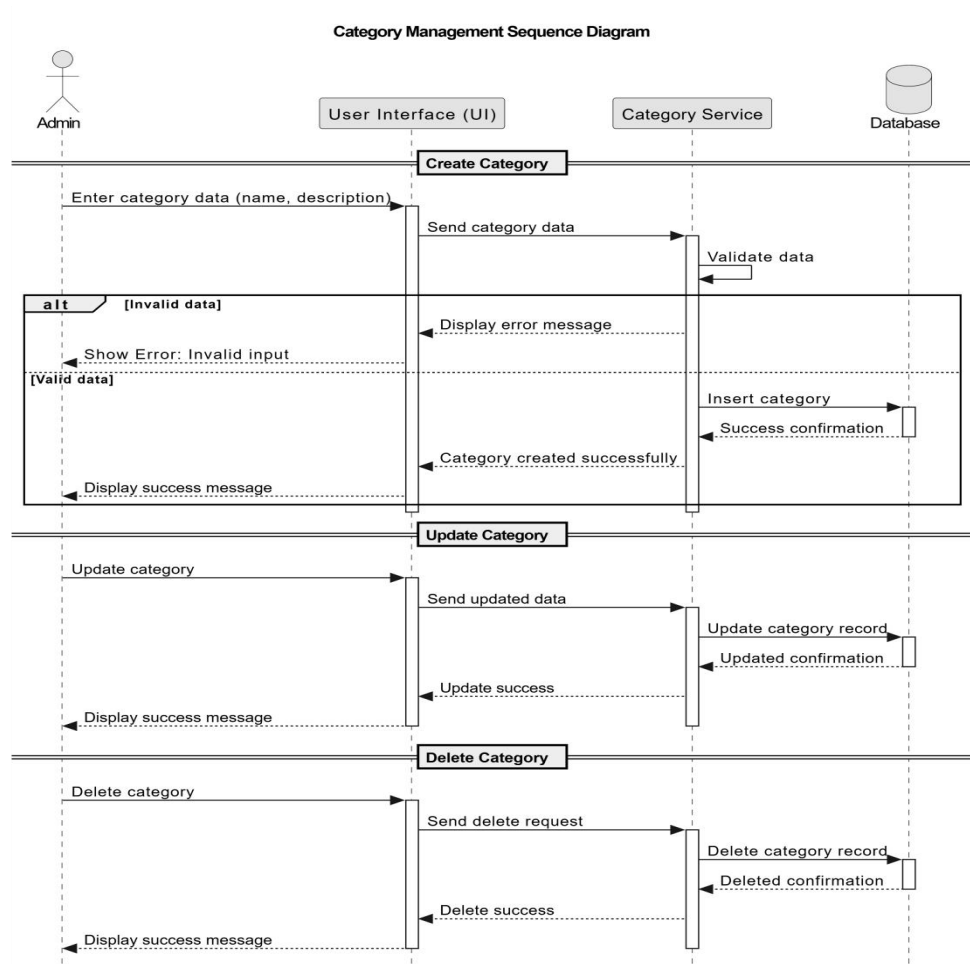


Figure 2.14: Category management sequence diagram

Text description: This sequence diagram explains how the administrator can control categories in the system, create, update and delete categories. The administrator enters the category information (name and description) into the user interface in the category creation process. This information is transferred to the category service, where it is authenticated to make sure that all the necessary fields are provided appropriately. In case the data is invalid, then a system sends out an error message. Otherwise, the category is added to the database, and the message stating that the category has been created is shown. Under the category update process, the administrator uses the user interface to update the current category information. The updated information is sent to the category service which handles the

request and modifies the appropriate record in the database. When the update is done the system will indicate that the operation was successful. In the category deletion process, the administrator requests to delete a category. This is sent to the category service that removes the chosen category in the database. Once deletion is done, the system will send a confirmation to the administrator.

3.2.12. Subscription plan management sequence diagram

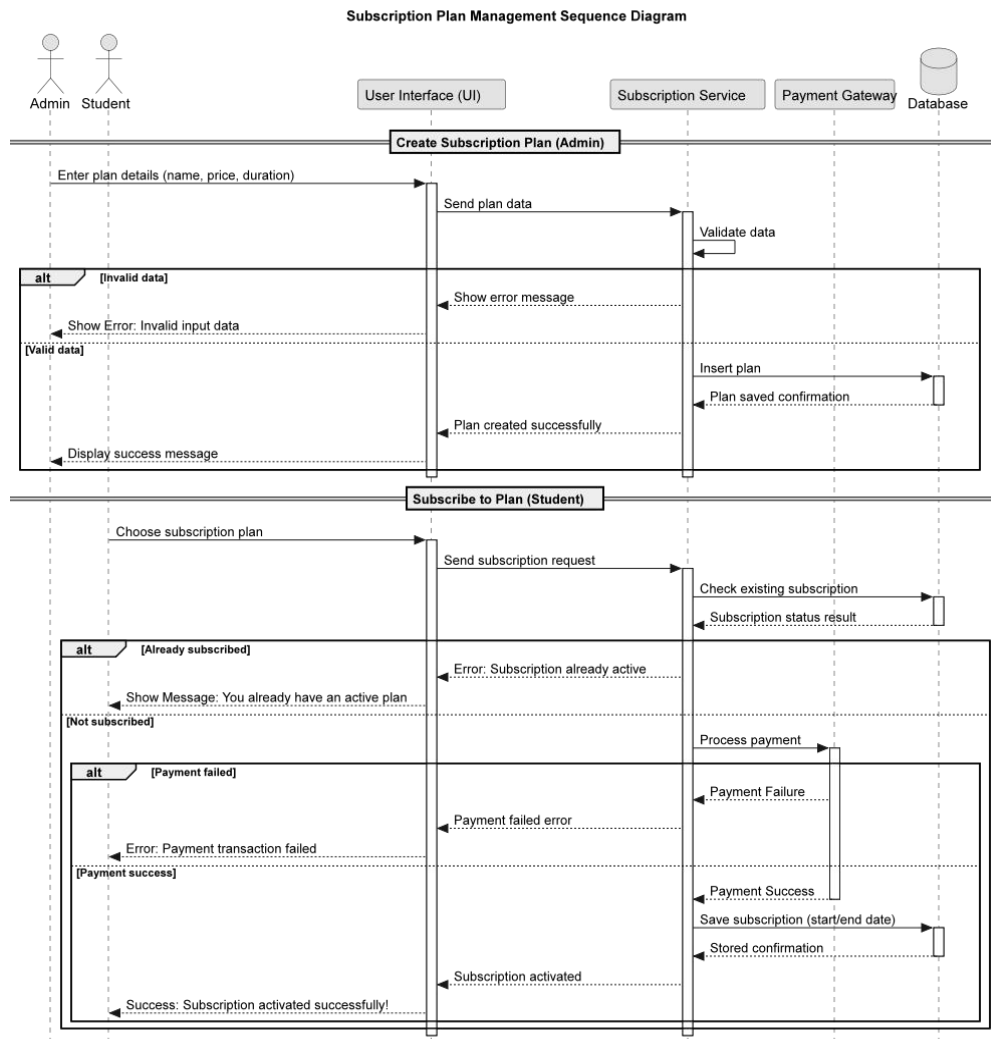


Figure 2.15: Subscription plan management sequence diagram

Text description: This flow chart shows how the administrators control subscription plans and how students subscribe to these plans in the system. The administrator starts by filling in plan information including name, price, duration and other details using the user interface, during the stage of the subscription plan creation. This data is forwarded to the subscription service which checks on the accuracy and completeness of the data. In case of wrong data, then there is an error message in the system. In case it is right, the plan is stored in the

database and a confirmation message is sent that the plan is created successfully. The student will choose a subscription plan during the subscription phase through the user interface. The request is forwarded to subscription service that will initially check the database to determine whether or not the student already has an active subscription. In case the student is a subscriber, the system reminds the student that they are still under subscriptions. In case the student is not subscribed, the system will start the payment process using the payment gateway. In case of failure of payment, the system will alert the student with the relevant error message. But in case of a successful payment, the subscription information, the date of beginning and termination are stored in the database. Lastly, the system will verify the successful subscription activation and inform the student through the user interface.

3.2.13. AI tutor interaction sequence diagram

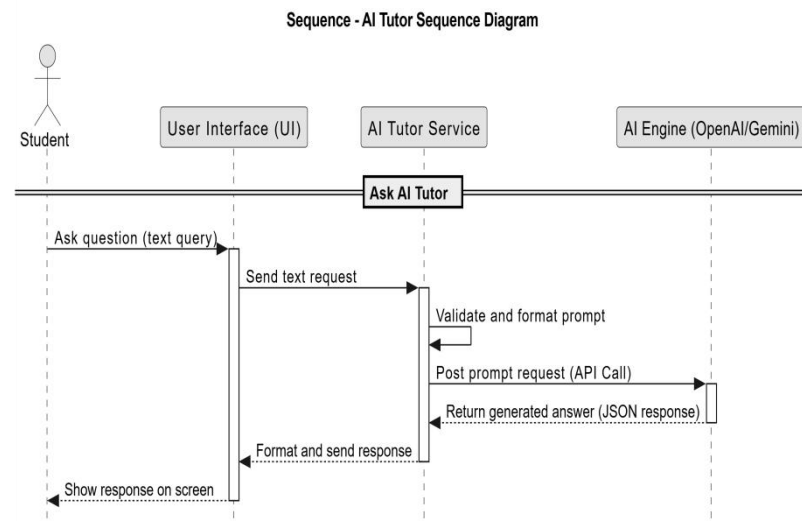


Figure 2.16: AI tutor interaction sequence diagram

Text description: The sequence of steps for the AI Tutor interaction starts when the student asks a question through the system. The system then sends the request to the AI. The AI generates an answer and sends it back to the system. Finally, the system displays the response to the student.

3.3. The class diagram

3.3.1. Definition

A class diagram is a structural diagram in the Unified Modeling Language (UML) that displays the fixed structure of a system by depicting the classes, attributes, methods

(operations) and the relationships among them. It is applied to emulate the structure of the system and the relationship between the components and gives an overview of the architecture of the system without considering how the system behaves [10].

3.3.2. Global class diagram

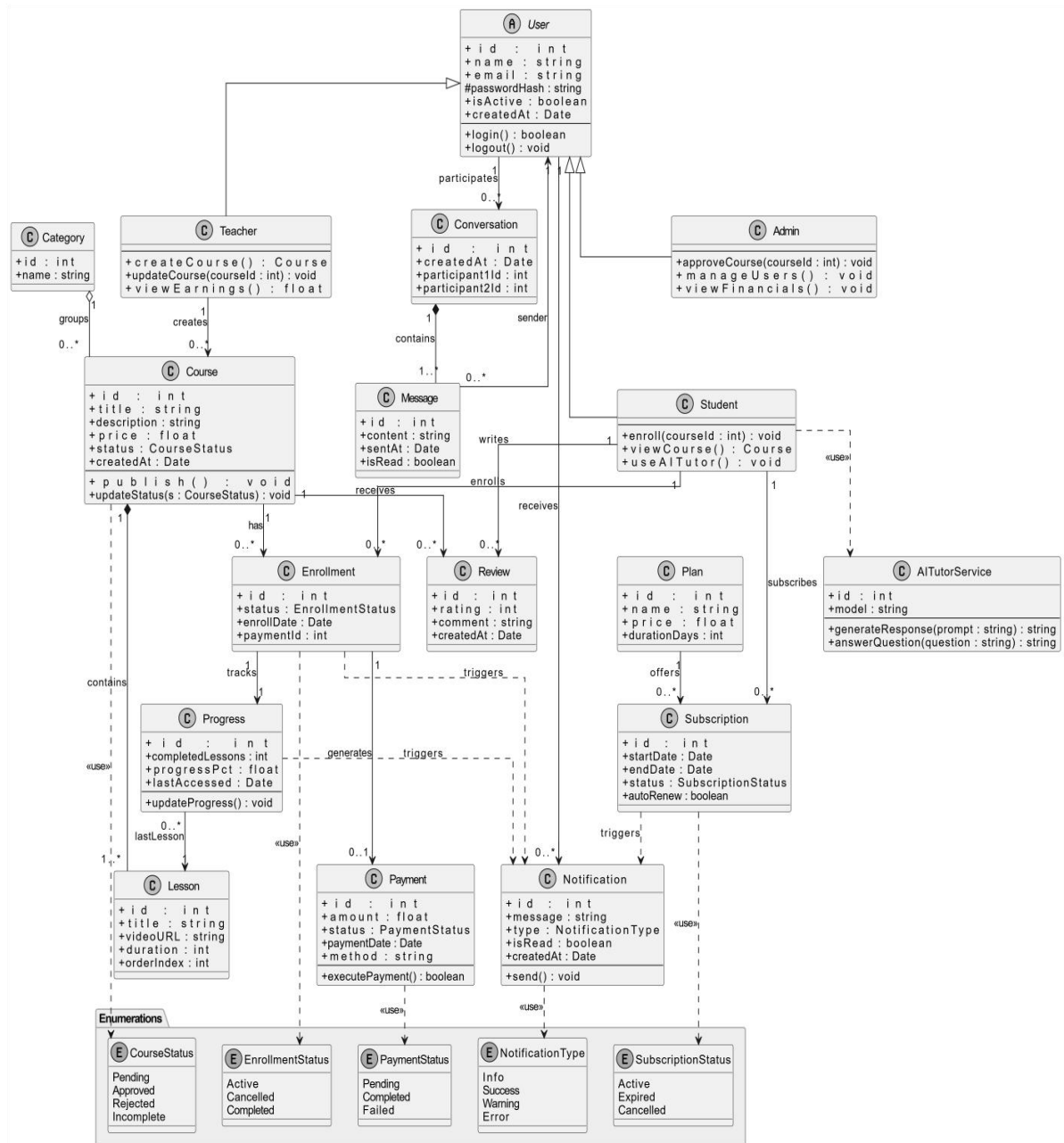


Figure 2.17: Global class diagram

Complete Class Diagram Explanation for Learnify DZ :

1.User : The user class is an abstract class which represents all the users of the system. It has some common properties like id, name, email, password, status and date of creation that include simple functions like logout and login. It is the parent of all types of users.

2.Student, Teacher, Admin These are classes that are based on User. The Student will be able to take courses, watch lessons, monitor their progress, leave reviews, and use the AI tutor. The Teacher is in charge of course creation and management. The Admin oversees the platform, giving the courses approval and managing user accounts.

3.Course : The primary educational material of the platform is the Course class. The courses are characterized by a title, price, status, and publish functionality. A course is designed by an instructor and is the main thing that students will have to deal with.

4. Lesson : Lesson is a learning material within a course. It is associated with Course using composition, such that there can be no lesson without its course and one is removed when the course is removed.

5.Category : Courses are grouped according to their topic in category. It operates on the basis of aggregation, i.e. a category puts together a number of courses, although courses can still exist even without the category.

6.Enrollment : Enrollment is defined as the association between a student and a course. It holds enrollment information date and status. There may be multiple enrollments to a student, and multiple students to a course. A student is not allowed to take the same course twice.

7.Progress : Progress monitors the level of completion of a course by the student. One enrollment has a single progress record that is updated according to lessons completed.

8.Payment : Payment entails transactions involving finances and enrollments. Each enrollment can produce either none or a single payment. Without a valid enrollment, there can be no payment.

9.Subscription & Plan : Plan determines pricing and offers to be used in subscriptions, whereas Subscription is access by a student. A student may have several subscriptions in the course of time but one active subscription at a time.

10.Review : Review enables students to comment and rate the course. A student is able to write several reviews and a course is able to have several reviews. Reviews can, however, only be posted by registered students.

11.Notification : The notification system is applied to alert individuals about events in the system like a course update or confirmation of payment. A notification has got a message, type.

12.Conversation & Message : Conversation is a chat between users and Message is individual messages. Composition A conversation consists of several messages and would not exist without them. Each conversation involves at least two users.

13.AI Tutor Service : AITutorService is a third-party service that is a part of the system and offers intelligent support to students. It enables students to pose questions and get automatic answers.

4. Relational Database Model

The class diagram shown above was used to design the relational database design of the Learnify DZ platform. It features multiple related tables for managing user management, course management, lesson management, enrollment management, payment management, subscription management, AI tutor interactions, messages, review management, and notification management efficiently. The relational schema of the system is given as:

-**User** (**id**, name, email, passwordHash, isActive, createdAt, role)

-**Student** (**id**, user_id*)

-**Teacher** (**id**, user_id*)

-**Admin** (**id**, user_id*)

-**Category** (**id**, name)

-**Course** (**id**, title, description, price, status, createdAt, teacher_id*, category_id*)

-**Lesson** (**id**, title, videoUrl, duration, orderIndex, course_id*)

-**Enrollment** (**id**, status, enrollDate, student_id*, course_id*)

-**Progress** (**id**, completedLessons, progressPct, lastAccessed, enrollment_id*, lesson_id*)

-**Payment** (**id**, amount, status, paymentDate, method, enrollment_id*)

-**Review** (**id**, rating, comment, createdAt, student_id*, course_id*)

-**Plan** (**id**, name, price, durationDays)

-**Subscription** (**id**, startDate, endDate, status, autoRenew, student_id*, plan_id*)

-AITutorService (id, model)

-AIInteraction (id, prompt, response, createdAt, student_id*, ai_tutor_service_id*)

-Conversation (id, createdAt, participant1_id*, participant2_id*)

-Message (id, content, sentAt, isRead, conversation_id*, sender_id*)

-Notification (id, message, type, isRead, createdAt, user_id*)

Relationships Description

The relationships between the tables are defined using foreign keys as follows:

-user_id in Student, Teacher, and Admin references User(id)

-teacher_id in Course references Teacher(id)

-category_id in Course references Category(id)

-course_id in Lesson references Course(id)

-student_id in Enrollment references Student(id)

-course_id in Enrollment references Course(id)

-enrollment_id in Progress references Enrollment(id)

-lesson_id in Progress references Lesson(id)

-enrollment_id in Payment references Enrollment(id)

-student_id in Review references Student(id)

-course_id in Review references Course(id)

-student_id in Subscription references Student(id)

-plan_id in Subscription references Plan(id)

-participant1_id and participant2_id in Conversation reference User(id)

-conversation_id in Message references Conversation(id)

-sender_id in Message references User(id)

-user_id in Notification references User(id)

These relationships enable data consistency, and enable students, teachers, courses, lessons, enrollments, payments, subscriptions, messages and reviews, notifications, and interactions with the AI tutor to be managed within the Learnify DZ platform.

5. Conclusion

This chapter on design introduced the conceptual design of the Learnify DZ e-learning platform with the help of UML. We were able to organize the interactions between the different actors (Student, Teacher, and Admin) in a clear and precise manner by creating use case diagrams, sequence diagrams, and a class diagram. Such diagrams determine the functional specifications, statical structure and dynamic behavior of the system. The layout introduced within this chapter gives a good basis in the implementation process which will be addressed in the following chapter.

