AI Application to Support Teaching and Learning Proposal to North Penn School District

1. Executive Summary

MinervAI presents its AI-powered educational platform, Quintilian, as a comprehensive solution to support North Penn School District's mission to deliver personalized, inclusive, and high-quality education. MinervAI combines deep educational expertise with cutting-edge AI to support over 100 schools across North America.

The Quintilian Platform is a modular, cloud-native system hosted on AWS, designed to seamlessly integrate with existing applications such as Google for Education, Infinite Campus, and any LMS supporting LTI 1.3. It includes robust role-based access control, Single Sign-On (SSO) support, and a library of native AI-powered micro-apps that address core district priorities:

- Adaptive Learning Engine to personalize student learning paths
- Intelligent Feedback System for real-time, rubric-aligned feedback
- Predictive Analytics Module to identify at-risk students early

Quintilian empowers educators and administrators with configurable dashboards, enabling data-driven decisions without requiring technical expertise.

Security and privacy are core to our approach. Quintilian is COPPA-compliant (iKeepSafe-certified), and aligns with NIST standards for data protection. All customer environments are provisioned in isolated, secure AWS tenants.

The proposed 12-month implementation plan (April 2025–March 2026) includes stakeholder workshops, tailored model development, full system integration, and user training. Labor, infrastructure, and licensing costs are transparent and scalable and are estimated as follows:

- Total one-time implementation cost: $833,000
- Annual licensing and support cost post-deployment: $641,500
- Based on 13,000 students and 2,110 educators

MinervAI's competitive advantage lies in our scalable micro-app architecture, extensive education-sector experience, and a focus on measurable outcomes. Our solution aligns closely with North Penn School District's evaluation criteria for functionality, cost-effectiveness, user experience, and service quality, making MinervAI a strategic partner in the district's digital learning transformation.

2. Company Overview

MinervAI was founded in 2018 with a vision of revolutionizing how education providers harness technology to enable superior educational outcomes for students, and a better teaching experience for educators.

The traditional model of education delivery has remained largely unchanged for decades, with teachers spending a significant amount of their time either in large-group settings that limit the amount of attention they can give to individual students to understand their personal educational needs, or manually reviewing schoolwork and tests. The very best educators are known not just for their subject expertise, but also for their ability to tailor their teaching to diverse groups with different educational needs and learning styles.

Named after Minerva, the Roman goddess of wisdom, the founders of MinervAI believe that AI can augment - not replace - the work of great educators, ensuring they have the insights they need to provide personalized, focused attention to students so that those students can achieve their full potential.

Since 2018, we at MinervAI have grown from a small startup to a company of over 120 employees mainly based in Austin, TX, San Jose, CA and Toronto in Canada. Our employees include data scientists, AI engineers, cloud engineers, educational experts and user experience designers with years of experience designing products for an education audience. Additionally, we have partnerships with SoftServe, Inc in eastern Europe to provide flexible technical staffing for projects that operate under our US and Canada-based delivery teams.

