



DERIVITA

ESSA Level IV Report

Prepared for:
Derivita

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EXECUTIVE SUMMARY

Instructure developed a logic model for *Derivita* and designed the logic model to satisfy Level IV requirements (*Demonstrates a Rationale*) according to the Every Student Succeeds Act (ESSA).¹

Logic Model

A logic model provides a program roadmap, detailing program inputs, participants reached, program activities, outputs, and outcomes.

Study Design for *Derivita* Evaluation

Informed by the logic model, the next phase will focus on planning ESSA studies to examine how *Derivita* relates to student learning outcomes. Specifically, Instructure planned an ESSA Level III study to answer the following research questions:

Implementation Questions

1. To what extent did students use *Derivita* during the 2024–25 school year?
 - a. On average, how many *Derivita* sessions did students complete?
 - b. On average, how much time (total active minutes) did students spend using *Derivita*?
 - c. On average, how many *Derivita* assignments did students submit?
 - d. On average, how many *Derivita* questions per day did students answer and how many attempts per question?
 - e. On average, how many *Derivita* feedback messages did students review?
2. To what extent did teachers use *Derivita* during the 2024–25 school year?
 - a. On average, how many assessments did teachers create?
 - b. On average, how many common assessments did teachers use?
 - c. On average, how many Professional Learning Community (PLC) tools did teachers use and how often?
 - d. On average, how many times did teachers use SpotCheck?

Outcome Questions

3. How does students' use of *Derivita* relate to students' math scores?
 - a. Do these relationships differ by student demographic subgroups (e.g., English learner status, special education status (SPED), gender, race, socioeconomic status, etc.)?
4. How does teachers' use of *Derivita* relate to students' math scores?

¹ Level IV indicates that an intervention should include a “well-specified logic model that is informed by research or an evaluation that suggests how the intervention is likely to improve relevant outcomes; and an effort to study the effects of the intervention that will happen as part of the intervention or is underway elsewhere...” (p. 9, U.S. Department of Education, 2016).

- a. Do these relationships differ by student demographic subgroups (e.g., English learner status, SPED, gender, race, socioeconomic status, etc.)?

Conclusions

This study satisfies ESSA evidence requirements for Level IV (*Demonstrates a Rationale*). Specifically, this study met the following criteria:

- ✓ Detailed logic model informed by previous, high-quality research
- ✓ Study planning and design is currently underway for an ESSA Level III or higher study

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INTRODUCTION

Instructure developed a logic model for *Derivita* and designed the logic model to satisfy Level IV requirements (*Demonstrates a Rationale*) according to the Every Student Succeeds Act (ESSA).

The logic model begins by identifying the core challenges *Derivita* seeks to address.

- **Challenges**
 - Teachers lack the time to design and deliver high-quality math instruction—especially when it requires differentiation, timely feedback, and nuanced grading.
 - As a result, students often receive low-rigor tasks that fail to spark engagement or build mathematical thinking.
 - In response, administrators introduce multiple tools, but this adds complexity and fragments the data needed for system-wide improvement.
- ***Derivita's* response:**
 - Embeds high-quality, standards-aligned math content into the systems teachers already use.
 - Uses its Artificial Intelligence (AI)-powered engine to interpret every open-ended response, delivering instant feedback, automated grading, and real-time insights.
 - Enables teachers to focus on teaching, keeps students engaged, and leaders to act on connected data that drives improvement in math outcomes at scale.

The study had the following objectives:

1. Define the *Derivita* logic model and foundational research base (in Appendix A).
2. Document the ESSA Level III study design.



LOGIC MODEL

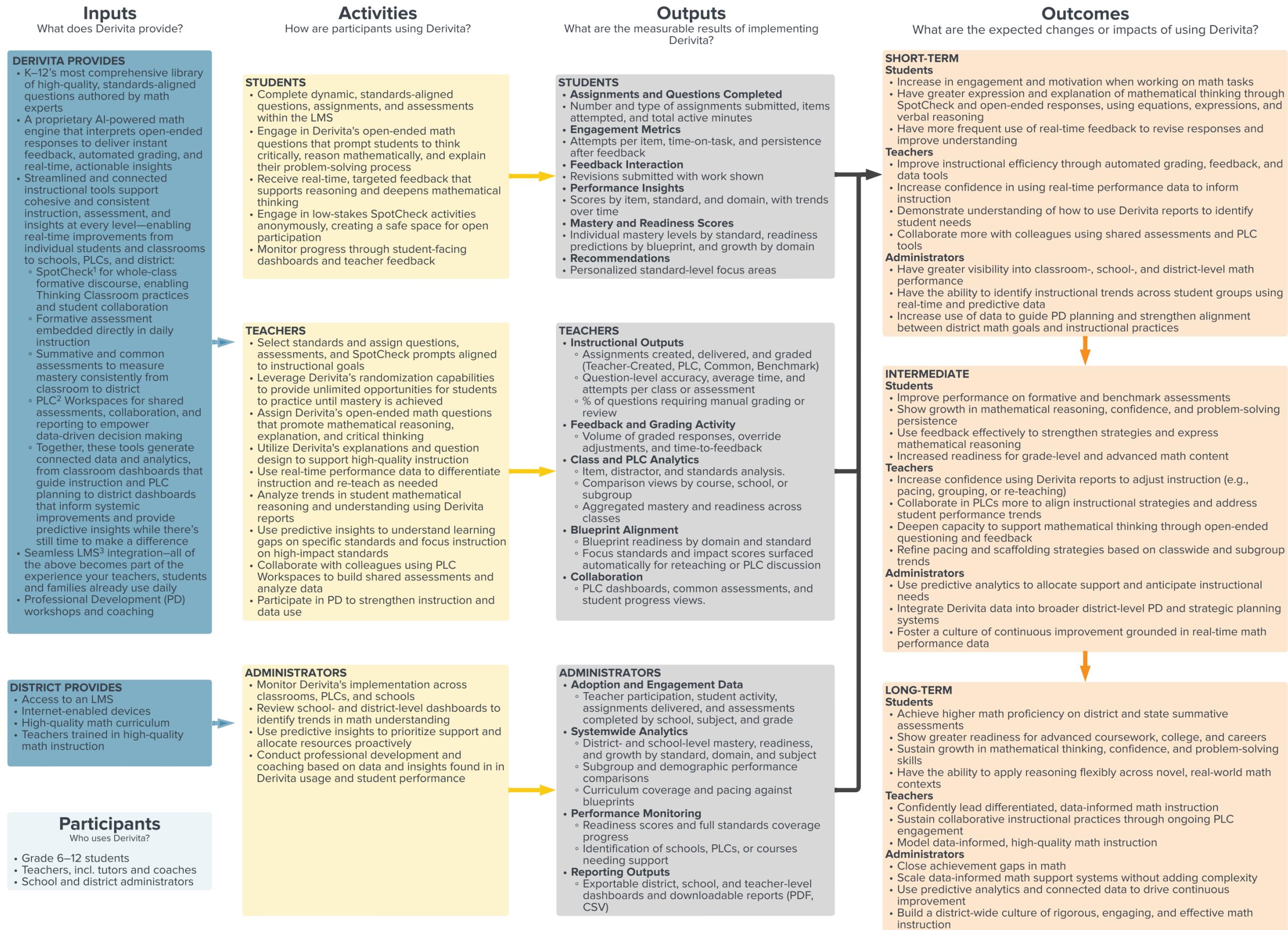
A logic model is a program or product roadmap. It identifies how a product aims to impact learners, translating inputs into measurable activities that lead to expected results. A logic model has five core components: inputs, participants, activities, outputs, and outcomes (see Table 1).

