

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 (68 tests)

- Database seeding verification (8 tests)
- RLS policy enforcement including profile security (20 tests)
- E2E tests for authentication and community features (28 tests)
- Email delivery function (5 tests)
- 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, $\leq 5\%$ failure rate, $\leq 30\%$ 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 (14 tests)

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

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
-  Complete authentication system with email verification
-  68 automated tests + 5 manual procedures covering all requirements
-  Custom toast system for reliable testing
-  Performance optimizations with 15 additional tests (bonus)

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