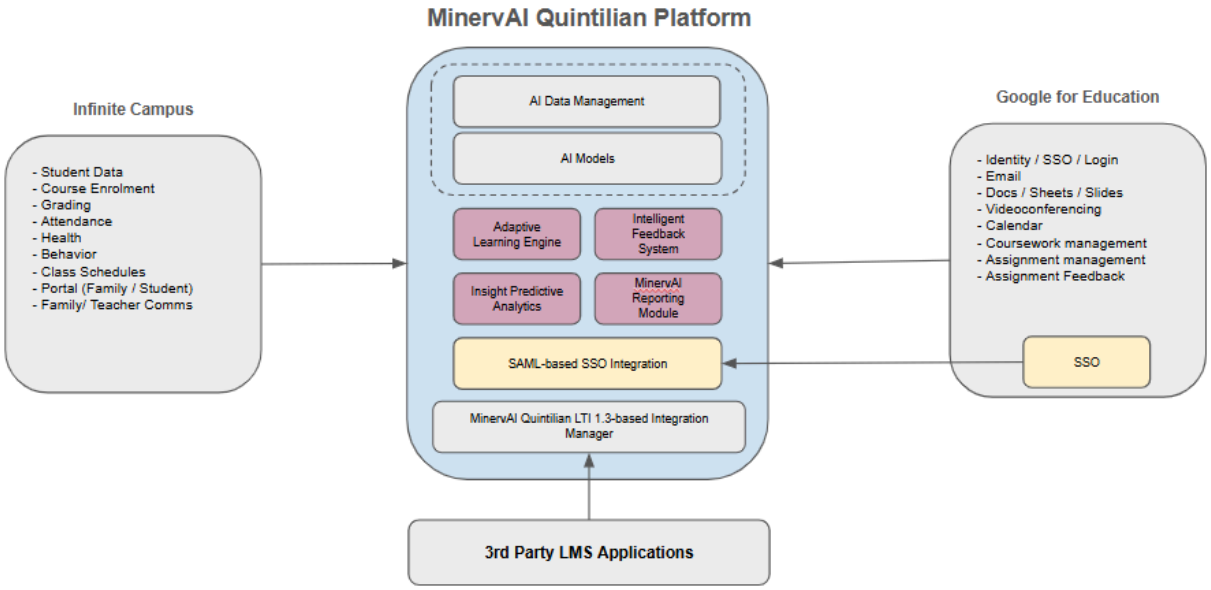
We have worked with over 100 schools and educational authorities to date across the US and Canada to help them build solutions that are adapted for their specific goals, environments and challenges. Major recent projects include the implementation of a district-wide AI-driven personalized learning platform for 16,000 students in the BigTown Unified School District (CA) that demonstrated increased student proficiency in mathematics and literacy within 18 months. We also partnered with a major international integration partner to deliver a gamification module for Ciudadita Schools (TX) to improve educational engagement for targeted intervention students including those whose first language is not English and neurodivergent students.

Our proprietary cloud-based MinervAI Quintilian™ Platform is the foundation of our product offering. This highly-flexible platform allows for rapid development and integration of both MinervAI plug-in micro-applications (micro-apps), but also supports standards-based integration from third-party solutions such as Google for Education, Canvas and Infinite Campus.

MinervAI has demonstrated consistent growth since its foundation, growing at a CAGR of 31% over the past 5 years. The company is privately held and has completed two successful funding rounds to fund our expansion and build our presence across the US and Canada. The company achieved cash flow positivity in Q4 of 2024, further underpinning our responsible approach to expansion and financial prudence.

3. Solution Description

The MinervAI Quintilian Platform is the foundation of our AI solutions. Quintilian is an Amazon AWS-based cloud-native platform that allows rapid deployment of existing and future MinervAI components.



Quintilian integrates with both Google Single Sign-On and Microsoft Active Directory for user identity management, enabling end-users, roles and organizations to be quickly set-up. It also provides all the internal services needed by both native and 3rd party micro-apps such as role-based access control, common UI rendering, security and access to the underlying common data stores and models.

Using our experience working with customers, we have developed native micro-apps that greatly increase the speed of development without sacrificing customizability for customer-specific use cases. Customers can choose to either build upon our native micro-apps, or to rapidly develop custom micro-apps that have the same access to the data and AI models of native micro-apps.

Our native micro-apps include:

- **MinervAI Adaptive Learning Engine (AL Engine)**
  The AL Engine uses real-time student performance and engagement signals to dynamically adjust the learning path of students. Students performing poorly can be flagged for additional intervention. For example, if a student is struggling with more advanced mathematics can be directed towards more foundational math skills learning.
- **MinervAI Intelligent Feedback System (IFS)**
  The IFS provides instant feedback on student assignments and project submissions. Students can get instant access on submission quality such as grammar and syntax, clarity and structure, and alignment with assignment rubrics. Educators can receive

draft scores for review and approval, rubric alignment, as well as red-flag alerts such as originality scores, generative AI content detection, and inconsistencies with historic writing styles.