Table 1. Logic model core components

Component	Description	More information
Inputs	What the product and district, school, or teacher invests	What resources are invested and/or required for the learning solution to function effectively in real schools?
Participants	Who the product reaches	Who receives the learning solution or intervention? Who are the key users?
Activities	What participants do	What do participants do with the resources identified in Inputs? What are the core/essential components of the learning solution? What is being delivered to help students/teachers achieve the program outcomes identified?
Outputs	Products of activities	What are numeric indicators of activities? (e.g., key performance indicators; allows for examining program implementation)
Outcomes	Short-term, intermediate, long-term	<p>Short-term outcomes are changes in awareness, knowledge, skills, attitudes, and aspirations.</p> <p>Intermediate outcomes are changes in behaviors or actions.</p> <p>Long-term outcomes are ultimate impacts or changes in social, economic, civil or environmental conditions.</p>

The Instructure research team reviewed *Derivita* resources, artifacts, and product materials to develop a draft logic model. The *Derivita* team reviewed the draft and provided revisions during virtual meetings. The final logic model depicted below reflects these conversations and revisions.

Problem Statement: Teachers lack the time to design and deliver high-quality math instruction—especially when it requires differentiation, timely feedback, and nuanced grading. As a result, students often receive low-rigor tasks that fail to spark engagement or build mathematical thinking. In response, administrators introduce multiple tools, but this adds complexity and fragments the data needed for system-wide improvement. Derivita addresses this by embedding high-quality, standards-aligned math content into the systems teachers already use. Its engine interprets every open-ended response, delivering instant feedback, automated grading, and real-time insights—so teachers can focus on teaching, students stay engaged, and leaders can act on connected data that drives improvement in math outcomes at scale.



¹ SpotCheck is a Derivita feature that allows teachers to instantly present any question to the whole class for real-time responses—enabling quick formative checks, increasing student engagement, and guiding immediate instructional adjustments.

² A Professional Learning Community (PLC) is a collaborative group of teachers—often organized by grade level, subject, or department—who meet regularly to share expertise, analyze student data, and refine instructional practices to improve student outcomes.

³ Learning Management System (LMS)



Derivita Logic Model Components

Derivita provides several resources, including:

- K–12’s most comprehensive library of high-quality, standards-aligned questions authored by math experts
- A proprietary AI-powered math engine that interprets open-ended responses to deliver instant feedback, automated grading, and real-time, actionable insights
- Streamlined and connected instructional tools support cohesive and consistent instruction, assessment, and insights at every level—enabling real-time improvements from individual students and classrooms to schools, PLCs, and district:
 - SpotCheck² for whole-class formative discourse, enabling Thinking Classroom practices and student collaboration
 - Formative assessment embedded directly in daily instruction
 - Summative and common assessments to measure mastery consistently from classroom to district
 - PLC³ Workspaces for shared assessments, collaboration, and reporting to empower data-driven decision making
 - Together, these tools generate connected data and analytics, from classroom dashboards that guide instruction and PLC planning to district dashboards that inform systemic improvements and provide predictive insights while there’s still time to make a difference
- Seamless LMS⁴ integration—all of the above becomes part of the experience teachers, students, and families already use daily
- Professional Development (PD) workshops and coaching

Districts, schools, or teachers who use *Derivita* should offer access to an LMS, internet-enabled devices, high-quality math curriculum, and teachers trained in high-quality math instruction.

Ultimately, *Derivita* aims to reach grade 6–12 students, teachers (including tutors and coaches), and school and district administrators.

² SpotCheck is a *Derivita* feature that allows teachers to instantly present any question to the whole class for real-time responses—enabling quick formative checks, increasing student engagement, and guiding immediate instructional adjustments.

³ A Professional Learning Community (PLC) is a collaborative group of teachers—often organized by grade level, subject, or department—who meet regularly to share expertise, analyze student data, and refine instructional practices to improve student outcomes.

