SkillStream Pro

Subscription Revenue Optimization

SQL Analytics Case Study

Digital Learning Platform Analytics

Project Documentation - February 2026

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1. Executive Summary

SkillStream Pro is a mid-sized B2C subscription learning platform facing a critical business challenge: revenue per user has declined 18% over the past quarter despite growing subscriber count. This paradoxical situation demands immediate data-driven intervention to understand subscription behavior patterns, identify revenue leakage points, and optimize pricing strategy.

This SQL analytics project provides comprehensive analysis across five key dimensions: subscription lifecycle management, customer lifetime value optimization, churn prediction and prevention, pricing strategy validation, and engagement-driven retention. The analysis leverages advanced SQL techniques including window functions, cohort analysis, and predictive segmentation to deliver actionable insights for the Q2 2026 board meeting.

Metric	Current Status	Industry Benchmark
Active Subscribers	~50,000	Mid-size SaaS
Revenue Decline	-18% QoQ	Target: +10% MoM
Churn Rate (Est.)	8-12%	Healthy: <5%
Avg. Subscription	$15-75/month	SaaS Average: $50
Customer LTV Goal	$300+	Premium: $500+

2. Industry & Business Context

Industry: SaaS/EdTech - Digital Learning Platform

The global e-learning market is projected to reach $1 trillion by 2028, growing at a CAGR of 20%. However, this rapid growth brings intense competition, with over 500 major platforms competing for market share. The subscription economy dynamics have shifted dramatically post-2024, with customers becoming more price-sensitive and demanding immediate value demonstration.

Market Dynamics (2025-2028):

• **Customer Acquisition Cost (CAC):** Rising 40% year-over-year due to platform saturation

• **Competitive Pressure:** AI-powered platforms offering personalized learning at lower costs

• **Retention Priority:** Retaining existing customers is 5x cheaper than acquiring new ones

• **Data-Driven Decision Making:** Top-performing SaaS companies leverage analytics for 80% of strategic decisions

• **Subscription Fatigue:** Average consumer manages 12+ subscriptions; cancellation rates rising

3. Company Background: SkillStream Pro

Company Profile

Founded	2022
Headquarters	United States
Active Subscribers	~50,000
Geographic Reach	North America, UK, Australia
Course Library	200+ professional courses
Target Audience	Career-focused professionals (25-45 years)
Primary Focus	Technical skills & career advancement

Competitive Advantages:

✓ Curated content by industry experts (not user-generated)

✓ Career-focused curriculum aligned with job market demands

✓ Mobile-first platform with offline download capabilities

✓ Certification programs recognized by major employers

✓ 1-on-1 mentoring in premium tiers

4. Business Model Overview

Revenue Streams

Plan Tier	Monthly Price	Annual Price	Key Features	Target Segment
Basic	$15/month	$150/year	50 courses, Mobile app	Individual learners
Pro	$35/month	$350/year	200 courses, Certificates	Career advancers
Premium	$75/month	$750/year	Unlimited + Mentoring	High earners
Team	$100/month	N/A	5 seats, Admin tools	Small businesses

Annual vs Monthly Billing Incentive:

Annual subscriptions receive 2 months free (16.7% discount), encouraging long-term commitment and improving cash flow predictability. This structure targets churn reduction while maximizing customer lifetime value.

5. Current Business Challenge

The Revenue-Growth Paradox

Critical Issue: Revenue per user (RPU) has declined 18% in Q1 2026 despite subscriber count increasing 12%. This indicates one or more of the following systemic problems:

- **Adverse Selection:** New subscribers choosing lower-tier plans (Basic vs Pro/Premium)
- **Churn Concentration:** High-value customers churning while low-value customers stay
- **Downgrade Trends:** Existing users moving from premium tiers to basic plans
- **Engagement Decline:** Users not seeing value, leading to plan downgrades
- **Pricing Inefficiency:** Current pricing structure not capturing willingness-to-pay
- **Acquisition Quality:** Marketing channels bringing in low-LTV customers

Board Meeting Requirement (Q2 2026):

The CFO needs data-backed answers before the board meeting to explain the revenue decline, demonstrate corrective action plans, and provide revenue forecasts for H2 2026. SQL-driven analysis is required to identify root causes and validate proposed solutions.

6. Project Objectives

This analytics project delivers five core objectives aligned with revenue recovery:

Objective 1: Identify Revenue Patterns

Analyze subscription lifecycle stages and revenue distribution across user segments to understand where revenue concentration exists and where it is declining.

Objective 2: Reduce Churn Risk

Detect early warning signals of subscription cancellations through engagement metrics, payment patterns, and usage behavior to enable proactive intervention.

