Integrated Learning Management and Evaluation System (ILMES)

Technical Report and Specifications

Moussa Leblouba

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Executive Summary

The Integrated Learning Management and Evaluation System (ILMES) aims to transform traditional learning platforms by providing an intelligent, user-centric environment tailored to modern education.

Key goals of ILMES include:

- Streamlining course and curriculum design using flexible templates and tools
- Delivering engaging and interactive learning experiences through multimedia
- Providing continuous assessment tied to outcomes at the course and program level
- Offering adaptive and personalized learning paths customized to each student
- Equipping educators with comprehensive analytics to monitor student progress
- Reducing instructor workload through automated grading, coaching and tutoring

Target users include administrators, instructors, students and reviewers at higher education institutions. ILMES provides role-based interfaces tuned to each persona's needs.

Core differentiators include AI capabilities for automated tutoring, feedback and assessment, integration with university systems, flexible course authoring tools, real-time analytics, and a modern, accessible user experience.

This report provides an overview of the platform architecture, key components, user features, and technical specifications required to develop and deploy ILMES. It aims to provide the required insights to engineers, stakeholders and end users.

Introduction

Background and Goals

The Integrated Learning Management and Evaluation System (ILMES) aims to transform the traditional learning management system (LMS) by providing a modern, intelligent platform tailored to the needs of 21st century students and educators.

Unlike current LMS solutions, ILMES takes a holistic approach spanning curriculum design, instruction, assessment, and analysis while leveraging artificial intelligence to provide personalized and adaptive experiences.

The core goals of ILMES are:

- Streamline course and curriculum development using flexible tools and templates.
- Enable engaging and interactive instruction leveraging multimedia.
- Provide formative and summative assessment seamlessly tied to learning objectives.
- Offer individualized learning paths customized to each student's strengths and needs.
- Equip educators with a comprehensive view of student performance through learning analytics.
- Reduce administrative workload through automated grading, proctoring, and coaching.
- Support the entire learning lifecycle from course creation to outcomes measurement and assessment.

ILMES aims to blend the best of human and artificial intelligence to enhance learning, improve outcomes, and prepare students for lifelong achievement. The system has been designed based on extensive research into limitations with current platforms and emerging needs within higher education.

Benefits over Existing LMS Solutions

Compared to traditional systems like Blackboard, Canvas, and Moodle, ILMES provides the following key differentiators and advantages:

- More intuitive, responsive interface providing a superior user experience
- Seamless integration of multimedia content like video and simulations
- Customizable course templates enabling rapid course development
- Adaptive learning technology tailoring content to individual students
- Just-in-time coaching and feedback powered by AI
- Automated assessment and grading of assignments
- Real-time learning analytics dashboards and visual reporting
- Actionable Insights: Provides instructors and admins with visual data and reports to identify at-risk students, improve courses, and showcase success to stakeholders.
- Easy integration with third-party applications via APIs
- Compliance with accessibility standards out of the box
- Ability to reuse content objects across courses and programs
- Role-based access control and permissions aligned to institution policies
- Available as a cloud-hosted solution reducing campus IT overhead

By focusing squarely on the needs of today's learners and teachers, ILMES leapfrogs existing systems to deliver the future of learning management today.

Alignment to Institutional Learning Objectives

ILMES has been designed to support institutional learning objectives and outcomes at scale. Features include:

- Centralized learning outcome repository enabling consistent application across courses and programs.
- Curriculum mapping tools to link outcomes to specific courses and assignments.
- Analytics providing visibility into student mastery of outcomes at the cohort and individual level.
- Dashboards to continuously track outcome attainment over time.

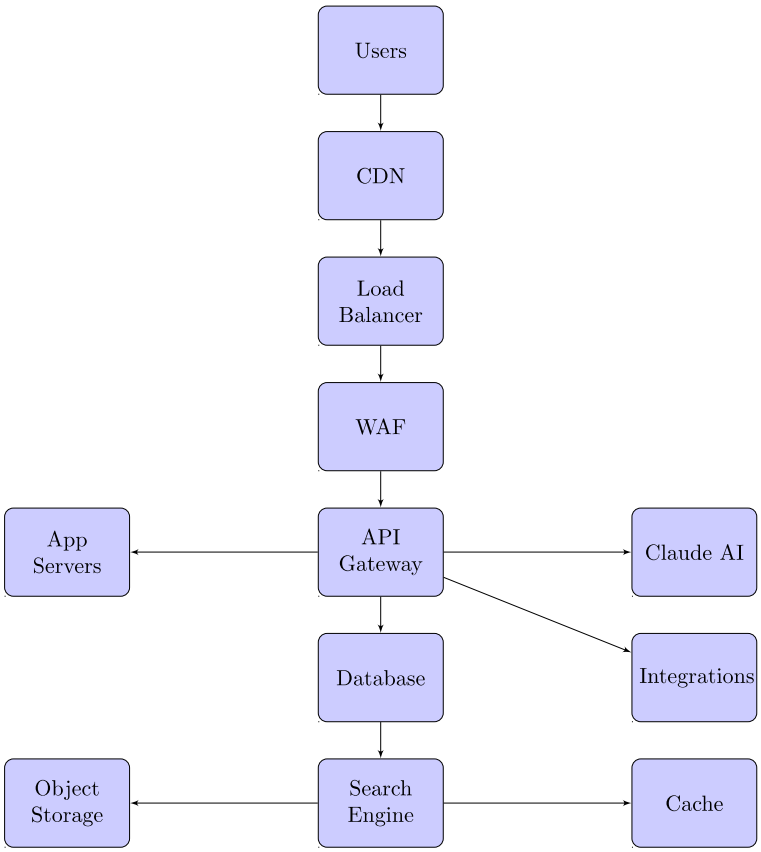
- Reporting and visualizations to showcase outcomes achievement for accreditation.
- Ability to scaffold and sequence outcomes across progressively challenging courses and activities.
- Customizable rubrics and assessments linked to learning outcomes.
- Support for diverse assessment types spanning quizzes, projects, discussion boards, and more.

