

# CAHIER DE CHARGE

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## EduConnect

Plateforme de Tutorat en Ligne pour l'Éducation Algérienne  
Online Tutoring Marketplace — Flutter + Go + LiveKit

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<b>Auteur</b>	Kazer — Lead Developer
<b>Statut</b>	Draft — En cours de validation
<b>Technologies</b>	Flutter (Mobile) · Go (Backend) · LiveKit (Real-time)
<b>Paiement</b>	CCP / Baridimob · Edahabia
<b>Langues de l'app</b>	Français ·  · English

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# 1. Introduction et Contexte du Projet

## 1.1 Présentation Générale

**EduConnect** is an online tutoring marketplace platform designed specifically for the Algerian education system. It connects qualified teachers with students (and their parents) for live and pre-recorded educational sessions across all levels of the Algerian curriculum — from Primaire through CEM to Lycée, including all specialized streams (filières).

The platform leverages modern real-time communication technology (LiveKit) to deliver high-quality interactive learning experiences including video/audio calls, collaborative whiteboards, screen sharing, and file sharing. Built with **Flutter** for cross-platform mobile applications, **Go** for a high-performance backend, and **LiveKit** for WebRTC-based real-time communication.

## 1.2 Contexte du Marché Algérien

Private tutoring (*cours de soutien*) is a massive market in Algeria, with an estimated 70-80% of students receiving some form of supplementary education. Currently, this market operates primarily through informal channels: word-of-mouth referrals, local tutoring centers, and private in-home sessions. There is no dominant digital platform serving this market, representing a significant opportunity.

- High demand for qualified tutoring across all education levels
- Growing smartphone penetration and internet connectivity across Algeria
- Parents willing to invest significantly in their children's education
- No established digital tutoring platform targeting the Algerian curriculum
- Post-COVID acceptance of online learning modalities

## 1.3 Problématique

Current challenges in the Algerian private tutoring market include:

- **Accessibility:** Students in remote areas (wilayas) have limited access to quality tutors
- **Quality assurance:** No verification system for tutor qualifications
- **Price transparency:** No standardized or visible pricing, leading to exploitation
- **Scheduling:** Difficult to coordinate between tutors, students, and parents
- **Payment:** Cash-only transactions with no traceability or protection
- **Progress tracking:** Parents lack visibility into their children's learning progress

## 2. Objectifs du Projet

### 2.1 Objectifs Principaux

- **Digitize** the Algerian private tutoring market with a professional, reliable platform
- **Connect** verified teachers with students/parents through a transparent marketplace
- **Deliver** high-quality live interactive sessions with professional-grade tools
- **Enable** secure electronic payments via CCP/Baridimob and Edahabia
- **Track** student progress with homework, quizzes, attendance, and performance reports
- **Scale** to serve all 58 wilayas of Algeria across all education levels

### 2.2 Objectifs Secondaires

- Build a trusted community through teacher verification and student reviews
- Provide pre-recorded content for asynchronous learning
- Support multiple lesson formats: 1-on-1, group classes, and recorded courses
- Offer flexible payment models: per-session, subscription, and course packages
- Create a sustainable revenue model through 20% platform commission

### 2.3 Key Performance Indicators (KPIs)

KPI	Target (Year 1)	Target (Year 2)
Registered Teachers	500+	2,000+
Active Students	5,000+	25,000+
Monthly Sessions	10,000+	50,000+
Teacher Verification Rate	100%	100%
Average Rating	> 4.0 / 5.0	> 4.2 / 5.0
Platform Uptime	99.5%	99.9%
Payment Success Rate	> 95%	> 98%

## 3. Périmètre et Limites

### 3.1 In Scope (Version 1.0)

- User authentication and profile management (Teacher, Parent, Student, Admin)
- Teacher registration with diploma/certificate verification
- Subject and level management aligned with Algerian curriculum
- Live 1-on-1 and group sessions via LiveKit (video, audio, whiteboard, screen share, chat, file sharing)
- Session recording and replay
- Pre-recorded course content (video upload and streaming)
- Homework and quiz system with submission and grading
- Payment processing: CCP/Baridimob and Edahabia card
- Flexible billing: per-session, subscription, course packages
- Free first session / intro call feature
- Teacher-managed promotions (e.g., buy 10 get 1 free)
- Teacher rating and review system
- Progress dashboard for parents
- Push notifications + in-app + SMS for critical alerts
- Search and discovery with filters (level, subject, price, rating, availability)
- Admin dashboard for user management, verification, disputes, analytics
- Multi-language support: French, Arabic (RTL), English

### 3.2 Out of Scope (Future Versions)

- AI-powered features (AI tutor, automatic grading, personalized recommendations)
- University-level courses (Licence, Master, Doctorat)
- Professional certification programs
- Integration with Ministry of Education systems
- Desktop/web application (mobile-first for V1)
- International expansion beyond Algeria
- In-app video editing for recorded content
- Marketplace for educational materials (books, documents)