⁴ Learning Management System (LMS)

Activities

Using these program resources, participants can engage with *Derivita* through the following activities:

Students:

- Complete dynamic, standards-aligned questions, assignments, and assessments within the LMS
- Engage in *Derivita's* open-ended math questions that prompt students to think critically, reason mathematically, and explain their problem-solving process
- Receive real-time, targeted feedback that supports reasoning and deepens mathematical thinking
- Engage in low-stakes SpotCheck activities anonymously, creating a safe space for open participation
- Monitor progress through student-facing dashboards and teacher feedback

Teachers:

- Select standards and assign questions, assessments, and SpotCheck prompts aligned to instructional goals
- Leverage *Derivita's* randomization capabilities to provide unlimited opportunities for students to practice until mastery is achieved
- Assign *Derivita's* open-ended math questions that promote mathematical reasoning, explanation, and critical thinking
- Utilize *Derivita's* explanations and question design to support high-quality instruction
- Use real-time performance data to differentiate instruction and re-teach as needed
- Analyze trends in student mathematical reasoning and understanding using *Derivita* reports
- Use predictive insights to understand learning gaps on specific standards and focus instruction on high-impact standards
- Collaborate with colleagues using PLC Workspaces to build shared assessments and analyze data
- Participate in PD to strengthen instruction and data use

Administrators:

- Monitor *Derivita's* implementation across classrooms, PLCs, and schools
- Review school- and district-level dashboards to identify trends in math understanding
- Use predictive insights to prioritize support and allocate resources proactively
- Conduct professional development and coaching based on data and insights found in *Derivita* usage and student performance

Outputs

Derivita can examine the extent to which core activities were delivered and participants were reached by examining the following quantifiable outputs for the solution:

Students:

- **Assignments and Questions Completed**
 - Number and type of assignments submitted, items attempted, and total active minutes
- **Engagement Metrics**
 - Attempts per item, time-on-task, and persistence after feedback
- **Feedback Interaction**
 - Revised submissions with work shown
- **Performance Insights**
 - Scores by item, standard, and domain, with trends over time
- **Mastery and Readiness Scores**
 - Individual mastery levels by standard, readiness predictions by blueprint, and growth by domain
- **Recommendations**
 - Personalized standard-level focus areas

Teachers:

- **Instructional Outputs**
 - Assignments created, delivered, and graded (Teacher-Created, PLC, Common, Benchmark)
 - Question-level accuracy, average time, and attempts per class or assessment.
 - % of questions requiring manual grading or review
- **Feedback and Grading Activity**
 - Volume of graded responses, override adjustments, and time-to-feedback
- **Class and PLC Analytics**
 - Item, distractor, and standards analysis
 - Comparison views by course, school, or subgroup
 - Aggregated mastery and readiness across classes
- **Blueprint Alignment**
 - Blueprint readiness by domain and standard
 - Focus standards and impact scores surfaced automatically for reteaching or PLC discussion
- **Collaboration**
 - PLC dashboards, common assessments, and student progress views

Administrators:

- **Adoption and Engagement Data**
 - Teacher participation, student activity, assignments delivered, and assessments completed by school, subject, and grade
- **Systemwide Analytics**
 - District- and school-level mastery, readiness, and growth by standard, domain, and

- subject
 - Subgroup and demographic performance comparisons
 - Curriculum coverage and pacing against blueprints
- **Performance Monitoring**
 - Readiness scores and full standards coverage progress
 - Identification of schools, PLCs, or courses needing support
- **Reporting Outputs**
 - Exportable district, school, and teacher-level dashboards and downloadable reports (PDF, CSV)

Outcomes

If implemented with fidelity, based on a review of program outputs, Derivita can expect outcomes for students, teachers, and administrators across three timeframes:

1. Short-Term Outcomes

- a. Students
 - i. Increased engagement and motivation when working on math tasks.
 - ii. Greater expression and explanation of mathematical thinking through SpotCheck and open-ended responses, using equations, expressions, and verbal reasoning.
 - iii. More frequent use of real-time feedback to revise responses and improve understanding.
- b. Teachers
 - i. Improved instructional efficiency through automated grading, feedback, and data tools.
 - ii. Increased confidence in using real-time performance data to inform instruction.
 - iii. Demonstrate understanding of how to use Derivita reports to identify student needs.
 - iv. More collaboration with colleagues through shared assessments and PLC tools.
- c. Administrators
 - i. Greater visibility into classroom-, school-, and district-level math performance.
 - ii. Ability to identify instructional trends across student groups using real-time and predictive data.
 - iii. Increased use of data to guide PD planning and strengthen alignment between district math goals and instructional practices.

2. Intermediate Outcomes

- a. Students
 - i. Improved performance on formative and benchmark assessments.

- ii. Growth in mathematical reasoning, confidence, and persistence in problem-solving.
 - iii. Better use of feedback to strengthen strategies and express mathematical reasoning.
 - iv. Increased readiness for grade-level and advanced math content.
- b. Teachers
- i. Increased confidence using Derivita reports to adjust instruction (e.g., pacing, grouping, re-teaching).
 - ii. More collaboration in PLCs to align instructional strategies and address student performance trends.
 - iii. Deeper capacity to support mathematical thinking through open-ended questioning and feedback.
 - iv. Refined pacing and scaffolding strategies based on classwide and subgroup trends.
- c. Administrators
- i. Use of predictive analytics to allocate support and anticipate instructional needs.
 - ii. Integration of Derivita data into district-level PD and strategic planning systems.
 - iii. Fostering a culture of continuous improvement grounded in real-time math performance data.