- **MinervAI Predictive Analytics (PA)**
  The PA module analyses student attendance records, work submission data, grades, behavior logs, and LMS activity to help flag at-risk students as early as possible. Educators, including counsellors or student advisors can receive periodic reports that provide actionable data for early intervention in cases of student disengagement.

COPPA Compliance

The Quintilian platform, as well as the native micro-apps developed by MinervAI are certified by iKeepSafe as a COPPA Safe Harbor organization for the purposes of compliance with COPPA requirements for technology used by children. Protection of children and the privacy of their data is embedded in our organizational DNA with all our software developers, ML and AI professionals required to successfully complete a COPPA training on at least an annual basis.

Accessibility Features

MinervAI is committed to helping students of all abilities to maximize their potential and has prioritized accessibility requirements since the first release of the Quintilian platform and related micro-apps.

Our development methodology and quality control processes ensure compliance with Web Content Accessibility Guidelines (WCAG) 2.1 as new features are designed from the start with accessibility requirements in mind, and those features cannot be released without an internal sign-off from our Accessibility User Experience team that includes people with experience of visual and physical challenges.

Key accessibility features include:

- Screen Reader Compatibility to ensure our UI is navigable via standard screen readers used by those with visual impairments.
- Keyboard Navigation to facilitate UI navigation without a mouse.
- Text-to-Speech and Speech-to-Text support that allows users to interact with our applications directly with our platform through speech and aural cues.
- Customizable pre-defined accessibility modes that allow for adjustment of text size, font and color contrast to suit individual preferences.
- Multi-language support in English, Spanish and French (currently), with plans within the next 12 months to support an additional 8 languages including Portuguese, Arabic and Simplified Chinese.
- A clean, guided navigation system that reduces cognitive load for students with processing challenges common with autism and ADHD.

System Integration, Compatibility and Standards Compliance

Integration with 3rd party systems is managed through the Quintilian Integration Manager (QIM) that is based on the LTI 1.3 standard. Using QIM, integration points with these other tools can be quickly configured without the need for additional development effort. QIM takes care of securely and scalably connecting to 3rd party applications, as well as managing ongoing communication between these applications and the Quintilian platform.

Applications such as Google for Education and Infinite Campus that support the LTI 1.3 standard can quickly be integrated for the full range of LTI 1.3-supported features including authentication, deep-linking of learning content, synchronization of grades and student performance reports, and course enrollment information.

Multimodal Learning Support

The Quintilian platform supports learning content to be delivered through multiple formations, including visual, auditory, interactive and text-based learning modes that can be used to suit the individual learning styles of students. Some forms of kinesthetic learning techniques are also supported including gamified learning through interactive drag-and-drop activities, interactive puzzles, and competitive leaderboards. All these approaches support a diverse set of learning preferences that cater for richer, more individualized learning paths for students.

User Control Functions

The MinverAI Report Modules allows administrators and education professionals to create customizable dashboards without the need for coding skills. Pre-prepared dashboards supplied by MinervAI accelerate the development of these custom reports that can be viewed securely online or exported in multiple standard formats including PDF, Google Docs, Google Slides and Microsoft Office documents. These dashboards can provide users such as teachers, guidance counselors and school managers with insight into student progress and engagements, individual and group performance trends and can flag the need for intervention for at-risk students.

4. Implementation Strategy

4.1 Project Management Approach

MinervAI follows a ROAD framework for development and integration projects.

Requirements: Ensure the project activities are grounded in a firm understanding of the customer's environment.
Operationalize Data: Collect, clean, and transform data for use in AI model development, and put in place data labelling operations and controls for quality in model training.
Analytic Method: Use our data science expertise to select the most appropriate AI algorithms, balancing efficacy and cost. Train models, measure and assess accuracy and bias.
Deployment: Deploy the solution to ensuring readiness for ongoing operations, including data visualization, monitoring and ongoing retraining.

