XPRIZE DIGITAL LEARNING CHALLENGE

Sponsored by the Institute of Education Sciences (IES)

CHALLENGE GUIDELINES 3.0

June 21, 2021

XPRIZE Digital Learning Challenge | IES is governed by these **Challenge Guidelines**. The Challenge Guidelines summarize the high-level requirements and rules of the challenge.

XPRIZE may revise these Guidelines at any time during the course of the challenge to provide additional information or to improve the quality of the challenge. Unanticipated issues that arise may require modifications to these Guidelines. XPRIZE reserves the right to revise these Guidelines as it, in its sole discretion, deems necessary. All registered Teams will be notified of revisions in a timely manner.

For further details concerning the operation of the challenge, such as exact dates and locations of events, specific technical thresholds for performance testing, and operational information, please refer to the **Rules & Regulations**, **Competitor Agreement**, and other documents throughout the course of the challenge.

The Rules & Regulations will be developed by XPRIZE in consultation with the **Advisory Board** and **Judging Panel** and will be provided to all registered teams in advance of the events they govern.

Please send any questions about this challenge and/or feedback regarding the Challenge Guidelines to DigitalLearning@xprize.org.

NOTE: **Bolded** items are defined in Section 10: Glossary and Definitions.

1 CHALLENGE OVERVIEW

In any given year in the United States almost 80 million students (nearly 25% of the U.S. population) are enrolled in pre-k through post-secondary and continuing education. Yet over the past decade, as adoption of education technology has grown and digital learning systems have proliferated, methods for collecting data on and analyzing learning processes and outcomes have not changed substantially. We face unprecedented challenges in education, both to close the opportunity gap for historically underserved populations as well as to adjust to an era of technology-driven, rapid educational change. The needs of student populations, whether in the early years or higher education, are evolving rapidly.

Today, the combination of digital learning tools; increasing connectivity; and acceleration in big data, machine learning, and artificial intelligence methods provide an opportunity to expand data collection methods in order to dramatically improve the measurement and understanding of how learning takes place. While many learning systems already collect copious data and conduct substantive analyses, practices to collect data with the intention of rapidly understanding learning in formalized settings are not the standard practice. Incentivizing the development, demonstration, and deployment of an infrastructure for conducting experiments in learning contexts has the potential to improve our understanding of what works in education, while saving time and at a much lower cost than traditional methods, and potentially improving learning outcomes for millions of students.

The Digital Learning Challenge seeks to catalyze development of systems that can run rigorous experiments that can be implemented and replicated faster, and at a lower cost, than traditional on-ground randomized control trials. The Challenge is an open innovation competition that incentivizes digital learning systems to improve their capabilities and functionalities to host valid, systematic, and methodologically rigorous scientific experiments in the education sciences. These experiments must be interoperable and have the ability to measure third-party interventions in collaboration with research institutions and external evaluators, and in full compliance with current privacy laws and best practices. In this way, we seek to catalyze learning system developers to support rigorous empirical inquiry by developing capabilities that improve the breadth and quality of data they can capture and analyze. **The long-term goal of the challenge is to modernize, accelerate, and improve the ways in which we identify effective learning tools and processes that improve learning outcomes.**

A consistent goal of IES's work is to test the efficacy of educational interventions in a wide range of populations of learners to identify which interventions work best for whom. By diverse learners we mean, but do not limit ourselves to, gender diversity, age diversity, ethnic diversity, race diversity, socioeconomic status diversity, geographic diversity, as well as students with learning differences. The ability of competitors to include a diverse set of learners will be considered throughout the judging process.

The winning team of the Digital Learning Challenge will build systems to conduct rapid, reproducible experiments and demonstrate the resilience and rigor of this infrastructure in a formal learning context.

The winning team must minimally demonstrate its ability to:

- ***Conduct an Randomized Control Trial (RCT) or Quasi Experimental Design (QED) using meaningful and substantive educational interventions***
- ***Systematically replicate the experiment at least five times in no more than 30 days***
- ***Replicate the experiment within at least three distinct demographics***

While Teams will not be judged on the effectiveness of the intervention they are testing, the intervention cannot be trivial. Judges will have discretion to weight criteria including, for example, the variability of learner populations and groups with which competitors conduct replications, the sample size competitors achieve, and other metrics.

The XPRIZE Digital Learning Challenge will enable experiments of frequency, scope, and scale not possible through traditional methods used in education research or commercial EdTech processes. These experiments will transform our understanding of successful educational processes and result in better experiences and outcomes for all learners.

2 CHALLENGE TIMELINE

The XPRIZE Digital Learning Challenge is a 24-month effort (launching March 22, 2021 and concluding March 2023) to harness the energy and creativity of software developers, engineers, data scientists, education researchers, and others to dramatically improve our ability to conduct technology-mediated learning experiments in education settings (such as public, private, or charter, nonprofit or for-profit pre-kindergarten, primary schools, secondary schools, colleges, universities, vocational schools, and career and technical education programs).