## 4. Acteurs du Système et Rôles

### 4.1 User Roles Overview

Role	Description	Key Capabilities
Teacher (Enseignant)	Verified educator who offers live and recorded lessons	Create profile, set subjects/levels/prices, conduct live sessions, upload content, assign homework, manage schedule, view earnings
Parent (Parent d'élève)	Account holder who manages children and handles payments	Register children, browse/search teachers, book sessions, make payments, view progress reports, leave reviews, manage subscriptions
Student (Élève)	Learner who attends sessions and completes assignments	Attend live sessions, watch recordings, submit homework/quizzes, view grades, communicate with teacher (supervised for minors)
Admin (Administrateur)	Platform operator managing the entire ecosystem	Verify teachers, manage users, handle disputes, monitor payments, view analytics, manage content, configure platform settings

### 4.2 Account Hierarchy

The platform supports a flexible account hierarchy to accommodate the Algerian family structure and older students' independence:

- Parent-managed accounts:** A parent can create and manage multiple child profiles. Each child has their own student profile linked to the parent's account. The parent controls payments, session bookings, and receives progress reports.
- Independent student accounts:** Available for all levels (Primaire, CEM, Lycée). Students can register independently, manage their own sessions, and handle payments. Recommended for older students (Lycée and above).
- Hybrid:** A student can start as parent-managed and later transition to an independent account, or an independent student can link a parent for progress visibility.

**Note:** For child safety: students under 16 who register independently will be prompted to optionally link a parent account. All chat and session features include safety monitoring capabilities for the admin team.

### 4.3 Teacher Profile Structure

Each teacher profile contains the following information:

- Personal info:** Full name, profile photo, bio/description, wilaya, contact info
- Qualifications:** Diploma(s), certificate(s), teaching experience (years), specializations
- Teaching offer:** Subjects taught, levels covered, available time slots, pricing
- Verification status:** Pending, Verified, Rejected (with reason)
- Performance metrics:** Rating, number of reviews, total sessions, total students, completion rate
- Content:** Uploaded courses, recorded sessions, shared materials

## 5. Système Éducatif Algérien — Niveaux et Filières

### 5.1 Enseignement Primaire (Primary School)

Duration: 5 years. Ages 6–11. Certificate: Examen de 5ème.

Niveau	Code	Age Typique	Examen
1ère Année Primaire	1AP	6 ans	—
2ème Année Primaire	2AP	7 ans	—
3ème Année Primaire	3AP	8 ans	—
4ème Année Primaire	4AP	9 ans	—
5ème Année Primaire	5AP	10 ans	Examen de fin de cycle primaire

**Core subjects:** Arabic, French, Mathematics, Islamic Education, Scientific Education, History/Geography, Civic Education, Physical Education, Arts, Tamazight (in some wilayas). English is introduced in 3AP.

### 5.2 Enseignement Moyen — CEM (Middle School)

Duration: 4 years. Ages 11–15. Certificate: BEM (Brevet d'Enseignement Moyen).

Niveau	Code	Age Typique	Examen
1ère Année Moyenne	1AM	11 ans	—
2ème Année Moyenne	2AM	12 ans	—
3ème Année Moyenne	3AM	13 ans	—
4ème Année Moyenne	4AM	14 ans	BEM

**Core subjects:** Arabic, French, English, Mathematics, Physics, Natural Sciences, History/Geography, Islamic Education, Civic Education, Informatics, Physical Education, Arts, Tamazight.

### 5.3 Enseignement Secondaire — Lycée (High School)

Duration: 3 years. Ages 15–18. Certificate: BAC (Baccalauréat).

#### 5.3.1 Tronc Commun (1AS — Common Core)

Filière	Code	Description
Sciences et Technologie	1AS-ST	Sciences, mathematics, and technology foundation
Lettres	1AS-L	Literature, languages, and humanities foundation

### 5.3.2 Spécialisation (2AS & 3AS)

Filière	Code	Subjects Clés
Sciences Expérimentales	SE	Physics, Chemistry, Natural Sciences, Mathematics
Mathématiques	M	Advanced Mathematics, Physics, Chemistry
Technique Mathématique	TM	Technical Mathematics, Engineering Sciences, Physics
Gestion et Économie	GE	Management, Economics, Accounting, Law
Lettres et Philosophie	LP	Arabic Literature, Philosophy, History, Languages
Langues Étrangères	LE	French, English, Spanish/German, Arabic

### 5.4 Subjects Database Structure

The platform must maintain a comprehensive subjects database mapped to each level and filière. Teachers select from this predefined list when setting up their profile. The database should be admin-configurable to accommodate curriculum changes by the Ministry of Education.

Category	Example Subjects
Languages	Arabic, French, English, Tamazight, Spanish, German
Sciences	Mathematics, Physics, Chemistry, Natural Sciences, Biology
Humanities	History, Geography, Philosophy, Islamic Education, Civic Education
Technical	Informatics, Engineering Sciences, Technical Mathematics
Business	Management, Economics, Accounting, Law
Other	Physical Education, Arts, Music

# 6. Spécifications Fonctionnelles Détailées

## 6.1 Authentication & User Management

### 6.1.1 Registration Flows

#### Teacher Registration:

- Step 1: Basic info — full name, email, phone number, password, wilaya
- Step 2: Professional info — subjects, levels, years of experience, bio
- Step 3: Verification — upload diploma(s), certificate(s), ID document (front/back)
- Step 4: Profile setup — profile photo, availability schedule, pricing
- Step 5: Pending review — account created but inactive until admin verification
- Step 6: Admin approval/rejection — teacher notified via push + SMS

