

# Product Requirements Document (PRD)

---

## Educational Chatbot for High School Business Classes

---

### Document Information

---

- **Version:** 2.0.3
  - **Last Updated:** September 14, 2025
  - **Project Status:** Phase 2 Complete - Production Ready with Enhanced Assessment System
  - **Next Phase:** Optional Phase 3 - Advanced Features & Integrations
- 

## 1. Executive Summary

---

### Vision

Create an AI-powered educational chatbot that facilitates dynamic warm-up and exit ticket questions for high school business classes, enabling teachers to conduct real-time formative assessments with 20-30 students simultaneously.

### Success Metrics

- Support 20-30 concurrent students per session
  - Generate contextually relevant questions with progressive difficulty
  - Provide real-time session monitoring for teachers
  - Export comprehensive assessment reports (individual .md files + consolidated CSV)
- 

## 2. Product Overview

---

### Core Value Proposition

- **For Teachers:** Streamlined session creation with structured templates, real-time student monitoring, and automated assessment generation
- **For Students:** Interactive learning experience with personalized difficulty progression and immediate feedback
- **For Schools:** Scalable assessment tool that enhances classroom engagement and provides data-driven insights

### Target Users

- **Primary:** High school business teachers (grades 9-12)
- **Secondary:** Students in business classes
- **Stakeholders:** School administrators, curriculum coordinators

---

## 3. Functional Requirements

---

### 3.1 Teacher Dashboard

- **Session Creation**
  - ✓ Structured form with mandatory concept names and learning objectives
  - ✓ Configurable session types (Pre-Assessment, Formative Check, Review Session, Unit Assessment, Final Review)
  - ✓ Assessment focus area selection (Vocabulary Understanding, Concept Application, Critical Thinking, etc.)
  - ✓ Difficulty progression settings (Gradual, Adaptive, Mixed, Fixed Level)
  - ✓ Additional context for recent activities or upcoming topics
- **Session Management**
  - ✓ Real-time participant monitoring
  - ✓ Live session statistics and progress tracking
  - ✓ Session control (start, pause, end)
  - ↻ Assessment scoring and feedback generation (Phase 2)

### 3.2 Student Interface

- **Session Participation**
  - ✓ Simple join process (name + session code)
  - ✓ Real-time chat interface with AI tutor
  - ✓ Progressive difficulty scaling (Basic → Scenario → Advanced)
  - ✓ Responsive design for various devices

### 3.3 AI Chatbot Intelligence

- **Conversation Management**
  - ✓ Context-aware responses based on session configuration
  - ✓ **UPDATED:** Concise responses (2-3 sentences for formative/review sessions)
  - ✓ Progressive difficulty adjustment based on student performance
  - ✓ Real-world business examples and scenarios
  - ✓ Age-appropriate content for high school students

### 3.4 Assessment & Reporting

- **Data Collection**
  - ✓ Complete chat log storage with timestamps
  - ✓ Question difficulty level tracking
  - ✓ Student engagement metrics
- **Report Generation** (Phase 2)
  - ↻ Individual student .md assessment files
  - ↻ Consolidated CSV reports for class analysis
  - ↻ Understanding score calculations
  - ↻ Feedback summaries

---

## 4. Technical Requirements

---

### 4.1 Performance

- ☒ Support 20-30 concurrent users per session
- ☒ Response time < 2 seconds for chat interactions
- ☒ Real-time updates for participant tracking
- ☒ Session data persistence across browser refreshes

### 4.2 Scalability

- ☒ Horizontal scaling capability through stateless design
- ☒ Database optimization for concurrent sessions
- ☒ Cloud-ready architecture for deployment

### 4.3 Data Management

- ☒ PostgreSQL database for structured data
  - ☒ JSON storage for flexible chat logs and session configurations
  - ☒ Data retention policies for student privacy
- 