3. Long-Term Outcomes

- a. Students
- i. Higher math proficiency on district and state summative assessments.
 - ii. Greater readiness for advanced coursework, college, and careers.
 - iii. Sustained growth in mathematical thinking, confidence, and problem-solving skills.
 - iv. Ability to apply reasoning flexibly across novel, real-world math contexts.
- b. Teachers
- i. Confident leadership of differentiated, data-informed math instruction.
 - ii. Sustained collaborative practices through ongoing PLC engagement.
 - iii. Modeling of data-informed, high-quality math instruction.
- c. Administrators
- i. Closed achievement gaps in math.
 - ii. Scaled data-informed math support systems without adding complexity.
 - iii. Use of predictive analytics and connected data to drive continuous improvement.
 - iv. A district-wide culture of rigorous, engaging, and effective math instruction.

STUDY DESIGN FOR *DERIVITA*

To continue building evidence of effectiveness and examine the proposed relationships in the logic model, Instructure planned an ESSA Level III study to answer the following research questions:

Implementation Questions

1. To what extent did students use *Derivita* during the 2024–25 school year?
 - a. On average, how many *Derivita* sessions did students complete?
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Outcome Questions

3. How does students' use of *Derivita* relate to students' math scores?
 - a. Do these relationships differ by student demographic subgroups (e.g., English learner status, SPED, gender, race, socioeconomic status, etc.)?
4. How does teachers' use of *Derivita* relate to students' math scores?
 - a. Do these relationships differ by student demographic subgroups (e.g., English learner status, SPED, gender, race, socioeconomic status, etc.)?

WHY THIS REPORT MATTERS

This ESSA Level IV report shows not only that Derivita is backed by research, but also why it matters for your work in schools.

For Teachers: The report highlights how Derivita reduces time-consuming tasks like manual grading and replaces them with real-time, automated feedback. That means more time for meaningful engagement—working directly with students, adjusting instruction, and collaborating with colleagues.

For students: The logic model presents the foundational framework of showing when students interact with Derivita’s expert-authored math questions, the engine provides immediate, tailored feedback. This encourages them to revise work, build persistence, and strengthen mathematical reasoning—habits directly tied to long-term achievement.

For administrators: Because every instructional tool in Derivita feeds connected data, they gain a clear line of sight from individual student responses to district-wide trends. This allows for earlier interventions, better allocation of support, and alignment between classroom practice and district math goals.

CONCLUSIONS

This study satisfies ESSA evidence requirements for Level IV (*Demonstrates a Rationale*). Specifically, this study met the following criteria for Level IV:

- ✓ Detailed logic model informed by previous, high-quality research
- ✓ Study planning and design is currently underway for an ESSA Level III or higher study



APPENDIX A: ANNOTATED BIBLIOGRAPHY

The following annotated bibliography demonstrates the research underlying *Derivita*, including how the platform leveraged this research to come to design decisions about *Derivita*.

***Derivita's* proprietary Computer Algebra System supports open-ended math questions that elicit students' mathematical reasoning and allow for symbolic, written, and expressive forms of solution. This enables automated, nuanced feedback and helps teachers understand how—not just what—students are thinking.**

Citation	Citation type	Information about sample and theoretical framework	Design decisions driven by the research	How did <i>Derivita</i> leverage the citation to come to this design decision
Gningue, S. M., Peach, R., & Schroder, B. (2013). Developing effective mathematics teaching: Assessing content and pedagogical knowledge, student-centered teaching, and student engagement, <i>The Mathematics Enthusiast</i> , 10(3), 621–646. https://doi.org/10.54870/1551-3440.1282	Research Article	This study uses a quasi-experimental design to assess the effectiveness of student-centered pedagogy in mathematics teaching. Forty experienced middle and high school math teachers were observed over a three-year period and a mixed-methods approach was used to collect data.	The study found that teachers who used more student-centered teaching techniques had significantly more student engagement in their classrooms. This highlights the effectiveness of student-centered pedagogical approaches in math teaching. <i>Derivita</i> supports student-centered math instruction by enabling open-ended questions that elicit mathematical reasoning. Additionally, <i>Derivita's</i> ability to provide insights into a student's thinking supports teachers in guiding students through mathematical processes. This type of approach encourages students to actively solve problems while learning which can result in higher student engagement and understanding.	<i>Derivita's</i> proprietary Computer Algebra System (CAS) allows for customized standards-aligned problem types, which aligns with student-centered teaching and symbolic and expressive mathematical input. randomized, standards-aligned problems and embedded feedback, <i>Derivita</i> facilitates a dynamic environment for mathematical reasoning and flexible expression. These approaches engage students in a dynamic math environment. Furthermore, <i>Derivita</i> allows teachers to proactively adapt instruction to students' mathematical thinking. <i>Derivita</i> helps teachers shift the focus from simply correcting answers to analyzing and responding to mathematical reasoning.
Ran, H., Kim, N.J., & Secada, W.G. (2022). A meta-analysis on the effects of technology's functions and roles on students' mathematics achievement in K–12 classrooms. <i>Journal of Computer Assisted Learning</i> , 38(1), 258–284. https://doi.org/10.1111/jcal.12611	Meta-analysis	This paper reviewed 77 studies with 151 effect sizes to analyze the role of technology in math instruction. The researchers coded the studies based on their features and student characteristics, using a random-effects model to account for the variety in effect sizes.	The analysis indicated that using technology in mathematics classrooms had a statistically significant positive effect on student achievement. The most notable benefits were seen when technology was used to support collaborative	



