

# Soroban Abacus Classroom: Teacher User Guide

Complete Operational Manual: 1:4 Soroban Pedagogy, Real-Time Telemetry, Screen-Share Safe PIN Security, Quizzes & Flash Anzan

App Link: <https://www.aivacado.com/abacus> | Target Audience: Math Educators, Abacus Senseis & Academy Coaches

## EXECUTIVE SUMMARY

The Aivacado Soroban Abacus Classroom is a next-generation web application combining traditional Japanese abacus pedagogy with real-time bidirectional telemetry. Instructors can demonstrate calculations, monitor connected student bead movements live with 0ms latency, push synchronized quizzes, run Flash Anzan speed drills, and securely present screens without risking passcode or student privacy leaks.

## 1. Introduction & Pedagogical Foundations

The Soroban (算盤) counting frame was standardized in Japan in the 1930s into a streamlined **1:4 configuration** (1 upper Heaven bead worth 5; 4 lower Earth beads worth 1 each). This decimal base-10 design eliminated bead redundancy, providing significant computational advantages over Western base-10 counter frames and Chinese 2:5 Suanpans.

Operating a Soroban develops:

- **Dual-Hemisphere Brain Activation:** Left-brain analytical calculation coupled with right-brain visuospatial memory.
- **Direct Place-Value Concrete Modeling:** Abstract digits are converted into physical bead coordinates across units, tens, hundreds, and thousands.
- **Speed & Mental Arithmetic Transition:** Hands-on tactile muscle memory directly facilitates subsequent transition to *Anzan* (mental bead imagery).

## 2. Classroom Session Setup, Screen-Share Safe PIN & Roles

Every classroom session operates with zero friction:

- **Instant Session Launch:** Visiting <https://www.aivacado.com/abacus> automatically initializes a new Teacher Session with a unique alphanumeric Room Code (e.g., **SOROBAN-4821**).
- **Instant 0ms Teacher PIN:** A unique 4-digit passcode is generated instantaneously with zero latency upon room creation and saved locally and server-side.
- **Screen-Share Safe Masking:** When sharing your screen via Zoom, Google Meet, or Classroom Smartboards, the PIN is masked as **....** by default. You can click the Eye icon to reveal it privately or use the 1-click Copy button to share it with co-instructors.
- **Student Invite Link:** Click the copy link icon in the top header to copy the direct student joining link (<https://www.aivacado.com/abacus?room=SOROBAN-4821&role=student>).
- **Protected Role Elevation:** If a student attempts to switch to Teacher Mode, a passcode modal demands the room's secret PIN before elevation is granted. Unauthorized users are completely blocked from viewing peer rosters.

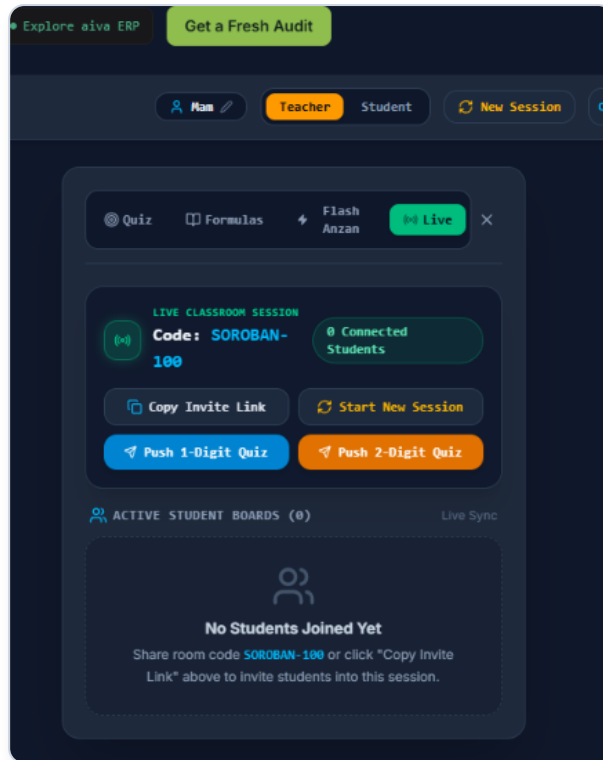


Figure 1: Teacher Dashboard Live Drawer showing active student roster, live bead values, scores, streaks, and quiz push triggers.