Chapter 03

Implementation and Realization

Chapter 03 Implementation and Realization

1. Introduction

This chapter presents the implementation and realization of the Learnify DZ platform, which makes the proposed design to a running e-learning system, is presented in this chapter. It shows the technologies, development tools and technical environment used for the development of the application. The chapter also covers the key components of the system including the mobile application and the web dashboards dedicated to teachers and administrators. Lastly, it shows the way in which modern technologies were used to create a safe, smart and easy-to-use learning environment suitable to the Algerian context.

2. Application development environment and tools

In this section, you'll be introduced to the technologies and tools that are employed in the development of the Learnify DZ platform. The technology that has been chosen is efficient, reliable and provides users with an excellent experience.

2.1. Development environment and tools

The development was made with the help of modern tools which enabled coding, testing, and debugging:

-Visual Studio Code (VS Code): Visual Studio Code is an Open Source, free code editor created by Microsoft. It offers enhanced support like syntax highlighting, debugging features and code completion, thus helping the developers to be efficient and productive in software development.

-Android Studio: Android Studio is the official integrated development environment (IDE) for Android Application Development. Provides a full package of tools to design, code, test and debug mobile applications in an efficient and structured way.

2.2. Technology Stack

Learnify DZ platform is built on modern technology stack, including front end, back end, database, security technologies and cloud technology.

2.2.1. Back-end Technologies

-**Node.js:**Node.js is an open source, cross-platform JavaScript runtime environment to run JavaScript code on the server side. It is a widely used framework to create high performance and scalable web applications [11].



Figure 3.1: Node.js logo [12]

-**MySQL:**MySQL is relational database management system that efficiently stores, organizes and manages structured information in web applications [13].



Figure 3.2: MySQL logo [13]

-**Firebase:**Google has created a cloud-based Backend-as-a-Service (BaaS) platform known as Firebase. It offers functions like authentication, real time databases, and push notifications, which make it easier to build applications [14].



Figure 3.3: Firebase logo [14]

- **JWT (JSON Web Token):** JSON Web Token (JWT) is a secure and compact way of sending information between parties as a JSON object. It is commonly used to access the web application, for authentication and session management .

2.2.2. Front-end Technologies

- **Flutter & Dart:**Flutter is an open source UI framework created by Google for cross-platform application construction, and Dart is a programming language which is used for building Flutter applications. They help in the development of a mobile application in quick time and efficiently [15][16].



Figure 3.4: Flutter logo [15]



Figure 3.5: Dart logo [16]

-React.js:React.js is a JavaScript library that is used to create dynamic and interactive user interfaces with reusable components. It enhances performance and makes it easier to develop front end [17].

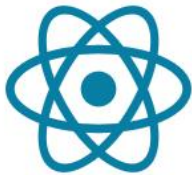


Figure 3.6: React logo [17]

-CSS and UI Libraries:CSS is a styling language for web pages, used to design and control the layout of the web pages. UI libraries offer a collection of pre-designed UI elements to build responsive UI interfaces with uniformity.

2.2.3. Artificial Intelligence Technologies

-Google AI Studio:Google AI Studio is a development platform that allows the embedding of AI capabilities, including AI-assisted recommendations and intelligent assistants into application [18].

2.2.4. Security Technologies

-Two-Factor Authentication (2FA):Two-Factor Authentication is Security measure that forces people to enter two types of verification. It greatly improves security of the accounts against unauthorized access [19].

-Google Authenticator: Google Authenticator is a mobile app that supports Two-Factor Authentication (2FA). Generates one time passwords (OTP) that are used in user authentication to further deter unauthorized access and change with time.

-Biometric Authentication (Fingerprint):Biometric authentication is an access technique which uses fingerprint for user authentication, is fast, secure and convenient. Provides additional security, especially in mobile applications.

-Security PIN Code:The PIN code might be employed as additional security on delicate transactions including accessing accounts or confirming payments. It is good to have the login information stolen even then, it helps to keep unauthorized actions from happening.

2.2.5. Payment System

-Chargily Pay:Chargily Pay is an Algerian online payment gateway, which provides secure electronic transactions. Accepts local payment systems (EDAHABIA cards) and is tailored to the Algerian digital payment ecosystem [20].



Figure 3.7: Chargily logo [20]

2.2.6. Deployment and hosting

It gives information about the deployment environment, including cloud infrastructure, server administration and security configuration that ensure the high availability, high performance, and reliability of the Learnify DZ platform.

-DigitalOcean: DigitalOcean is a cloud-computing service provider that provides scalable virtual servers and infrastructure solutions to deploy and manage Web applications in a secure and efficient cloud environment [21].



Figure 3.8: DigitalOcean logo [21]

-VPS (Virtual Private Server): A Virtual Private Server (VPS) is a virtualized hosting solution that allows better performance, scalability and configuration control, as it allocates virtual resources to a single server that shares resources with other servers.

-Nginx Web Server: Nginx is a powerful, high-speed Web server and reverse proxy that handles incoming requests from clients, distributes incoming traffic efficiently, serves static content and optimizes the use of resources and system performance [22].



Figure 3.9: Nginx logo [22]

-PM2 Process Manager: It is a production level process manager for node.js apps that allows monitoring of processes, automatically restarting the server in case of crash, and provides performance monitoring tools [23].



Figure 3.10: PM2 logo [23]

-SSL Certificate (HTTPS Security): A security protocol that ensures secure communication between the client and the server via the HTTPS protocol, secure data transmission, protection of sensitive data and a general increase in system security.

3. Integration of Artificial Intelligence in Learnify DZ

3.1. Introduction to gemini

Google's Gemini is a one of the advanced Large Language Models (LLMs). It's built to handle various data formats, including text, code, and structured data, and can handle multilingual interactions, including Arabic. Characterized by their context understanding, accurate answering and intelligent assisting in real time, Gemini can help and serve. In this way, it is suitable for use in current e-learning platforms, enhancing engagement and support for users [24].

3.2. Integration method within the system

The Learnify DZ platform was developed into by using the Node.js environment to integrate the Gemini API. Once Google AI Studio is signed up, an API key was generated and properly added to the back-end system.

The integration process consists of the following:

-Install the Gemini library: `npm install @google/generative-ai` .

- A model is initialized by providing the API key.
- Multiple models of Gemini configured for various use cases .
- Communicating with the user and receiving answers from the AI.

```

86
87 let googleModel = null;
88 try {
89   if (process.env.GOOGLE_API_KEY) {
90     const { GoogleGenerativeAI } = require("@google/generative-ai");
91     const genAI = new GoogleGenerativeAI(process.env.GOOGLE_API_KEY);
92
93     googleModel = {
94       pro15: genAI.getGenerativeModel({ model: "gemini-1.5-pro" }),
95       flash15: genAI.getGenerativeModel({ model: "gemini-1.5-flash" }),
96       flash20: genAI.getGenerativeModel({ model: "gemini-2.0-flash-exp" }),
97       flash25: genAI.getGenerativeModel({ model: "gemini-2.5-flash" }),
98     };
99
100    console.log('Google Gemini initialized with multiple models');
101  }
102 } catch (error) {
103   console.error('Failed to initialize Google Gemini:', error.message);
104 }

```

Figure 3.11: Gemini API integration in learnify DZ

It is a system that dynamically interacts with the Gemini API to receive the user's request and output intelligent results dynamically.

3.3. AI applications in the Learnify DZ platform

The platform has been enhanced by integrating Artificial Intelligence to improve the learning experience and user interaction. The primary uses are:

- Intelligent content assistance for students.
- Real-time response generation.
- Recommended based on user behaviour.
- Dialogue with the system using natural language.

All these features help to create a more interactive, adaptive and user-centred platform.

3.4. Intelligent assistant (Neuro AI Chat Interface)

Learnify DZ platform has created an intelligent assistant (Neuro AI Chat) to assist with the user in real-time. This assistant is based on the Gemini model and will be an interactive interface (between the user and the system). Unlike a domain-specific assistant, this chatbot is able to answer general questions, such as the learner's request to learn something which he asks the platform or even general knowledge.

Working Principle: The chatbot's algorithm works in the following two phases:

-Input Understanding: Natural Language Processing (NLP) is employed to interpret and understand the user's question so as to gain insight into the intent and context of the question.

-AI Response Generation: The processed input is passed to the Gemini model to get a suitable and coherent response. The output is then presented to the user in a user-friendly manner.

4. Real-Time notifications using Firebase

For a modern e-learning system like LearnifyDZ, it is very important that the system is responsive and that communication with the users is done in real time so that the system remains engaged at all times. This is achieved by integrating Firebase as an efficient cloud backend service for handling notifications, instead of using traditional methods like HTTP Polling or WebSockets that can lead to unnecessary server load and latency.

With Firebase's strong infrastructure, push notifications and data synchronization can be made without complicated server management. Firebase pushes the notification to the user's device in real time if an event occurs in the platform, like a new course is published, a message is sent, or a system update is deployed, without the need to push the app.

Some of the most important benefits that this integration has for the platform are that it offers high levels of scalability, thereby allowing for the ability to support many more users; it also lowers the load on the server because Firebase has a managed cloud infrastructure, and it is very compatible with mobile apps. Therefore, students and teachers at LearnifyDZ are always updated and informed with the latest activities on the platform, at the same instant and effortlessly.

5. Deployment and system access

The Learnify DZ platform was deployed on DigitalOcean, a cloud computing platform, to ensure high availability, performance and accessibility.

-Droplets (Virtual Servers): Droplet is a virtual private server to run the platform's back-end. It comes with certain resources like CPU, RAM, storage to ensure that the system performs optimally. Deployment Process You will see the creation of a Droplet having adequate resources from the server. When the backend application (Node.js) is deployed

on the server. Responding to customer requests and accessing the database Providing 24/7 support (Online access). **System Access:**

Learnify DZ can be accessed online using individual web dashboards for various user roles:

-Main Platform Access:

<https://main.learnifydz.com/>

-Admin Dashboard:

<https://admin.learnifydz.com/>

-Teacher Dashboard:

<https://teacher.learnifydz.com/>

These dashboards offer a single place for managing courses, users and platform operations. They allow for effective system monitoring, content management and administration in a structured and user friendly way.

Benefits:

- Excellent performance and reliability.
- Scalable infrastructure
- Complete server control
- The platform is very easy to access and can be used by professionals.
- Advanced and efficient management with dedicated dashboards.

6. Domain management using Namecheap

Learnify DZ uses Namecheap to manage their domain making it easy and professional to access online. A domain name (like main.learnifydz.com) is purchased, and then configured with DigitalOcean server DNS configuration, so that users can access the platform from a simple, fast and easy URL. Overall, this integration will boost the platform's visibility online, as well as offer secure, reliable, and efficient domain management and improve the overall user experience.

7. Mobile application deployment

Learnify DZ application is developed using flutter and is available in Google play app store, which is easily accessible to Android users.

It enables learners to explore courses, receive real-time alerts, access personalized learning suggestions, and interact with the learning content through modern and user-friendly interface.

This deployment enables access to content, contributes to streamlining deployment processes to optimise the experience of learners in an Algerian educational environment, while ensuring it is a seamless and effective deployment that meets the needs of the users in this context.

For more information or to download the application, visit: **Learnify DZ on Google Play:**

<https://play.google.com/store/apps/details?id=com.learnifydz.app>

8. Presentation of some of the application's interfaces

8.1. Welcome and Login interface

The Welcome Interface is the main gateway to the Learnify DZ platform and seamlessly leads the users to the offered authentication possibilities. This interface will allow users to log in with their email and password if they have an account, to register for a new account if they don't have one, and easy access to the system using Sign up with Google for a faster and more convenient experience.

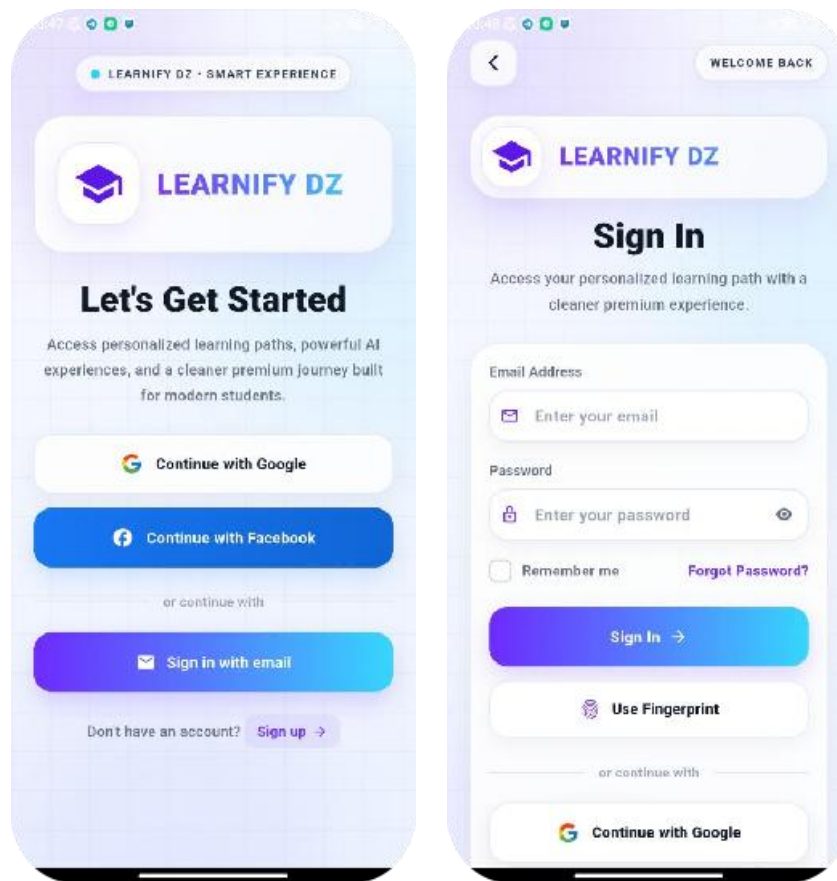


Figure 3.12: Welcome and Login interface

8.2. Home interface

After successful authentication, the user is directed to the Home interface, which acts as the central dashboard of the application. It provides a personalized and engaging experience by displaying top-rated instructors with their profiles and ratings, as well as a selection of recommended courses categorized by field. The interface is designed to facilitate easy navigation through key sections using a bottom menu, allowing users to quickly access courses, AI features, messages, and profile settings. This layout ensures a smooth and intuitive user experience, as illustrated in Figure 3.13 below.

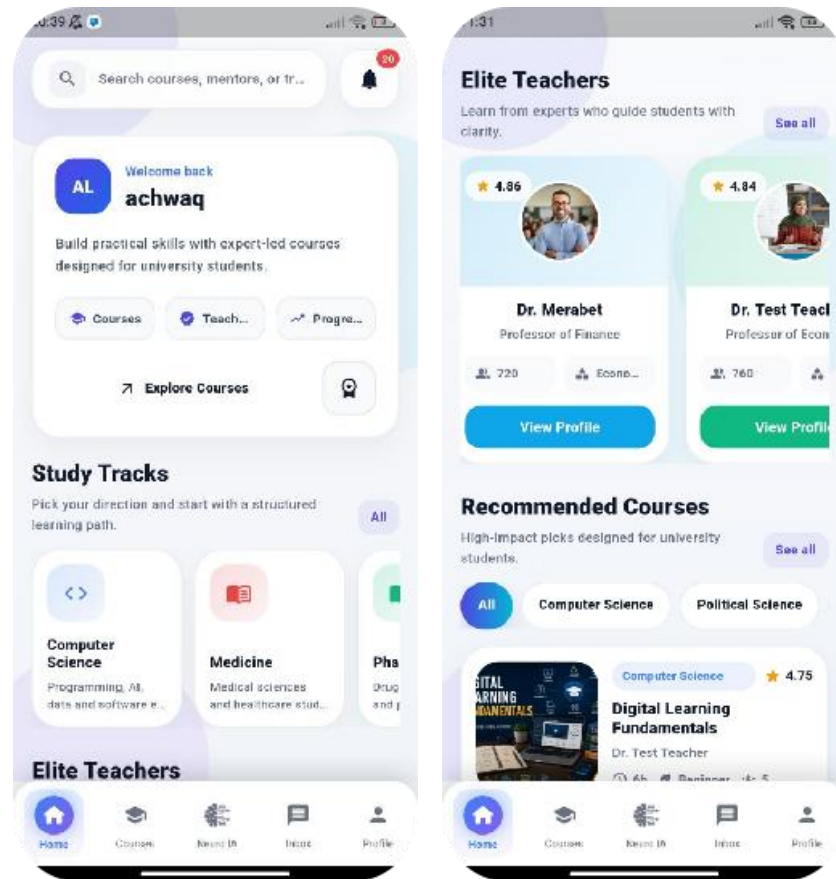


Figure 3.13: Home interface

8.3. Courses interface

The Courses interface allows users to explore and discover available courses through a structured and user-friendly layout. It includes search functionality, category filters, and detailed course cards displaying key information such as level, duration, and pricing, enabling users to easily select and enroll in suitable courses as illustrated in Figure 3.14.

This interface displays the "My Courses" section, allowing users to track their learning progress, monitor completed lessons, and resume ongoing courses through a clear, visual dashboard as illustrated in Figure 3.15.

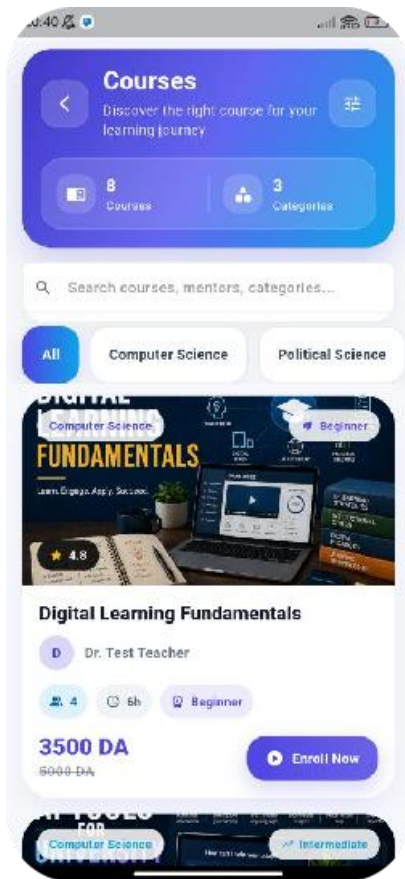


Figure 3.14: Courses interface

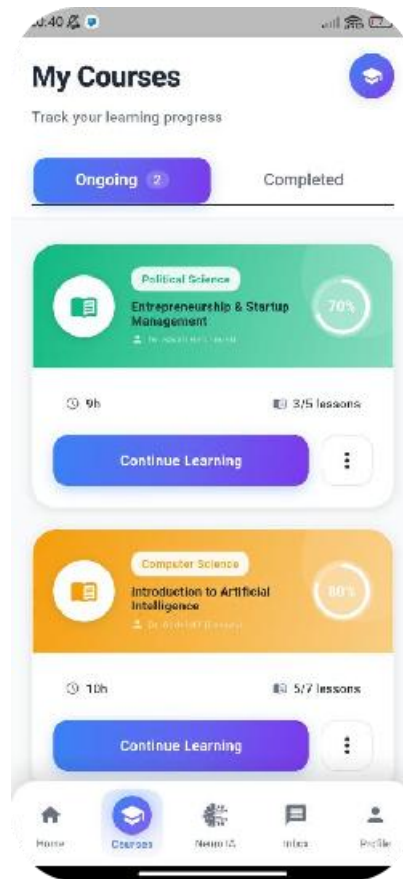


Figure 3.15: My courses interface

8.4. Course lessons interface

The Course Lessons Interface shows the student what lessons, resources, and quizzes are in an enrolled course, and indicates whether each lesson, resource, and quiz are complete or not in an organized format. It lets the student know his or her progress with a visual percentage indicator, and he or she can seamlessly continue learning through the Continue Learning button.