Citation	Citation type	Information about sample and theoretical framework	Design decisions driven by the research	How did <i>Derivita</i> leverage the citation to come to this design decision
			<p>environments, problem-solving, conceptual development, and adaptive practice. The researchers concluded that students achieve the greatest success when math technology is implemented in interactive, problem-solving environments that support reasoning and conceptual understanding. This aligns with <i>Derivita's</i> design, which generates non-repetitive, randomized problems, provides real-time, embedded feedback and scaffolding, and supports symbolic input and multi-strategy problem solving. These findings reinforce. <i>Derivita's</i> approach of generating randomized problems with symbolic input and embedded scaffolding to support conceptual understanding and multi-path reasoning.</p>	
<p>Thanheiser, E., & Melhuish, K. (2023). Teaching routines and student-centered mathematics instruction: The essential role of conferring to understand student thinking and reasoning. <i>The Journal of Mathematical Behavior</i>, 70, 101032. https://doi.org/10.1016/j.jmathb.2023.101032</p>	<p>Research Article</p>	<p>This study uses a qualitative case study methodology to analyze the effects of student-centered mathematics instruction. The study compared two lessons taught by the same teacher on a similar math topic. One lesson before a professional development session, and one after. The professional development included three components: making student thinking public, having students engage with each other's thinking, and using sense-making and reasoning to drive instruction.</p>	<p>Researchers found that the first lesson focused on procedures and correct answers, while the second lesson included elements of understanding student thinking and reasoning. This allowed the teacher to listen to and understand students' mathematical thinking, which was then used to drive the remainder of the lesson. These findings support <i>Derivita's</i> design, which makes students' mathematical reasoning visible and accommodates instructional</p>	



Citation	Citation type	Information about sample and theoretical framework	Design decisions driven by the research	How did <i>Derivita</i> leverage the citation to come to this design decision
			<p>adjustments in real time. The study shows that to effectively facilitate this, a teacher needs to be able to access student work, which can be accomplished through <i>Derivita's</i> "Show Work" and real-time analytics functionality. <i>Derivita</i> surfaces students' symbolic and open-ended responses, enabling teachers to adapt instruction based on reasoning rather than correctness.</p>	



Derivita’s dynamic math engine delivers instant, formative feedback—providing step-by-step explanations and hints that help students revise strategies, avoid errors, and strengthen self-regulated learning.

Citation	Citation type	Information about sample and theoretical framework	Design decisions driven by the research	How did <i>Derivita</i> leverage the citation to come to this design decision
<p>Fyfe, E. R., & Rittle-Johnson, B. (2016). The benefits of computer-generated feedback for mathematics problem solving. <i>Journal of Experimental Child Psychology</i>, 147, 140-151. https://doi.org/10.1016/j.jecp.2016.03.009</p>	<p>Research Article</p>	<p>This study examined the effects of computer-generated feedback on mathematics learning for 75 second grade students from two schools. Students were randomly assigned to a no feedback (n=24), immediate feedback (n=25) or summative feedback (n=26) group. Students received a pretest, intervention problems, and a post-test. Results were coded according to problem-solving strategies and self-assessment. Students’ scores on measures were analyzed using ANCOVAs.</p>	<p>The results of the study show that immediate computer-generated feedback increased students’ problem-solving strategies and reduced common errors. Additionally, the immediate feedback transferred to new problems. The summative-feedback group’s results were similar to the no-feedback group, indicating that summative feedback was not as helpful to students’ learning progress. The study further indicated that the self-assessment results after a summative assessment were higher for students who were in the feedback group. This suggests a positive connection between self-regulated learning and frequency of feedback. <i>Derivita</i> delivers automated, formative feedback to students as they complete their math work.</p>	<p><i>Derivita’s</i> dynamic math engine delivers instant, formative feedback and detailed, step-by-step solutions to improve student problem-solving strategies. This design is supported by extensive research on formative assessment. <i>Derivita’s</i> ability to provide immediate and personalized feedback aligns with research confirming this is one of the most beneficial components of computer-based assessments. Additionally, immediate feedback, particularly when it includes explanations, improves math success by strengthening problem-solving strategies. Highly informative feedback that not only points out the mistake but also explains why it occurred and how to avoid it in the future frames feedback as a tool for improvement and promotes self-regulated learning.</p>



Citation	Citation type	Information about sample and theoretical framework	Design decisions driven by the research	How did <i>Derivita</i> leverage the citation to come to this design decision
<p>Lee, H., Chung, H. Q., Zhang, Y., Abedi, J., & Warschauer, M. (2020). The effectiveness and features of formative assessment in US K–12 education: A systematic review. <i>Applied Measurement in Education</i>, 33(2), 124–140, https://doi.org/10.1080/08957347.2020.1732383</p>	<p>Systematic Review</p>	<p>This study synthesizes findings from 33 empirical studies (25 research projects) on formative assessment in US K–12 education. The study used a multilevel modeling approach to investigate the overall effect of formative assessment on student learning and identify which specific features of feedback (source, formality, length) influence effectiveness.</p>	<p>This study found that when formative feedback is integrated directly into instruction, student learning outcomes improve significantly. Real-time, actionable feedback—rather than delayed correction—supports deeper engagement and timely adjustments. <i>Derivita's</i> design reflects this principle by embedding formative feedback into each step of the math experience. The platform provides students with immediate, targeted feedback while they work through problems, enabling revision and supporting learning in the moment.</p>	
<p>Pinger, P., Rakoczy, K., Besser, M., & Klieme, E. (2018). Implementation of formative assessment – effects of quality of programme delivery on students' mathematics achievement and interest. <i>Assessment in Education: Principles, Policy & Practice</i>, 25(2), 160–182. https://doi.org/10.1080/0969594X.2016.1170665</p>	<p>Research Article</p>	<p>This study uses a quasi-experimental design to investigate the impact of formative assessment for 17 ninth-grade math classes. The study focused on how teachers implement feedback and its effectiveness on student achievement and engagement. The researchers analyzed four feedback characteristics: number of comments, specificity, self-feedback, and norming.</p>	<p>This research showed that detailed, elaborative feedback has a greater impact on learning than general or frequent feedback. Students who received specific guidance on their reasoning made more meaningful revisions and demonstrated deeper understanding. <i>Derivita</i> incorporates this by providing feedback that responds to students' specific mathematical inputs—including equations, expressions, and symbolic responses—rather than generic correctness cues. Its engine interprets student reasoning and offers insights that help improve strategies and build conceptual understanding.</p>	