Scope Agreement and Change Management

We at MinervAI have worked with many customers with differing environments, regulatory frameworks, budgets, challenges and goals. While we have built the Quintilian platform and micro-apps to accelerate the development and deployment of AI-powered learning systems, we continue to recognize that every customer has different needs. Our aim is to develop a deep understanding of the value each customer wants to drive within their organizations by investing in learning and AI technology.

At the start of every engagement, our Value Analysts:

- Work with project sponsors to identify key stakeholders and influences within the organization, including roles such as financial sponsors, teachers, student representatives, school administrative staff, IT staff and parent representatives.
- Conduct Discovery and Alignment workshops with the aim of defining project objectives, metrics and constraints. These workshops are non-technical in nature and aim to clearly articulate and baseline the desired outcomes of the project and how those outcomes can be assessed. The team will produce a baseline Solution Requirements Document to be approved by project sponsors and other key customer staff that captures the requirements, high-level timelines and deliverables for the project.

We also recognize that as projects evolve, new opportunities can be identified or there can be internal or external-driven changes to the project environment. To facilitate these, MinverAI uses a standardized change control process that aims to quickly get to decisions on changes, including trade-offs to scope, cost and schedule. Change Requests are formally documented and assessed first at the lowest organization level possible with the aim to allow decisions to be made quickly with minimal overhead. Where change requests impact significantly on scope, cost of schedule, such changes are brought to a bi-weekly Steering Committee meeting, reviewed and either approved, rejected or sent back for more information. The Steering Committee consists of both empowered customer representatives such as nominated financial controllers and project sponsors, as well as MinervAI account managers, project managers and value analysts.

Stakeholder Communication Plan

Communication is critical throughout the engagement lifecycle - not just at project initiation. Our standard communications plan includes:

- Daily stand-up meetings for individual scrum teams
- Weekly project team roll-up reports for offline review by stakeholders
- Bi-Weekly project Steering Committee meetings to review ongoing progress, review top-level risks and make decisions to resolve issues and manage change.
- Monthly Program Reviews to review hosted by value analysts and project managers to review progress against the documented outcomes of the project

Quality Assurance and Testing

The responsibility for product and model quality lies with all our employees and partners, not just our quality assurance (QA) experts. We build quality assurance into our development framework starting with ensuring that the Solution Requirements Document is clear and understood by all project team members.

We adopt a test-driven development (TDM) approach to software development where unit test cases are defined in advance by software developers and testers before any functional code is written. Unit test coverage of at least 75%, and 100% success is expected before any code is merged into the main software branch. These unit tests are automatically executed after every check-in the main branch and breaking issues flagged to developers to ensure no breaking changes are introduced.

During data labelling exercises, the inter-annotator agreement (Krippendorf) score is monitored to ensure consistency and accuracy of labelling among subject matter experts. Where deviations between data labellers is detected, results are analyzed to determine the root cause and take action as needed to ensure the highest quality of training data for our AI models.

During AI model training, accuracy, precision and recall metrics are constantly monitored to ensure the optimal performance of the models and underlying algorithms.

Integration testing is conducted as appropriate between Quintilian and 3rd party applications such as Google for Education and Infinite Campus to ensure that APIs and data exchanges are working as expected.

Finally, before any production release, testing is carried out in a pre-production environment that mirrors the final production environment to ensure all components are working and correctly configured.

