



Zero-Cost Educational Portal Stack

Building `educational.ac-tech.pro` with \$0/month recurring costs

Research Date: 2026-01-02 | **Target:** 100-500 initial students

✓ **YES, It's Possible!**

You can build and run a fully functional educational portal with **genuinely \$0/month in recurring costs** using the stack below. The only costs are:

- **Stripe transaction fees:** 2.9% + \$0.30 per sale (only when you make money)
- **Domain:** Already included in your Hostinger plan
- **AI (optional):** Pay-per-use only (~\$0.10-0.50 per tutoring session)

1. The Zero-Cost Stack

| COMPONENT | SERVICE | FREE TIER LIMITS | COST |
|----------------|--------------------|-----------------------------------------------------|-------------|
| Hosting | Cloudflare Pages | Unlimited sites, 500 builds/mo, unlimited bandwidth | \$0 FOREVER |
| Serverless API | Cloudflare Workers | 100k requests/day, 10ms CPU per request | \$0 FOREVER |

| COMPONENT | SERVICE | FREE TIER LIMITS | COST |
|----------------|------------------|-----------------------------------------|------------------------|
| Database | Supabase Free | 500MB DB, 1GB file storage, 50k MAUs | \$0 FOREVER* |
| Authentication | Supabase Auth | 50,000 monthly active users | \$0 FOREVER |
| Video Storage | Cloudflare R2 | 10GB storage, 10M reads/mo, FREE egress | \$0 FOREVER |
| Video Alt | YouTube Unlisted | Unlimited storage, unlimited bandwidth | \$0 FOREVER |
| CDN | Cloudflare Free | Unlimited bandwidth, DDoS protection | \$0 FOREVER |
| Payments | Stripe | No monthly fee, only per-transaction | 2.9% + \$0.30 per sale |
| Email | Resend Free | 3,000 emails/month, 100 emails/day | \$0 FOREVER |
| AI Tutor | Gemini API Free | ~1000 requests/day (Flash-Lite model) | \$0 (limited) |
| AI Tutor Alt | OpenAI API | Pay-per-use, no monthly fee | ~\$0.10-0.50/session |

* Supabase Free tier pauses projects after 7 days of inactivity. A simple cron job keeps it alive.

2. Why Cloudflare Over Vercel?

While Vercel is excellent, its Hobby tier has two issues for commercial use:

- **Commercial Use Prohibited:** Vercel Hobby explicitly prohibits commercial projects. Educational courses sold for money = commercial.
- **Hard Limits:** 100GB bandwidth cap, 100 deployments/day.

Cloudflare Pages + Workers has no commercial restriction and offers:

- Unlimited bandwidth (truly unlimited)
- 500 builds/month (plenty for a single project)
- Workers: 100,000 requests/day free tier
- R2: 10GB storage with FREE egress (critical for video)

Architecture Change: Instead of Next.js (Vercel-optimized), use **SvelteKit**, **Astro**, or **Next.js with Cloudflare adapter**. All work on Cloudflare Pages.

3. Video Strategy: Two Options

Option A: YouTube Unlisted (Recommended for Start)

- **Cost:** \$0, unlimited storage, unlimited bandwidth
- **Pros:** Zero maintenance, auto-transcoding, mobile-optimized player
- **Cons:** YouTube branding, potential for students to find via search if not careful
- **How:** Upload videos as "Unlisted" → Embed in your platform

Option B: Cloudflare R2 + Custom Player

- **Cost:** \$0 for first 10GB storage, FREE egress
- **Pros:** Full control, no YouTube branding, professional look
- **Cons:** Need to transcode videos yourself (use FFmpeg locally)
- **Upgrade Path:** When you exceed 10GB, R2 costs \$0.015/GB/month (10 hours of video ≈ \$0.15/month)

4. AI Features: Pay-Per-Use Only

AI tutoring is a "premium" feature. You have two free/low-cost options:

| SERVICE | FREE TIER | PAY-PER-USE COST | BEST FOR |
|--------------------|--------------------|------------------------|-----------------------|
| Gemini Flash-Lite | 1000 requests/day | \$0.0375 per 1M tokens | High-volume basic Q&A |
| OpenAI GPT-4o-mini | None (pay-per-use) | ~\$0.05 per session | High-quality tutoring |

Recommendation: Start with Gemini Flash-Lite (free) for initial students. If quality isn't sufficient, switch to GPT-4o-mini (pennies per interaction). *AI cost is revenue-dependent: you only pay when students use it.*

5. Capacity Analysis: Can This Handle 500 Students?

50k

Monthly Active Users
(Supabase)

100k

API Requests/Day (Workers)

10M

R2 Reads/Month (Video)



Bandwidth (Cloudflare)

500 students using the platform daily:

- 500 logins/day = 500 auth checks → **Well under 100k/day limit**
- 500 students × 5 API calls each = 2,500/day → **2.5% of limit**
- 500 students × 2 video watches/day = 1,000 R2 reads → **0.03% of monthly limit**

Verdict: This stack can comfortably handle 500-5,000 students before hitting any free tier limits. You have **massive headroom**.

6. Upgrade Triggers (When to Start Paying)

| TRIGGER | WHAT TO UPGRADE | COST |
|-----------------------------|-----------------------|--------------------------|
| > 500MB database | Supabase Pro | \$25/month |
| > 10GB video storage | R2 paid tier | \$0.015/GB/month |
| > 100k Workers requests/day | Workers Paid (\$5/mo) | \$5/month |
| Need better AI quality | OpenAI pay-per-use | ~\$50-200/month at scale |

Reality check: You'll likely hit 500MB database before anything else. That happens around 1,000-2,000 enrolled students. At that point, \$25/month is trivial compared to revenue.

7. Recommended Stack Summary

Frontend

- **Framework:** Astro + React (or SvelteKit) — works on Cloudflare Pages
- **Styling:** Tailwind CSS 4
- **Hosting:** Cloudflare Pages (free, unlimited BW)

Backend

- **API:** Cloudflare Workers (100k req/day free) or Supabase Edge Functions
- **Database:** Supabase PostgreSQL (500MB free)
- **Auth:** Supabase Auth (50k MAUs free)
- **Storage:** Cloudflare R2 (10GB free, FREE egress)

Integrations

- **Videos:** YouTube Unlisted (start) → R2 (premium look later)
- **Payments:** Stripe (only pays when you earn)
- **Email:** Resend (3k/month free)
- **AI:** Gemini Flash-Lite (1k/day free) → OpenAI (pay-per-use)

8. What's Different from Previous Recommendation?

| Component | Previous (Had Costs) | New (Zero Cost) |
|------------------|---------------------------------|---------------------------------|
| Hosting | Vercel (Pro \$20/mo eventually) | Cloudflare Pages (free forever) |
| Video | Cloudflare Stream (\$5/mo min) | YouTube Unlisted or R2 (free) |
| AI | OpenAI (~\$500/mo at scale) | Gemini free tier or pay-per-use |
| Total Fixed Cost | ~\$50-150/month | \$0/month |



Ready to Build

With this stack, you can launch `educational.ac-tech.pro` with:

- **\$0/month fixed costs** until you have thousands of students
- **Only transaction-based costs** (Stripe, optional AI)
- **Massive free tier headroom** for growth

When you're ready, I can start implementing Phase 1: Cloudflare Pages + Supabase + Astro setup.

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