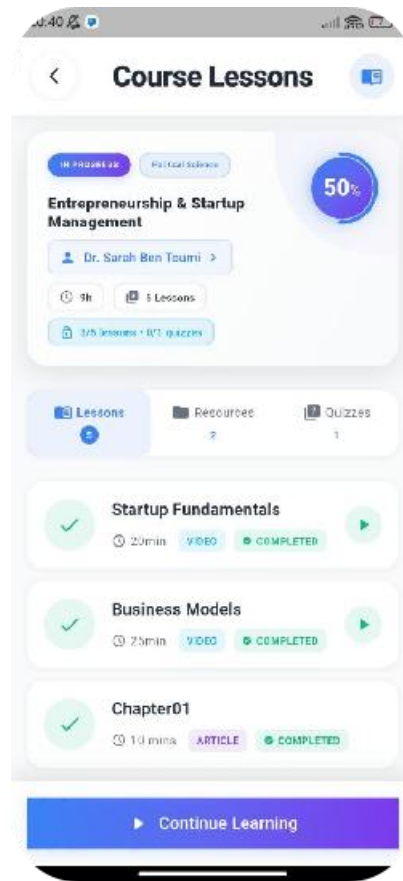


Figure 3.16: Courses lessons interface

8.5. Categories interface

The Categories Interface displays all the course categories in an easy-to-browse and easy-to-explore grid, making it simple for students to navigate and discover various courses like Computer Science, Medicine, Pharmacy, and beyond. Brief description included on each category card and the number of courses is clearly indicated allowing students to easily identify their area of interest and interest level.



Figure 3.17: Categories interface

8.6. Course payment & checkout flow interface

LearnifyDZ payment flow starts with the Checkout screen that presents all of the order details in full including Course Name, Original Price, discount price, and total to pay using Chargily Pay with EDAHABIA and CIB cards. Once the order is acknowledged, the user will be pushed to the Chargily Pay gateway and will enter the billing information and select his preferred payment mode - either EDAHABIA Card, CIB Card or Chargily App. When the user clicks on EDAHABIA, he is taken to the official payment portal of Algérie Poste where he inputs securely his card number, expiration date, full name and CVC2/CCV2 code to finalize the payment. All of this guarantees a secure, localized, and seamless payment process perfectly geared toward Algerian users.

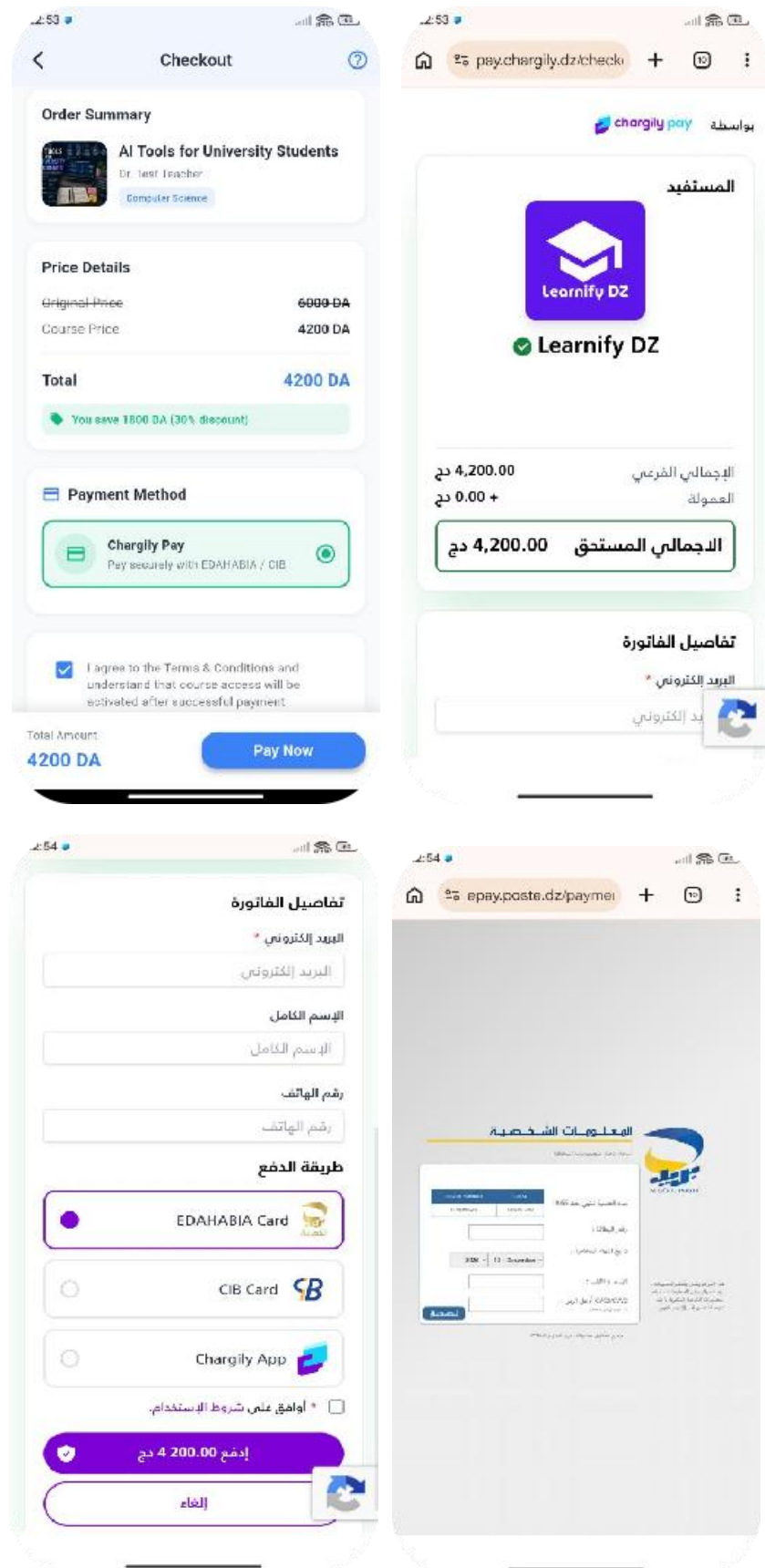


Figure 3.18: Course payment & checkout flow interface

8.7. Subscription Plans interface

The Subscription Plans interface enables customers to conveniently manage their subscriptions, view the existing plans, and discover the subscription tiers. It displays courses plans and AI plans in a clear and well-organized manner, and provides the price and expiration date for each course in its respective category, which allows users to make informed choices as shown in Figure 3.19.

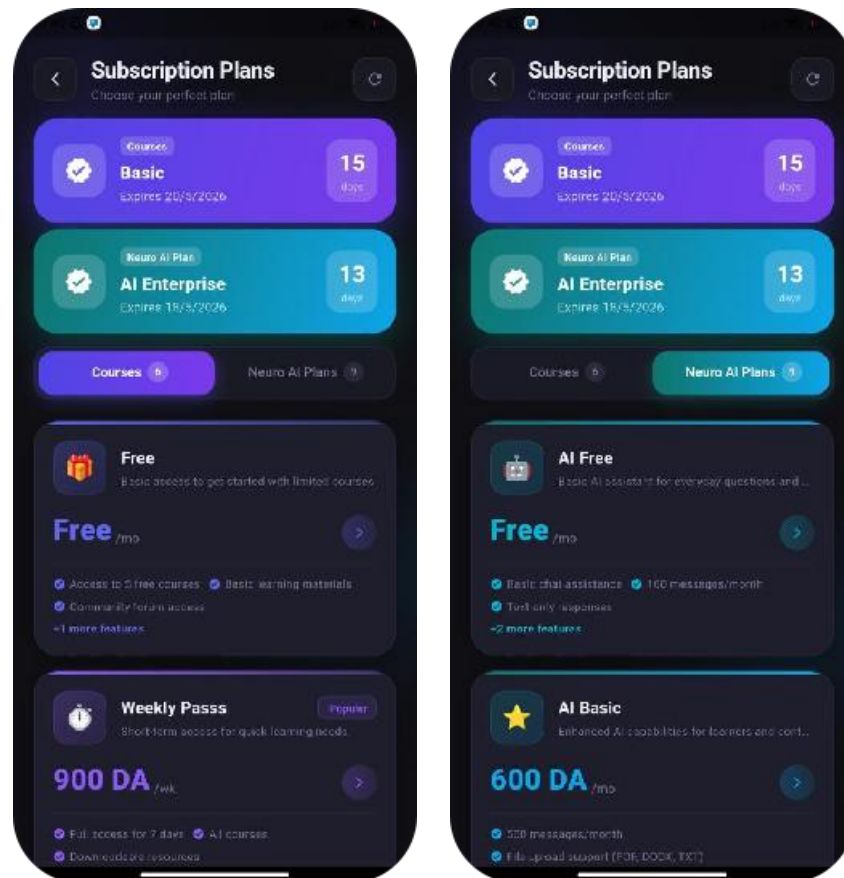


Figure 3.19: Subscription Plans interface

8.8. Neuro AI Chat Interface

The Neuro AI Chat interface is an innovative and intelligent assistant that integrates a friendly entry point with a sophisticated, interactive chat experience. It allows real-time communication, and also has advanced features like automated code generation, plus complex problem solving, all through a secure and friendly dashboard, as shown in Figure 3.20.

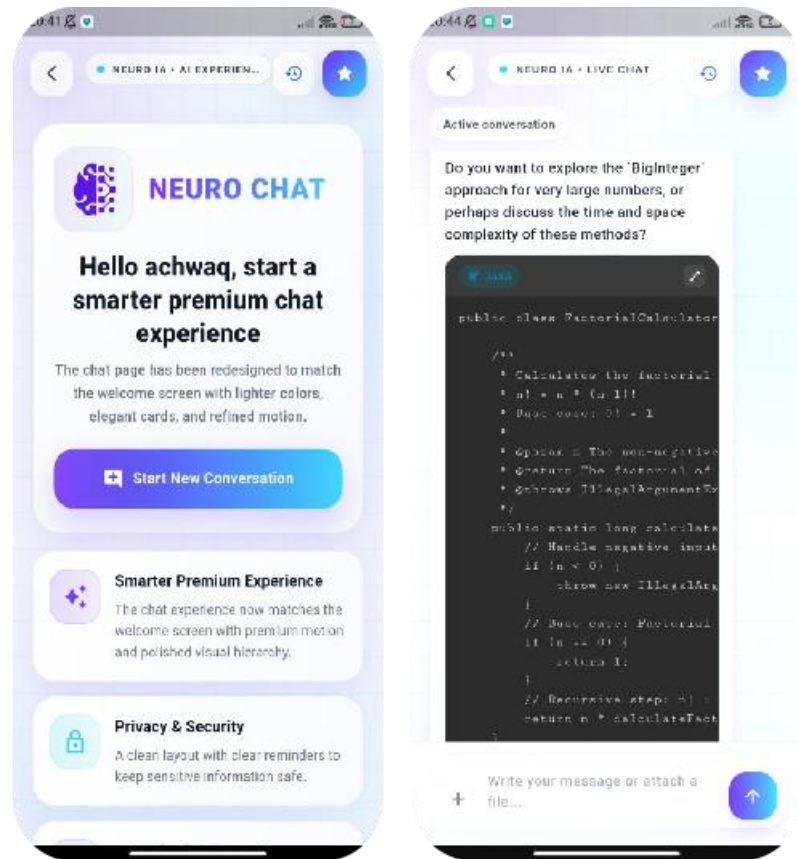


Figure 3.20: Neuro AI Chat interface

8.9. Messaging & Communication interface

Messaging interface allows for communicating with the instructor and other students in real time in the platform. It enables users to send, receive, and manage messages via an organized and user-friendly system. This enhances communication and interaction and facilitates effective academic communication. The messaging interface is shown in figure 3.21.

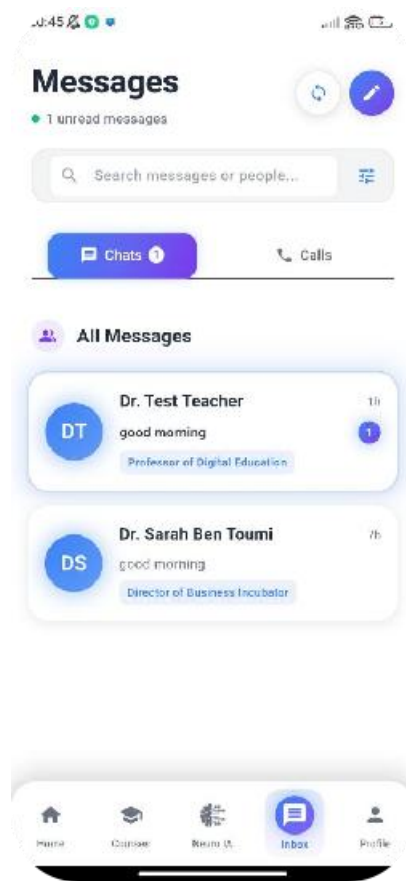


Figure 3.21: Messaging & Communication interface

8.10. Profile & Transaction Management interface

This interface allows users to manage their personal information and update their account settings, as shown in Figure 3.22. While figure 3.23 provides a detailed view of financial transactions, including payment status and activity history. This functionality ensures transparency and efficient management of user accounts and payments.

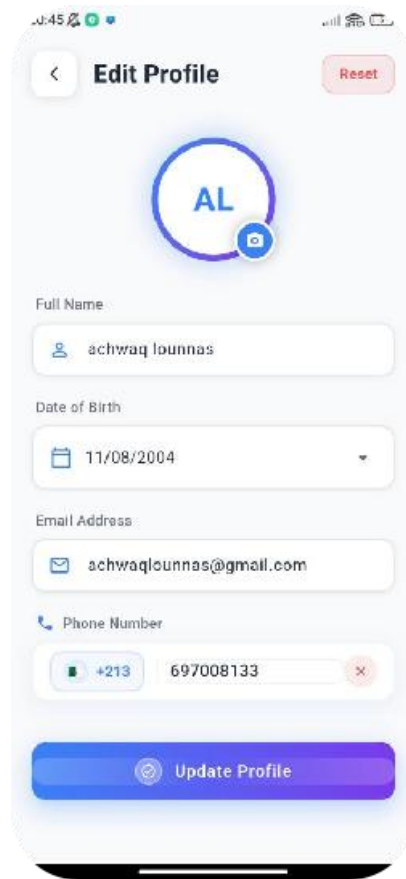


Figure 3.22: Profile interface

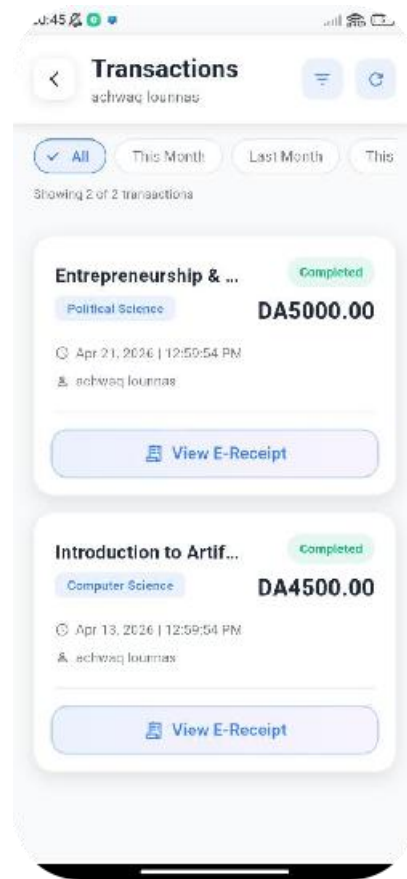


Figure 3.23: Transaction interface

8.11. Security & Authentication Settings interface

The Security Interface gives a detailed view of your account security, including the security status and provides advanced security options such as biometric authentication and Two-Factor Authentication (2FA). It lets users control trusted devices and get notifications when they log in on suspicious devices. Also, it brings all of them important actions, like changing the PIN and password, in a secure and easy-to-use environment.

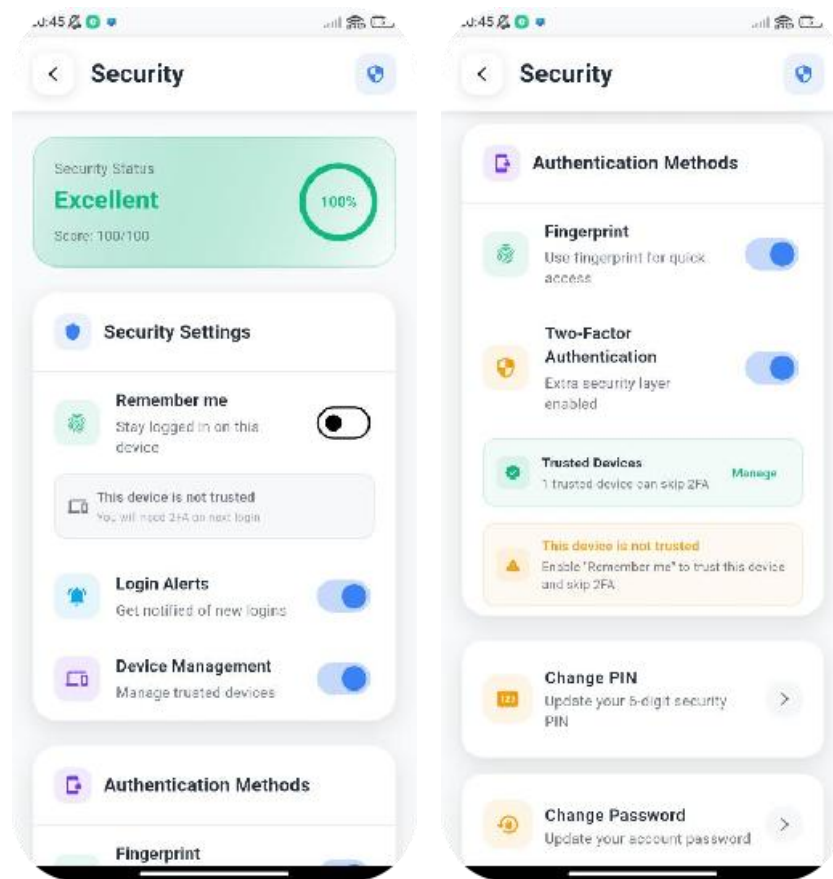


Figure 3.24: Security setting interface

8.12. Main page interface

The main page acts as the central gateway to the Learnify DZ platform, showcasing its vision to revolutionize higher education through AI-powered learning and provide digital services. It's responsive, as seen in Figure 3.25, to be accessible from different devices. It also contains a direct link to the teacher and admin dashboards, as well as a link to download the mobile application.