March 22, 2021	Challenge Launch: Team Registration Opens & Guidelines Released
April 22, 2021	Updated Guidelines Published
April 22, 2021	Team Questionnaire Released to Teams
May 24, 2021	Team Questionnaire Opens in POP
June 2021	Updated Guidelines Released
July / August 2021	Rules & Regulations Released
September 30, 2021	Team Registration and Team Questionnaire Deadline
October 1, 2021	Team Technical Submission Opens

December 1, 2021	Team Technical Submission Deadline
December 2021	Competitor Agreement and Insurance & Eligibility Deadline
January 2022	Technical Submission Judging
January 2022	Teams Notified of Approval to Proceed to Pilot Study
January 2022	Pilot Study Submission Opens
July 2022	Pilot Study Submission Deadline
July - August 2022	Pilot Study Submission Judging
August 2022	Finalist Teams Notified (up to 5 Finalist Teams split $250,000)
August 2022	Demonstration Phase Opens
February 2023	Demonstration Phase Deadline
February - March 2023	Demonstration Phase Judging
March 2023	Grand Prize Winners Announced

Note: All dates subject to change

3 CHALLENGE FORMAT

TEAM QUESTIONNAIRE

Teams will have between May 24, 2021 and September 30, 2021 to submit responses to the **Team Questionnaire** for this challenge on the **Prize Operations Portal** (pop.xprize.org). Responses to the Team Questionnaire should include details about the team and the current capabilities of the team's system to gather and analyze data on learning outcomes, provide a roadmap for intended features to be added, and expected capabilities of the system throughout the challenge. Teams should also outline plans for collecting data and for carrying out pilot studies and full experiments with accredited education institutions during the final phase of this challenge.

Team Questionnaires are informational in nature and will enable XPRIZE to better empower the teams to succeed in this challenge. Team Questionnaires will be screened for completeness and for meeting the minimum requirements outlined in these Guidelines.

TECHNICAL SUBMISSION

Starting from the launch of the challenge, Teams will have roughly nine months to develop or add features and instructional components to their systems and provide a **Technical Submission** for the Judging Panel's review. Teams will submit their systems, as well as any technical documentation on the system (such as diagrams, drawings, schematics, videos) and other written explanations of the functionality and architecture of the system, with particular evidence of the system's ability to deliver high quality experiments and replications.

Teams will also have the option to include any data from pilots or experiments they have already performed to demonstrate their system's function as designed. Teams will also be required to demonstrate their ability to set up pilot studies ahead of those to be carried out during the Pilot Study and Demonstration Phase of the challenge.

Additional details and requirements regarding the Technical Submission will be provided to teams in the form of the Rules & Regulations and other explanatory documents ahead of the submission window. All submissions will be screened by XPRIZE for completeness. The Judging Panel, consisting of experts in the fields of data science, technology, and education research will then review the Technical Submissions and select Teams to advance to the Pilot Study phase of the challenge. Teams that have advanced to the Pilot Study phase will be notified within approximately four weeks of the submission deadline.

PILOT STUDY

Teams will have approximately six months to conduct **Pilot Studies** in accredited education institutions settings to demonstrate the capabilities of their systems. Teams will be required to submit both a technical report of their pilot, the raw data generated by the study, reports of the data, and a set of analyses using the raw data. During the pilot stage, Teams will need to carry out a (minimum) one-month-long pilot experiment in an education setting in the United States and demonstrate the ability and capacity to conduct rigorous research—and to form partnerships with educational institutions with diverse populations in order to conduct experiments. Teams must conduct at least one experiment and at least one replication with at least one learner demographic by the Pilot Study Deadline (currently scheduled for July 2022). XPRIZE will make a best effort to help facilitate team partnerships with educational institutions for qualified teams that do not have existing partners in place.

During the Pilot Study, Teams must demonstrate that they have a clear path for further deployment of their tools for the improvement of the learning systems. Such plans should include, but are not limited to: a business plan showing how the winner will use its tool or method to generate revenue; an open sourcing strategy for the codes, algorithms, and models of the winning solution to be adopted; and deployment plans through partnerships or joint ventures with research institutions.

Additional details and requirements regarding the Pilot Study phase will be shared with teams in upcoming releases of the Rules & Regulations that govern this challenge. Before being reviewed by the Judging Panel, these submissions will be screened again for completeness by XPRIZE. Based

on criteria defined in the Rules & Regulations for this challenge, submissions will then be reviewed by the Judging Panel and up to five (5) Finalist Teams will be selected to advance to the Demonstration Phase of the challenge and split a Milestone Prize of $250,000 (up to $50,000 awarded to each team). Finalist Teams that have advanced to the Demonstration Phase of the Challenge will be notified within approximately four weeks of the submission deadline.