#### Parent Registration:

- Step 1: Basic info — full name, email, phone number, password, wilaya
- Step 2: Add child(ren) — name, date of birth, current level, school (optional)
- Step 3: Account active immediately

#### Independent Student Registration:

- Step 1: Basic info — full name, email, phone number, password, date of birth, wilaya
- Step 2: Academic info — current level, filière (if Lycée), school (optional)
- Step 3: Optional parent linking — invite parent by phone/email for progress visibility
- Step 4: Account active immediately

### 6.1.2 Authentication Methods

- **Email + Password:** Standard registration with email verification
- **Phone + OTP:** SMS-based OTP login (primary for Algeria, where email usage is lower)
- **Social login:** Google and Facebook (optional, future)
- **Biometric:** Fingerprint/Face ID for returning users (device-level)

### 6.1.3 Session & Token Management

- JWT-based authentication with access token (15 min) + refresh token (30 days)
- Multi-device support with device management (list active sessions, revoke remotely)
- Automatic token refresh on API calls
- Force logout on password change

### 6.1.4 Profile Management

- Edit personal information, profile photo, bio
- Change password with old password verification
- Deactivate/delete account (with data retention policy compliance)

- Privacy settings: control visibility of profile information

## 6.2 Teacher Module

### 6.2.1 Dashboard

The teacher dashboard serves as the central hub and displays:

- Upcoming sessions (today and this week) with student names and subjects
- Pending homework/quiz submissions requiring grading
- Earnings summary (this month, total, pending payout)
- Recent reviews and overall rating
- Quick actions: start session, create homework, upload content
- Notifications center

### 6.2.2 Course & Offering Management

- **Create offerings:** Define subject + level combinations with individual pricing
- **Session types:** 1-on-1 (set price per hour), Group class (set price per student, max capacity)
- **Pricing:** Teacher sets prices freely per offering, can set different prices for different levels
- **Availability:** Weekly recurring schedule with exception dates (holidays, vacations)
- **Packages:** Create session bundles (e.g., 10 sessions at discounted rate)
- **Promotions:** Create limited-time offers (e.g., buy 10 get 1 free, 20% off first month)
- **Free trial:** Enable/disable free first session or 15-min intro call

### 6.2.3 Session Management

- View calendar with all scheduled sessions
- Start session (launches LiveKit room)
- Cancel session (with cancellation policy enforcement)
- Reschedule session (requires student/parent approval)
- Session history with recordings, attendance, duration
- Post-session notes and feedback per student

### 6.2.4 Content Management

- Upload pre-recorded video lessons (with title, description, subject, level)
- Organize content into courses/chapters
- Upload supplementary materials (PDF, images, documents)
- Set content as free (sample) or paid
- View content analytics (views, completion rates)

### 6.2.5 Earnings & Payouts

- Real-time earnings dashboard
- Transaction history (date, student, amount, commission, net)
- Payout requests (manual or automatic schedule)
- Payout via CCP or Baridimob transfer
- Monthly/annual earnings reports (downloadable)

## 6.3 Parent Module

### 6.3.1 Dashboard

- Overview of all children's upcoming sessions
- Quick access to each child's progress report
- Recent activity feed (sessions attended, homework submitted, grades received)
- Payment history and upcoming charges
- Notifications center

### 6.3.2 Child Management

- Add/remove child profiles
- Edit child's academic info (level, filière, school)
- Set learning goals per child
- View detailed progress per child (grades, attendance, teacher feedback)
- Manage child's session schedule

### 6.3.3 Teacher Discovery & Booking

- **Search:** Find teachers by subject, level, price range, rating, wilaya, availability
- **Filters:** Verified only, price range, rating threshold, session type, language
- **Teacher profile view:** Full profile with qualifications, reviews, sample content
- **Book session:** Select available time slot, choose session type, confirm booking
- **Book package:** Purchase session bundle at discounted rate
- **Subscribe:** Monthly subscription to a teacher for recurring sessions
- **Free trial:** Book free intro session (if teacher offers it)

### 6.3.4 Progress Tracking

Comprehensive progress dashboard per child showing:

- Attendance rate (sessions attended vs. scheduled)
- Homework completion rate and average grades
- Quiz scores with trend analysis
- Teacher's written feedback and notes
- Subject-by-subject performance breakdown
- Monthly progress reports (downloadable PDF)

## 6.4 Student Module

### 6.4.1 Dashboard

- Upcoming sessions with countdown timer
- Pending homework and quizzes with deadlines
- Recent grades and feedback
- Enrolled courses and progress
- Quick join button for imminent sessions

### 6.4.2 Session Participation

- Join live session (auto-redirect to LiveKit room)
- View session recordings (replay)
- Download shared materials from sessions
- Rate sessions after completion

### 6.4.3 Learning Tools

- Browse and watch pre-recorded courses
- Take notes during sessions (saved per session)
- View and submit homework
- Take quizzes (timed or untimed, as set by teacher)
- View grades, corrections, and teacher comments
- Personal progress dashboard

### 6.4.4 Independent Student Features

Students with independent accounts additionally have:

- Full teacher search and booking capabilities (same as parent)
- Payment management (own wallet/payment methods)
- Option to link parent account for progress sharing
- Full profile management

## 6.5 Live Session Module (LiveKit Integration)

### 6.5.1 Session Architecture

Live sessions are powered by **LiveKit**, an open-source WebRTC platform. Each session creates a LiveKit room with configurable permissions based on session type and participant roles.