Citation	Citation type	Information about sample and theoretical framework	Design decisions driven by the research	How did <i>Derivita</i> leverage the citation to come to this design decision
<p>Wisniewski, B., Zierer, K., & Hattie, J. (2020). The power of feedback revisited: A meta-analysis of educational feedback research. <i>Frontiers in Psychology, 10</i>, 3087. https://doi.org/10.3389/fpsyg.2019.03087</p>	<p>Meta-analysis</p>	<p>This paper analyzed 435 empirical studies to examine the effects of feedback on student learning. The studies reviewed were all conducted within an educational context, spanning from PreK to higher education. The researchers coded each study's features and calculated effect sizes using a random-effects model.</p>	<p>This meta-analysis found that formative feedback is most effective when it provides elaboration—helping students understand why an answer is incorrect and how to improve it. Simple right/wrong feedback had a much smaller effect on learning. <i>Derivita's</i> feedback engine goes beyond correctness by surfacing explanation-based feedback and step-level guidance. This approach reinforces mathematical reasoning and helps students persist through challenging problems by refining their thinking, not just their answers.</p>	
<p>Yao, Y., Amos, M., Snider, K., & Brown, T. (2024). The impact of formative assessment on K-12 learning: a meta-analysis. <i>Educational Research and Evaluation, 29</i>(7–8), 452–475. https://doi.org/10.1080/13803611.2024.2363831</p>	<p>Meta-analysis</p>	<p>This review synthesizes the findings from 118 studies (with 258 effect sizes) that examine the impact of formative assessment on K–12 student achievement. The researchers include various forms of assessment such as quizzes, rubrics, and benchmark assessments, as long as the purpose was to inform instruction. A random effects model and robust variance estimation (RVE) was used to account for variations across the studies.</p>	<p>The analysis found that the impact of formative assessment had a statistically significant effect on student achievement. The impact was noted across types of assessments and content areas. The findings also suggest formative feedback has an increased effect on self-regulated learning for secondary students. These findings support <i>Derivita's</i> design of providing continuous, real-time feedback in multiple forms.</p>	



Derivita generates real-time analytics and predictive insights that support data-driven instructional decisions—from individual student feedback to system-wide improvement strategies.

Citation	Citation type	Information about sample and theoretical framework	Design decisions driven by the research	How did <i>Derivita</i> leverage the citation to come to this design decision
<p>Fuchs, A., Radkowsch, A., & Sommerhoff, D. (2025). Using learning progress monitoring to promote academic performance? A meta-analysis of the effectiveness. <i>Educational Research Review</i>, 46, 100648. https://doi.org/10.1016/j.edurev.2024.100648</p>	<p>Meta-analysis</p>	<p>This analysis reviewed 25 peer-reviewed studies to examine the effects of learning progress monitoring (LPM) on students' academic performance. The research included a total of 7,379 students and 87 effect sizes. The studies, published before June 2024, were coded for educational setting, LPM implementation, and how the results were used. The researchers calculated effect size using Hedges' <i>g</i> and a random-effects model.</p>	<p>The reviewed studies showed that using learning progress monitoring (LPM) has a significant positive effect on academic performance. The effects were even more notable for students with educational needs, which showed a moderate to large positive impact, particularly within math domains. This analysis demonstrates that LPM is an effective tool for improving student performance. The researchers recommended implementing LPM frequently, based on their findings. This supports <i>Derivita's</i> design of surfacing trends early enough to support intervention and instructional change.</p>	<p><i>Derivita's</i> real-time analytic and predictive data at the student, class, classroom, and district-level helps teachers make targeted, data-driven, instructional and systems-wide decisions. This feature is supported by research on the value of using learning progress monitoring (LPM) systems to guide instructional decisions. This research particularly notes the usefulness of LPM systems in math. Researchers recommend frequent implementation of LPM, which is encouraged by <i>Derivita's</i> immediate and continuous data reports. <i>Derivita</i> provides clear, actionable data and its predictive insights guide teachers on specific areas to focus on for improvement.</p>
<p>Knoop-van Campen, C. A. N., Wise, A., & Molenaar, I. (2021). The equalizing effect of teacher dashboards on feedback in K-12 classrooms. <i>Interactive Learning Environments</i>, 31(6), 3447–3463. https://doi.org/10.1080/10494820.2021.1931346</p>	<p>Research Article</p>	<p>This study used a quasi-experimental design to examine how learning dashboards influence feedback practices. The researchers observed 35 teachers in K–12 classrooms who used a real-time data dashboard. The researchers compared the feedback given after the teacher consulted the dashboard with the feedback given on the teacher's own initiative to see how teachers allocated feedback.</p>	<p>The research found that when teachers used a dashboard, they were more likely to provide balanced feedback to students of all ability levels. This suggests that the real-time data from the dashboard helped teachers provide more effective feedback for struggling students. This supports the value of <i>Derivita's</i> real-time analytics as this data can guide teachers in providing specific, high-quality feedback to students who need it. By surfacing trends in real-time, <i>Derivita</i> provides teachers with the information to share actionable and equitable feedback.</p>	<p>Research further shows that teachers who consistently use real-time analytics and predictive insights are more likely to differentiate instruction, which leads to increased student engagement and higher learning gains. Administrators can use real-time analytics and predictive insights to inform broader decisions about instruction, allocate</p>