TEAM DEMONSTRATION PHASE

In the final phase of the challenge, Finalist Teams will have an additional six months to conduct experiments that demonstrate the full capabilities of their systems and running and replicating experiments. Teams will be required to submit both a technical report of their experiments, the raw data generated by the study (with appropriate safeguards protecting privacy and in compliance with the team's IRB requirements), reports of the data, and a set of analyses using the raw data.

To be eligible for the final **Prize Purse**, Teams must demonstrate the ability to conduct an experiment and at least five systematic replications of that experiment with at least three learner demographics in no more than 30 days. More details will be made available in the Rules & Regulations document.

Additional details and requirements regarding the Team Demonstration Phase will be shared with teams in upcoming releases of the Rules & Regulations that govern this challenge. Submissions will be reviewed by the Judging Panel to select a Grand Prize Winner and a Runner-Up Team for the challenge who will, respectively, be awarded a $500,000 grand prize and a $250,000 runner-up prize. The winning **Solutions** will be those that meet the minimum requirements and are best able to demonstrate the robustness of their system to host a variety of experiments of education interventions, including randomly assigning students, teachers, classrooms, or schools to groups; collecting relevant high quality data; and conducting reproducible analyses based on those data that demonstrate the capabilities of the system. Ideally, the winning team will be able to provide comprehensive measures, multi-dimensional representation of learner engagement, robustness of measures in relation to the constructs that are attempted to be measured, and will include contextual and granular data as well.

Teams will NOT be assessed on whether the interventions used in their experiments produce the desired impact, but rather will be evaluated by the ability of their systems to conduct experiments and *measure* learning processes and outcomes as described in the Rules and Regulations for this challenge.

4 PRIZE PURSE

A total of $1,000,000 (USD) in cash prizes will be awarded in the Digital Learning Challenge, as follows:

MILESTONE AWARD	$250,000	*$50,000 awarded to each of up to five Finalists Teams*
RUNNER UP	$250,000	*Second Place Team*
GRAND PRIZE	$500,000	*1 Grand Prize Winner*
TOTAL	**$1,000,000**	

All prize purses will be paid directly to Teams by the U.S. Department of Education. Teams that win any prize will therefore be required to register with the Department of Education at challenge.gov. These teams will be provided with the relevant registration page at a later date.

5 EXAMPLE TESTING CRITERIA

During each phase of the Challenge, Team submissions will be measured against set criteria aligned with the Challenge goals. Some judging criteria are binary. For example, Teams must demonstrate adherence to open data requirements and data standards as described below in Section 8. Other criteria will be ranked based on a scoring rubric developed by XPRIZE and the Judging Panel.

As an example, the Judging Panel may decide to rate each submission on a scale of 0 to 5 for (1) the substantiveness of the interventions and the outcomes that are being measured; (2) the quantity and variability of replications and the speed with which they are able to be carried out; (3) the sufficiency of the sample size of the experiment and replications in relation to Teams' power analyses; (4) the variability of the populations with which experiments and replications are run; (5) the experimental design; (6) the quality of data gathered, including data on learning contexts, contextualized learner demographics, attendance data; and (7) the scalability of the experimental design. Teams will not be judged on what they find, but rather on the quality of evidence that they produce.

DECISIONS OF JUDGING PANEL ARE FINAL

The Judging Panel shall have sole and absolute discretion to declare the winners of the challenge and award the Prize Purses and other Awards. Decisions of the Judging Panel are binding on XPRIZE, sponsors, Teams, and each Team Member. All parties agree not to dispute any decision or ruling of the Judging Panel. Competitors shall have no right to be informed of other Teams' calculations, measurements, and results, unless such information is made publicly available by XPRIZE.

If no Team meets the criteria for an award, then the Judging Panel will retain sole and absolute discretion to declare or not declare a winner of the challenge and, in unison with XPRIZE, otherwise allocate or choose not to allocate one or more of the Awards and/or any other Award associated with the challenge.

6 REGISTRATION REQUIREMENTS

The Digital Learning Challenge is open to any United States-based individual, educational institution, non-profit, NGO, company, corporation, person, or any other non-governmental legal entity, regardless of size or locality.

All Teams must register to compete for the challenge at pop.xprize.org. There is no registration fee, but Teams must be U.S. based legal entities permitted to do business with the U.S. Department of Education and complete all registration requirements prior to the Team Registration Deadline of September 30, 2021. All submissions must be made through the POP platform. Teams that win any portion of a prize purse will be required to additionally register at challenge.gov with details and a URL to be provided at a later date to those Teams.

XPRIZE reserves the right to limit, or restrict upon notice, participation in the challenge to any person or entity at any time for any reason. Organizations, individuals, or other entities deemed to promote hate, hateful speech, discriminatory policy, violence, or illegal activities are barred from competing in the challenge.