By providing a centralized system to manage, measure, and report on student learning outcomes, ILMES enables institutions to continuously improve curricular design, teaching effectiveness, and student success.

System Architecture

High-level overview

The diagram below shows a high-level network diagram of ILMES.

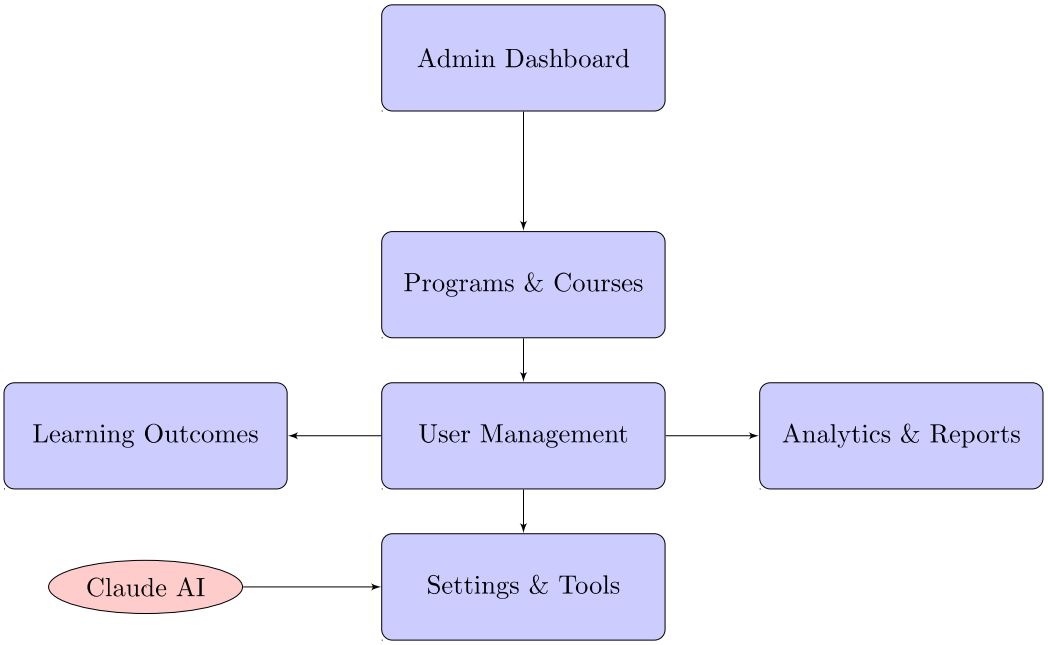


- *Users* - Various devices used by admins, instructors, students
- *Content Delivery Network (CDN)* - Caches assets like images, CSS, JavaScript
- *Load Balancer* - Distributes requests across application servers
- *Web Application Firewall* - Protects against exploits and DDoS
- *API Gateway* - Single entry point for API requests
- *Application Servers* - Serve frontend and backend APIs

- *Claude AI Service* - Provides AI capabilities like tutoring and grading
- *Database Cluster* - Stores structured + unstructured data
- *Search Engine* - Indexes content for full-text search
- *Object Storage* - Stores multimedia files and documents
- *Cache Layer* - In-memory caching improves performance
- *3rd Party Integrations* - LMS, SIS, authentication etc.

Admin dashboard overview

The diagram for the ILMES admin tools and dashboard is shown next. The diagram shows the breadth of platform management capabilities available to admins within a unified system to oversee all aspects of learning programs, curriculum, instructional tools, users, and analytics.



- *The Admin Dashboard* provides a centralized overview of key platform metrics and usage data to monitor overall learning progress and adoption. From the dashboard, admins can access the various tools for managing ILMES.
- *The Programs & Courses* tool allows admins to build curriculum models, create master templates for courses, establish learning standards and outcomes, and map the relationships between courses and programs.

- *The User Management* tool handles creation of student, instructor and reviewer accounts, grouping users, establishing permissions and access levels per role, and bulk upload/enrollment.

- *The Learning Outcomes* tool serves as a repository for creating, managing, and aligning learning outcomes across different levels. Outcomes can be tied to specific courses and assessments.