### 3. The Teacher Workspace & Abacus Controls

The interactive abacus workspace features comprehensive controls tailored for instruction:

- **Direct Value Input:** Type any integer or decimal into the input box to instantly set beads on the board.
- **1-Click Board Reset (Clear):** The Clear button sweeps all beads away from the reckoning beam back to zero (0).
- **Adjustable Rod Configurations:** Switch from 5 rods (elementary) up to 17 rods (advanced high-digit arithmetic). Default is the standard 13-rod frame.
- **Adjustable Unit Rod Marker:** Set any column as your ones unit rod. Column #7 is marked with a white unit dot by default.
- **Place Value Indicators:** Toggle column numeric values beneath each rod to reinforce visual reading for beginner students.
- **Visual Themes:** Choose between Classic Wood, Amber Sunset, Ocean Blue, and Modern Dark (ideal for projectors).

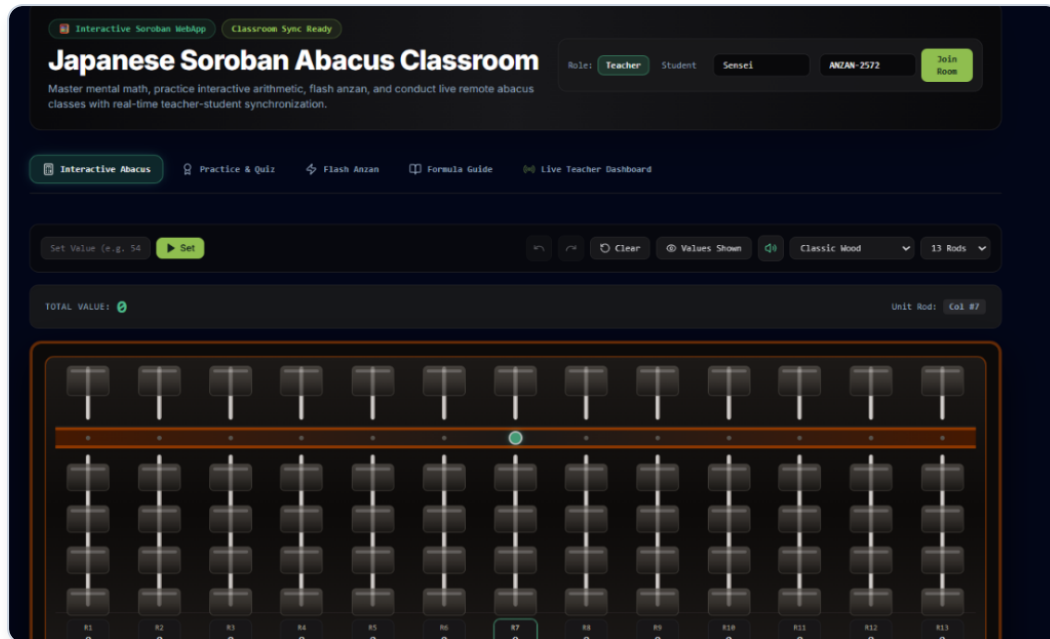


Figure 2: 13-Rod Soroban Abacus in Modern Dark theme, optimized for physical classroom projection and smartboards.

## 4. Live Classroom Management & Real-Time Telemetry

The standout capability of the Aivacado Soroban Classroom is real-time bidirectional telemetry. As a teacher, you never have to wonder if a student has set the correct beads on their screen.

- **Active Student Roster:** Open the 'Live' sidebar tab to view every connected student card. The roster displays each student's name, currently calculated abacus total, cumulative quiz score, and active answer streak.
- **Live Telemetry Polling:** Students' boards transmit state updates every time beads are moved, with a 1.5-second heartbeat fallback guaranteeing sync across mobile and incognito clients.
- **Individual Student Inspector Modal:** Click the 'Inspect' eye icon on any student's card to open an interactive 3D Soroban modal showing that student's exact live bead positions in real time. You can instantly diagnose if a student misapplied a 5-bead or forgot to clear an earth bead.
- **Live Demonstration Broadcasting:** When you demonstrate bead movements, the sync engine transmits your column configuration to all connected students so their boards mirror your instruction.