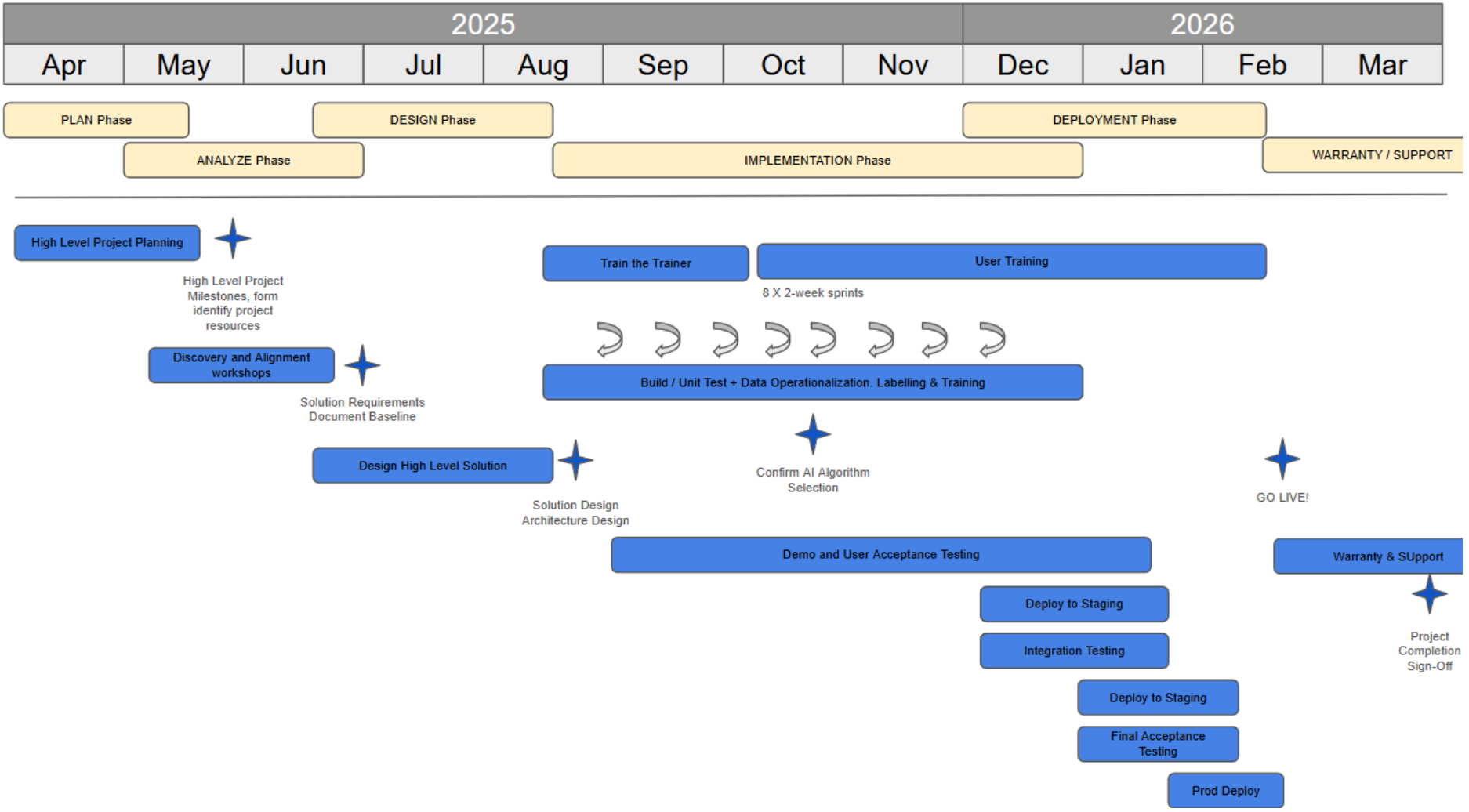
Risk Management

At MinervAI, we have extensive experience of the kinds of risks and issues faced by our customers when building new AI solutions. We adopt an ISO31000-based process for identifying, managing and mitigating project risks. Some common and likely risks for North Penn School District include:

Risk	Likelihood	Impact	Mitigation
Resistance to Adoption by Educators	H	VH	● Identification of influencers through network analysis ● Inclusion of influencers in project value ● Ongoing demos / acceptance testing to influencers to show development and get feedback
Excessive Operational Costs	M	H	● During architecture design and algorithm selection will be done with costs in mind and estimated operational costs will be

			presented along with model accuracy metrics to ensure balanced decision-making.
Requirements may change due to regulatory or internal changes	H	H	• Rigorous baselining and communication of the solutions requirements document to ensure all parties are agreed on the baseline project scope. • Appropriate change control in place with a light-touch process for minor changes and a more rigorous process for large cost-impacting changes.