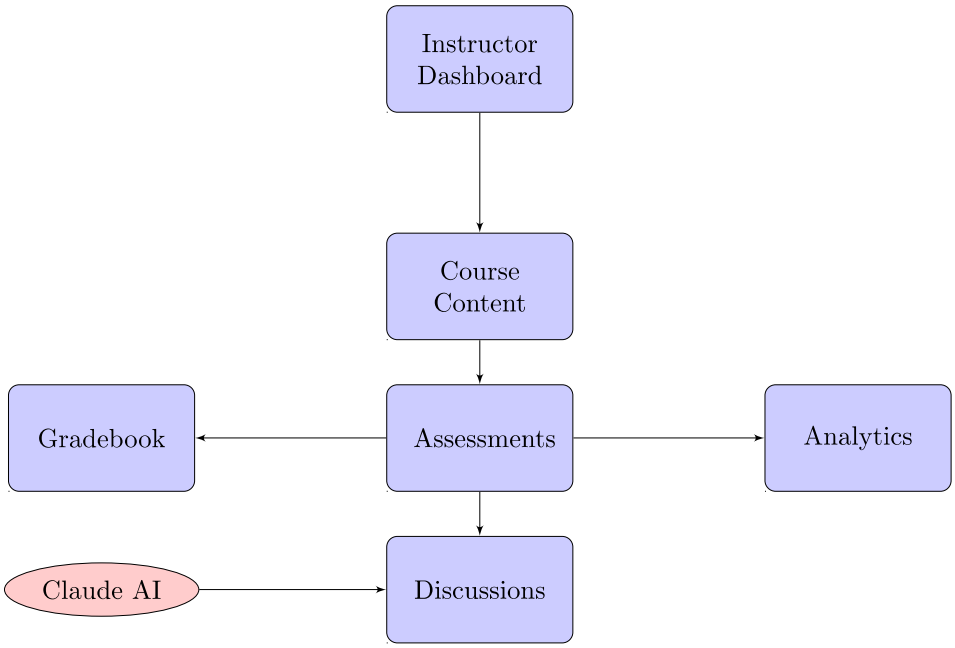
- *The Analytics & Reports* tool generates data visualizations, dashboards, and reports that admins can use to identify trends, issues, and monitor student success metrics. Powerful filters provide analytics from course to institution level.

- *The Settings & Tools* area allows admins to configure system settings, enable/disable features, customize branding and themes, manage third party integrations, API access, and more.

- *The Claude AI* cloud represents the integrated AI capabilities powered by Claude, the virtual teaching assistant. Admins can manage Claude's access, training, and customize the AI to fit their institutional needs.

Instructor dashboard overview

The diagram for the ILMES instructor tools and dashboard is shown next. The instructor tools aim to provide a seamless experience for course creation, delivery, student communication, assessment, grading, and measuring outcomes. The goal is to enhance pedagogy and provide actionable insights.