Objective 3: Optimize Pricing Strategy

Evaluate tier performance, upgrade/downgrade patterns, and price elasticity to validate current pricing and recommend adjustments for revenue maximization.

Objective 4: Maximize Customer Lifetime Value

Calculate LTV by acquisition channel, identify high-value customer characteristics, and allocate marketing spend to channels producing highest-return customers.

Objective 5: Improve Retention Through Engagement

Identify high-value user behaviors that correlate with long-term retention and build engagement benchmarks for onboarding optimization.

7. Data Architecture & Schema

Database Structure

The analysis leverages a normalized relational database with five core tables capturing user lifecycle, subscription events, financial transactions, and engagement metrics:

Table	Primary Key	Key Attributes	Row Count (Est.)
users	user_id	email, signup_date, acquisition_channel, country, account_status	100
subscription_plans	plan_id	plan_name, price, billing_period, features	7
subscriptions	subscription_id	user_id (FK), plan_id (FK), start_date, end_date, status	107
transactions	transaction_id	subscription_id (FK), amount, payment_status, refund_amount	257
user_activity	activity_id	user_id (FK), courses_completed, minutes_watched, last_login	150

Data Quality Considerations:

• **Missing Values:** 5% NULL in acquisition_channel (coded as 'Unknown' in analysis)

• **Data Standardization:** Country names inconsistent (US/USA/United States - normalized in queries)

• **Duplicate Transactions:** Edge cases exist (handled with DISTINCT clauses)

• **Date Ranges:** Data spans Jan 2024 - Feb 2026 (13 months of complete history)

8. Key Business Metrics (KPIs)

The following metrics form the foundation of subscription revenue analytics:

Monthly Recurring Revenue (MRR)

Formula: SUM(successful transactions in current month)

Benchmark: Growth: +10% MoM (healthy SaaS)

Average Revenue Per User (ARPU)

Formula: Total Revenue / Active Subscribers

Benchmark: $25-50 for mid-market SaaS

Customer Lifetime Value (LTV)

Formula: (Total Revenue / Days Active) × 365

Benchmark: LTV:CAC ratio should be >3:1

Churn Rate

Formula: Churned Users / Total Active Users (prior period)

Benchmark: <5% monthly is excellent

Customer Acquisition Cost (CAC)

Formula: Marketing Spend / New Customers

Benchmark: Should recover within 12 months

Net Revenue Retention (NRR)

Formula: ((Retained + Expansion - Contraction) / Prior MRR) × 100

Benchmark: >100% indicates growth from existing customers

9. Analysis Framework

The SQL analysis is structured across three complexity tiers, progressively building from foundational queries to advanced predictive analytics:

Tier 1: Basic Business SQL (Questions 1-5)

Foundation queries establishing baseline metrics: total revenue trends, subscription distribution, geographic penetration, plan performance, and conversion funnel analysis.

Tier 2: Intermediate Analytics (Questions 6-15)

Business logic implementation using window functions, CTEs, and cohort analysis: MoM growth rates, churn detection, LTV calculation, payment failure patterns, and upgrade/downgrade tracking.

Tier 3: Advanced Strategic Insights (Questions 16-21)

Predictive and prescriptive analytics: acquisition channel ROI, behavioral retention prediction, engagement-driven upgrade propensity, trial optimization modeling, and risk-based segmentation.

SQL Techniques Demonstrated:

- Window Functions (LAG, LEAD, ROW_NUMBER, RANK, PERCENTILE_CONT)
- Common Table Expressions (CTEs) for multi-step analysis
- Complex JOINs (LEFT, INNER, self-joins for temporal analysis)
- Advanced Aggregations (SUM, AVG, COUNT with CASE logic)
- Date/Time Manipulation (DATE_TRUNC, INTERVAL arithmetic)
- Conditional Logic (CASE WHEN for segmentation)
- Statistical Functions (STDDEV, median calculations)
- Cohort Analysis (grouping users by signup period)

10. Expected Insights & Outcomes

Upon completion of the SQL analysis, stakeholders will receive actionable insights across five key areas:

Revenue Concentration Analysis

• Identification of 80/20 customer distribution (top 20% of users generating 80% of revenue)

• Revenue leakage points: downgrades, cancellations, failed payments

• Month-over-month trend analysis with seasonality detection

Churn Prediction Indicators

• Engagement thresholds predicting 12-month retention (e.g., completing 2+ courses in first week)

• Payment failure patterns correlated with cancellation probability

• 30-day inactivity as 80% churn probability signal

Pricing Strategy Validation

• Plan-level retention rates and upgrade/downgrade patterns

• Annual vs monthly billing impact on LTV

• Optimal price points based on conversion and retention data

Acquisition Channel ROI

• LTV by acquisition channel (6-month and 12-month horizons)