4.2 Timeline


2025
2026
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
PLAN Phase
DESIGN Phase
DEPLOYMENT Phase
ANALYZE Phase
IMPLEMENTATION Phase
WARRANTY / SUPPORT
High Level Project Planning
High Level Project Milestones, form identify project resources
Train the Trainer
User Training
8 X 2-week sprints
Discovery and Alignment workshops
Solution Requirements Document Baseline
Build / Unit Test + Data Operationalization. Labelling & Training
Design High Level Solution
Solution Design Architecture Design
Confirm AI Algorithm Selection
GO LIVE!
Demo and User Acceptance Testing
Warranty & SUpport
Deploy to Staging
Integration Testing
Project Completion Sign-Off
Deploy to Staging
Final Acceptance Testing
Prod Deploy

Methodology

MinervAI uses a hybrid Scrum methodology. For the overall project, we adopt a traditional waterfall SDLC that ensures that the requirements, timelines and costs of the engagement are agreed and regularly monitored, and that significant changes to the parameters of the engagement are closely controlled.

During the development phase, the teams adopt a Scrum methodology that allows for rapid experimentation and adjustment in response to customer feedback that is within the parameters of the engagement. Development is followed by bi-weekly demos of development progress to ensure the customer can provide regular feedback as the solution is developed.

5. Data Security and Compliance

Data Integrity and Security

MinervAI aligns with National Institute of Standards and Technology (NIST) standards for security of data at rest and in-transit. All data stored either centrally in the cloud or on any user devices (including desktops, laptops and mobile devices) is protected by AES-256 symmetric-key encryption. Transmission of data between user devices and the Quintilian cloud is encrypted using the TLS 1.3 protocol. Access to data is controlled through a strictly-enforced Roles Based Access Control (RBAC) system that ensures that only those with the right to view and change data can do so. Finally, all customer cloud services are provisioning uniquely within their own tenants, ensuring separation of data and services from other MinervAI customers.

COPPA Compliance and Student Data Privacy

Key COPPA-related features include:

- **Verifiable and Auditable Consent:** Consent for collecting and using children's personal data is recorded and auditable. Any data auditor can easily determine what consent has been given for data collection, who provided that consent and when. A blockchain-based digital certification ensures traceability and immutability of consent records.
- **COPPA-compliant privacy policy:** Our plain English privacy policy clearly states what data is collected, how that data is used, who it can be shared with and how it is stored and protected.
- **Limited Data Collection:** All personal data related to students is collected exclusively for the purposes of educational functionality and never for other commercial purposes.
- **Data Security:** MinervAI aligns with National Institute of Standards and Technology (NIST) standards for security of data at rest and in-transit.

6. Technical Specifications and Compatibility

As a web-based application, the Quintilian platform and related microapps are designed for device independence and accessibility from browsers that support the HTML5, CSS3, Javascript ES6+ standards and TLS 1.3 protocol. This offers a wide variety of usable potential form factors such as tablets, laptops and desktops running on different operating systems. MinervAI has tested our solution on a range of common devices and operating systems.

As a cloud-based service, Quintilian requires no on-premises server or other physical infrastructure. Customers benefit from AWS's scalable, high-availability service.

User authentication and RBAC are handled through secure, seamless Single Sign-On (SSE) integrations with both Google Workspace and Microsoft Active Directory supporting the OAuth 2.0 and SAML 2.0 protocols.