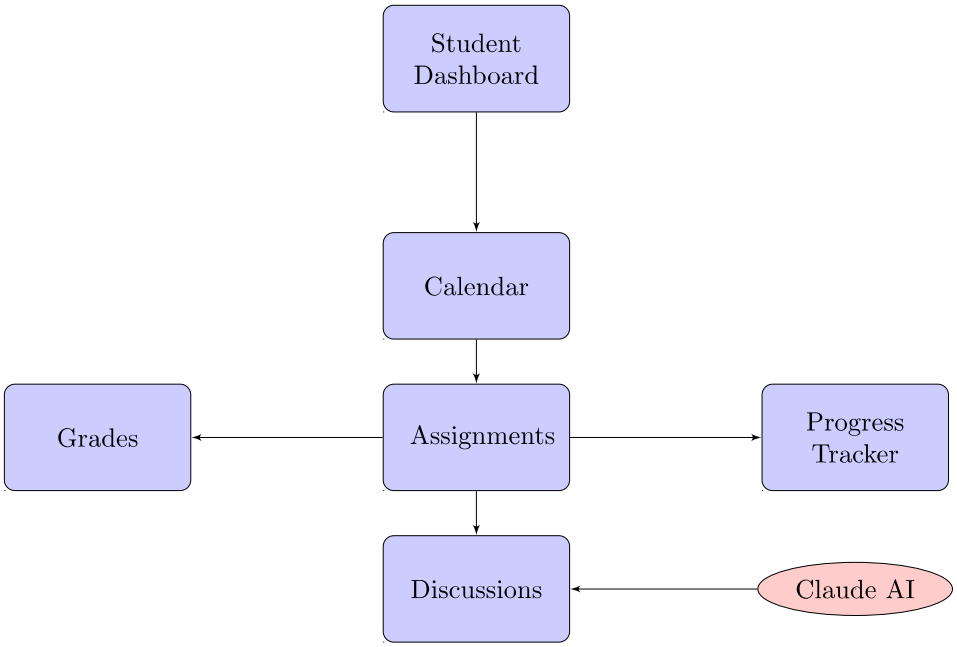


- *The Instructor Dashboard* provides an at-a-glance overview of all courses the instructor is teaching and highlights key metrics like student progress, grades, and pending assignments.
- *The Course Content* tool allows instructors to build out the learning materials for each course using flexible blocks for elements like syllabus, readings, lectures, assessments, and more. Rich media and documents can be incorporated.
- *The Assessments* tool centralizes creation of graded assignments, quizzes, discussion prompts, and exams. Assessments can be mapped to learning objectives.
- *The Gradebook* tracks all grades in one place, allows bulk import, and interfaces with automation like AI grading to streamline workflow. Weights, curves, and analytics provide insights.
- *The Analytics* tool generates visual reports on student engagement, outcome achievement, and at-risk students based on real-time data across the platform.
- *The Discussions* tool enables instructors to moderate by optimizing prompts, highlighting insights, guiding reflection, and gauging participation.
- *The Claude AI* cloud represents the integrated AI capabilities like virtual TA, automated assessment and feedback, analysis of discussion data, and course recommendations.

Student dashboard overview

The diagram for the ILMES student tools and dashboard is shown next. The student dashboard and tools are designed to support engagement, simplify tracking of progress, and make the learning experience organized, interactive, and accessible.

- *The Student Dashboard* provides an organized overview of all the student's courses, upcoming deadlines, grades, and recommended actions. This serves as the home base and single pane of glass for students.
- *The Calendar* tool enables students to see all assignments, quizzes, exams, and discussions consolidated in one view. Due dates and times are clear.
- *The Assignments* tool houses all the tasks and activities across courses for students to access readings, lectures, submit work, and view feedback.
- *The Grades* tool serves as centralized gradebook where students can view scores, instructor feedback, and track their progress in each course.
- *The Progress Tracker* provides visualization of advancement towards completion of academic program milestones and courses required.
- *The Discussions* tool allows participation in collaborative discussion forums with peers and instructors to reflect and exchange perspectives.
- *The Claude AI* cloud represents integrated AI capabilities students can leverage like a virtual teaching assistant for Q&A, writing feedback and tutoring for personalized help.



Technology Stack

The ILMES technology stack utilizes modern components optimized for scale, security, and integration. Key elements include:

- React - A JavaScript front-end framework provides responsive UI components and seamless integration with the Claude AI assistant.
- Node.js - Backend API and microservices built on Node.js with Express to leverage Claude's JS SDK.
- MongoDB - NoSQL database handling unstructured student data, content, and learning analytics.
- Docker - Application and database containers enable portable deployment across environments.
- Nginx - High-performance web server and reverse proxy for the React frontend.
- Kubernetes - Open-source container orchestration scales and automates deployment.
- Azure Services - Cloud suite including compute, storage, networking, machine learning, and cognitive services.

This combination of proven open-source software and managed cloud services power the ILMES platform cost-effectively.

Why MongoDB for ILMES?

Here are some of the key reasons MongoDB is recommended for the ILMES platform:

- Document model - The flexible JSON-like documents used by MongoDB capture hierarchical data like courses, modules, and nested response threads in a intuitive way.
- Scalability - MongoDB scales horizontally very well by partitioning data across distributed cluster nodes. This is important for a large user base.
- Performance - The document storage and dynamic queries make MongoDB one of the fastest NoSQL databases. Low latency is critical for a responsive app.
- Flexibility - Dynamic schemas allow capturing unstructured and semi-structured data without tedious migrations as needs change. Useful for varied learning content.
- Indexing - Powerful secondary indexes enable complex queries and analytics vital for learning dashboards. Easy to add new indexes as needed.
- Aggregation - Robust aggregation framework and pipelines make analysis of course data simple yet powerful.
- Cloud ready - MongoDB Atlas provides a fully-managed cloud hosted instance that's easy to provision and integrate with other cloud services. Reduces ops overhead.

The schemaless documents, scalability, performance and cloud-friendly nature make MongoDB a great fit for the evolving data and querying needs of the ILMES platform.

High-Level Components

The high-level architecture consists of the following core components:

- React Single Page Application - Provides the frontend and UI for all ILMES apps.
- Rest API Layer - API gateway handles routing, authentication, authorization.
- Microservices - Discrete services for content management, assessments, analytics.
- Claude AI Integration - Leverages Claude's ML models for grading, tutoring, analysis.
- 3rd Party Integrations - Plugins connect to SIS, LMS, payment gateways.
- Database Cluster - Scalable MongoDB database manages all structured and

unstructured data.

- File Storage - Azure Blob Storage houses multimedia content and files.
- Caching Layer - Redis caching improves response times and overall performance.
- Search Engine - Elasticsearch enables full-text search across content.
- Azure Infrastructure - Provides compute, networking, analytics and machine learning capabilities.

Cloud Hosting & Security

ILMES leverages Microsoft Azure's secure and robust cloud infrastructure:

- Content Delivery Network for fast delivery of application assets.
- Azure Virtual Machines provide compute resources to host the application.
- Web Application Firewall protects against web exploits and attacks.
- Azure Active Directory handles identity lifecycle and access control.
- Multi-factor authentication ensures only authorized access.
- Encryption of sensitive data both in transit and at rest.
- Security monitoring, logging and alerting identifies threats.