## 5. Pushing Interactive Quizzes & Challenges

Keep students engaged with instant gamified challenges pushed directly from the Teacher Live Drawer:

- **Push 1-Digit Quiz:** Broadcasts an instant single-digit challenge (e.g., 'Set 8 on the abacus') to all student screens simultaneously.
- **Push 2-Digit Quiz:** Broadcasts a two-digit challenge (e.g., 'Set 74 on the abacus') to test tens and units coordinate movements.
- **Self-Paced Practice Modes:** Students can also practice independently in three modes: 'Read the Number' (beads are shown, numeric value is masked with **? ?**), 'Set the Number' (target given, beads must be formed), and 'Mental Arithmetic' (solve equations).
- **Live Gamification:** Correct answers earn +10 points (with streak multipliers) accompanied by rewarding audio chimes. Streaks of 3 or more trigger the Fire Streak badge.

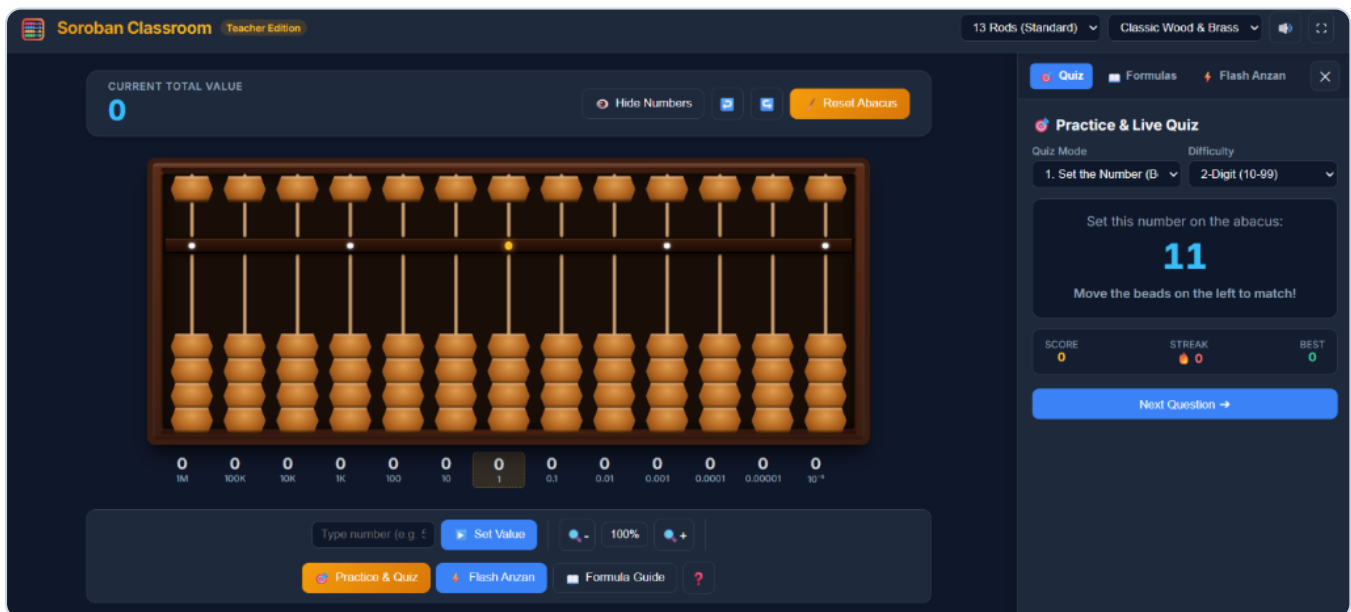


Figure 3: Practice & Live Quiz Mode showing masked answer prompt, streak counters, and real-time validation on the Soroban board.