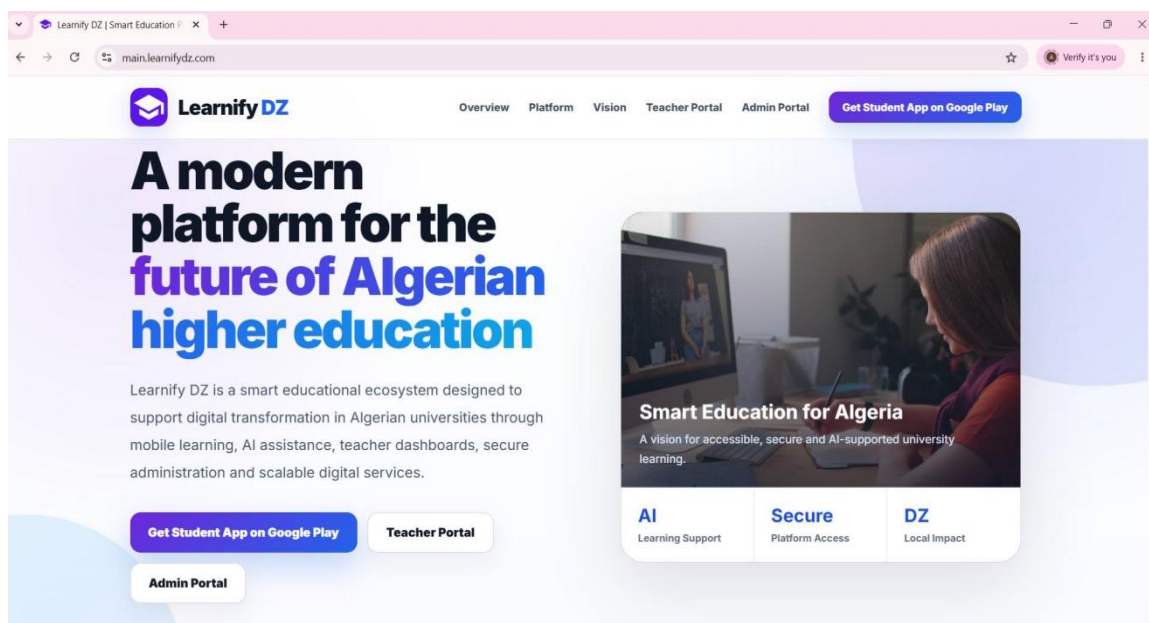


Figure 3.25: Main page interface

8.13. Admin dashboard interface

View all platform information and statistics in a central overview in the Admin Dashboard Interface, including system activities. It allows administrators to handle users, courses and platform operations efficiently with an organized and intuitive interface.

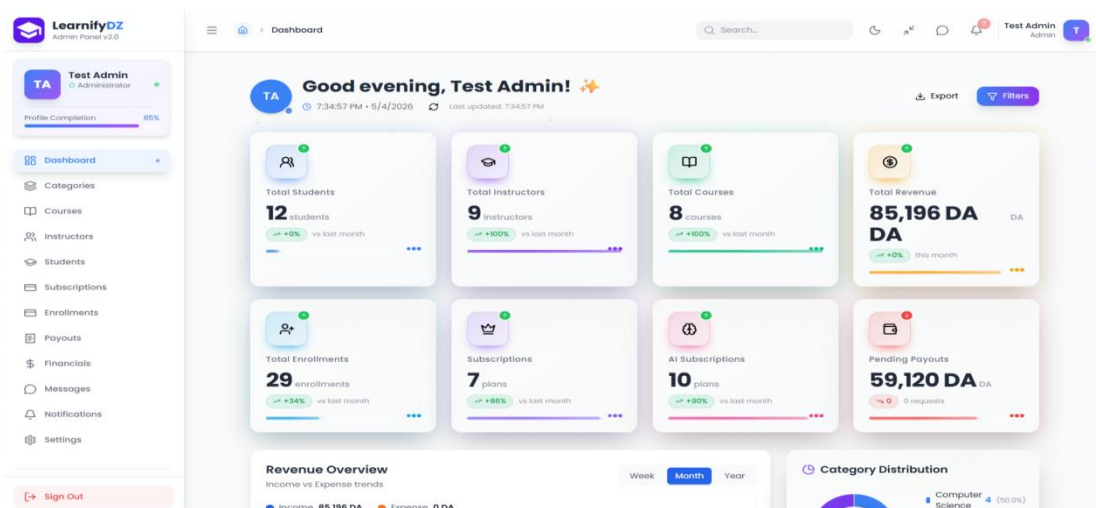


Figure 3.26: Admin dashboard interface

8.14. Categories management interface

The Categories Management Interface allows administrators to easily arrange and control groups of courses in the platform. It can be used to create new categories via the

“Add New Category” option and offers a range of useful figures like total categories, total courses, total students and total revenue. The interface is also equipped with the possibility of filtering by status: Active and Draft , Archived and allows data export in JSON / CSV format to enable analysis and monitoring.

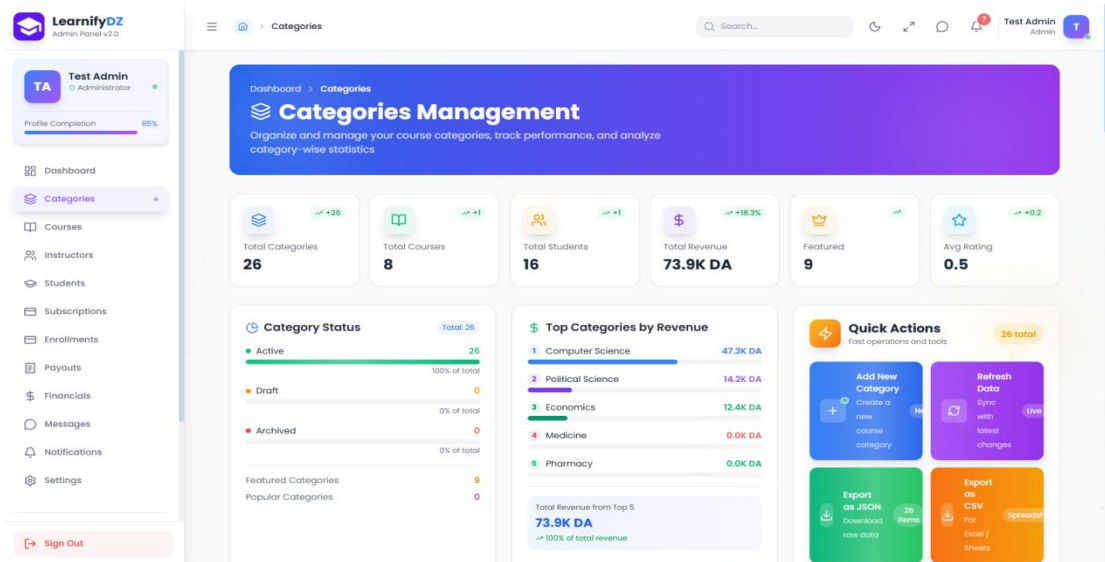


Figure 3.27: Categories management interface

This Add New Category interface enables the admin to add and manage categories for courses and enter the information in multilingual (English, Arabic, French) and detailed descriptions. It goes through a step-by-step process, categorized as Basic Info, Settings, SEO & Preview, for a correct and accurate organization and optimization of course categories in the platform.

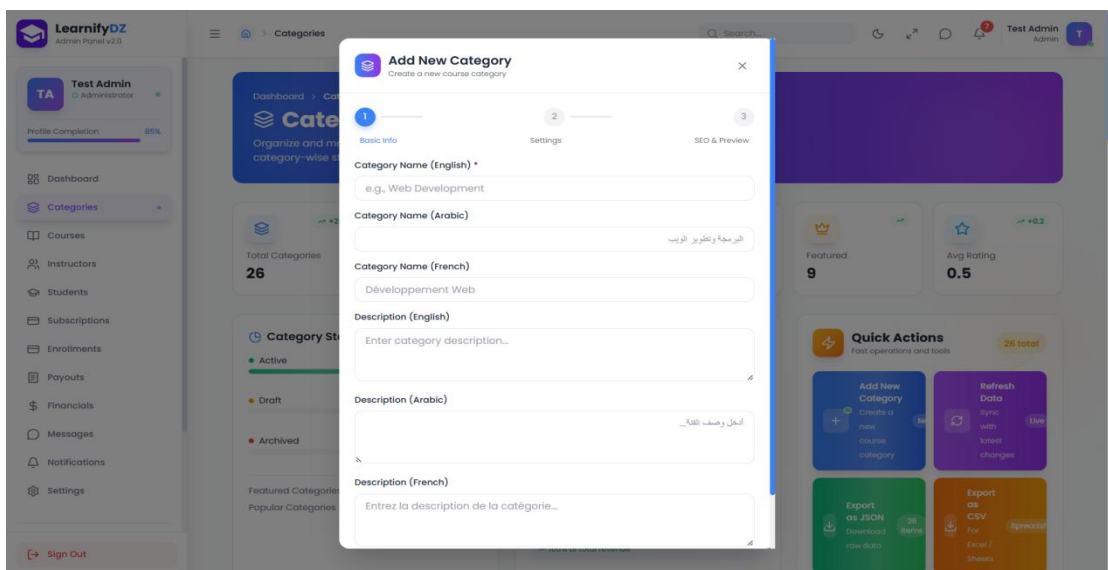


Figure 3.28: Add new categories interface

8.15. Courses management interface

Within the Courses Management Interface, all aspects of the academic catalogue, such as performance metrics and revenue insights. It enables administrators to easily track courses by category and to view platform usage efficiently. The detailed catalog view, as seen in Figure 3.29, allows for filtering and handling courses by status (Published, Pending, Rejected). This provides good quality control and course lifecycle management.

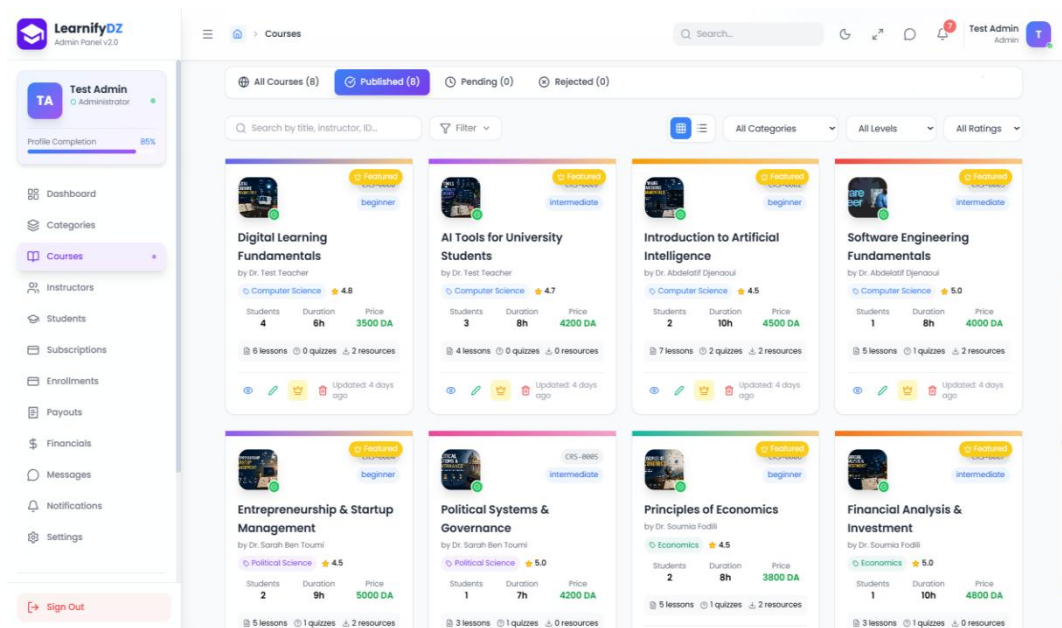


Figure 3.29: Courses list interface

8.16. Instructors management interface

The Instructors Management Interface allows one to add and monitor all the teachers in the platform, the admin can add more instructors by using the Add New Instructor button. It shows numbers of total, active, inactive, verified and pending instructors, attendance overview chart and numbers overview of department distribution. Furthermore, it has the capability to export data to JSON or CSV for tracking and performance assessment of the teaching staff.

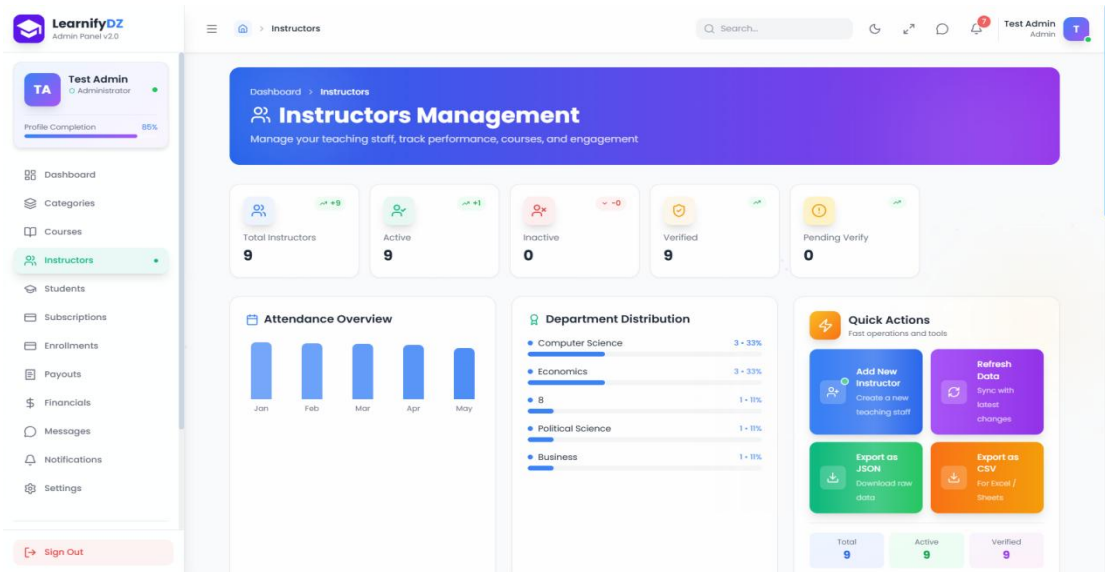


Figure 3.30: Instructors management interface

8.17. Students management interface

The Students Management Interface will allow the admin to manage and monitor all registered students in the platform, their learning progress, achievement and engagement. It shows the important data: total, active, inactive, enrolled, completed and certified students and a chart showing growth of new student enrollments over time. Also, it offers a student level distribution analysis (Beginner / Intermediate / Advanced) which will assist the admin to understand the academic profile of the student population.

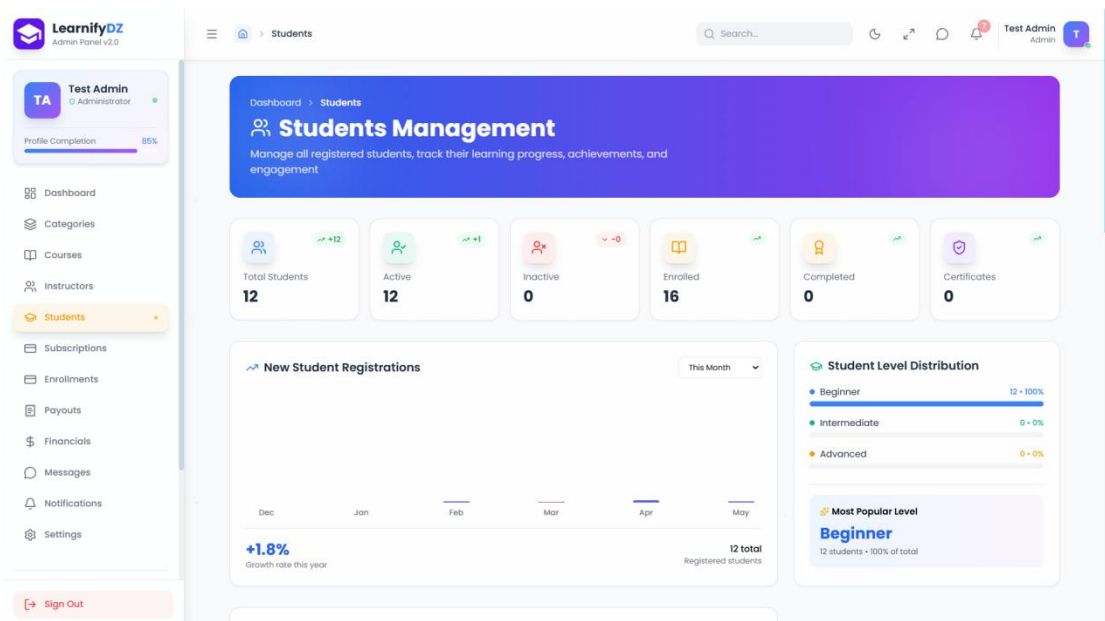


Figure 3.31: Students management interface

8.18. Subscriptions management interface

The subscription management interface allows administrators to manage and monitor all subscription plans on the platform, including course subscriptions and neural networking plans. This interface includes detailed statistics such as total subscribers, revenue, and plan distribution, as shown in Figure 3.32. It also enables administrators to add new plans via a multi-step form that includes plan information, features, limits, and pricing settings. Furthermore, the interface offers different subscription levels, from free to lifetimesubscriptions.