Browser Compatibility

Browser	Minimum Version	HTML5	CSS3	Javascript ES6+	TLS 1.3
Chrome	70	Yes	Yes	Yes	Yes
Safari	13	Yes	Yes	Yes	Yes
Chromium-based (MS Edge, Opera, Samsung)	79	Yes	Yes	Yes	Yes
Firefox	63	Yes	Yes	Yes	Yes

OS Compatibility

The Quintilian platform and apps has been tested and validated on the following Operating Systems:

Operating System	Minimum Supported Version
Windows	Windows 10 Version 22H2 Windows 11 Version 23H2
macOS	macOS 12 Monterey
ChromeOS	ChromeOS 113
iOS	iOS 15
Android	Android 11
Linux	Ubuntu 22.04 LTS RHEL 8.6 and 9.x

Hardware Compatibility

For an optimal smooth performance across all Quintilian users, the following minimum hardware specifications are recommended.

Component	Minimum Recommended Specification
Processor	Dual-core CPU (Intel Celeron N4020 or ARM Cortex-A73 equivalent)
RAM	4GB
Storage	8 GB available for OS and browser caching
Screen Size	9.7” diagonal 1024 x 768 resolution
Network	5 Mbps connection

7. Support and Training Services

Support Model

MinervAI offers help desk support from our shared services centres in Austin and Toronto. We offer telephone, email and live chat support for customers experiencing any issues with the Quintilian platform. Regular Tier 1-3 support is available Monday - Friday from 8:00pm to 8:00pm Eastern, with 24/7 on-call support for critical escalations.

On-site technical support is available for 3 months after the initial deployment as standard to help resolve any early issues experienced after the first roll-out. Remote support is available via Zoom, Webex or Teams for system troubleshooting. All customers are assigned to a dedicated Customer Success Manager.

Platform Maintenance and Updates

As a cloud platform, MinervAI fully manages the platform for product updates and maintenance. We operated a ringed upgrade rollout, meaning that our updates are first deployed to a small set of customers before being deployed to wider rings of customers. This ensures that any post-deployment issues are caught early and reduce the risk of outage. Platform updates are carried out on the last weekend of each month. Security patches and critical fixes are deployed within 72 hours of release or discovery.

Our support dashboard is available to all customers and this displays our uptime and other performance metrics for the platform, and lists any known issues and resolution times.

Training

Our training staff are skilled and experienced with training different user groups across our customer-base. Tailored in-person and online training are available for different roles including for IT staff, school administrators, and teachers. We also offer Train-the-trainer programs so that districts can deliver their own internal customer-specific training for their AI solution.

8. Cost Proposal

Overall Cost Summary

The overall implementation costs assume a project start on April 1st, 2025 with a targeted completion by March 31st, 2026.

Total labor costs cover analysis and design phases through the AI model development, systems integration, configuration, and on to deployment and training. These labor costs are estimated at $833,000 (excluding any contingency). This includes $120,000 related to train-the-trainer and training costs for school staff.

Comprehensive Cost Breakdown

Cost Category	Apr - June ($,000)	Jul - Sep ($,000)	Oct - Dec ($,000)	Jan - Mar ($,000)	TOTAL
Cloud Infrastructure	0	23	35	31	89
Labour	108	196	316	213	833
Other Licensing	0	3	6	4	13
TOTAL	**108**	**222**	**357**	**248**	**935**

Quintilian Licensing & Maintenance Costs

No Quintilian Licensing costs are payable until the system has been fully deployed in line with the contractual agreement between MinervAI and the customer.

Following successful deployment and acceptance by North Penn School District, the following licensing costs will apply.

Cost Category	Count	Cost per Year ($)	Total per Year ($,000)
Student License	13,000	25	325
Educator License	2,110	150	316.5
TOTAL ANNUAL LICENSING*			641.5

Refer to the Appendix for detailed cost breakdowns.