## 5. User Experience Requirements

---

### 5.1 Teacher Experience

- ☒ **UPDATED:** Streamlined session creation (removed definition field, mandatory validation)
- ☒ Intuitive dashboard with clear navigation
- ☒ Real-time visibility into student progress
- ☒ Quick session setup (< 5 minutes)

### 5.2 Student Experience

- ☒ **UPDATED:** More concise chatbot responses (especially for quick assessments)
  - ☒ Simple join process (< 30 seconds)
  - ☒ Engaging conversational interface
  - ☒ Clear feedback on progress and difficulty level
- 

## 6. Constraints & Assumptions

---

### Technical Constraints

- ☒ Built on Next.js 14 with TypeScript
- ☒ Uses AbacusAI LLM API for chatbot responses
- ☒ PostgreSQL database with Prisma ORM
- ☒ Responsive web application (no native mobile apps)

### Business Constraints

- Target deployment: Educational institution networks

- Privacy compliance: Student data protection requirements
  - Usage patterns: Classroom session durations (15-45 minutes)
- 

## 7. Success Criteria

---

### Phase 1 (✅ COMPLETED)

- ✅ Core web application with teacher and student interfaces
- ✅ Real-time chatbot functionality with difficulty progression
- ✅ Session management and participant tracking
- ✅ Responsive design and error handling
- ✅ **UPDATED:** Improved UX with concise responses and mandatory field validation

### Phase 2 (✅ COMPLETED)

- ✅ Assessment scoring algorithm implementation
- ✅ Individual student report generation (.md files)
- ✅ Consolidated class reports (CSV export)
- ✅ Advanced analytics dashboard
- ✅ **CRITICAL FIX:** Session management reliability (v2.0.2)

### Phase 3 (🔄 FUTURE)

- 🔄 Integration with learning management systems
  - 🔄 Advanced AI features (sentiment analysis, learning path recommendations)
  - 🔄 Mobile application development
  - 🔄 Multi-language support
- 

## 8. Risk Mitigation

---

### Technical Risks

- **AI Response Quality:** Implemented structured prompting with session context
- **Concurrent User Load:** Stateless architecture with database optimization
- **Data Privacy:** No sensitive data collection, anonymous session participation

### Operational Risks

- **Teacher Adoption:** Intuitive interface design and comprehensive documentation
  - **Student Engagement:** Progressive difficulty and real-world business scenarios
  - **Technical Support:** Clear error messages and fallback mechanisms
- 

## 9. Recent Updates

---

### Version 2.0.2 (September 14, 2025) - Critical Production Fix

- **RESOLVED: Session Stopping Failure:** Fixed critical bug preventing teachers from properly ending sessions

- **Enhanced System Reliability:** Improved error handling and database transaction management
- **Production Ready:** System now fully stable for classroom deployment

## Version 2.0.1 (September 14, 2025) - Assessment & Reporting Complete

- **Assessment Scoring Engine:** Full implementation of understanding score calculations
- **Report Generation:** Individual student .md files and consolidated CSV exports
- **Time Tracking:** Complete session duration tracking and "Leave Session" functionality
- **Analytics Dashboard:** Comprehensive performance metrics and reporting

## Version 1.1 (September 14, 2025)

- **Chatbot Response Optimization:** Reduced wordiness, especially for formative assessments and review sessions
  - **Form Simplification:** Removed definition field from concept creation
  - **Mandatory Field Validation:** Enhanced validation for concept names and learning objectives
  - **UI Improvements:** Clear indication of required fields with asterisk (\*) markers
- 

## Appendix

---

### Business Concepts Supported

- Marketing (segmentation, targeting, positioning)
- Finance (budgeting, cash flow, investment analysis)
- Operations (supply chain, quality management)
- Entrepreneurship (business planning, market research)
- Ethics and Social responsibility

### Assessment Focus Areas

- Vocabulary Understanding
- Concept Application
- Critical Thinking
- Problem Solving
- Case Study Analysis
- Real-world Connections