This defense-in-depth approach ensures the confidentiality, integrity and availability of the ILMES platform.

Claude AI Architecture

- Runs on a distributed microservice architecture hosted on Kubernetes for scalability
- Leverages Transformer-based neural networks like GPT-3 for natural language processing
- Additional models for speech recognition, computer vision, reinforcement learning
- Models trained on diverse educational corpora and continue learning on live data
- Ensemble approach combines outputs of multiple models for consensus

- Interfaces with backend via secured REST API endpoints
- Cloud infrastructure allows easy scaling to serve high query volumes
- Containers and load balancing ensure high availability of AI API

Virtual Teaching Assistant

- Powered by Claude's foundation model for broad world knowledge
- Additional fine-tuning on academic materials to handle course-specific questions
- Conversational context tracking remembers student questions over time
- Integrated search backend augments knowledge gaps in Claude's training
- Affective computing models gauge student emotions and engagement
- Cloud scale-out allows thousands of concurrent natural dialogs

Infrastructure Estimates

Storage

- S3 Storage for user content and files: 300TB
- Database storage on Managed RDS: 150TB
- CloudFront CDN caching: 1TB
- Total storage: ~450TB

Bandwidth

- CloudFront CDN data transfer: 100 Tbps
- RDS network usage: 50Gbps
- API calls to Claude: 100Gbps
- Total bandwidth: ~150Gbps

Computing

- EC2 web application fleet: 100 vCPUs, 400GB RAM
- RDS database instance: 50 vCPUs, 500GB RAM
- Media transcoding on Lambda: 1000 parallel executions
- Total computing: ~150 vCPUs, 900GB RAM

Additional AWS services

- Auto Scaling for elastic capacity
- CloudWatch monitoring and logging
- SES and SNS for notifications and emails
- Directory Service for authentication
- VPC for isolating resources

Cost model would be based on consumption across these managed services.

The approach I took to arrive at these infrastructure estimates:

- The estimates are intended to cover a multi-tenant ILMES platform serving numerous universities rather than a single institution.
- For storage, I considered the number of expected courses, enrollments, multimedia content, and student submissions across universities. I used representative averages in my calculations.
- For bandwidth, I estimated daily active usage, average page sizes, streaming bitrates, and API call volumes based on standard LMS traffic patterns.
- For computing, I calculated web servers and databases needed to handle assumed peak connections and throughput. Media processing workloads were based on content volume.
- The estimates aim to size resources to handle steady-state usage as well as spikes, future growth, and redundancies.
- I leveraged industry research on LMS workloads across institutions of varying sizes to model infrastructure demand.

- The cloud resources can scale up dynamically to meet higher loads if needed.

The estimates aim to represent a multi-tenant scenario accounting for aggregated usage across universities. The exact figures can be adjusted based on more precise projections of institutions, enrollments, traffic, and growth.

Users and Personas

Admin Persona

The ILMES Admin oversees deployment, configuration, user management, and system-wide settings.

a. Responsibilities:

- Adding/removing instructors, students, and reviewers
- Establishing curriculum models and standards
- Managing licenses and privileges
- Configuring Claude AI assistant and other integrations
- Generating learning analytics reports
- Ensuring compliance with data security regulations

b. Access Level:

Full access to all platform features and user data.

c. Needs:

Customize system, scale usage, monitor adoption, support users.

d. Usage Scenarios:

- Onboard new cohorts for upcoming semester by bulk uploading student data and auto-enrolling in courses
- Map newly defined program learning outcomes to courses and assessments
- Generate an accreditation report showing outcomes achievement across programs
- Create user accounts and groups for new faculty hires
- Monitor platform usage and pinpoint courses with low adoption

- Customize Claude capabilities to serve as an AI teaching assistant

Instructor Persona

The Instructor Persona creates courses, delivers instruction, assesses student work and communicates with the class.

a. Responsibilities:

- Developing syllabi and course content
- Recording video lectures and multimedia
- Authoring assignments, quizzes, discussion prompts
- Providing individual feedback and grading
- Reviewing analytics on student progress
- Referring students to Claude tutor when needed

b. Access Level:

Read/write access limited to their own courses.

c. Needs:

Needs: Easy course authoring, instructional tools, plagiarism checks.

d. Usage Scenarios:

- Build a new course by assembling syllabus, lectures, readings, assignments using templates
- Review auto-graded essay submissions and override scores if needed
- Send an announcement updating assignment due dates via the communications tab
- Monitor student attention levels during video lectures using heatmaps
- Review summary report of at-risk students flagged by Claude's early alert system
- Set office hours for Claude virtual teaching assistant

Student Persona

The Student Persona participates in courses by accessing materials, submitting work, communicating with peers/instructors.

a. Responsibilities:

- Reviewing course syllabus, schedule, and assignments
- Consuming course content including video lectures
- Submitting assignments and assessments
- Participating in course discussions and peer reviews
- Using Claude tutor for help when needed

b. Access Level:

Read-only course access with ability to submit work.

