Milestone 1 Completion Report

Database & Authentication

Completed: December 19, 2025

Preview: https://science-canvas-creator.vercel.app

What Was Delivered

Database Infrastructure

Database Reset Workflow

- Fixed migrations to support repeated database resets without errors
- Created seed script that populates all required data after reset
- Established development database for testing separate from production

Seed Data

- 12 icon categories (Chemistry, Biology, Physics, Medical, etc.)
- 28 sample icons distributed across categories
- Blog content (5 categories, 10+ tags, 3 sample posts)
- 4 researcher testimonials
- Admin role assignments and site settings

RLS Policy Improvements

- Expanded and fixed Row Level Security policies across all tables
- Fixed critical bug preventing authenticated users from accessing icon library
- Enabled public access to icons for landing page showcase
- Created `public_profiles` view to prevent email address exposure
- Removed overly permissive RLS policy and updated app code to use secure view
- Verified all permission scenarios work correctly

Authentication & Email System

Email Delivery

- Set up Resend for branded email delivery

- Created email templates for signup verification and password reset
- Deployed edge function to handle all authentication emails
- Built admin email preview page at https://science-canvas-creator.vercel.app/admin/email-preview for template testing
  - Requires admin authentication:
  - email: dev@gazzola.dev
  - password: Password123!

User Experience

- Built dedicated email verification page
- Implemented auto-resend for unverified email attempts
- Improved error and success handling with custom toast notifications
- Smooth signup → verification → login flow

Testing & Verification

Comprehensive Test Coverage (81 tests)

- Database seeding verification (8 tests)
- RLS policy enforcement including profile security (23 tests)
- E2E tests for authentication and community features (28 tests)
- Email delivery function (5 tests)
- E2E performance optimization tests (6 tests)
- E2E diagnostic tests (2 tests)
- Database performance RPC tests (8 tests)
- Stress test (1 comprehensive test)
- Manual testing procedures (5 documented procedures)

Custom toast notifications provide consistent, testable feedback for all user actions, allowing complete verification of features and edge cases.

Development Environment

- Preview deployment: https://science-canvas-creator.vercel.app
- Connected to development database for safe testing
- All features verified in production-like environment

Additional Work (Beyond Scope)

Performance Optimization

Stress Testing & Diagnosis (1 comprehensive test)

Simulates concurrent user load with multiple browser contexts (anonymous, authenticated, and admin users) under real-world conditions. Monitors console errors, network requests, and performance metrics to validate system stability:

- **Pass criteria:** Zero I/O timeout errors, ≤5% failure rate, ≤30% performance degradation
- **Result:** Successfully identified admin query bottlenecks, enabling targeted optimization

Database Query Optimizations

Replaced inefficient client-side queries with optimized server-side RPC functions:

- **Admin Notification Counts:** Batched queries with partial indexes on approval/read status (<400ms execution)
- **User Analytics:** Aggregated user data with efficient JOINs and pagination support

Optimization Test Coverage

Added comprehensive tests to ensure optimizations maintain original functionality:

- *RPC Function Tests (8 tests):* Verify performance, accuracy, data structure, and edge cases
- *Frontend Integration Tests (6 E2E tests):* Confirm AdminNotificationBell counts, notification popover display, analytics page loading, pagination behavior, and zero console errors during normal operation
- *Stress Test (1 test):* Validates system stability under concurrent load with multiple user contexts

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Deliverables Summary

- ✅ Database migrations fixed for reset workflow
- ✅ Seed script with all required data types
- ✅ Development database established
- ✅ Preview deployment live at https://science-canvas-creator.vercel.app
- ✅ RLS policies expanded and verified with secure profile email protection
- ✅ Complete authentication system with email verification
- ✅ 81 automated tests + 5 manual procedures covering all requirements
- ✅ Custom toast system for reliable testing
- ✅ Performance optimizations with comprehensive test coverage (bonus)

Status: Ready for review and approval to proceed to Milestone 2