

# INFFER Project: AI-Powered R Code Feedback

A Scalable Learning Assistant for R Coding and Data Analytics

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Ulrich Matter & WDDA Team

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**Bern University of Applied Sciences (BFH)**

*Supported by BFH E-Learning funding program ([virtuelle-akademie.ch](http://virtuelle-akademie.ch))*

*AI tools used: Claude Code (Sonnet 4.5, Opus 4.5) for app framework, testing, deployment, bug fixing, CSS styling,  
Beamer setup*

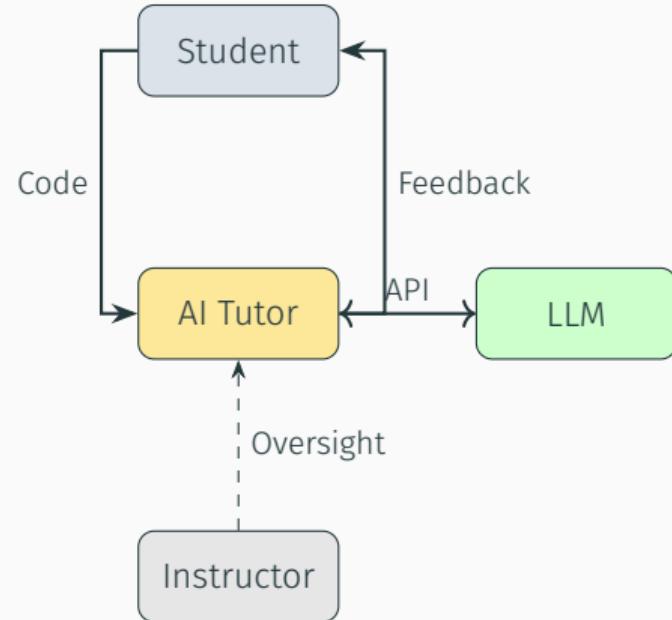
# The Challenge: Scaling R Coding Education

Teaching R coding at scale presents unique challenges:

- Students need **immediate, personalized feedback**
- Instructors face high grading workloads
- Traditional office hours don't scale
- Students hesitate to ask “basic” questions

Our approach:

Leverage large language models (LLMs) as on-demand tutoring assistants.



# Conceptual Background: AI in Education

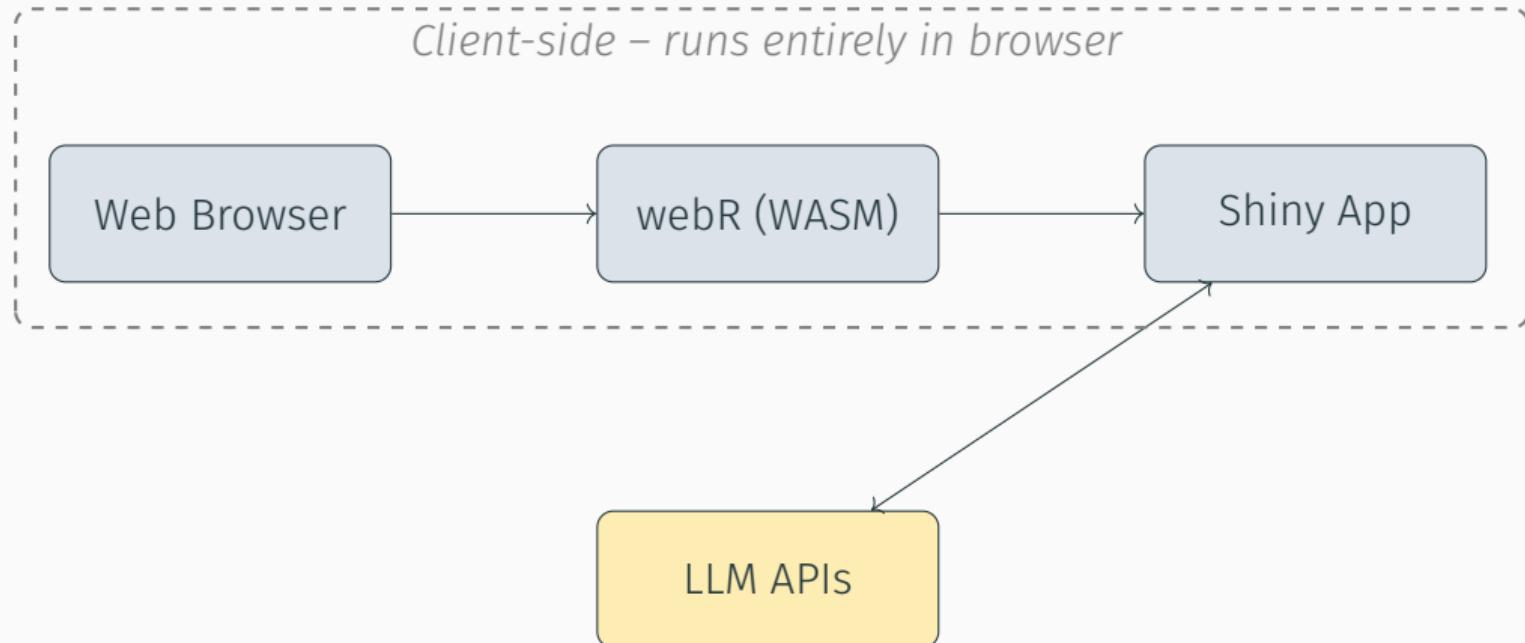
Formative feedback is critical for learning R coding:

- Timely feedback improves learning outcomes (Hattie & Timperley, 2007)
- Self-regulated learning requires actionable guidance
- Positive framing reduces anxiety and encourages experimentation

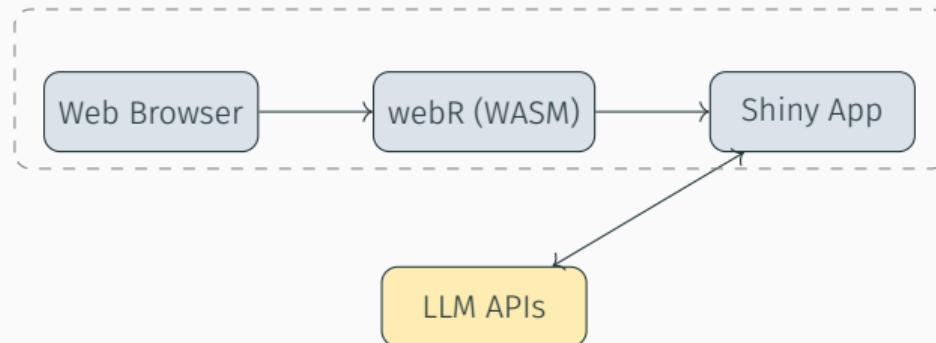
Why LLMs for code feedback?

Capability	Traditional Tools	LLM-Based
Syntax checking	✓	✓
Unit tests / correctness	✓	✓
Style suggestions	Rule-based	Contextual
Conceptual explanations	Pre-written	Adaptive
Personalized tone	-	✓
Natural language interaction	-	✓

# Architecture: Serverless & Privacy-First



# Architecture: Key Design Principles



## Key design principles:

- **Privacy by design:** No student code stored on any server
- **“Zero” infrastructure:** Static hosting via GitHub Pages
- **BYOK model:** Students use their own API keys (which we hand out)
- **Multi-provider:** Flexible model selection (via OpenRouter)

# Three-Layer Feedback System

Layer 1: Syntax Check – Immediate R parsing validation

<1 sec

Layer 2: Rule-Based – Pattern matching (works offline)

<1 sec

Layer 3: AI Feedback – LLM analysis with pedagogical prompting

3–10 sec

AI feedback is pedagogically prompted to:

- Start with positive observations
- Frame suggestions as learning opportunities
- Provide actionable next steps

# Features & Intended Use

## Key Features:

- Multi-language UI (EN/DE/FR)
- Screenshot paste support
- Configurable AI models
- Free tier options available
- Mobile-responsive design

## Recommended Models:

- **Qwen 2.5 Coder** – Best for code
- DeepSeek V3 – Best value
- Gemini Flash – Free tier

## Intended Use Cases:

1. **Self-study:** Students practice independently
2. **Homework support:** Get unstuck without waiting
3. **Exam prep:** Test understanding with instant feedback
4. **Flipped classroom:** Pre-class coding exercises

Not intended to replace instructor grading.

# Enjoy the Show

The screenshot shows the R Code Feedback App interface. At the top, there are navigation links for "Code-Analyse" and "R Programmier-Leitfaden". A language selection dropdown shows "DE". On the left, there's a logo for "Berner Fachhochschule Hochschule für angewandte Wissenschaften Bern University of Applied Sciences" and a "FH" monogram. Below the logo, the title "R Code Feedback App" is displayed in large blue font, followed by the subtitle "KI-gestützter Lernassistent für WDDA-Kurs".

The interface is divided into two main sections:

- Einstellungen (Settings):** This section contains dropdown menus for "KI-Anbieter" (selected: OpenRouter (Multi-Model)) and "Modellauswahl" (selected: Qwen 2.5 Coder 32B (Best for coding)). It also includes a note: "Wählen Sie ein Modell nach Ihren Bedürfnissen - Coding-Spezialisten bieten besseres R-Feedback".
- Übungseingabe (Assignment Input):** This section has a blue header bar with the title "Übungseingabe". Below it, a text area says: "Fügen Sie hier Ihre Übungsbeschreibung oder einen Screenshot ein. Dies ist der Hauptweg, um Ihre Aufgabe einzugeben." A text input box contains the assignment description: "Aufgabe:\*\* Berechnen Sie den Mittelwert, den Median und die Standardabweichung eines numerischen Vektors namens 'preise'." A green circular icon with a white letter "G" is located in the bottom right corner of this box. At the bottom of this section is a yellow button labeled "Übung löschen" (Delete assignment).

## Summary

### What we built:

- AI-powered R code feedback tool
- Runs entirely in browser (no server)
- Privacy-preserving design
- Multi-model, multi-language support

### Technology stack:

- R + Shiny + Shinylive
- webR (WebAssembly)
- OpenRouter / OpenAI / Anthropic APIs

## Try it out

Deployed at:

[https://umatter.github.io/inffer\\_feedback\\_app](https://umatter.github.io/inffer_feedback_app)

Source code:

[https://github.com/umatter/inffer\\_feedback\\_app](https://github.com/umatter/inffer_feedback_app)



Scan to open app

## Questions?