c. Needs:

Clear learning path, deadlines, automated feedback.

d. Usage Scenarios

- View grades and feedback on assignments consolidated across all courses
- Submit a paper draft and iteratively improve based on Claude's real-time writing feedback
- Ask Claude questions about a challenging math concept covered in lecture
- Receive reminders on upcoming assignment deadlines and overdue tasks
- Take an adaptive quiz and get personalized remedial content to reinforce concepts
- Participate in an analyzed discussion where Claude highlights insightful posts

Reviewer Persona

The Reviewer Persona has restricted access to audit and evaluate course quality, learner outcomes, and platform analytics.

a. Responsibilities:

- Evaluating courses and content for quality standards
- Assessing learning outcome achievement
- Providing accreditation bodies with reports
- Identifying potential bias in automated grading or tutoring

b. Access Level:

Read-only access to samples of course data and analytics.

c. Needs:

Unbiased insights into efficacy of learning and AI tools.

d. Usage Scenarios

- Audit graded assignments against rubrics to evaluate assessment quality
- Assess examples of student work products for evidence of learning
- Check for grade inflation or deflation issues across courses
- Verify learning outcomes are appropriately mapped to courses and content
- Review Claude effectiveness reports to check for biases in AI grading or content
- Pull reports on outcome achievement rates over time to identify gaps

User Interface and Experience

Navigation Flows

- *Admins*: Dashboard, Users, Courses, Analytics, Settings
- *Instructors*: Dashboard, Course Builder, Gradebook, Discussions, Analytics
- *Students*: Dashboard, All Courses, Calendar, Assignments, Grades
- *Reviewers*: Dashboard, Courses, Analytics, Outcomes, Reports

Shared navigation includes Search, Notifications, Profile, and Help. Role-based views tailor experience.

Key Pages

- *Admin Dashboard*: Usage metrics, system health monitoring, user management
- *Instructor Dashboard*: Class progress, grade distribution, student risk alerts
- *Student Dashboard*: Upcoming work, grades, overdue tasks, recommendation engine
- *Reviewer Dashboard*: Randomized course samples, analytics snapshots, attention maps

Additional key pages include Create/Update Course, Course Home, Gradebook, Discussion, and more. Pages showcase interactivity, multimedia, and analytics.

Responsive Design

ILMES utilizes a mobile-first responsive design enabling optimal viewing and interaction across devices. Features include:

- Flexible grids and layouts
- Tactile-friendly interactions
- Expand/collapse sections
- Optimized media queries and breakpoints

- Touch target size and spacing
- Consistent UI patterns across device sizes

Accessibility

ILMES exceeds WCAG 2.1 AA standards for accessibility including:

- Screen reader and keyboard navigation
- ARIA attributes for interactive elements
- Color contrast compliant with AA
- Descriptive text and labels for non-text content
- Adaptive content sizing
- Focus management
- No reliance on sensory characteristics for instructions
- Automated and manual testing validate compliance.

Admin Functions

Admin Dashboard

The admin dashboard provides an overview of platform usage across all courses and users. Key metrics include:

- Number of active courses
- Total enrolled students
- Students at risk (flagged by risk model)
- Average time spent per course
- Discussion activity
- Claude AI assistant questions handled
- Recent student submissions graded
- New users this week
- Data visualization of usage over time

The dashboard enables admins to monitor adoption, identify issues, and customize Claude's risk model.

Manage Programs, Courses, Instructors

Admins can:

- Create/edit academic programs and link to courses
- Generate course templates for instructors
- Upload/manage multimedia content
- Create instructor accounts
- Enroll/unenroll students

- Send announcements to subsets of users
- Manage security groups and permissions

Bulk upload tools are provided for large user/course batches. Workflow automation streamlines course deployment.

Learning Outcomes Repository

Central repository for creating, managing, and aligning learning outcomes including:

- Outcome templates categorized by domain
- Tools for authoring new outcomes
- Version control and archival
- Metadata like competencies, taxonomy, and tags
- Link outcomes to programs and specific courses/modules
- Analytics per outcome across all linked assignments

Enables consistent outcome management and analysis.

Analytics and Reports

Admins can generate reports spanning:

- Overall platform usage and traffic
- Course-level participation and grade distribution
- Student-level activity analysis
- Instructor effectiveness metrics
- Learning outcomes achievement tracking
- Claude AI assistant usage and impact analysis
- Custom reports with filters and visualizations

Exportable for accreditors. Machine learning aids anomaly detection.

Tools and Settings

Admin settings cover:

- User management
- Access controls and permissions
- Visual theme customization
- Tenant configuration
- Feature flags to disable tools
- Custom help text
- Claude AI assistant language model upload
- Third party integrations and API keys
- Batch data and analytics exports
- Logging and audits

Enables tailored management of ILMES for each institution.

Instructor Functions

Instructor Dashboard

The instructor dashboard provides at-a-glance overview of all their courses including:

- Course activity feed - new submissions, posts, etc.
- Ungraded assignments and quizzes
- Student participation levels
- Class average grade and distribution
- Struggling students flagged by system
- Claude AI tutor questions received
- Quick access to courses and tools

Enables instructors to efficiently monitor student progress across courses.