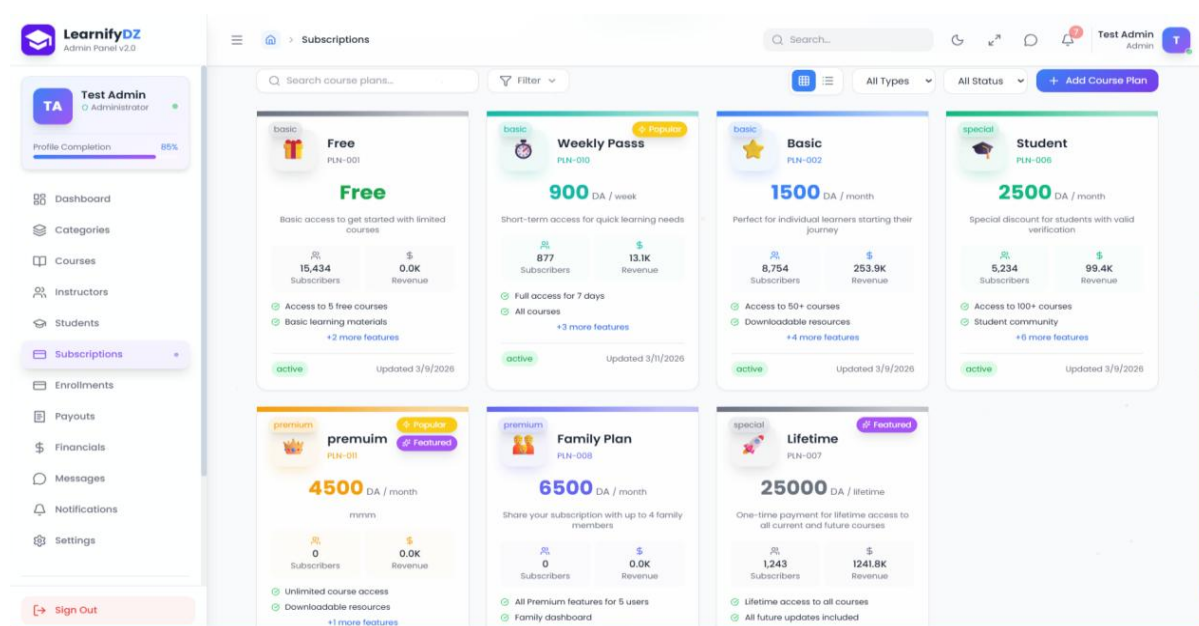


Figure 3.32: Subscription plans interface

8.19. Enrollments management interface

The Enrollments Management Interface allows the admin to monitor and control all course purchases, subscriptions, and AI Neuro memberships within the platform, and shows key statistics like number of transactions, pending, and expired enrollments. It includes a comprehensive data table containing students enrolled and their payment details, including their payment status, payment type, and transaction details, with advanced filtering options by status, type and period. In addition, the admin can check out all enrollment information in the Course Purchase Details modal, including complete student information, payment breakdown, and course information for each purchase.

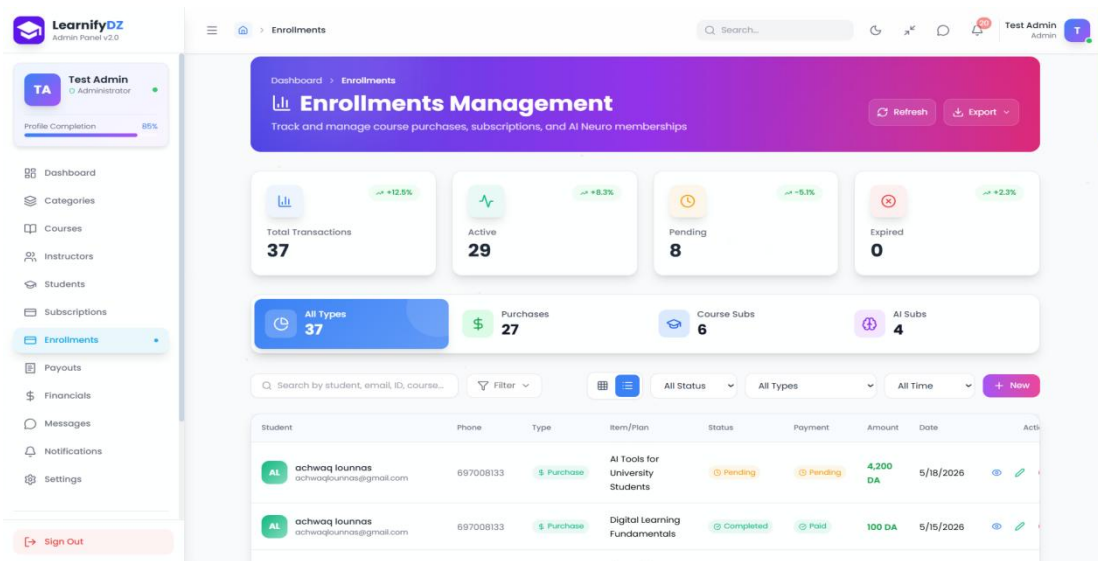


Figure 3.33: Enrollments management interface

8.20 Payouts management interface

The Payouts Management Interface allows the admin to view and process all payouts requests made by instructors, including total payouts, pending, completed and rejected payouts. It includes a comprehensive transactions table that displays every request for payout, including the mentor's details, the amount, the mode of payment, the status, and a lot more advanced filters on payout status, payment method, and time period. In addition, the admin can generate new payout requests using the New Payout button, and export all transaction data for financial reporting and tracking.

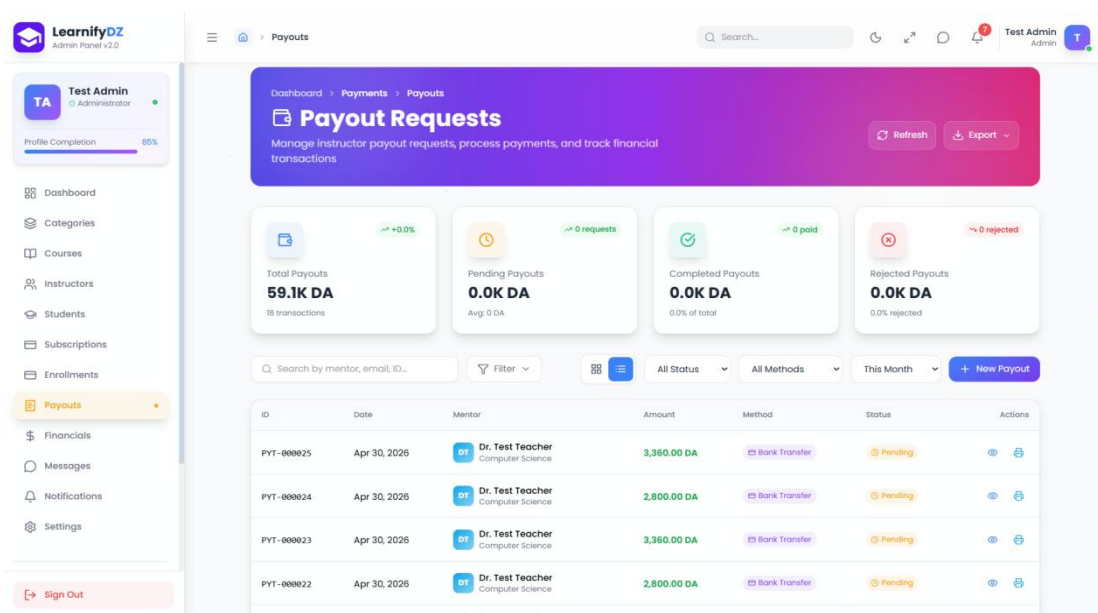


Figure 3.34: Payouts management interface

8.21. Financials management interface

The Financials Management Interface allows the admin to easily track and monitor all the revenue, expense and Financial performance of the platform on real-time basis. It shows metrics like total revenue, course purchases, subscriptions, AI subscriptions, pending payouts, net profit and a Cashflow Overview chart that shows the income and expense trends over time. Plus, it also offers an Income Breakdown donut chart that makes it easy to see how revenue is distributed between course purchases, subscriptions, and AI subscriptions for comprehensive financial data.

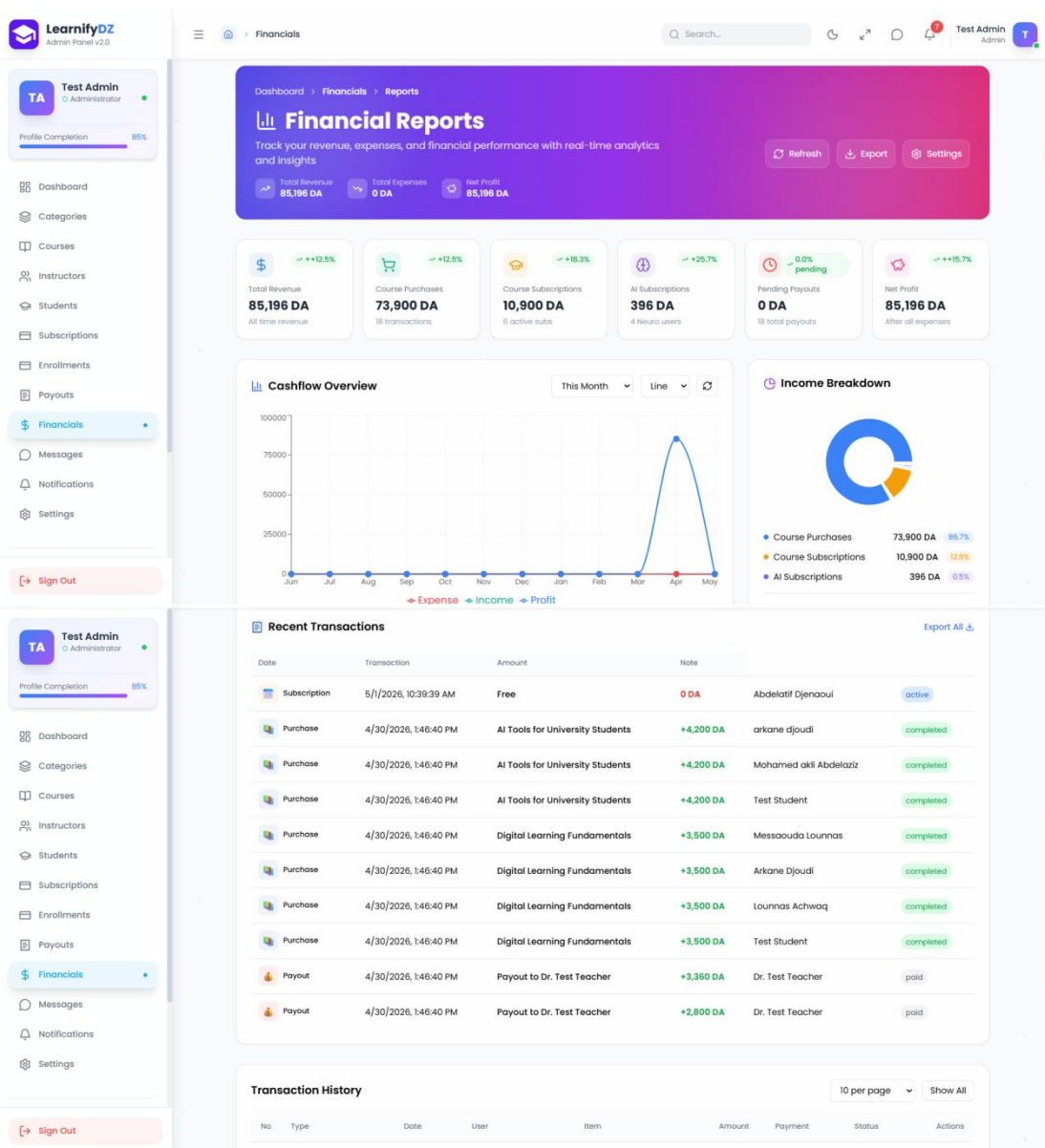


Figure 3.35: Financial management interface

8.22. Admin system settings interface

The Settings Interface provides the admin complete control on the platform's settings, preferences and integrations, organized in the following sections: General, Appearance, Notifications, and Security. The Security section enables the admin to activate Two-Factor Authentication (2FA) and to check all active admin sessions on various devices. It also offers the ability to sign out from all other devices at once to guarantee security and access control to the account.

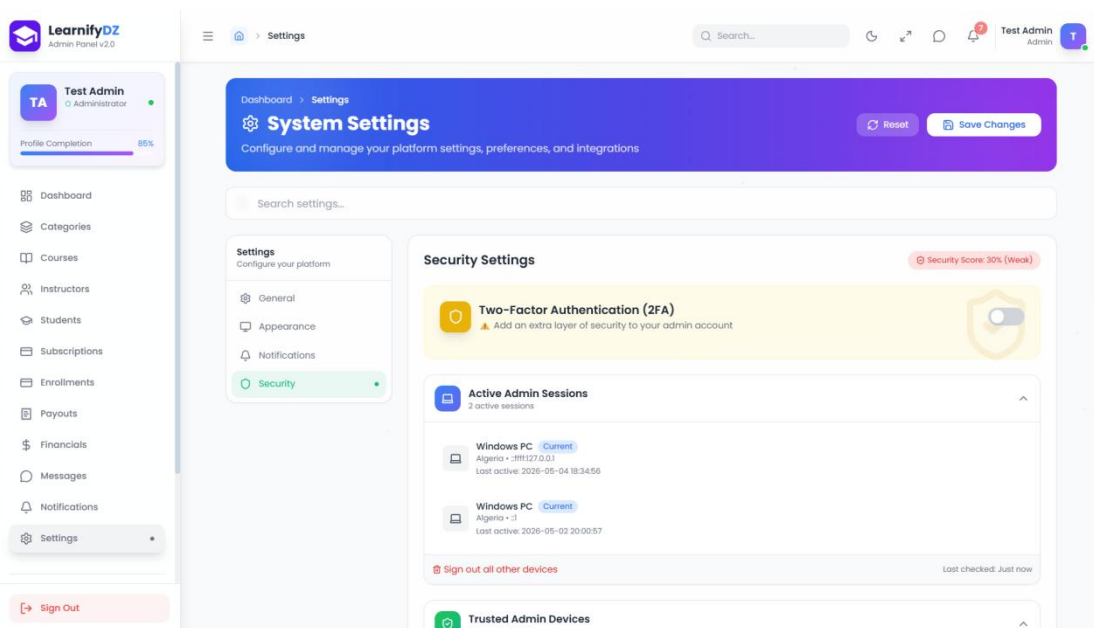


Figure 3.36 : Admin system settings interface

8.23. Teacher courses management interface

The Teacher Course Management Interface shows teachers a summary of all their courses with statistics like total number of courses, total number of published courses, total number of pending courses, total number of rejected courses (by admin), average rating, completed course percentage, and total revenue. It also allows teachers to develop new courses using a three-step form with basic details, course content, and pricing, which makes it easy to publish and manage interactive learning content with students.

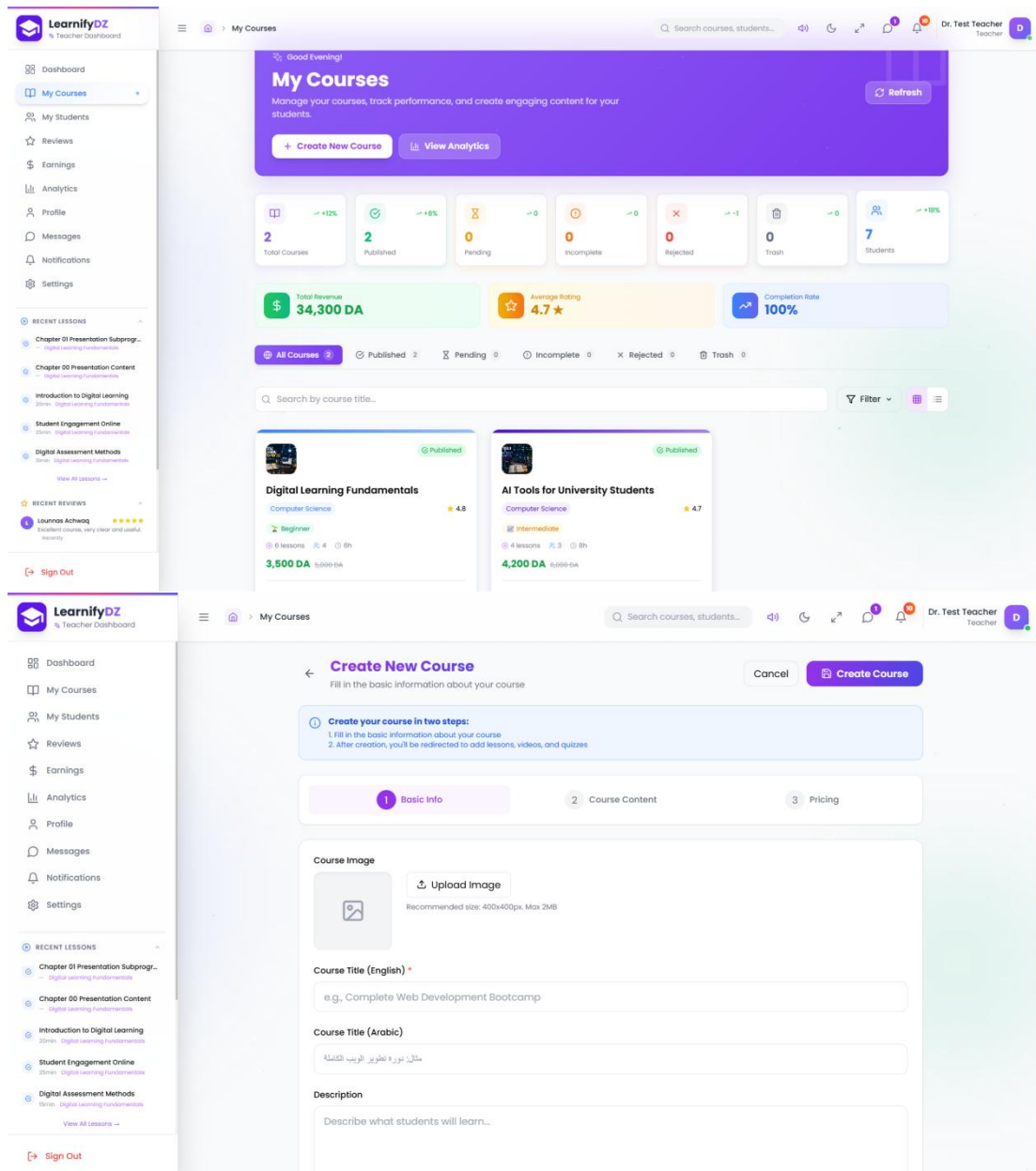


Figure 3.37: Teacher course management interface

8.24. Teacher students management interface

The Teacher Students Management Interface enables teachers to monitor and interact with all the students in their classes, showing important metrics like the number of students, the number of active students, the number of courses completed and average progress. It includes comprehensive student profile pages that display student progress, courses taken, hours spent, certifications earned, contact details, and activity history, along with a Send Message function for students to send specific messages directly to them.

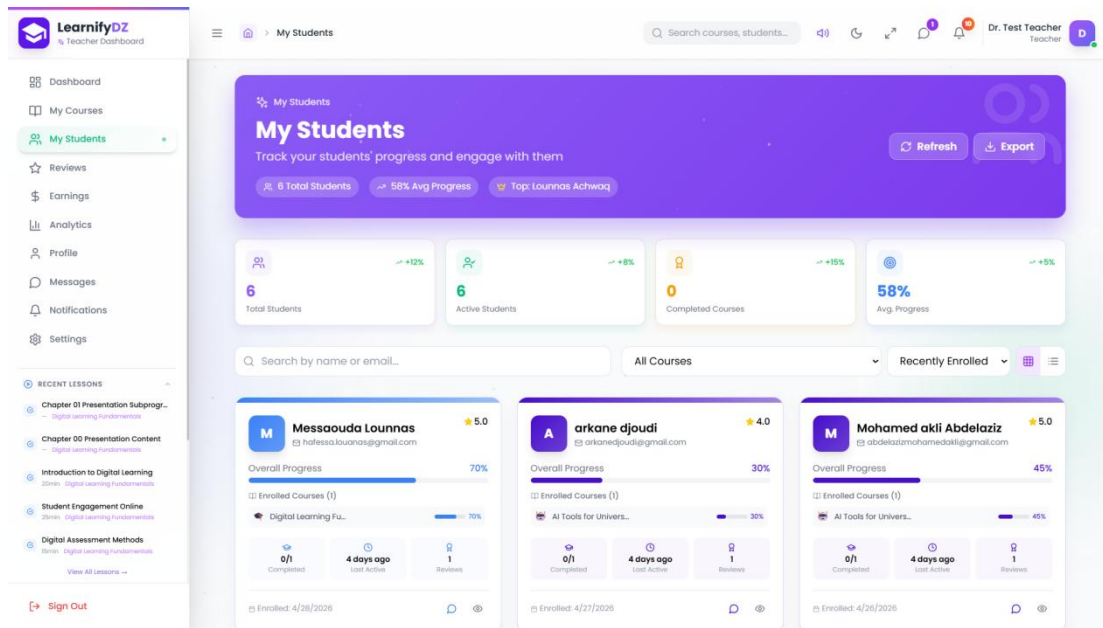


Figure 3.38: Teacher students management interface

8.25. Reviews & Ratings interface

The Reviews and Ratings Interface provides teachers an easy-to-use overview of all of the student reviews for their courses, including total reviews, average rating, helpful votes, a rating distribution chart and a trend of reviews made in the past week. It also segments reviews by course, so teachers can find out what students think about their learning and how they can enhance their teaching.