Feature	1-on-1 Session	Group Session
Max Participants	2 (teacher + student)	Configurable (teacher sets max, recommended: 2–30)
Video	Both participants	Teacher always on, students on/off (teacher controls)
Audio	Both participants	Teacher always on, students muted by default (raise hand)
Screen Share	Both can share	Teacher primary, students with permission
Whiteboard	Shared collaborative	Teacher-controlled, students can annotate
Chat	Bidirectional	Group chat + private teacher messages
Recording	Optional (teacher setting)	Optional (teacher setting)
File Sharing	Both can share	Teacher shares, students with permission

### 6.5.2 Session Lifecycle

#### Pre-Session:

- Session scheduled and confirmed (both parties notified)
- Reminder notifications: 24h, 1h, 30min, 5min before session
- Pre-session checklist: camera/mic test, connection quality check

#### During Session:

- Teacher starts room — students join via unique session link or in-app button
- Real-time video/audio communication
- Collaborative whiteboard with drawing tools, text, shapes, colors, undo/redo
- Screen sharing (teacher or student with permission)
- Text chat alongside video
- File sharing (drag-and-drop documents, images, PDFs)
- Session recording (if enabled by teacher) — saved to cloud
- Session timer visible to all participants
- Connection quality indicator

#### Post-Session:

- Session auto-ends or teacher manually ends
- Recording processed and made available for replay
- Teacher can add post-session notes

- Student/parent prompted to rate the session
- Attendance logged automatically
- Payment processed (if per-session billing)

### 6.5.3 Whiteboard Specifications

- Infinite canvas with zoom and pan
- Drawing tools: pen (multiple sizes), highlighter, eraser
- Shapes: line, arrow, rectangle, circle, triangle
- Text tool with font size options
- Color palette (preset + custom)
- Image insertion (paste or upload)
- Undo/redo (per participant)
- Export whiteboard as image/PDF
- Teacher can clear all or lock student annotations

### 6.5.4 Technical Requirements

- **Codec:** VP8/VP9 for video, Opus for audio
- **Adaptive bitrate:** Automatic quality adjustment based on connection
- **Reconnection:** Auto-reconnect within 30 seconds of disconnect
- **Fallback:** Audio-only mode for poor connections
- **Latency target:** < 200ms for real-time interaction
- **Recording storage:** Cloud-based (S3-compatible), with configurable retention

## 6.6 Pre-recorded Content Module

### 6.6.1 Course Structure

- **Course:** Top-level container (e.g., 'Mathematics 3AS — Complete BAC Preparation')
- **Chapter:** Section within a course (e.g., 'Chapter 1: Limits and Continuity')
- **Lesson:** Individual video within a chapter (e.g., 'Lesson 1.3: L'Hôpital Rule')
- **Material:** Supplementary files attached to lessons (PDF worksheets, slides, etc.)

### 6.6.2 Video Management

- Upload video (MP4, max 2GB per file)
- Video transcoding to multiple qualities (360p, 480p, 720p, 1080p)
- Adaptive streaming (HLS)
- Thumbnail generation (auto + manual upload)
- Video preview/trailer (first X minutes free as sample)
- Progress tracking (resume where left off)
- Playback speed control (0.5x, 1x, 1.25x, 1.5x, 2x)

### 6.6.3 Pricing

- Free courses (teacher's choice, for marketing/samples)
- Per-course purchase (one-time payment)
- Included in subscription (if student subscribes to teacher)

## 6.7 Homework & Quiz System

### 6.7.1 Homework

Teachers can create and assign homework to individual students or groups:

- **Create:** Title, description, instructions, attached files (PDF, images), deadline
- **Assign:** To specific students, a class/group, or all students in a subject/level
- **Submit:** Students upload their work (photos of handwritten work, documents, PDFs)
- **Grade:** Teacher grades with numerical score, written feedback, and annotations
- **Return:** Graded homework visible to student and parent with feedback
- **Late submission:** Configurable — allow/disallow late submissions, with penalty option

### 6.7.2 Quiz System

Teachers can create quizzes with various question types:

Question Type	Description	Auto-graded?
Multiple Choice (single)	Select one correct answer from options	Yes
Multiple Choice (multi)	Select all correct answers	Yes
True/False	Binary choice	Yes
Short Answer	Student types a short text response	No (teacher grades)
Essay	Long-form written response	No (teacher grades)
Fill in the Blank	Complete a sentence with missing words	Yes
Matching	Match items from two columns	Yes
Ordering	Arrange items in correct sequence	Yes

Quiz features:

- Timed or untimed (teacher configures)
- Randomize question order (optional)
- Randomize answer options (optional)
- Instant results for auto-graded questions
- Grade weight configuration per question
- Quiz statistics for teacher (average score, question-level analytics)
- Retake policy (allow/disallow, max attempts)

## 6.8 Payment & Billing System

### 6.8.1 Payment Methods

The platform supports Algerian-specific payment methods to maximize accessibility:

Method	Provider	Flow	Settlement
CCP / Baridimob	Algérie Poste	User initiates transfer via Baridimob app, confirms with OTP	T+1 to T+3 days
Edahabia Card	Algérie Poste	Card number + OTP for online payment	Instant to T+1