## 6. Flash Anzan (Mental Math) Speed Drills

Flash Anzan (フラッシュ暗算) is the world-renowned Japanese technique where numbers flash on the screen at rapid intervals and students calculate the cumulative sum entirely in their head by visualizing an imaginary Soroban.

- **Digits:** Configure 1-digit (1-9), 2-digit (10-99), up to 5-digit numbers depending on student grade level.
- **Terms:** Select how many numbers flash in sequence (typically 5 for beginners, 10-15 for advanced classes).
- **Flash Interval Speed:** Adjustable from 2000ms (2.0s for young learners) down to 300ms (0.3s for rapid mental calculation).
- **Synchronized Acoustic Cues:** Each flash plays an auditory click and countdown chimes, anchoring rhythm and focus.

## 7. The Interactive Formula Guide Module

Teaching bead complements is effortless with the built-in Formula Guide. Click any formula to view the breakdown:

| Category           | Formula                 | Rule Description                                 | Interactive Demo   |
|--------------------|-------------------------|--------------------------------------------------|--------------------|
| Small Friends (+5) | <b>+4 = +5 - 1</b>      | Add 5 Heaven bead down, clear 1 Earth bead down  | 1-Click<br>Animate |
| Small Friends (+5) | <b>+3 = +5 - 2</b>      | Add 5 Heaven bead down, clear 2 Earth beads down | 1-Click<br>Animate |
| Small Friends (+5) | <b>+2 = +5 - 3</b>      | Add 5 Heaven bead down, clear 3 Earth beads down | 1-Click<br>Animate |
| Small Friends (+5) | <b>+1 = +5 - 4</b>      | Add 5 Heaven bead down, clear 4 Earth beads down | 1-Click<br>Animate |
| Big Friends (+10)  | <b>+9 = -1 + 10</b>     | Clear 1 on current rod, add 1 on Tens rod left   | 1-Click<br>Animate |
| Big Friends (+10)  | <b>+8 = -2 + 10</b>     | Clear 2 on current rod, add 1 on Tens rod left   | 1-Click<br>Animate |
| Big Friends (+10)  | <b>+7 = -3 + 10</b>     | Clear 3 on current rod, add 1 on Tens rod left   | 1-Click<br>Animate |
| Big Friends (+10)  | <b>+6 = -4 + 10</b>     | Clear 4 on current rod, add 1 on Tens rod left   | 1-Click<br>Animate |
| Mixed Complements  | <b>+6 = +1 - 5 + 10</b> | Combine 5-bead and 10-bead borrowing             | 1-Click<br>Animate |

**TEACHER TIP**

Clicking 'Demonstrate on Abacus' next to any formula automatically animates the step-by-step bead movements on the main board, allowing your students to see the physical translation of the complement rule.

## 8. Recommended Lesson Structure (45-Minute Template)

| Phase                | Time    | Activity                                         | Application Tool         |
|----------------------|---------|--------------------------------------------------|--------------------------|
| 1. Warm-Up           | 5 mins  | Visual finger dexterity drill & zeroing board    | Abacus Clear + Set Value |
| 2. Flash Anzan       | 10 mins | 5-term speed arithmetic (1-digit & 2-digit)      | Flash Anzan Module       |
| 3. New Concept       | 12 mins | Introduce a Friend formula (e.g. $+4 = +5 - 1$ ) | Formula Guide + Demo     |
| 4. Hands-On Practice | 10 mins | Students complete 'Set the Number' challenges    | Practice & Quiz Tab      |
| 5. Live Competition  | 8 mins  | Teacher pushes 1-digit and 2-digit challenges    | Push Quiz + Live Roster  |

## 9. Troubleshooting & FAQ for Teachers

**Q: A student joined but their score/value isn't showing in the roster.**

A: Have the student check their internet connection. The app polls every 1.5s; refreshing the student's tab will automatically rejoin the same room code.

**Q: The audio clack sounds are not playing.**

A: Modern browsers require an initial user click before enabling the Web Audio API. Simply clicking any bead or the sound toggle unmutes the synthesizer.

**Q: Can I use this on an interactive smartboard or projector?**

A: Yes! Click the Fullscreen button (top right) and select 'Modern Dark' theme for maximum visibility across large physical classrooms.