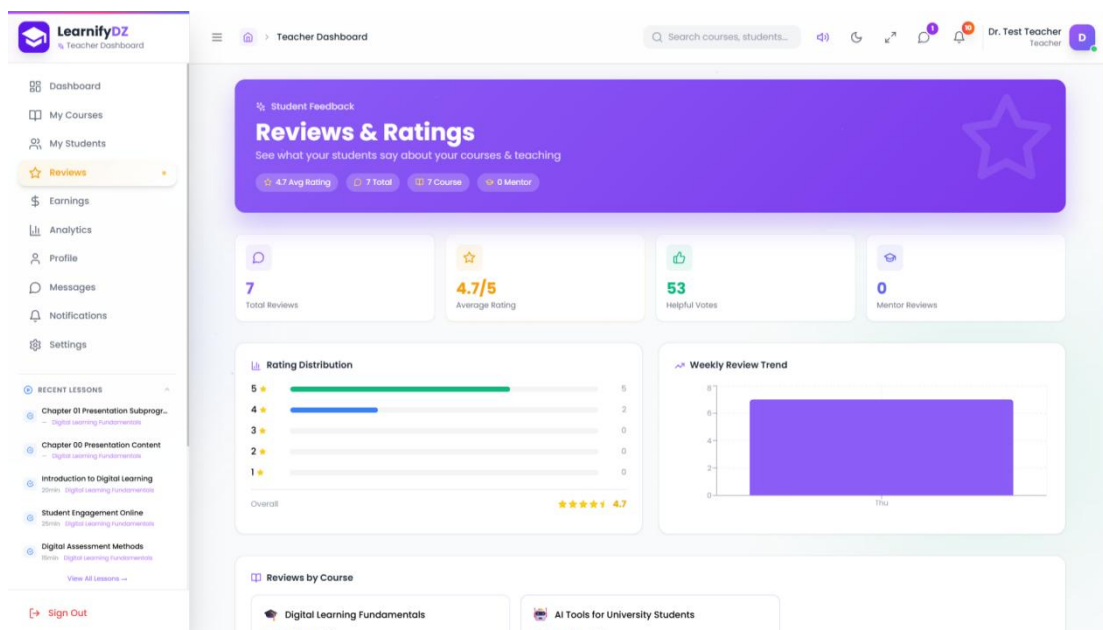


Figure 3.39: Reviews & Ratings interface

8.26. Earnings interface

The Earning Interface offers teachers a single, intuitive and up-to-the-minute view of their balance, their pending earnings, and their earnings this month. The Withdraw Funds button is available for teachers to easily request to withdraw their funds directly from the dashboard, which is also easy to use. It also features detailed tabs such as Transactions, Analytics and Payouts, giving teachers a clear idea of where their money is at all times.

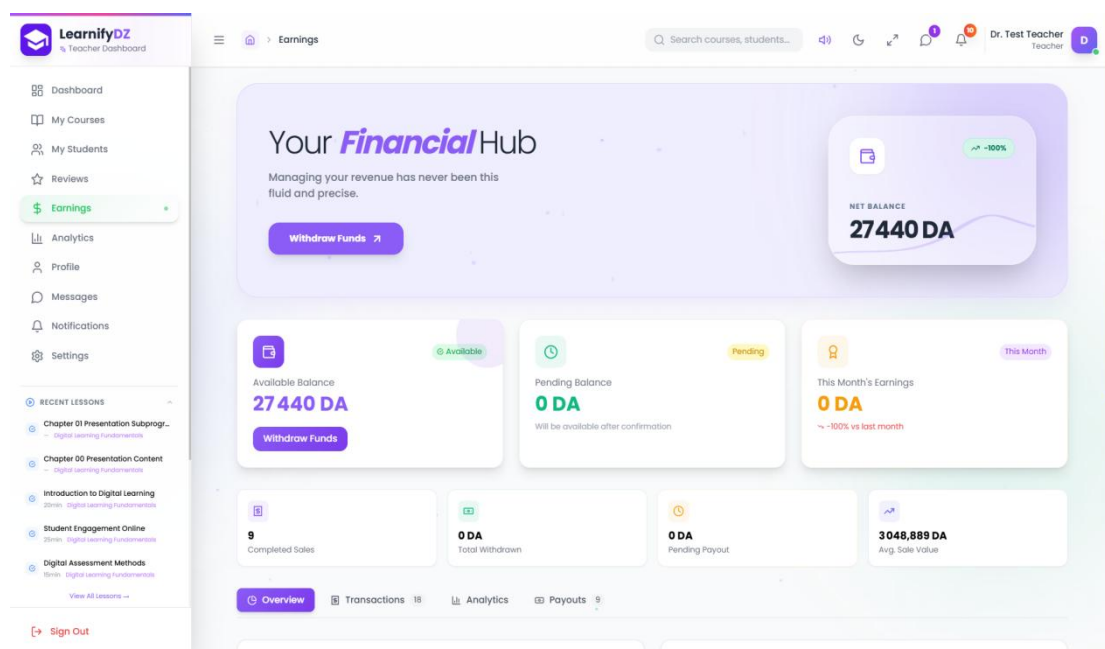


Figure 3.40: Earning interface

8.27. Analytics dashboard interface

The Analytics Dashboard provides teachers with a comprehensive, real-time data picture of their overall performance, including their total students, courses, earnings, average rating, completion rate, retention rate, and more. It also provides visualization of charts like Performance Trends and Weekly Activity which helps the teachers to understand the engagement and revenue generated by a student over a period of time and make informed decisions about teacher engagement.

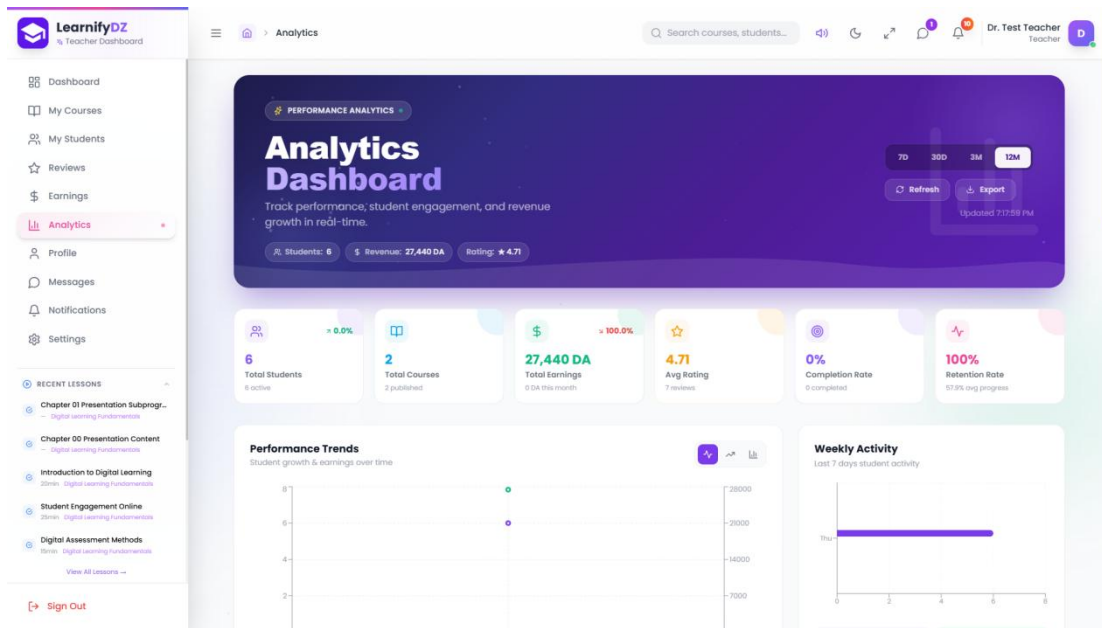


Figure 3.41: Analytics dashboard interface

8.28. Teacher profile interface

The Teacher Profile Interface presents a complete and professional profile of each verified teacher, including personal details like specialty, institution, position and academic qualification (as shown in the image). It offers a quick summary of the total number of students, courses, earnings and average rating, and also includes Edit Profile and Share Profile buttons for updating or sharing the profile.

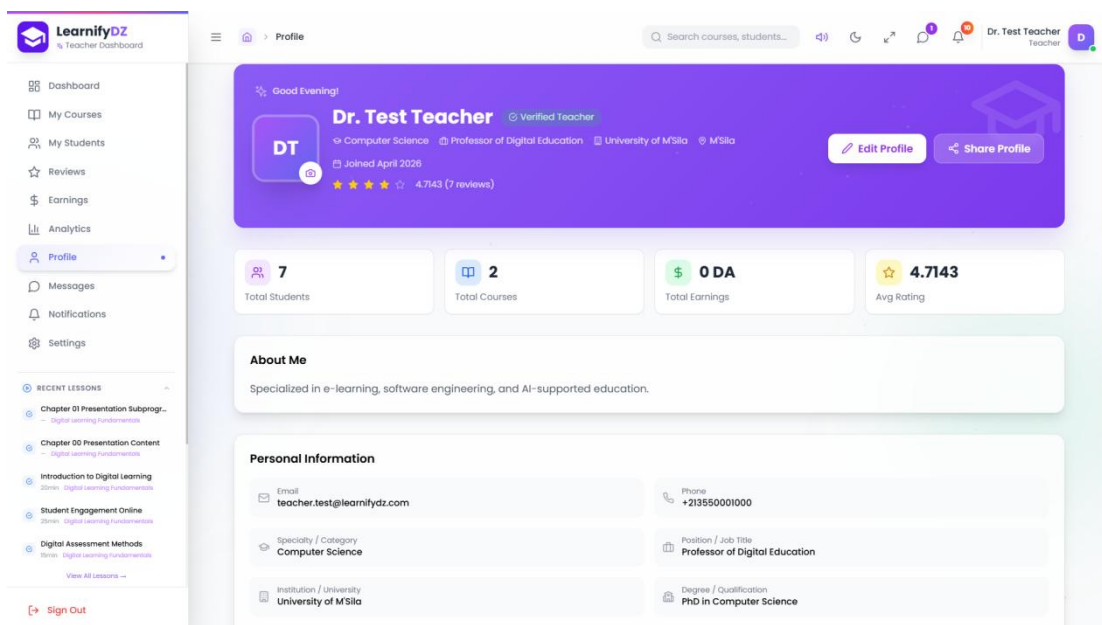


Figure 3.42: Teacher profile interface

8.29. Teacher account settings interface

Teacher Account Settings Interface, which includes the Profile, Teaching, Notifications, Payment and Security sections, enables teachers to manage their profile, preferences and account security. It also allows teachers to activate Two Factor Authentication (2FA) and view all sessions active across all devices as illustrated below.

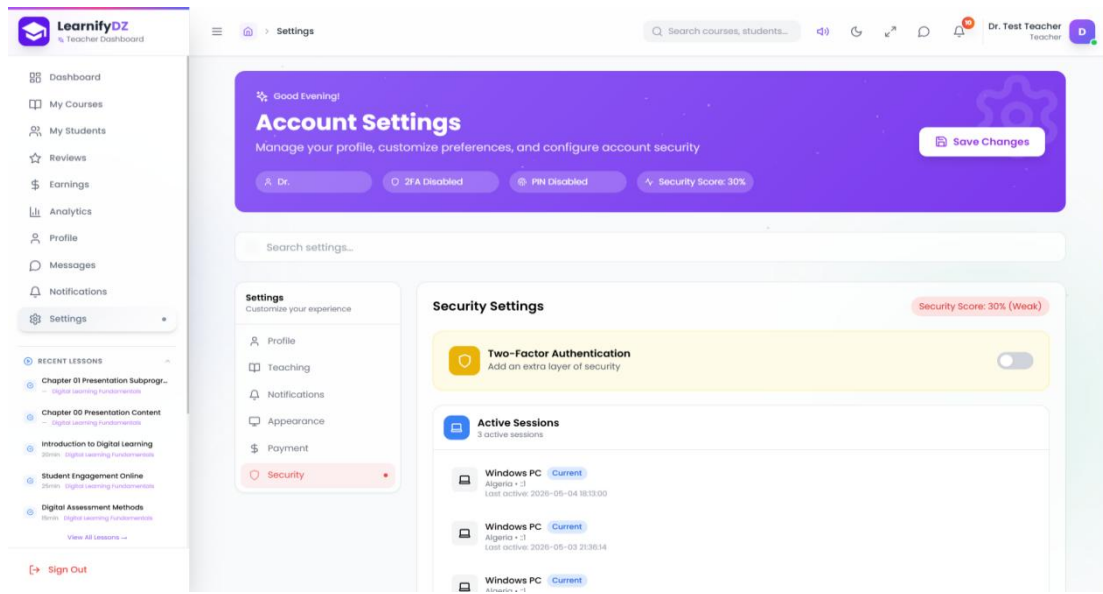


Figure 3.43: Teacher account settings interface

9. Conclusion

In this chapter, we presented the implementation and realization of the Learnify DZ platform, including the technologies, tools and system architecture used. We also sketched the primary interfaces and the main functions that were created to satisfy users' needs. The outcomes demonstrate the effectiveness of the proposed design in converting it into a practical and efficient system. This implementation verifies that the platform can provide a modern, secure and intelligent e-learning environment.

Conclusion

In this project, we explained the different phases which were carried out to design and develop the Learnify DZ platform, a smart mobile learning application aimed at Algerian university students. The main purpose of this work was to improve access to digital education, promoting an environment that is flexible, interactive and adapted to the local context.

The first step was to find out what challenges students faced in access to resources, particularly the lack of organized learning materials, and the lack of local digital learning tools. We suggested an innovative solution which combines structured courses, an AI-based assistant and electronic payment, adapted to a local context, and modern technologies to make the learning process more pleasant.

During the design process, Unified Modeling Language (UML) was used to model the system from functional, dynamic and structural perspectives. In addition to Google Gemini's intelligent support, the implementation process included state-of-the-art technologies such as Flutter (used in the mobile app), Node.js (used in backend services), Firebase (used for data management), and the integration of electronic payments solutions.

We have gained a lot of experience in both theoretical and practical work aspects with this project, especially in the area of system design, mobile development and the incorporation of artificial intelligence into real life applications. It also enhanced our skill of managing a whole project cycle and working professionally with up to date technologies.

In addition, there are opportunities for future improvements to the platform, with additional features, more customisation options and more educational services based on user feedback and new technologies.

PART II

ECONOMIC STUDY AND STARTUP PROJECT

General Introduction

Learnify DZ is an EdTech Startup project developed in Algeria to develop a structured, scalable and financially sustainable Digital Business from the technical prototype of Part I. The project builds on an AI-powered mobile and web learning ecosystem that brings Algerian university students and professors together using premium video courses, an intelligent academic assistant, monetization options for professors, local digital payment, and administrative management dashboards. The series of technical MVP's presented in Part I show that the platform can be developed, as the student mobile app, the teacher dashboard, admin dashboard, course management tools, payment integration, and AI-supported learning tools have already been built. Part II explores the economic contribution this prototype has created and the promising potential of the prototype as a start-up project in the Startup 1275 framework. This economic study is an attempt to prove that the Learnify DZ is addressing a true market need in Algeria, which includes the absence of structured digital learning platforms adapted to university students, the limited availability of good academic explanations and the weak integration of a digital platform based on artificial intelligence in Algerian education and the necessity of payment solutions in Algerian Dinar. The study also takes a look at the business model, target market, competition, financial projections, risks, and development roadmap. This part aims to demonstrate that Learnify DZ is a technical solution as well as a viable start-up that can generate added value for students, professors and the Algerian HE ecosystem.

Chapter 4

In-Depth Market Study

Chapter 4: In-Depth Market Study

1. Introduction

The present chapter gives the market study of Learnify DZ. This research is aimed at confirming the reality of a real, accessible and solvent market for the development of an AI based educational platform for Algerian University students and professors.

The analysis is made on the basis of the project pitch deck, the observations in the field, the needs of the users identified during the development phase, the plan for the market survey and the strategic analysis frameworks. The chapter consists of the PESTEL macroenvironmental analysis, target market segmentation, competitive analysis, Porter's Five Forces, SWOT analysis, primary research and the go to market strategy.

There is a great potential for digital transformation in the Algerian Higher Education sector. Students use a variety of resources including social media groups, private tutoring, PDFs, and random videos from YouTube. But these options are not tailored to individual university programmes, are not organized, and do not offer individual support. Learnify DZ is designed to address this, providing a local, structured, intelligent and affordable learning ecosystem.

2. Macro-Environmental Analysis: PESTEL Framework

The PESTEL analysis evaluates the external environment that may influence the development and growth of Learnify DZ in Algeria.

Dimension	Factors Identified	Impact	Intensity
Political	Algeria encourages entrepreneurship, innovation, digital transformation, university incubators, and startup creation through programmes such as Startup 1275.	Positive	High
Economic	Students are price-sensitive, but affordable online learning can be more accessible than private tutoring or foreign platforms. Inflation and purchasing power remain important constraints.	Mixed	Medium

Sociocultural	Algerian students increasingly use smartphones, social media, online videos, and digital tools for learning. However, they still need structured academic support adapted to their university context.	Positive	High
Technological	The growth of mobile applications, cloud computing, artificial intelligence, and online payment solutions creates opportunities for EdTech startups.	Positive	High
Environmental	Digital education reduces the need for printed documents and physical mobility, contributing indirectly to more sustainable learning practices.	Positive	Low
Legal	The project must respect personal data protection, copyright of educational content, electronic payment regulations, and trademark protection.	Neutral / Risk	Medium

Table 4.1 : PESTEL Analysis of the Algerian EdTech Environment

PESTEL Interpretation

The Algerian environment is favorable for the launch of a local EdTech startup because of the growing interest in digital transformation, university entrepreneurship, and startup support programmes. The sociocultural environment is also promising because students already use digital tools for learning, but their current resources are often fragmented and not structured.

