

Solution Requirements (Functional & Non-functional)

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Project Name: SmartTeach AI

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Authentication System	- User registration with secure password hashing - User login with credential validation - Session management with encrypted cookies - Logout functionality with session cleanup
FR-2	AI-Powered Chat Assistant	- Natural language query processing - Context-aware response generation using uploaded documents - Integration with IBM WatsonX API - Chat history storage and retrieval
FR-3	Dynamic Quiz Generation	- Topic-based quiz creation - Multiple difficulty levels (Easy, Medium, Hard) - Real-time scoring and feedback - Quiz history tracking and analytics
FR-4	File Processing System	- PDF text extraction using PyMuPDF - OCR processing for images using Tesseract - Context integration with AI responses - Support for multiple file formats (PDF, JPG, PNG)
FR-5	Progress Tracking Dashboard	- Performance visualization and analytics - Historical data tracking and trends - Quiz performance metrics - Learning progress insights
FR-6	Resource Finder	- Educational resource discovery - Content recommendations based on queries - External resource linking - Subject-specific resource categorization
FR-7	User Profile Management	- Personal information management - Learning preferences configuration - Account settings and customization - Data export capabilities
FR-8	Content Management	- Document upload and storage - File organization and categorization - Content versioning and updates - Bulk file processing

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

NFR No.	Non-Functional Requirement	Description
NFR-1	Usability	- Intuitive user interface with minimal learning curve - Responsive design for various devices and screen sizes - Clear navigation and user workflow - Accessibility compliance for users with disabilities - Multi-language support (future scope)
NFR-2	Security	- Secure password hashing using SHA-256 - Encrypted session management - Input validation and sanitization to prevent injection attacks - API key protection and secure configuration - Data privacy compliance (GDPR ready) - Secure file upload with validation
NFR-3	Reliability	- 99.9% system uptime availability - Robust error handling and graceful failure recovery - Data consistency and integrity maintenance - Automatic backup and recovery mechanisms - System monitoring and health checks
NFR-4	Performance	- AI response time under 3 seconds - PDF processing under 5 seconds for 50-page documents - Memory usage optimization (<500MB average) - Efficient database query response time (<100ms) - Optimized resource utilization and caching
NFR-5	Availability	- 24/7 system accessibility - Load balancing for high traffic periods - Failover mechanisms for critical components - Scheduled maintenance with minimal downtime - Geographic distribution readiness (future scope)
NFR-6	Scalability	- Support for 100+ concurrent users - Horizontal scaling capabilities - Modular architecture for easy feature additions - API rate limiting and throttling - Database optimization for large datasets - Auto-scaling infrastructure support
NFR-7	Maintainability	- Clean, modular code architecture - Comprehensive documentation and comments - Version control and change management - Automated testing and continuous integration - Code quality standards and best practices
NFR-8	Compatibility	- Cross-browser compatibility (Chrome, Firefox, Safari, Edge) - Mobile device responsiveness - API versioning for backward compatibility - Integration readiness with

NFR No.	Non-Functional Requirement	Description
		external systems - Standards compliance (HTML5, CSS3, REST APIs)

Acceptance Criteria:

- All functional requirements must pass end-to-end testing
- Performance benchmarks must be met under load testing
- Security vulnerabilities must be below acceptable threshold
- User acceptance testing must achieve 90%+ satisfaction rate
- System must handle peak load of 100 concurrent users without degradation