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<p>Mangaroska, K., & Giannakos, M. (2019). Learning analytics for learning design: A systematic literature review of analytics-driven design to enhance learning. <i>IEEE Transactions on Learning Technologies</i>, 12(4), 516–534. https://doi.org/10.1109/TLT.2018.2868673</p>	<p>Systematic Review</p>	<p>This paper reviewed 43 empirical, peer-reviewed studies to explore the connection between learning analytics and learning design. The authors' primary focus was on how learning analytics can support instructional decisions. The studies, which included participants from middle school to university, were coded based on research design, educational context, sample size, pedagogical approach, and technology used.</p>	<p>The review found that learning analytics are most effective in supporting instructional decisions when integrated into daily practice and regular learning routines. The evidence also highlights the benefit of educational environments that consistently incorporate learning analytics into their design process. Based on the research, the reviewers recommend using learning analytics to create personalized learning and feedback. <i>Derivita's</i> predictive impact analytics provide suggestions to teachers and administrators about which specific areas students should focus on to improve. This allows for teachers to make changes to instruction to respond to student needs.</p>	<p>resources, and monitor a school or district's overall performance. <i>Derivita's</i> predictive analytics help school leaders identify support for groups or schools where it is most needed.</p>
<p>Paolucci, C., Renzulli, F., Paolini, A., & Cuzzocrea, G. (2024). A review of learning analytics opportunities and challenges for K-12 education. <i>Heliyon</i>, 10(4), e25767.</p>	<p>Meta-analysis</p>	<p>This review analyzed 47 research articles about learning analytics. The articles were all published after 2015 and focused on PreK–12 education. The studies were coded to identify themes and analyze results.</p>	<p>This analysis highlights the importance of actionable data from learning analytics. Difficulties with over-complicated analytics reports were also noted. This aligns with <i>Derivita's</i> design that produces clear, easy to read insights for teachers and administrators. Additionally, <i>Derivita</i> provides predictive analytics and targeted insights that make the data actionable. By highlighting which standards or concepts should be improved on, <i>Derivita</i> provides clear information for instructional support.</p>	



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<p>Ysseldyke, J., & Tardrew, S. (2007). Use of a progress monitoring system to enable teachers to differentiate mathematics instruction. <i>Journal of Applied School Psychology, 24</i>(1), 1–28. https://doi.org/10.1300/J370v24n01_01</p>	<p>Research Article</p>	<p>This study investigated how progress monitoring and instructional management systems are used to differentiate math instruction. The research compared 67 classrooms using a progress monitoring system to 58 classrooms not using one. The classrooms were located across 24 states and consisted of a total of 2,202 students from grades 3–10.</p>	<p>The results showed that classrooms using a progress monitoring system demonstrated learning gains across all grades. Additionally, teachers in these classrooms dedicated more time to individualizing instruction. The research also revealed that students in these classrooms were significantly more likely to report finding math enjoyable. <i>Derivita's</i> assessment data gives teachers insight into student progress. Additionally, the SpotCheck feature gives real-time, whole-class checks to identify concepts for re-teaching.</p>	



Derivita’s seamless LMS integration streamlines instruction, assessment, and administrative tasks, significantly reducing the cognitive and technical burden while lightening teacher workload.

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<p>Attard, C., & Holmes, K. (2020). An exploration of teacher and student perceptions of blended learning in four secondary mathematics classrooms. <i>Mathematics Education Research Journal</i>, 34, 719–740. https://doi.org/10.1007/s13394-020-00359-2</p>	<p>Research Article</p>	<p>This article discusses the findings from ten case studies in nine K–12 schools. The schools were a mix of public, private, and religious schools. Each case was made up of a classroom teacher, school leader and 5–6 students. The data collected included classroom observations, lesson plans, and interviews. Interview prompts included questions about perceptions of technology use in mathematics. Inductive thematic analysis of data was carried out and a cross-case analysis was conducted.</p>	<p>The findings from all case studies indicate that use of technology increases opportunities for student engagement due to multiple pathways and methods of access. In particular, blended approaches provided benefits in differentiation, personalized learning, dynamic visualization of concepts, and feedback communication. The authors argue that a blended learning approach in mathematics classrooms is beneficial for mathematics success. The study further notes that embedded multi-media lessons within the school’s LMS increased student access to resources and promoted increased teacher-student communication.</p>	<p><i>Derivita</i> integrates seamlessly into a school’s existing LMS which directly addresses key barriers to technology adoption and results in streamlined instruction and assessment. Research indicates that time constraints and the learning curve for new technology is a prohibitive factor in implementing its use within regular instruction. By integrating into the existing LMS, <i>Derivita</i> eliminates the additional administrative burdens (such as separate logins and rostering), and incorporates into a tool teachers are already familiar with. This is important because ease of use, perceived usefulness, and teachers’ technological skills are crucial factors in technology adoption. <i>Derivita</i> facilitates blended learning by integrating into a familiar tool that provides a single, coherent environment for instructional activities. This leads to consistent usage that reduces teacher workload while increasing classroom engagement.</p>
<p>Dogan, S., Dogan, N. A. & Celik, I. (2021). Teachers’ skills to integrate technology in education: Two path models explaining instructional and application software use. <i>Education and Information Technologies</i>, 26, 1311–1332. https://doi.org/10.1007/s10639-020-10310-4</p>	<p>Research Article</p>	<p>This quantitative research study used structural equation modeling and path analysis to explore the factors that influence teachers’ use of technology. The Technology Uses and Perceptions Survey was administered to 1,335 K–12 teachers in Florida. Elements examined included technology support, teacher confidence, technology skills, and perceived usefulness.</p>	<p>The study found that perceived technology skills had the strongest effect on teachers’ use of instructional technology. Teachers were more likely to use technology in their teaching when they felt they had the skills to do so. This supports <i>Derivita</i>’s design which seamlessly integrates into the existing LMS, making the tool familiar and easy for teachers to use. Furthermore, the study found a positive effect between a teacher’s perceived skills and belief in a technology tool’s usefulness. This aligns with <i>Derivita</i>’s design</p>	<p><i>Derivita</i> facilitates blended learning by integrating into a familiar tool that provides a single, coherent environment for instructional activities. This leads to consistent usage that reduces teacher workload while increasing classroom engagement.</p>