However, Learnify DZ must carefully manage some constraints. These include students' limited purchasing power, competition from free resources, the need to protect educational content, and compliance with data protection and electronic payment regulations.

Overall, the macro-environment shows a positive opportunity for Learnify DZ, provided that the platform offers affordable pricing, strong educational value, local payment methods, and reliable academic content.

3. Target Market Analysis

3.1. Market Definition and Segmentation

The target users of Learnify DZ are mainly Algerian university students and professors. The platform is also looking at graduate students, job-seekers and educational institutions, which require digital academic content and smart learning tools.

The Algerian higher education market comprises over 1.5 million university students, and is a big market to address with digital learning solutions, according to the project pitch deck. There are three segments of the target market: TAM, SAM, SOM.

Market Level	Definition for Learnify DZ	Estimated Volume	Explanation
TAM — Total Addressable Market	All Algerian university students who may need academic support and online learning.	1.5M+ students	Represents the maximum theoretical market if the platform reaches all university students.
SAM — Serviceable Addressable Market	Students with smartphone/internet access and interest in digital learning.	Around 300,000–500,000 users	Represents the realistic part of the market that can be targeted through digital channels.
SOM — Serviceable Obtainable Market	Users that Learnify DZ can realistically capture in the first years.	1,000 to 15,000 users	Based on the roadmap and progressive adoption strategy.

Table 4.2: Learnify DZ Market Segmentation (TAM, SAM, SOM)

Algerian university students are their first target because they are the main users of the platform and are the main beneficiaries of it. The second target is university professors as they can provide the educational content and earn some money from the platform. The third objective is aimed at graduate students, job seekers and education institutions.

3.2. Market Size and Growth Trajectory

However, Algeria is experiencing a growing need for digital learning due to students' expectations of learning that is flexible, accessible, and affordable. The traditional way of learning is mostly restricted in terms of time, place, teacher availability, and private tuition

fees.

To meet this demand, Learnify DZ offers recorded courses from various universities, with AI support to assist with academic tasks, local payment and a structured learning environment. The project roadmap follows the progressive growth:

Phase	Period	Target Students	Target Professors	Target Courses	Monthly Revenue Objective
Phase 1	0–6 months	1,000+	50+	100+	250,000 DZD
Phase 2	6–12 months	5,000+	150+	500+	1,000,000 DZD
Phase 3	1–3 years	15,000+	300+	1,000+	3,000,000 DZD

Table 4.3: Learnify DZ Market Growth Phases and Revenue Objectives

The first phase is to launch and validate the MVP with real users. The second phase involves growth and expansion of courses, professors and users. The third phase is national leadership and scale in Algerian Universities. Learnify DZ's main customer is the university student. This user requires easily accessible academic material, tailored to Algerian university courses and delivered at all times.

3.3. Customer Segmentation and Personas

Persona 1: University Student

Element	University Student
Profile	Undergraduate or Master student in Algeria
Age	18–26 years
Needs	Clear academic explanations, exam preparation, affordable courses, AI support
Barriers	Limited budget, lack of trust in online platforms, payment difficulties
Behaviour	Uses smartphone daily, searches for lessons on YouTube,

	PDFs, Telegram, Facebook groups, and university groups
Willingness to Pay	500–1,500 DZD per month depending on course quality and AI features
Pain Point Solved	Difficulty finding structured and reliable university-level explanations

Table 4.4: Student Persona Profile

Learnify DZ's main client is the university student. The user should be able to access academic content that is accessible on all university programs in Algeria, and should be available at any time.

Persona 2: Graduate Student / Job Seeker

Element	Graduate Student / Job Seeker
Profile	Graduate preparing for exams, certifications, or professional skills
Needs	Practical courses, revision content, exam preparation, career-oriented learning
Barriers	Price sensitivity and uncertainty about course quality
Behaviour	Searches online for certifications, skills, and academic support
Willingness to Pay	1,000–3,000 DZD per course or subscription
Pain Point Solved	Need for flexible and affordable learning adapted to local context

Table 4.5: Graduate Student Persona Profile

This segment is a growth opportunity in the future, particularly with regards to certification services, professional skills courses, and career preparation content.

4. In-Depth Competitive Analysis

4.1. Competitive Landscape Mapping

Learnify DZ is playing in a market where there are several options to learn that students are already using. These competitors can be divided into direct competitors, indirect competitors, international platforms and substitutes.

Category	Examples	Description
Direct competitors	Local educational platforms	Platforms that offer online courses or academic content in Algeria
Indirect competitors	YouTube, Facebook groups, Telegram channels	Free or informal learning resources used by students
International competitors	Coursera, Udemy, Khan Academy	Global platforms with high-quality content but often not adapted to Algerian university programmes or local payment
Substitutes	Private tutoring, photocopied lessons, PDFs	Traditional alternatives used by students

Table 4.6: Competitive Landscape of Learnify DZ

While these options are available, most of them don't offer a full ecosystem suited for Algerian university students. Unstructured and free, YouTube and social media groups. International platforms provide good quality content but are costly and unlocalized to local programmes and are not readily available in Algerian Dinar. Although private tutoring may be helpful, it is expensive and time and place dependent.

4.2. Detailed Comparative Analysis

Criterion	Learnify DZ	YouTube / Social Media	Udemy / Coursera	Private Tutoring
Local university content	High	Low / Medium	Low	Medium
Algerian payment in DZD	High	Not applicable	Low	High
AI academic assistant	High	Low	Medium	Low

Professor monetization	High	Low	Medium	Low
Structured learning path	High	Low	High	Medium
Price accessibility	Medium / High	High	Medium / Low	Low
Algerian market adaptation	High	Medium	Low	High
Teacher dashboard	High	Low	Medium	Low
Admin quality control	High	Low	Medium	Low

Table 4.7: Comparative Analysis of Learnify DZ and Competitors**Interpretation:**

What makes Learnify DZ stand out is the integration of multiple components in a single ecosystem—local academic content, professor-designed courses, AI assistance, local payment, student mobile application, teacher dashboard, and admin dashboard.

4.3. Porter's Five Forces Analysis

Force	Analysis	Impact
Intensity of rivalry	EdTech competition is increasing, but few platforms are fully adapted to Algerian university students with local payment and AI support.	Medium
Threat of new entrants	Creating a simple course platform is possible, but building a complete ecosystem with AI, payment, dashboards, and a professor network requires time and expertise.	Medium
Bargaining power of suppliers	Main suppliers are cloud providers, AI API providers, and payment gateways. Alternatives exist, but AI costs must be monitored.	Low / Medium
Bargaining power of customers	Students are price-sensitive and can use free alternatives, so the platform must offer clear value.	Medium / High

Threat of substitutes	YouTube, PDFs, Telegram groups, private tutoring, and social media content are strong substitutes.	High
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Table 4.8: Porter's Five Forces Analysis**Sector Attractiveness:**

This mix provides the platform with added local value proposition over informal or international options. Medium to High - the sector is attractive. There are market risks, such as free substitutes and the sensitivity of students to price, but there is a good opportunity in the local specialization of Learnify DZ. Quality, affordability, local relevance, and AI-enabled academic support are the aspects it can play on to create a competitive position for the platform.

4.4. Sustainable Competitive Advantage

The Unique Selling Proposition of Learnify DZ is:

Learnify DZ offers Algerian university students a learning platform powered by artificial intelligence that makes university courses, content developed by Algerian professors and payment in Algerian Dinar instead of international platforms or informal sources that are not structured to address the Algerian academic context. Learnify DZ's sustainable competitive advantage lies in:

- Local university-oriented content.
- AI helper for summaries, explanations and exams.
- Professor teacher-dashboard for monetization.
- Quality control and platform manager admin dashboard.
- The seamless integration of local payment methods, tailored to Algerian users.
- Scalable platform architecture.
- A good grasp of the needs of Algerian students.
- Opportunity to establish links with professors and institutions.

5. SWOT Analysis

Strengths	Weaknesses
AI-powered academic assistant	New brand with limited market awareness
Local platform adapted to Algerian students	Need for continuous content production
Professor monetization system	Dependence on internet connectivity
Complete ecosystem: mobile app, teacher dashboard, admin dashboard	Need for marketing investment
Payment in Algerian Dinar	Need to build trust with students and professors
Scalable SaaS model	Limited financial resources at launch

Table 4.9: SWOT Analysis of Learnify DZ (Strengths and Weaknesses)

Opportunities	Threats
Growing demand for digital education in Algeria	International platforms entering the Algerian market
Support for startups and university entrepreneurship	Free substitutes such as YouTube, Telegram, and PDFs
Partnerships with professors and institutions	Payment system technical issues
Expansion to more universities and specialties	Price sensitivity of students
Future certifications and B2B services	Difficulty maintaining high-quality content
Increased use of AI in education	High AI API costs or technological dependency

Table 4.10: SWOT Analysis of Learnify DZ (Opportunities and Threats)

SWOT Interpretation:

Learnify DZ has internal strengths as seen from the SWOT analysis, such as the use of artificial intelligence, its educational system is complete, and its location. But the project has to come up with solutions to problems of brand awareness, content creation and marketing budget.

The external environment offers significant potential in areas such as supporting start-up programmes and Digital education. The main issues are to face competitive free international

market and to be sensitive towards user pricing. All of these risks can be mitigated with affordable prices, free trials, partnerships and constant platform enhancements.

6. Primary Research: Field Survey

6.1. Survey Objective

Google Forms was used to create a field survey for the validation of the market need of Learnify DZ. The questionnaire was directed towards Algerian University students, graduate and professors. The aim was to gain an understanding of their difficulties and current use of digital learning tools, their interest in academic support using AI tools and their readiness to pay for better quality educational resources.

The following are the hypotheses to be tested in the survey:

- In Algerian university, students have difficulties obtaining clear and structured Academic explanations.
- Students are utilizing a range of resources which are accessible in different locations, such as YouTube, pdfs and different telegram groups and social media.
- Students wish to see a local platform of courses offered by Algerian Universities.
- AI can be useful for users to help them with summarizing, clarifying, and preparing for exams.
- Local payment in Algerian Dinar is significant in the adoption process.
- Courses can be uploaded by professors and they can earn from their courses on a special dashboard.

6.2. Data Collection Method

Element	Description
Survey tool	Google Forms
Survey link	https://docs.google.com/forms/d/e/1FAIpQLSctry8b9hNPj3eprcW-cDe5mUctAxphucG7DUIV332EZcZCUQ/viewform
Target population	Algerian university students, graduate students

Data collection method	Online questionnaire
Main data collected	Learning problems, current tools, AI interest, payment preference, willingness to pay
Number of responses	To be inserted after closing the survey

Table 4.11: Survey Data Collection Overview

6.3. Questionnaire Structure

Section	Purpose
Respondent profile	Identify whether the respondent is a student, graduate, or professor
Learning difficulties	Understand the main academic problems faced by students
Current learning tools	Identify the platforms currently used by students
Interest in Learnify DZ	Measure acceptance of a local e-learning platform
AI assistant	Evaluate interest in AI-powered academic support
Payment and pricing	Understand willingness to pay and preferred payment methods
Professor participation	Evaluate whether professors are interested in publishing and selling courses

Table 4.12: Survey Questionnaire Structure

6.4. Results Summary

The results of the survey are given in detail in Appendix C. The main insights of this chapter are summarized in this chapter.

Expected / Observed Result	Interpretation for Learnify DZ
Many students use unstructured resources such as YouTube, PDFs, and social media groups	Confirms the need for a centralized academic platform
Students report difficulties in finding clear explanations adapted to their university courses	Validates the main problem addressed by Learnify DZ

Interest in an AI assistant for summaries and exam preparation	Supports the integration of the AI Tutor
Interest in video courses created by professors	Supports the premium video learning model
Preference for affordable pricing	Confirms the need for accessible subscription plans
Importance of local payment methods	Supports the integration of Algerian payment solutions

Table 4.13: Survey Results Summary and Interpretation**Interpretation:**

The survey also underscores the importance of the relevance of the Learnify DZ by affirming the need of the Algerian University students for structured, affordable, reliable digital learning resources. It also establishes the significance of incorporating AI tools and local payment options. The results support the value proposition, pricing, and go-to-market strategies of the platform.

The full questionnaire, screenshots of the Google Forms results and interpretation of the results are included in Appendix C: Market Survey Questionnaire.

7. Go-to-Market Strategy**7.1. Pricing Strategy**

Learnify DZ has a hybrid revenue structure that includes premium services, marketplace fees and a subscription model.

Revenue Source	Description
Student subscriptions	Monthly or annual subscription for access to learning content and platform features
Commission on paid courses	Percentage taken from courses sold by professors
Premium AI assistant	Paid access to advanced AI features
Featured course promotions	Professors pay to promote their courses
Future certifications	Paid certificates and additional educational services

Table 4.14: Learnify DZ Revenue Streams

The price has to be reasonable since students are cost conscious. Freemium model can be employed to draw in users, fundamental features can be complimentary, but premium video courses, advanced use of AI features, and certificates may come at an expense.

7.2. Distribution Channels

Channel	Role
Mobile application	Main access point for students
Website	Presentation, platform access, APK download, and information
Social media	Awareness and acquisition through Facebook, TikTok, Instagram, and LinkedIn
Student ambassadors	Promotion inside universities
Professors	Content providers and acquisition channel
Events and exhibitions	Demonstration of the platform and acquisition of early users

Table 4.15: Distribution Channels of Learnify DZ

7.3. Marketing and Communication Plan

Action	Objective
Social media campaigns	Attract students and build brand awareness
Demo videos	Explain how the student app and teacher dashboard work
Professor onboarding	Build the course catalogue
University events	Present the project and recruit early users
Referral system	Encourage students to invite friends
Free trial	Reduce hesitation before payment
Content marketing	Publish useful academic content to attract students
Testimonials	Build trust through feedback from students and

	professors
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Table 4.16: Marketing and Communication Plan

7.4. Growth Objectives

Period	Objective
0–6 months	Launch MVP, acquire first users, publish first course catalogue
6–12 months	Increase course categories, improve AI assistant, reach first stable revenue
1–3 years	Expand across Algerian universities and build institutional partnerships
3–5 years	Become a leading national EdTech platform and prepare regional expansion

Table 4.17: Growth Objectives of Learnify DZ

8. Conclusion

The market study results match with the fact that there's a real opportunity for Learnify DZ. The problems that Algerian students in universities are facing are related to the problem of access to learning resources, quality academic explanation, personalized support, and local online payment. Meanwhile, professors require digital means to publish and profit from their knowledge.

The competitive analysis reveals a number of alternatives but most of them are either informal or international, or they are not adapted to the context of the Algerian university or they are not linked to local payment methods. Learnify DZ can then become a local, affordable, AI-powered and scalable educational ecosystem. Student sensitivity to the price, high competition from free resources, high professor involvement, and the need to establish trust are major market risks. These risks can be mitigated by low cost pricing, free trials, collaborations, quality assurance and platform enhancements.

This market study is a preparation for Chapter 6 in which the business model and financial feasibility of the startup is presented.

Chapter 5

Business Model and Detailed Financial Study

Chapter 5: Business Model and Detailed Financial Study

1. Introduction

The business model and financial feasibility of Learnify DZ is given in this chapter. It conveys the value creation, value delivery and value capture of the startup. The analysis is used based on the Business Model Canvas, the financial projections done in Excel, and the platform's revenue model defined.

This goal is to show that Learnify DZ can be a financially viable and sustainable start-up over a five-year commercialization period, at student affordable prices and with new opportunities for professors to earn revenue.

The financial study presents the initial investment plan, the forecast of income, direct costs, payroll, operating costs, expected income statement, cash-flow projection, balance sheet, profitability indicators, risks, legal framework and the development roadmap.

2. Startup Presentation

Element	Description
Commercial name	Learnify DZ
Tagline	Learn Smart. Achieve More.
Sector	EdTech / SaaS / AI-powered E-learning
Mission	To provide Algerian university students with accessible, structured, and intelligent digital learning support.
Vision	To become a leading digital education platform in Algeria and later expand to the Maghreb region.
Target users	University students, professors, graduate students, and educational institutions.
Current stage	MVP / Pre-launch

Main solution	Student mobile app, teacher dashboard, admin dashboard, AI assistant, paid courses, local payment.
Founder	Lounnas Achwaq
Team Member	Berra Nabila
Main Revenue Streams	Student subscriptions; paid course commissions; Premium AI subscriptions; featured course promotions; future certifications.

Table 5.1: Learnify DZ Startup Overview

Learnify DZ is conceived to be a full-scale learning ecosystem. Student accesses courses, communicates with the AI assistant, and buys learning content via a mobile app. The professor can create and administer courses on teacher dashboard. The admin dashboard is used by the administrator to manage users, courses, payments and platform quality.

3. Business Model Canvas

Block	Learnify DZ Content
Customer Segments	Algerian university students, university professors, graduate students, educational institutions
Value Propositions	AI academic assistant, premium video courses, local payment in DZD, professor monetization, personalized learning, complete educational ecosystem
Channels	Mobile app, website, social media, university partnerships, professors, student ambassadors
Customer Relationships	AI chatbot, personalized notifications, student support, professor support, community engagement
Revenue Streams	Student subscriptions, commission on paid courses, Premium AI subscription, featured course promotions, future certifications
Key Resources	Technical team, platform infrastructure, AI tools, professor network, course content, user data analytics

Key Activities	Platform development, content management, AI integration, marketing, customer support, data analysis
Key Partners	Algerian payment gateways, professors, cloud providers, AI technology providers, content creators
Cost Structure	Platform development, hosting and cloud, AI API costs, salaries, marketing, payment processing fees, legal and administrative costs

Table 5.2: Learnify DZ Business Model Canvas

3.1. Customer Segments

The main groups of customers that Learnify DZ is targeting are:

-University students.:They seek clarity, exam study, cost-effective education and academic assistance using AI.

-University professors: content providers who are able to publish and monetize courses via teacher dashboard.

-Users interested in practical courses and certifications, and in skills development, include graduate students and job seekers.

-Potential partners for future B2B services and institutional deployment: educational institutions.

The priority segment is university students as they are the biggest market and the source of regular income via subscription and course purchase.

3.2. Value Proposition

Learnify DZ is an academic learning platform that offers structured academic courses, affordable prices and accessibility for Algerian university students, and also serves as a guide for the students. Unlike the free resources that you can find everywhere, the platform provides structured content in line with the context of the Algerian university.

Learnify DZ is offering professors a digital monetisation system where they can publish courses, connect with students and gain extra income. The platform differs from conventional teaching in the fact that it facilitates professors to convert their knowledge into scalable digital content.

Learnify DZ can be a digital learning partner for educational institutions, providing a structured platform, analytics, and academic support tools.

The value proposition of the core can be encapsulated as follows:

In Algerian university, students can learn smarter and with improved academic outcomes with the courses designed by their professors and with the help of artificial intelligence combined with local payment solutions at Learnify DZ.

3.3. Channels

Learnify DZ uses both direct and indirect channels.