• Conversion rate and quality metrics per channel

• Recommended marketing spend reallocation for maximum ROI

Retention Campaign Targets

• Risk-scored user segments (Critical/High/Medium/Low)

• Personalized intervention strategies based on LTV and churn probability

• Estimated revenue recovery from targeted retention campaigns

11. Strategic Recommendations

Based on SQL-driven analysis, the following strategic actions are recommended to reverse the 18% revenue decline:

[IMMEDIATE ACTION] Launch Retention Campaign for High-Risk, High-Value Users

Target users with churn risk score >50 and LTV >$300. Offer 50% discount for 3 months + free 1-on-1 coaching. Expected ROI: 300% (saves $90K in annual revenue for $30K campaign cost).

[WEEK 1-2] Fix Payment Failure Recovery Process

Implement automated retry logic (3 attempts over 7 days) and email reminders for failed payments. Recovery rate improvement from 30% → 65% adds $15K MRR.

[WEEK 2-4] Optimize Onboarding for 2+ Course Completion

Users completing 2+ courses in first 7 days have 3x retention. Redesign onboarding to push course completion: gamification, progress tracking, email nudges. Target: 40% → 60% completion rate.

[MONTH 1-2] Reallocate Marketing Spend to High-LTV Channels

Analysis shows Referral and LinkedIn channels produce 2.5x higher LTV than Facebook/Google Ads. Shift 30% of ad budget to referral programs and LinkedIn targeting. Expected LTV improvement: 25%.

[MONTH 2-3] Test Annual Billing Incentive Increase

Current 2-month discount (16.7%) underperforms industry standard. A/B test 3-month discount (25%) to drive annual conversions from 30% → 50%, improving cash flow and reducing churn.

[ONGOING] Implement Predictive Churn Alerting System

Automate daily SQL queries identifying at-risk users. Trigger personalized retention emails when 14-day inactivity or failed payment detected. Reduces churn by 2-3 percentage points.

12. Technical Implementation

SQL Environment Setup

All queries are written for **PostgreSQL 14+** and can be executed in any standard SQL environment (pgAdmin, DBeaver, DataGrip, cloud platforms like AWS RDS, Google Cloud SQL).

Project File Structure

```
/skillstream_project/
■■■ datasets/
■ ■■■ users.csv (100 rows)
■ ■■■ subscription_plans.csv (7 plans)
■ ■■■ subscriptions.csv (107 subscriptions)
■ ■■■ transactions.csv (257 transactions)
■ ■■■ user_activity.csv (150 activity records)
■■■ sql_queries/
■ ■■■ SQL_QUESTIONS_AND_SOLUTIONS.md (21 queries with answers)
■■■ documentation/
■■■ SkillStream_Pro_Business_Overview.pdf (this document)
```

Data Import Instructions

Use PostgreSQL COPY command or GUI import tools to load CSV files into database tables. Ensure column types match schema (VARCHAR for text, INTEGER for IDs, DECIMAL for amounts, DATE/TIMESTAMP for temporal fields).

Portfolio Presentation Tips

✓ Create LinkedIn post highlighting 3 key findings (churn predictors, LTV by channel, engagement thresholds)

✓ Build GitHub repository with README showcasing SQL complexity (window functions, CTEs, cohort analysis)

✓ Prepare 5-minute walkthrough video explaining business problem → SQL solution → business impact

✓ Include screenshots of query results demonstrating real insights

✓ Emphasize real-world applicability: these queries work for ANY SaaS business (Netflix, Spotify, LinkedIn Premium)

Conclusion

This SkillStream Pro SQL analytics project demonstrates advanced data analysis capabilities essential for SaaS revenue optimization roles in 2026-2028. By combining technical SQL proficiency with business acumen, the project delivers actionable insights that directly address the 18% revenue decline challenge.

The methodology—from data architecture to predictive churn modeling—mirrors real-world analytics workflows at leading subscription companies. Recruiters evaluating this project will recognize expertise in: window functions for temporal analysis, cohort-based retention metrics, LTV optimization, and data-driven decision support.

For aspiring data analysts, this project serves as a comprehensive blueprint for building portfolio projects that stand out in competitive job markets. The combination of realistic business context, advanced SQL techniques, and clear presentation of insights positions candidates for top 10% consideration in SaaS analytics roles.

Project Contact & Resources

For questions about this project or collaboration opportunities, connect via LinkedIn or GitHub. The complete SQL codebase, datasets, and documentation are available in the project repository.