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			that ease-of-use and benefits in streamlining instruction and grading will result in teachers finding the tool useful for instruction.	
<p>McCulloch, A. W., Hollebrands, K., Lee, H., Harrison, T., & Mutlu, A. (2018). Factors that influence mathematics teachers' integration of technology in mathematics lessons. <i>Computers & Education</i>, 123, 26–40. https://doi.org/10.1016/j.compedu.2018.04.008</p>	Research Article	This study analyzed the factors that influence math teachers' decisions regarding using technology in their classrooms. 21 secondary mathematics teachers were interviewed and their interviews coded using both theory and data-driven codes.	The results showed that all teachers integrated some technological implementation in their classrooms. However, while all the teachers demonstrated some degree of technological literacy, they noted time constraints as one of the biggest barriers to integrating more technology. Teachers also noted ease of use and accessibility as some of the most common factors they considered when choosing to implement technology. This aligns with <i>Derivita's</i> design as the product is incorporated into the school's current LMS, allowing for increased accessibility and ease of use, as well as reducing the time needed to implement the technology.	



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<p>Stockless, A., (2018). Acceptance of learning management system: The case of secondary school teachers. <i>Education and Information Technologies</i>, 23(3), 1101–1121. https://doi.org/10.1007/s10639-017-9654-6</p>	<p>Research Article</p>	<p>This study analyzed teacher acceptance of a district-wide LMS deployment. 105 secondary school teachers participated in the study. Data was collected based on the TAM model and a PCA was conducted to determine important dimensions. A path analysis was subsequently conducted. Variables about perceived usefulness, ease of use, and influences were examined.</p>	<p>The principal component that influenced teachers' acceptance of LMS was perceived usefulness. Ease of use was also examined, and researchers determined that were teachers to be required to register students and create course parameters, teachers would have seen a reduction in the perceived usefulness of the course. This aligns with <i>Derivita's</i> integration into an existing LMS as it removes the burden from teachers of administrating a separate digital environment.</p>	



Derivita’s built-in PLC Workspaces enable teachers to collaborate on common assessments and share data-informed reports to improve instructional practices.

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<p>Burns, M. K., Naughton, M. R., Preast, J. L., Wang, Z., Gordon, R. L., Robb, V., & Smith, M. L. (2017). Factors of professional learning community implementation and effect on student achievement. <i>Journal of Educational and Psychological Consultation</i>, 28(4), 394–412. https://doi.org/10.1080/10474412.2017.1385396</p>	<p>Research Article</p>	<p>This study examined the relationship between implementation of Professional Learning Communities (PLCs) and student achievement. One hundred eighty-one schools ($n = 181$) in Missouri participated in the study and the researchers used a combination of exploratory and confirmatory factor analysis to identify the constructs of PLC implementation. Linear regression models were then used to determine how these related to student achievement scores.</p>	<p>The study found that effective PLCs included collaborative leadership processes and data-driven systems for learning. Researchers found that when PLCs used formative assessment data and team focus on results, it had a significant correlation with student math achievement. This finding directly supports the value of <i>Derivita’s</i> PLC workspaces which are designed to provide data-driven collaboration. By enabling teachers to share assessments and data, <i>Derivita</i> facilitates the practices identified in this study that resulted in improved student math scores.</p>	<p><i>Derivita’s</i> built-in PLC Workspaces enable teachers to collaborate on common assessments and share data-informed reports to improve instructional practices. This aligns with research showing that data-driven PLCs are related to higher student math achievement. By enabling teachers to collaborate on these elements, <i>Derivita</i> supports effective PLC practices that can lead to meaningful instructional improvement and student achievement gains.</p>
<p>Harvey, F., & Teledahl, A. (2022). Characteristics of professional learning communities in mathematics: A systematic review. <i>Mathematics Teacher Education and Development</i>, 24(1), 72–95.</p>	<p>Systematic Review</p>	<p>This study synthesizes findings from 32 empirical studies on Professional Learning Communities (PLCs) in mathematics. The review uses cultural-historical activity theory (CHAT) to analyze and compare different PLC models and clarify elements of an effective PLC.</p>	<p>The findings of this review identified that the most effective PLCs use student data, common assessments, and mathematical problems to generate discussions and analysis. <i>Derivita’s</i> PLC Workspaces support this type of collaboration by sharing assessments and data. Furthermore, the study notes that successful PLCs use these elements for teachers to engage in critical inquiry into mathematics teaching. <i>Derivita’s</i> PLC Workspaces facilitates effective inquiry and collaboration for math teachers.</p>	



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<p>Ronfeldt, M., Farmer, S. O., McQueen, K., & Grissom, J. A. (2015). Teacher collaboration in instructional teams and student achievement. <i>American Educational Research Journal</i>, 52(3), 475–514. https://doi.org/10.3102/0002831215585562</p>	<p>Research Article</p>	<p>This quantitative research study investigated the relationship between teacher collaboration and student achievement. The quasi-experimental design used survey and administrative data from over 9,000 teachers in 336 schools over 2 academic years. The study used common value-added modeling to measure student achievement gains in relationship to the use of teacher collaboration and Professional Learning Communities (PLCs).</p>	<p>The study found that quality collaboration among instructional teams is directly and positively related to higher student achievement gains in both math and reading. The researchers noted that collaboration that included analyzing student data and developing instructional responses was particularly effective. This aligns with <i>Derivita's</i> PLC Workspaces which are designed to facilitate data-driven collaboration. The ability to create and share common assessments and review data-informed reports supports productive collaboration that can influence student success.</p>	