Item	Description
Student mobile app	Main platform used by students to access courses and AI support
Website	Provides information, platform links, demo video, and access points
Teacher dashboard	Allows professors to upload and manage courses
Social media	Used for awareness, acquisition, and communication
University events	Used to demonstrate the platform and recruit users
Partnerships	Used to reach professors, institutions, and student communities
Referral system	Encourages students to invite classmates

Table 5.3: Distribution Channels of Learnify DZ

3.4. Customer Relationships

Item	Description
Students	Self-service, AI support, notifications, community engagement
Professors	Personal assistance, onboarding support, dashboard guidance
Institutions	Partnership management and direct communication

Premium users	Priority support and advanced AI access
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Table 5.4: Customer Relationships of Learnify DZ

Customer relationship management is an essential aspect of the customer experience, and the AI assistant can greatly assist students in interacting with the platform and getting learning support whenever they need it.

3.5. Revenue Streams

Learnify DZ is a diversified revenue generation model.

Item	Description
Student subscriptions	Paid access to learning content and platform features / Monthly or Annual
Commission on paid courses	Percentage taken from course sales made by professors / Per transaction
Premium AI assistant	Paid access to advanced AI support / Monthly
Featured course promotions	Professors pay to promote their courses / Monthly or Campaign
Certifications and services	Future paid certificates and additional educational services / Per service

Table 5.5: Learnify DZ Revenue Streams

This revenue diversification will make the project more financially sustainable as it will not heavily rely on one source of income.

3.6. Key Resources

Item	Description
Physical resources	Computers, test devices, video/audio equipment, workspace
Intellectual resources	Platform source code, AI integration, brand, educational content, user data insights
Human resources	Founder, developers, AI/content support, sales/customer success, UX/design
Financial resources	Initial investment, working capital, startup support,

	possible external funding
Technological resources	Cloud infrastructure, database, payment gateway, AI API, security tools

Table 5.6: Key Resources of Learnify DZ

3.7. Key Activities

- Developing and maintaining the mobile application.
- Developing and maintaining the teacher dashboard and admin dashboard.
- Integrating and improving AI academic assistance.
- Course content and professor management.
- Making sure that payments are made and financial tracking is done.
- Marketing and acquiring students.
- Providing customer support.
- Performance and Security Monitoring of Platform.
- Collecting feedback and improving the product.

3.8. Key Partnerships

Partner Type	Role
University professors	Create and publish academic content
Payment providers	Enable local payment in Algerian Dinar
Cloud providers	Host the platform and databases
AI providers	Support AI academic assistant features
Incubator and Startup 1275 programme	Support development and business validation
Student clubs and communities	Help user acquisition and feedback collection

Table 5.7: Key Partnerships of Learnify DZ

3.9. Cost Structure

Learnify DZ has variable and fixed costs.

Cost Type	Examples
Fixed costs	Salaries, software tools, office/coworking, accounting, legal fees
Variable costs	AI API usage, cloud hosting, video streaming, payment gateway fees
Marketing costs	Social media campaigns, launch assets, events, referral campaigns
Development costs	Platform improvement, cybersecurity, maintenance
Content costs	Professor onboarding, course validation, content moderation

Table 5.8: Cost Structure of Learnify DZ

AI API cost, payroll, marketing, and cloud/video infrastructure are the key pain points.

4. Financial Projections

4.1. General Assumptions

The following assumptions have been made when performing the financial projections:

Assumption	Explanation
Currency	Algerian Dinar — DZD
Projection period	2026 to 2031
Launch phase	Year N / 2026 is dedicated to development and preparation
Sales start	Revenues begin from N+1 / 2027
Growth model	Progressive adoption through students, professors, and course catalogue expansion
Main revenues	Subscriptions, commissions, Premium AI, featured course promotions, future certifications
Main costs	AI API, cloud hosting, video streaming, salaries, marketing, software tools

Tax assumption	Estimated corporate tax of 19% applied on positive profit
Scenario used	Realistic scenario

Table 5.9: Financial Assumptions

The financial projection is made for one year of preparation and five years of commercial. The entire Excel workbook is included in Appendix E.

4.2. Initial Investment Plan

The total sum of initial investment for the start of Learnify DZ is approximately 3,720,000 DZD.

Item	Estimated Amount
Platform and backend development	1,200,000 DZD
Student mobile app finalization	600,000 DZD
AI tutor integration and testing	450,000 DZD
Laptops for team	360,000 DZD
Mobile test devices	210,000 DZD
Video/audio recording equipment	350,000 DZD
Cloud setup and cybersecurity	250,000 DZD
Branding, legal setup and launch assets	300,000 DZD
Total Initial Investment	3,720,000 DZD

Table 5.10: Initial Investment Plan

The project will need investment and working capital for initial operating costs until the project is stable with revenue.

Working Capital Item	Amount
Cash reserve for 3 months cloud and operations	1,200,000 DZD
Launch marketing prepayment	600,000 DZD
Legal/accounting advances	250,000 DZD

Unexpected working cash	500,000 DZD
Total Working Capital	2,550,000 DZD

Table 5.11: Working Capital Requirements

Therefore, the total funding need is:

Element	Amount
Total Initial Investment	3,720,000 DZD
Total Working Capital	2,550,000 DZD
Total Funding Need	6,270,000 DZD

Table 5.12: Total Funding Requirements

4.3. Projected Revenue — Realistic Scenario

The actual scenario goes in five directions of revenue streams:

- Student subscriptions.
- All courses are subject to a commission.
- Subscription for premium AI assistants.
- Highlighting the course promotions of professors.
- Future certifications and education.

Revenue Stream	N / 2026	N+1 / 2027	N+2 / 2028	N+3 / 2029	N+4 / 2030	N+5 / 2031
Student subscriptions	0	7,200,000	10,800,000	15,120,000	19,656,000	24,570,000
Commission on paid courses	0	1,200,000	2,100,000	3,300,000	4,800,000	6,600,000
Premium AI assistant	0	1,440,000	2,880,000	5,040,000	7,920,000	11,520,000
Featured course promotions	0	720,000	1,080,000	1,620,000	2,160,000	2,880,000

Certifications and services	0	0	500,000	1,200,000	2,200,000	3,500,000
Total Revenue	0	10,560,000	17,360,000	26,280,000	36,736,000	49,070,000

Table 5.13: Projected Revenue (Realistic Scenario)

Revenue Interpretation:

The first year (N / 2026) is regarded as a preparation year, in which no commercial revenue is generated. Revenue begins in N+1 / 2027 and is cumulative as more students, more professors, more courses, and more premium users are added to the platform.

Student subscriptions are the primary source of revenue, with Premium AI subscriptions and commissions on paid courses coming in second. This is because Learnify DZ is SaaS and a marketplace.

4.4. Direct Costs

Direct costs are costs which are directly associated with the service delivered. They increase as the number of users and transactions increases.

Cost Item	N / 2026	N+1 / 2027	N+2 / 2028	N+3 / 2029	N+4 / 2030	N+5 / 2031
AI API usage	0	900,000	1,400,000	2,100,000	3,000,000	4,000,000
Cloud hosting and database	0	600,000	850,000	1,150,000	1,500,000	1,900,000
Video streaming / CDN	0	550,000	800,000	1,100,000	1,450,000	1,900,000
Payment gateway fees	0	280,000	470,000	740,000	1,060,000	1,400,000
Teacher onboarding and content moderation	0	300,000	450,000	500,000	600,000	750,000

Total Direct Costs	0	2,630,000	3,970,000	5,590,000	7,610,000	9,950,000
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Table 5.14: Direct Costs Projection

Direct costs include AI API usage fees, cloud storage and hosting fees, video streaming fees, and payment processing fees. The operating expenses breakdown should be closely monitored, particularly the use of AI as more people use it, the costs can add up rapidly.

4.5. Operating Expenses Breakdown Payroll

Operating expenses are payroll and general overheads.

Position	Role
Founder / Project Manager	Strategy, management, coordination
Full-stack Developer	Backend, dashboards, API
Mobile Developer	Student mobile application
AI and Content Support	AI features and educational content
Sales / Customer Success	User acquisition and customer support
UX / Design	Interface improvement and user experience

Table 5.15: Project Team Roles

Year	Payroll
N / 2026	0 DZD
N+1 / 2027	4,824,000 DZD
N+2 / 2028	6,408,000 DZD
N+3 / 2029	9,288,000 DZD
N+4 / 2030	13,864,000 DZD
N+5 / 2031	17,344,000 DZD

Table 5.16: Payroll Projection

Other Operating Expenses

Expense	Description
Coworking / small office	Workspace for team activities
Digital marketing	Social media ads, campaigns, content promotion
Internet and phone	Communication and connectivity
Accounting and legal	Administrative and legal support
Software tools	Design, development, analytics, email, CRM tools
Training and events	Startup events, incubator activities, exhibitions
Maintenance and cybersecurity	Security, backup, maintenance, monitoring

Table 5.17: Operating Expenses Breakdown

Year	Operating Expenses
N / 2026	0 DZD
N+1 / 2027	2,940,000 DZD
N+2 / 2028	4,030,000 DZD
N+3 / 2029	5,280,000 DZD
N+4 / 2030	6,810,000 DZD
N+5 / 2031	8,670,000 DZD

Table 5.18: Operating Expenses Projection

Operating Expenses Interpretation :

Learnify DZ is a technology based start-up and as such its biggest operating cost is payroll as it employs technical, commercial and support staff. The marketing budget is also crucial during the initial 'launching' period for promoting the product and getting the first customers to try it.

4.6. Projected Income Statement

The projected income statement shows the profitability of Learnify DZ during the projection period.

Indicator	N / 2026	N+1 / 2027	N+2 / 2028	N+3 / 2029	N+4 / 2030	N+5 / 2031
Revenue	0	10,560,000	17,360,000	26,280,000	36,736,000	49,070,000
Direct Costs	0	2,630,000	3,970,000	5,590,000	7,610,000	9,950,000
Gross Profit	0	7,930,000	13,390,000	20,690,000	29,126,000	39,120,000
Operating Overheads	0	2,940,000	4,030,000	5,280,000	6,810,000	8,670,000
Payroll	0	4,824,000	6,408,000	9,288,000	13,864,000	17,344,000
EBITDA	0	166,000	2,952,000	6,122,000	8,452,000	13,106,000
Depreciation	0	983,333	983,333	983,333	983,333	983,333
EBIT	0	-817,333	1,968,667	5,138,667	7,468,667	12,122,667
Estimated Tax 19%	0	0	374,047	976,347	1,419,047	2,303,307
Net Profit	0	-817,333	1,594,620	4,162,320	6,049,620	9,819,360

Table 5.19: Projected Income Statement

Income Statement Interpretation :

The startup costs, marketing expenses and initial operating requirements indicate that the first commercial year is expected to experience a slight loss of 817,333 DZD, which is considered normal for a startup. The project starts to make a profit from N+2 / 2028.

By N+5 / 2031, Learnify DZ is expected to reach 49,070,000 DZD in revenue and 9,819,360 DZD in net profit. If the user acquisition and revenue assumptions are met, this means that the startup can become profitable.

4.7. Cash-Flow Projection

The cash-flow projection is a representation of the cash available at various points in time based on income, outgo, investment and working capital.

Year	Ending Cash Position
N / 2026	0 DZD
N+1 / 2027	166,000 DZD
N+2 / 2028	2,243,953 DZD
N+3 / 2029	6,589,606 DZD
N+4 / 2030	12,654,959 DZD
N+5 / 2031	22,251,172 DZD

Table 5.20: Cash Flow Projection

Cash-Flow Interpretation :

The project needs to be well funded at the start, for initial project development and launch. Once sold, cash is positive and will grow over time. This allows the startup to fund its own future growth as it brings in revenue, assuming it reaches these goals.

It's necessary to keep track of cash-flow because a startup can be profitable on paper but still experience liquidity issues if they pay their expenses before they receive their income. Learnify DZ needs working capital of 2,550,000 DZD when it is launched.

4.8. Financing Plan and Capital Structure

The total funding requirement is put at 6,270,000 DZD.

Funding Source	Amount	Share	Conditions
Founders' contribution	770,000 DZD	12.3%	Personal contribution and development effort
Startup 1275 / Incubation support	2,500,000 DZD	39.9%	Support requested for development, marketing, and launch
ANADE / public	2,000,000 DZD	31.9%	Possible financing for

entrepreneurship support			equipment and operations
Private partner / Business Angel	1,000,000 DZD	15.9%	Optional support for growth and marketing
Total	6,270,000 DZD	100%	—

Table 5.21: Financing Plan

Financing Interpretation :

The financing plan involves founders' contribution, public startup funding and potential private funding. This has the effect of lessening the reliance on an overarching funding source, and enables the project to address its developmental, marketing, working capital and initial operational requirements.

4.9. Profitability and Viability Indicators

Indicator	Result
Total funding need	6,270,000 DZD
First profitable year	N+2 / 2028
Break-even period	Between N+2 and N+3
Revenue in N+5	49,070,000 DZD
Net profit in N+5	9,819,360 DZD
Net profit margin in N+5	Around 20%
EBITDA margin in N+5	Around 26.7%
Payback period	Around 3 years
Business viability	Positive under the realistic scenario

Table 5.22: Profitability and Viability Indicators

Unit Economics :

The average per student per month is estimated at dollar cost per student per month as follows:

Cost Component	Estimated Cost per Month
AI Tutor API	280 DZD
Cloud hosting	90 DZD
Video bandwidth	105 DZD
Payment fee	45 DZD
Support and moderation	60 DZD
Total Cost per Active Student	580 DZD

Table 5.23: Cost per Active Student

This translates to about 580 DZD monthly per active student. Thus, the subscription price needs to exceed this figure to be profitable before the fixed cost (salary and marketing).

5. Financial Risk Analysis

Risk	Likelihood	Impact	Criticality	Mitigation Measure
Lower than expected student subscriptions	Medium	High	High	Use free trial, social media campaigns, affordable pricing, and referral system
High AI API costs	Medium	High	High	Limit free AI usage, optimize prompts, offer Premium AI plans
Difficulty attracting professors	Medium	Medium	Medium	Provide easy dashboard, revenue sharing, and onboarding support
Payment gateway issues	Low / Medium	High	Medium	Integrate multiple local payment solutions
Strong competition from free content	High	Medium	High	Focus on structured university courses, quality control, and AI support
Cash-flow shortage	Medium	High	High	Secure working capital and monitor expenses monthly

Legal/data protection risk	Medium	Medium	Medium	Apply privacy policy, secure user data, and register brand
Low user trust at launch	Medium	Medium	Medium	Use testimonials, university events, demos, and professor credibility
Slow content production	Medium	High	High	Onboard professors progressively and prioritize high-demand specialties

Table 5.24: Financial Risk Analysis

Risk Interpretation :

The biggest ones include customer acquisition, controlling costs of the AI, free competition, and cash-flow management. Learnify DZ can mitigate and control these risks, provided it offers the student an educational benefit that is clearly communicated and is priced affordably; establishes robust partnerships with professors; and keeps an eye on costs on a regular basis.

6. Intellectual Property and Legal Framework

It is imperative that Learnify DZ safeguard its brand, platform and educational materials with an appropriate legal and administrative response.

Area	Planned Action
Trademark	Register “Learnify DZ” with INAPI
Educational content	Protect professor-created content through platform terms and copyright agreements
Software	Protect the source code and platform architecture
Legal structure	Start with EURL or SARL depending on the final team and financing structure
Administrative formalities	CNRC registration, NIF, NAS, bank account
Data protection	Privacy policy, secure authentication, user consent, data protection measures

Payment compliance	Use recognized Algerian-compatible payment gateways
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Table 5.25: Legal and Intellectual Property Framework**Recommended Legal Structure :**

If the management of the project only involves one primary founder, EURL can be appropriate in the first phase. If the team and investors are officially integrated, then SARL might be more suitable as it makes it easier to allocate shares and has more than one partner.

The legal arrangement should be determined by the eventual ownership, funding and responsibilities of each team member.

7. Development Roadmap and Key Milestones

Period	Milestone	Description	Success Indicator
M0–M3	MVP finalization	Improve app, dashboards, AI assistant, and payment flow	Stable MVP ready for testing
M3–M6	First user testing	Test with students and professors	Feedback collected and bugs corrected
M6–M9	Commercial launch	Launch subscriptions and first paid courses	First paying users
M9–M12	Course catalogue expansion	Add more professors and academic specialties	100+ courses
M12–M18	Growth phase	Increase users and improve AI personalization	5,000+ students
M18–M24	Institutional partnerships	Build partnerships with organizations	5+ partners
Year 3	National scaling	Expand across Algerian universities	15,000+ students

Table 5.26: Development Roadmap**Roadmap Interpretation :**

The roadmap follows a progressive strategy. The first goal is to validate the MVP with actual users. Once validated, the project will concentrate on commercial launches, user

acquisition, professor onboarding, and course catalogue growth. In the medium term, Learnify DZ wants to establish cooperation with universities and institutions. Long-term vision for the project is to develop it into a national edTech platform.

8. Conclusion

This chapter has shown that Learnify DZ can achieve a profitable profit after the phase of initial investments and it is financially viable. The future forecasts indicate that the company will achieve profitability in the second year of commercial operations, which is achieved by steady growth in various revenue streams and a controlled cost structure. While the project has a number of initial capital costs and must go through the normal start-up risks, the overall analysis indicates that the project is economically feasible with realistic assumptions.

Conclusion

According to the economic and financial study, Learnify DZ can be a viable and scalable start-up. The market study validates the existence of a real demand from Algerian university students of structured, accessible and intelligent learning solutions. It also validates the possibility for professors to publish and earn monetary returns from their academic knowledge by creating a special digital platform.

The business structure is diversified and suitable to the Algerian context. It offers student subscription, commissions from paid courses, Premium AI services, course promotions, and future certification services. This diversification will lessen reliance on a single income stream and make the finances more sustainable.

The financial projections indicate that the project has a total funding requirement of around DZD 6.27 million. The initial year of sales might be a minor loss as expected in the start-up stage. But the project starts to become profitable in the second commercial year and is projected to generate about 49.07 million DZD in revenue and 9.82 million DZD in net profit in the fifth year.

The primary concerns include customer acquisition, costs of the AI, the competition with free content, and cash-flow management. These risks can be mitigated by providing affordable pricing, free trials, a close connection with professors, and cost monitoring, as well as constant improvements to the platform.

Thus, Learnify DZ is a good start-up project to be considered in the framework of Startup 1275 from a financial and strategic perspective. The next item on the agenda will be to test the MVP with actual users, gather survey results, welcome the first professors and set up the formal commercialization process.

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Appendices to Reference in Part II

Appendix C: Market Survey Questionnaire

<https://docs.google.com/forms/d/e/1FAIpQLSctry8b9hNPj3eprcW-cDe5mUctAxphucG7DUIV332EZcZCUQ/viewform?usp=sharing&oid=112882887729101860051>

Appendix E: Financial Study Excel Workbook

<https://docs.google.com/spreadsheets/d/1G8mtVq9pUnGCcmImBrHvBmWymvFKlkMO/edit?usp=sharing&oid=112882887729101860051&rtpof=true&sd=true>