9. Evaluation and Differentiation

MinervAI offers the scalable, secure, and modular Quintilian platform which aligns with the North Penn School District's requirement for a comprehensive and flexible AI-driven learning tool.

Functionally, the configurable pre-built native modules allow for an accelerated development cycle that leverages the experience of MinervAI in delivering diverse solutions across the education industry, while ensuring also that North Penn School District's specific requirements are met through thoughtful development of AI models. Out of the box micro-apps include:

- **The Adaptive Learning (MinervAI AL Engine)**: Personalizes student pathways in real-time.
- **Intelligent Feedback (IFS):** Provides immediate, rubric-aligned feedback to students and educators.
- **Predictive Analytics (PA Module):** Identifies at-risk students using multidimensional data sources.

The solution also allows for gamified, multimodal, and interactive learning experiences tailored for diverse learning styles, while our support for WCAG 2.1 standards and multi-lingual interfaces make our solution highly-attuned to the inclusive needs of all students.

The platform also supports standards-based integration with 3rd party applications including LTI 1.3, OAuth 2.0 and SAML 2 for seamless, secure integration. Integration with Google for Education and Infinite Campus as already supported through the integration module which also allows for any future LMS applications or solutions that support LTI 1.3 to easily integrate.

The platform approach allows the customer to focus their effort and resources on their specific challenges and requirements rather than on common challenges such as security, 3rd party integration and infrastructure maintenance. The modular, API-based development model also provides future-proofed opportunities to develop customized microapps that leverage the same underlying platform, user interface, and user identities with full RBAC-based access to data, AI models and interfaces.

Our reporting module offers many customizable pre-built dashboards developed in tandem with education professionals that allow them to offer a differentiated personalized learning experience to students of different backgrounds and abilities.

Appendix

Detailed Labor Costs by Role

Role	Count	Months	Monthly Rate ($,000)	Total Cost ($,000)
Value Analysts (Onshore)	2	3	12	**72**
Program Manager (Onshore)	1	12	12	**144**
Training Content Developers (Offshore)	2	2	4	**16**
Training Delivery (Onshore)	2	5	12	**120**
Software Developers & QA (Offshore)	8	7.5	4	**240**
Data Engineer (Offshore)	1	7.5	4	**30**
Data Engineer (Onshore)	1	7.25	12	**87**
DevOps Engineer (Offshore)	1	3.5	8	**28**
Integration Testers (Offshore)	4	6	4	**96**
TOTAL IMPLEMENTATION COST				**833**

Detailed Labor Costs by Month

	2025 ($,000)									2026 ($,000)		
	A	M	J	J	A	S	O	N	D	J	F	M
Value Analysts (Onshore)	24	24	24									
Program Manager (Onshore)	12	12	12	12	12	12	12	12	12	12	12	12
Training Content Developers (Offshore)					8	8						
Training Delivery (Onshore)							24	24	24	24	24	
Software Developers & QA (Offshore)				32	32	32	32	32	32	16	16	16
Data Engineer (Offshore)				4	4	4	4	4	4	2	2	2
Data Engineer (Onshore)				12	12	12	12	12	12	6	6	3
DevOps Engineer (Offshore)								8	8	4	4	4
Integration Testers (Offshore)							16	16	16	16	16	16

TOTAL ($,000)	**36**	**36**	**36**	**60**	**68**	**68**	**100**	**108**	**108**	**80**	**80**	**53**

One-Off Infrastructure Costs by Month

	2025 ($,000)									2026 ($,000)		
	A	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**	**J**	**F**	**M**
Cloud Compute				1	5	8	5	5	4	4	3	3
Cloud Storage				1	1	3	5	5	5	5	5	5
Cloud Networking				1	1	2	2	2	2	2	2	2
TOTAL ($,000)	**0**	**0**	**0**	**3**	**7**	**13**	**12**	**12**	**11**	**11**	**10**	**10**