### 6.8.2 Billing Models

#### Model 1: Per-Session Billing

- Parent/student pays for each session individually
- Payment held in escrow until session is completed
- Automatic refund if teacher cancels
- Partial refund policy for student no-shows (configurable)

#### Model 2: Subscription

- Monthly recurring payment to a specific teacher
- Includes X sessions per month (teacher defines)
- Access to teacher's pre-recorded content
- Auto-renewal with option to cancel
- Prorated refund for mid-cycle cancellation

#### Model 3: Course Packages

- Buy a bundle of sessions at discounted rate (e.g., 10 sessions for 8x price)
- Package expires after defined period (e.g., 3 months)
- Unused sessions: refundable or extend (teacher policy)

### 6.8.3 Commission & Revenue

The platform operates on a **20% commission** model:

- On every transaction, 20% goes to the platform, 80% to the teacher
- Commission applied on gross amount before any discounts by the teacher
- Teacher sees net earnings in their dashboard
- Platform generates monthly commission reports

#### Financial flow example:

- Parent pays 2,000 DZD for a session
- Platform retains 400 DZD (20% commission)
- Teacher receives 1,600 DZD (80%)
- Teacher payout: on request or scheduled (weekly/bi-weekly/monthly)

#### 6.8.4 Promotions & Free Trials

- **Free first session:** Teacher can offer a free intro session (15-30 min). No payment required from parent. Platform absorbs cost (no commission on free sessions).
- **Teacher promotions:** Teachers can create custom promotions:
  - Buy X sessions get Y free
  - Percentage discount for a limited time
  - Special package rates
  - Promotion visibility on teacher profile and search results

#### 6.8.5 Dispute Resolution

- Student/parent can raise a dispute within 48h of a session
- Reasons: teacher no-show, poor quality, technical issues
- Admin reviews dispute, can issue full/partial refund
- Repeated disputes against a teacher trigger a review

## 6.9 Rating & Review System

### 6.9.1 Review Structure

- **Who reviews:** Students or parents after completed sessions
- **Rating:** 1–5 stars (overall) + optional sub-ratings:
  - Teaching quality
  - Communication
  - Punctuality
  - Content quality
- **Written review:** Optional text review (min 20 characters if provided)
- **Timing:** Review prompt after each session, reviewable within 7 days

### 6.9.2 Review Policies

- One review per session per student/parent
- Reviews are public on teacher profile
- Teacher can respond to reviews (one response per review)
- Admin can moderate reviews (remove abusive/inappropriate content)
- Minimum 3 reviews before rating is displayed on search results
- Rating algorithm: weighted average (recent reviews weighted higher)

## 6.10 Notification System

### 6.10.1 Notification Channels

Channel	Use Case	Priority
Push Notification	All notifications (primary channel)	Default
In-App	All notifications (persistent, viewable in notification center)	Default
SMS	Critical alerts only: payment confirmations, session starting in 5 min, account security, teacher verification result	Critical only

### 6.10.2 Notification Types

#### Session-related:

- Session booked/confirmed
- Session reminder: 24h, 1h, 30min, 5min before
- Session starting now (join link)
- Session cancelled/rescheduled
- Recording available

#### Academic:

- New homework assigned
- Homework deadline approaching (24h before)
- Homework graded
- Quiz available / quiz results
- New course content uploaded

#### Financial:

- Payment received/confirmed
- Subscription renewal upcoming
- Payout processed (teacher)
- Refund issued

#### System:

- Account verification status (teacher)
- New review received (teacher)
- Promotion expiring
- Security alerts (new device login, password change)

### 6.10.3 User Preferences

- Users can configure notification preferences per type
- Quiet hours setting (no notifications between X and Y)

- SMS opt-in/opt-out per category

## 6.11 Search & Discovery

### 6.11.1 Search Functionality

- **Text search:** Search by teacher name, subject, or keyword
- **Filters:**
  - Level (Primaire, CEM, Lycée + specific year)
  - Filière (for Lycée: SE, M, TM, GE, LP, LE)
  - Subject
  - Price range (min–max DZD)
  - Rating (minimum stars)
  - Session type (1-on-1, group, recorded)
  - Availability (day of week, time range)
  - Wilaya / location
  - Language of instruction
  - Verified teachers only

### 6.11.2 Search Results

- Teacher card: photo, name, verified badge, rating, subjects, levels, price range, brief bio
- Sort by: relevance, rating, price (low-high / high-low), number of sessions, newest
- Pagination with infinite scroll
- Save/bookmark teachers for later

### 6.11.3 Recommendations

- 'Popular teachers' based on session count and rating
- 'Teachers for your level' based on student profile
- 'Recently viewed' history
- 'Similar teachers' on teacher profile pages

## 6.12 Admin Dashboard

### 6.12.1 User Management

- View all users with search, filter, and pagination
- View individual user profiles and activity
- Suspend/ban users with reason
- Reset user passwords
- Impersonate user for debugging (with audit log)

### 6.12.2 Teacher Verification Queue

- List of pending verification requests
- View uploaded documents (diploma, certificate, ID)
- Approve with verified badge
- Reject with reason (teacher notified)
- Request additional documents
- Revoke verification (if issues discovered later)