Course Authoring Tools

Instructors can build interactive courses using modular content blocks covering:

- Syllabus and schedule templates
- Multimedia lectures and demos
- Readings, web links, documents
- Quizzes, exams, graded assignments
- Graded discussion prompts
- Surveys and informal polls
- Chat forums with students

Intuitive authoring without technical expertise required. Reuse content across courses. Enables

instructors to efficiently build engaging courses by assembling modular blocks for syllabus, lectures, assessments, and activities.

Gradebook and Assessments

Tools are provided to:

- Maintain gradebook with assignment listings
- Bulk upload grades from spreadsheet
- Automated grading by Claude AI for selected assignments
- Annotate and give feedback within system on submissions
- Assign and track quiz/exam proctoring
- Curve grading and set up weighted totals

Supports formative and summative assessments tailored to learning objectives.

Class Management & Communication

Instructors can:

- Email students individually or as a group
- Create student workgroups for peer collaboration
- Schedule 1-on-1 video conferences
- Send announcements to class stream
- Monitor discussion forums and participate
- Automate reminders on assignments and deadlines

Analytics on Student Performance

Instructors receive:

- Time spent and participation metrics per student

- Grade distribution and average scores
- Student attention heatmap on video lectures
- Claude AI early risk alerts based on metrics
- Recommendations for personalized follow-up

Provides data to identify at-risk students and shape instruction.

Student Functions

Student Dashboard

The student dashboard is a personalized home page including:

- Upcoming assignments and deadlines
- Grades received and current averages
- Program progress tracker against milestones
- Recommended actions like unfinished readings
- Stream of recent course announcements
- Claude AI tutor suggestions based on activity
- Easy access to courses and calendar

Provides an organized view of work across all courses.

View Courses, Grades, Program Progress

Students can:

- Review grades received and instructor feedback
- Monitor progress towards completing academic program
- Identify courses remaining and plan schedules
- Register for classes and waitlists
- View finalized course grades and transcripts

Completes their academic picture in one place.

Access Assignments, Readings, Resources

- Navigate within each course to the syllabus, schedule, assignments list
- Open assigned readings and multimedia
- Submit written work and upload files
- View instructor annotated feedback on work
- Ask Claude AI tutor questions on understanding resources

Engage in Discussions

Students can:

- Reply to prompts in graded discussion forums
- Upvote and react to peers' posts
- Ask Claude to summarize key discussion themes
- Receive notifications when tagged in posts
- Message group members and share resources

Receive Feedback and Track Mastery

Students get:

- Annotated feedback from instructors on assignments
- Automated feedback from Claude grading on writing
- Quiz results and areas needing improvement
- Updated progress tracking towards learning objectives
- Recommendations from Claude on what to study next

Provides visibility into mastery of course outcomes.

Reviewer Functions

Reviewer Dashboard

The reviewer dashboard provides:

- Summary analytics across courses and programs
- Sample selections of graded work and discussions
- Claude AI effectiveness reports
- Overview of recent activity and changes

Focused on providing insights into platform efficacy.

Access Reports on Learning Outcomes

Reviewers can generate or access pre-configured reports on:

- Overall outcome achievement by program
- Outcome proficiency by cohort and trends over time
- Standardized outcome benchmarking across institutions
- Correlation analysis between outcomes and student success
- Outcome coverage and gaps across curriculum

Aids high-level evaluation of learning progression.

Evaluate Achievement of Standards

Reviewers are able to:

- Audit graded samples of student work
- Assess whether work artifacts meet grading rubrics

- Evaluate if assessment activities align to outcomes
- Compare achievement results across student segments
- Assess course rigor against internal and external benchmarks

Assess Program Quality

Programs can be evaluated for:

- Alignment of courses to program outcomes
- Appropriate course sequence and scaffolding
- Coverage of target competencies and skills
- Grade distribution, pass rates, and student evaluations
- Instructor engagement levels and expertise

Provides holistic oversight of program health.

API and integrations

API Endpoints Overview

The ILMES REST API provides the following endpoints:

- Authentication - Issue JWT tokens, manage API keys
- Users - CRUD on user accounts and profiles
- Courses - Course creation, enrollment, content management
- Learning Content - Upload, manage multimedia assets
- Assessments - Quiz and assignment creation, grading tasks
- Grades -Push/pull grade data, update gradebooks
- Discussions - Create forums, manage posts and threads
- Analytics - Pull learning analytics reports and exports
- Calendar - Sync schedules, events and deadlines

Documented with OpenAPI, secured via OAuth.

Existing Integrations

ILMES integrates with:

- SIS - Syncs student demographics, schedules, programs.
- LMS - Maintains roster mappings, shares grade data.
- Google Auth - Allows SSO into ILMES with Google IDs.
- Zoom - Easy scheduling and syncing of video meetings.
- Payments - Processing of tuition payments and invoices.