### 6.12.3 Financial Management

- Transaction ledger (all payments, commissions, payouts)
- Revenue dashboard (daily, weekly, monthly, annual)
- Payout management (approve, process, track)
- Dispute management (review, refund, resolve)
- Commission configuration
- Financial reports (exportable CSV/PDF)

### 6.12.4 Content Moderation

- Review reported content (reviews, messages, course materials)
- Remove inappropriate content
- Ban repeat offenders
- Content policy management

### 6.12.5 Analytics Dashboard

- Total users (by role, registration trend)
- Active users (DAU, WAU, MAU)
- Session analytics (count, duration, completion rate)
- Revenue analytics (GMV, commission, average transaction)
- Teacher analytics (top performers, verification pipeline)
- Subject/level demand heatmap
- Geographic distribution by wilaya
- Retention and churn metrics

### 6.12.6 Platform Configuration

- Manage subjects and levels database
- Configure commission rates
- Manage notification templates
- Feature flags (enable/disable features)
- App version management (force update thresholds)

# 7. Architecture Technique

## 7.1 Technology Stack

Layer	Technology	Purpose
Mobile App	Flutter (Dart)	Cross-platform iOS/Android application
Backend API	Go (Golang)	REST API + WebSocket server, high-performance request handling
Real-time Communication	LiveKit (self-hosted or cloud)	WebRTC-based video/audio/data channels
Database — Primary	PostgreSQL	User data, sessions, transactions, content metadata
Database — Cache	Redis	Session cache, OTP storage, rate limiting, real-time presence
Object Storage	S3-compatible (MinIO or cloud)	Video files, documents, images, recordings
Message Queue	NATS or RabbitMQ	Async job processing (notifications, transcoding, payouts)
Search Engine	Meilisearch or Elasticsearch	Full-text search for teachers and content
Video Transcoding	FFmpeg (worker service)	Convert uploaded videos to HLS multi-quality
SMS Gateway	Twilio or local provider (e.g., ICOSNET)	OTP and critical SMS notifications
Push Notifications	Firebase Cloud Messaging (FCM)	Push notifications for iOS and Android
CDN	Cloudflare or local CDN	Static assets and video streaming delivery
Monitoring	Prometheus + Grafana	System metrics, alerting, and dashboards
Logging	Loki or ELK Stack	Centralized logging and error tracking
CI/CD	GitHub Actions or GitLab CI	Automated testing and deployment
Containerization	Docker + Docker Compose / K8s	Service containerization and orchestration

## 7.2 System Architecture Overview

The system follows a **microservices-oriented architecture** with the following core services:

- **API Gateway:** Request routing, rate limiting, authentication middleware
- **Auth Service:** Registration, login, JWT management, OTP
- **User Service:** Profile management, teacher verification, student/parent management

- **Session Service:** Scheduling, LiveKit room management, recording
- **Content Service:** Video upload, transcoding pipeline, course management
- **Payment Service:** Transaction processing, commission calculation, payout management
- **Notification Service:** Push, in-app, SMS dispatch with templates
- **Search Service:** Indexing, search queries, recommendations
- **Analytics Service:** Event collection, aggregation, reporting
- **Homework Service:** Assignment creation, submission, grading workflow

## 7.3 Database Schema — Key Entities

Entity	Key Fields	Relationships
users	id, email, phone, role, name, wilaya, avatar, created_at	Has many: sessions, payments, reviews
teacher_profiles	user_id, bio, experience_years, verification_status, diploma_urls	Belongs to: user. Has many: offerings, courses
student_profiles	user_id, level, filiere, parent_id, school	Belongs to: user. Optional: parent
parent_profiles	user_id	Belongs to: user. Has many: students
offerings	teacher_id, subject, level, session_type, price, max_students	Belongs to: teacher_profile
sessions	id, offering_id, teacher_id, start_time, end_time, status, livekit_room_id, recording_url	Belongs to: offering. Has many: participants
session_participants	session_id, student_id, joined_at, left_at, attendance	Belongs to: session, student
courses	id, teacher_id, title, subject, level, price, published	Belongs to: teacher. Has many: chapters
chapters	id, course_id, title, order	Belongs to: course. Has many: lessons
lessons	id, chapter_id, title, video_url, duration, order	Belongs to: chapter
homework	id, teacher_id, title, description, deadline, files	Belongs to: teacher. Has many: submissions
homework_submissions	id, homework_id, student_id, files, grade, feedback	Belongs to: homework, student
quizzes	id, teacher_id, title, time_limit, questions_json	Belongs to: teacher. Has many: attempts
quiz_attempts	id, quiz_id, student_id, answers_json, score, completed_at	Belongs to: quiz, student
transactions	id, payer_id, payee_id, amount, commission, net, method, status	Belongs to: users

Entity	Key Fields	Relationships
subscriptions	id, student_id, teacher_id, plan, price, start, end, status	Belongs to: student, teacher
reviews	id, session_id, reviewer_id, teacher_id, rating, text, response	Belongs to: session, users
notifications	id, user_id, type, title, body, read, channel	Belongs to: user
subjects	id, name_fr, name_ar, name_en, category	Has many: offerings
levels	id, name, code, cycle, order	Has many: offerings, student_profiles

## 7.4 API Design

RESTful API with versioning (v1), consistent error handling, and pagination:

- **Base URL:** <https://api.educonnect.dz/v1>
- **Auth:** Bearer token (JWT) in Authorization header
- **Format:** JSON request/response
- **Pagination:** Cursor-based for lists (limit, cursor, total)
- **Errors:** Standardized error responses with codes and messages
- **Rate limiting:** Per-user and per-endpoint limits
- **WebSocket:** For real-time features (chat, presence, notifications)

## 8. Modèle Économique et Monétisation

### 8.1 Revenue Streams

Revenue Source	Description	Estimated Contribution
Transaction Commission (20%)	20% of every session payment, subscription, and course purchase	Primary (80-90% of revenue)
Featured Listings	Teachers pay to appear at top of search results (future)	Secondary (5-10%)
Premium Tools	Advanced analytics, bulk messaging, priority support for teachers (future)	Secondary (5-10%)

### 8.2 Pricing Strategy

Teachers set their own prices freely. Market will self-regulate based on:

- Teacher qualifications and verification status
- Subject demand (BAC preparation subjects command premium)
- Teacher ratings and reviews
- Session type (group classes typically cheaper per student)

**Expected price ranges (DZD per hour):**

Level	1-on-1 Session	Group Session (per student)
Primaire	500 – 1,500 DZD	200 – 600 DZD
CEM	800 – 2,000 DZD	300 – 800 DZD
Lycée (general)	1,000 – 3,000 DZD	400 – 1,000 DZD
Lycée (BAC year - 3AS)	1,500 – 5,000 DZD	500 – 1,500 DZD

### 8.3 Financial Projections (Simplified)

**Note:** These are rough estimates for planning purposes. Actual numbers will depend on market adoption, marketing spend, and competitive landscape.

# 9. Exigences Non-Fonctionnelles

## 9.1 Performance

- API response time: < 200ms (p95) for standard requests
- Search response time: < 300ms (p95)
- LiveKit session setup: < 3 seconds from join click to connected
- Video playback start: < 2 seconds (first frame)
- App cold start: < 3 seconds
- Concurrent users: support 10,000+ simultaneous users at launch
- Concurrent live sessions: support 1,000+ simultaneous rooms

## 9.2 Scalability

- Horizontal scaling for all backend services
- Database read replicas for high-read operations
- CDN for static and media content
- Auto-scaling based on load metrics
- LiveKit SFU scaling for large group sessions

## 9.3 Availability

- Target uptime: 99.5% (Year 1), 99.9% (Year 2)
- Planned maintenance windows: off-peak hours (2-5 AM Algeria time)
- Graceful degradation: if a service is down, other features continue working
- Disaster recovery: daily backups with < 1 hour RTO

## 9.4 Compatibility

- Android: 6.0+ (Marshmallow) — covers 95%+ of Algerian devices
- iOS: 13.0+ (for LiveKit compatibility)
- Minimum screen: 4.7-inch
- Network: functional on 3G (degraded mode), optimal on 4G/WiFi

## 9.5 Accessibility

- RTL (Right-to-Left) layout support for Arabic
- Font scaling support for readability
- Color contrast ratios meeting WCAG 2.1 AA
- Screen reader compatibility for core flows

## 9.6 Offline Capabilities

- View cached course content and materials offline
- Queue homework submissions for upload when online
- View cached schedule and notifications
- Graceful handling of connectivity loss during sessions

# 10. Sécurité et Protection des Données

## 10.1 Authentication & Authorization

- Bcrypt password hashing (cost factor 12+)
- JWT tokens with RS256 signing
- Role-based access control (RBAC) on all API endpoints
- OTP rate limiting (max 5 attempts per 10 minutes)
- Account lockout after 10 failed login attempts
- CSRF protection on all state-changing endpoints

## 10.2 Data Protection

- TLS 1.3 for all communications (API, WebSocket, LiveKit)
- Encryption at rest for sensitive data (passwords, payment info, documents)
- PII (Personally Identifiable Information) handling compliance
- Data minimization: only collect what's necessary
- Secure file upload: virus scanning, file type validation, size limits
- Database encryption for sensitive columns

## 10.3 Child Safety

- All teacher accounts verified before interaction with students
- Session recording capability for accountability
- Parent visibility into all child activities
- Report mechanism for inappropriate behavior
- Admin moderation tools for content and communication
- No direct messaging between teachers and minor students outside sessions (unless parent-approved)

## 10.4 Payment Security

- No storage of full payment credentials on platform servers
- Transaction logging with audit trail
- Escrow system: funds held until session completion
- Anti-fraud monitoring (unusual transaction patterns)

## 10.5 Infrastructure Security

- DDoS protection (Cloudflare or equivalent)
- Web Application Firewall (WAF)
- Regular security audits and penetration testing

- Dependency vulnerability scanning in CI/CD
- Secrets management (HashiCorp Vault or equivalent)
- Audit logging for all admin actions

# 11. Internationalisation (i18n)

## 11.1 Supported Languages

Language	Code	Direction	Priority	Notes
French	fr	LTR	Primary	Default language, used in Algerian education system
Arabic (Standard)	ar	RTL	Primary	Full RTL support, Arabic numeral option
English	en	LTR	Secondary	International accessibility

## 11.2 Implementation

- Flutter: flutter\_localizations + intl package with ARB files
- Backend: all user-facing strings in i18n JSON files, served via API
- Dynamic language switching without app restart
- RTL layout mirroring for Arabic
- Date/time formatting per locale (Algerian format: dd/MM/yyyy)
- Currency: Algerian Dinar (DZD) with appropriate formatting
- Arabic font: Noto Sans Arabic or equivalent for consistent rendering

# 12. Planning Prévisionnel

## 12.1 Development Phases

Phase	Duration	Deliverables
Phase 1: Foundation	8 weeks	Project setup, CI/CD, database schema, authentication system, basic user management, admin scaffolding
Phase 2: Core Features	10 weeks	Teacher profiles, student/parent management, search & discovery, scheduling, basic payment integration
Phase 3: LiveKit Integration	8 weeks	Live sessions (1-on-1 + group), whiteboard, screen sharing, chat, file sharing, recording
Phase 4: Content & Learning	6 weeks	Pre-recorded content, video upload/transcoding, homework system, quiz system, progress tracking
Phase 5: Payment & Billing	6 weeks	CCP/Baridimob integration, Edahabia integration, subscriptions, packages, promotions, commission system
Phase 6: Notifications & Polish	4 weeks	Push notifications, SMS integration, notification preferences, i18n (AR/EN), UI/UX polish
Phase 7: Testing & Launch	4 weeks	End-to-end testing, load testing, security audit, beta testing, app store submission, launch

**Note:** Total estimated development time: **46 weeks (~11 months)**. This assumes a solo developer with focused full-time work. Timeline can be compressed with additional developers.

## 12.2 Milestones

- **M1 (Week 8):** Users can register, authenticate, and manage profiles
- **M2 (Week 18):** Teachers can be discovered, sessions can be scheduled
- **M3 (Week 26):** Full live session experience with all LiveKit features
- **M4 (Week 32):** Complete learning platform with content, homework, and quizzes
- **M5 (Week 38):** Payment system fully operational
- **M6 (Week 42):** All notifications working, fully localized
- **M7 (Week 46):** Production launch on App Store and Google Play

## 13. Risques et Mitigation

Risk	Probability	Impact	Mitigation
Payment integration delays (Algerian providers have limited APIs)	High	High	Start integration early, have manual payment verification as fallback, engage provider contacts
Low internet quality in some wilayas	Medium	High	Audio-only fallback mode, adaptive bitrate, offline content caching, lightweight UI
LiveKit self-hosting complexity	Medium	Medium	Start with LiveKit Cloud, migrate to self-hosted after scaling. Budget for cloud costs initially
Teacher adoption resistance	Medium	High	Low/zero onboarding friction, free trial period for teachers, referral program, in-person outreach
Regulatory changes in online education	Low	High	Monitor regulatory landscape, design for compliance flexibility, legal consultation
Competition from established platforms	Medium	Medium	Focus on Algerian-specific features (curriculum, payment methods, language), first-mover advantage
Server costs scaling faster than revenue	Medium	Medium	Usage-based pricing awareness, optimize infrastructure, set spending alerts, efficient resource usage
SMS costs for notifications	Medium	Low	SMS only for critical alerts, push notifications as primary channel, batch SMS sending

# 14. Annexes

## 14.1 Glossary

Term	Definition
BAC	Baccalauréat — Algerian high school final exam
BEM	Brevet d'Enseignement Moyen — Middle school certificate
CEM	Collège d'Enseignement Moyen — Middle school
CCP	Compte Courant Postal — Postal current account (Algérie Poste)
DZD	Dinar Algérien — Algerian Dinar (currency)
Edahabia	Electronic payment card issued by Algérie Poste
Baridimob	Mobile banking app by Algérie Poste
LiveKit	Open-source WebRTC platform for real-time video/audio
SFU	Selective Forwarding Unit — Server that routes video streams in group calls
HLS	HTTP Live Streaming — Video streaming protocol
JWT	JSON Web Token — Authentication token format
RBAC	Role-Based Access Control
RTL	Right-to-Left — Text direction for Arabic
Wilaya	Administrative division (province) of Algeria
Filière	Academic stream/track in Lycée

## 14.2 API Endpoints Summary

Key API endpoint groups (detailed API documentation to be produced separately):

- **/auth** — register, login, refresh, logout, verify-otp, reset-password
- **/users** — profile CRUD, avatar upload, deactivate
- **/teachers** — list, search, profile, verify, offerings, availability, earnings
- **/students** — profile, progress, enrollments, submissions
- **/parents** — children management, progress reports
- **/sessions** — create, join, cancel, reschedule, recording, participants
- **/courses** — CRUD, chapters, lessons, materials, enrollment
- **/homework** — create, assign, submit, grade
- **/quizzes** — create, attempt, results
- **/payments** — initiate, confirm, refund, payout, history
- **/subscriptions** — create, cancel, renew

- **/reviews** — create, respond, report
- **/notifications** — list, mark-read, preferences
- **/search** — teachers, courses
- **/admin** — users, verifications, disputes, analytics, config

## 14.3 Document Revision History

Version	Date	Author	Changes
1.0	09/02/2026	Kazer	Initial version — complete cahier de charge

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— Fin du Document —

EduConnect — Plateforme de Tutorat en Ligne pour l'Éducation Algérienne