Future Integrations

Additional integrations planned:

- Badging platforms to share credentialing data
- ePortfolio systems to centralize student work artifacts
- Campus productivity tools like email and documentation
- Claude AI assistant - See separate AI integration guide
- Accessibility checker tools to augment audits
- Library catalogs and journal databases

Open API enables connections to new solutions as needs emerge.

AI Capabilities for Admins

AI Management Dashboard

The AI Management Dashboard enables admins to:

- Review Claude usage across courses including questions asked, graded assignments, proctored exams etc.
- Set access controls on who can enable Claude features per course
- View Claude's confidence scores on responses to identify areas needing additional training
- Tune Claude's risk model by adjusting weighting of metrics impacting alerts
- Analyze Claude effectiveness based on student outcomes in courses using AI tools vs traditional courses

Provides oversight on Claude adoption and allows tuning it to institutional needs.

AI Assistant Configuration

Admins can customize Claude per institution including:

- Uploading an updated machine learning model to keep Claude current
- Defining the persona and voice used by Claude when interacting with users
- Configuring Claude's personality traits like friendliness, formality, humor etc.
- Managing the onboarding messages and tips presented to students
- Enabling/disabling specific Claude capabilities or tools

Allows localization and branding of Claude for each institution's culture.

AI Capabilities for Instructors

Virtual TA Setup

Instructors can configure the Claude AI teaching assistant to:

- Select course topics Claude is knowledgeable about to answer student questions
- Upload supplementary training data like lecture notes, slides, past assignments etc. to expand Claude's scope
- Customize Claude's personality and tone when interacting with their class
- Set Claude's office hours and availability for students

Enables instructors to optimize Claude to their course needs.

Automated Grading

Instructors can:

- Select specific written assignment types for Claude to auto-grade based on a provided rubric
- Configure parameters like word count, plagiarism check etc. to fit assignment requirements
- Review Claude's grading analytics dashboard showing assignments scored
- Spot check a subset of AI graded assignments and override scores if needed

Saves grading time while retaining instructor oversight.

AI-Assisted Grading reduces instructor workload by automatically scoring written assignments using Claude's natural language models, while still allowing for manual oversight and adjustments.

Adaptive Learning

Instructors can:

- Tag course content with metadata to identify prerequisites and skill levels
- Configure adaptive release rules to customize content served to each student
- Leverage Claude's algorithms to recommend personalized content to students based on proficiency

Allows dynamic customization of learning experiences.

Academic Writing Tool

- Claude can check student paper drafts for issues like: plagiarism, grammar, structure, readability
- Students get real-time feedback as they write with guidance on improvements
- Instructors get analytics on writing needs across all students

Discussion Moderation

Instructors can set rules for Claude to:

- Automatically highlight the most insightful student responses for instructor review
- Proactively encourage further discussion by posing follow up questions and prompts
- Identify students who need nudging to participate more actively in discussions

Saves time while keeping discussions productive.

AI Capabilities for Students

Virtual TA

Students can:

- Ask Claude questions via chat on course concepts, deadlines, assignments etc.
- Receive personalized explanations on topics they are struggling with
- Have discussions translated into study flashcards/notes for revision

Provides 24/7 help and tutoring support.

Automated Grading

For AI graded assignments, students get:

- Instant provisional scores upon submission
- Highlighted areas that met criteria vs needs improvement
- Feedback on writing like clarity, structure, grammar etc.
- Ability to revise and resubmit the assignment based on feedback

Faster turnaround without waiting for instructor.

Adaptive Learning

Based on their progress, students are recommended:

- Remedial content to fill in knowledge gaps
- Advanced materials when they excel in a topic
- Practice questions and quizzes to reinforce concepts

Keeps students learning at an optimal pace.

Writing Support

While authoring papers, students can:

- View AI feedback as they type with prompts to improve
- Ask Claude for suggestions on sharpening their thesis or abstract
- Receive recommended sources to support arguments

Improves quality of work produced.

Tutoring System

Interactive exercises allow students to:

- Identify personal knowledge gaps to focus practice
- Work through automatically generated quizzes
- Get hints and explanations from Claude during the activities

Identifies and fills learning gaps.

AI for API and integrations

AI Assistant API

The Claude AI assistant can be integrated via API endpoints that:

- Accept natural language questions and respond with answers or prompts for clarification.
- Allow configuring Claude's persona, knowledge base and conversation flow.
- Provide analytics on questions asked, Claude's confidence in responses, most common topics etc.

Enables Claude to hold natural dialogs with students and instructors.

AI Moderation API

APIs expose capabilities like:

- Automated suggestion of high-quality discussion posts for instructor review.
- Identifying and tagging meaningful themes/topics within discussions.
- Metrics on student participation levels across discussion activities.
- Programmatic injection of prompts and questions to extend discussions.

Augments human moderation.

AI Assessment API

Instructors and students can submit written assignments to Claude for automated:

- Scoring based on rubric criteria and NLP analysis
- Feedback on grammar, structure, clarity of writing
- Academic integrity checks for potential plagiarism

- Analytics on common student issues and trends

Automates repetitive assessment functions.

The ILMES platform leverages Claude's AI through seamless API integrations across user experiences and system functions.