7 OPERATING COSTS

Teams will be responsible for funding all costs associated with competing in the Digital Learning Challenge, including but not limited to personnel, marketing, advertising, legal fees, insurance, participant recruitment costs and incentives, and other costs. XPRIZE will not provide grants or other direct support to Teams.

8 DATA STANDARDS AND OPEN DATA REQUIREMENTS

Competing Teams must demonstrate compliance with Federal and Department of Education open data requirements, which can be found at https://ies.ed.gov/funding/datasharing_implementation.asp. Teams must also demonstrate adherence to all necessary and relevant data privacy and confidentiality requirements including federal, state and local law in the locality where the pilots are done.

Competing Teams must use CEDS data standards and governance, as outlined in https://ceds.ed.gov/dataModelEntities.aspx. XPRIZE will create a centralized repository of data following CEDS standard models. The system will validate the accuracy of the data in the centralized repository. Teams will connect their solutions to this repository so that XPRIZE can collect and validate the data.

9 INSTITUTIONAL REVIEW BOARD (IRB) REQUIREMENTS

The XPRIZE Foundation is a non-profit within the United States and all teams awarded funds by the XPRIZE Foundation and The Institute of Education Sciences (IES) must adhere to the ethics processes typical of research universities within the United States. Teams performing any experimentation and/or who collect data about people (e.g., having people interact with a chatbot) will likely require IRB review.

Competing Teams must obtain their own Institutional Review Board (IRB) approvals based on the Human Subject Regulations Decision Charts (HHS Tree), if necessary, for conducting human subjects research and submit them to the Judges. Teams will be required to provide details regarding any current and/or planned IRB review status. Teams who declare that they are IRB exempt must provide documentation to that effect for Judges' review. Systems must also comply with all other relevant regulations, such as COPPA.

- Teams will need to select one of the following options: The proposed research program is (1) Self-determined exempted from IRB review, (2) Formally exempted from ethical review by an IRB, (3) Pending ethical review, (4) Granted approval by an IRB, (5) Rejected by an IRB, (6) Pending establishment of international process equivalency, or (7) Currently exploring our legal and ethical responsibilities. Exempt teams will still need to adhere to all relevant safeguards of privacy, confidentiality, and data protection.
- Option 1 requires submitting a written justification of your exemption qualification to the Digital Learning Challenge team (submitted via POP during a later phase of the Challenge) citing a specific exemption, such as detailing your traversal of the HHS Tree. Options 2 through 4 above may be supported with IRB communications.
- XPRIZE and the Judging Panel will summarily reject any team inappropriately conducting research of and or providing ethically dubious results.

Please note: XPRIZE is not responsible for determining whether a team requires IRB review and it is the sole responsibility of each team to determine their status and requirements for obtaining IRB review. XPRIZE may provide additional educational materials on IRB requirements through workshops and trainings, but teams should rely on IRB experts to ensure their compliance with all necessary regulations.

10 GLOSSARY AND DEFINITIONS

Below are glossary terms and additional definitions for the purposes of this Challenge:

ADVISORY BOARD

A select group of prominent advisors who contribute their wisdom, knowledge and guidance to various aspects of the prize.

CHALLENGE GUIDELINES

Document for the public and for teams that describes the requirements and parameters of the challenge.

COMPETITOR AGREEMENT

A legal and binding document that details the responsibilities of competitors for the prize.

DIGITAL LEARNING SYSTEMS

Digital learning systems (DLSs) are defined as any software that either organizes learning in both formal and informal settings or delivers content and pedagogical tools. DLSs can range from, but are not limited to, Learning Management Systems, online learning tools, curriculum products, school communication tools, data systems, educational operations software, and digital educational content, among others.

EXPERIMENTS

An experiment is defined as either a randomized controlled trial or a quasi-experimental design that introduces an innovation or a new idea to a subset of a learner population with an intended goal in mind. Experiments must be instrumented to test substantive interventions and collect meaningful learner outcomes, not trivial ones. For example, being able to test the impact of the color of a button on the speed with which learners respond to an answer is a trivial intervention. Conversely, testing an increase in the number of repetitions of a mathematical concept to a subset of learners is substantive.

EXPERIMENT INFRASTRUCTURE

Experiment Infrastructure is defined as an integrated set of features that enables product innovators and education researchers to implement interventions or innovations on a defined population subset and evaluate the outcomes using randomized controlled trials (RCT's) or quasi-experimental designs (QED's). Learner outcomes should include both behavior and learning gains. The best systems will enable a flexible and robust range of experiments, collect rich and insightful learning data, and require the least amount of effort from the researcher.

JUDGING PANEL

The subject matter and technical experts who serve as an impartial and independent evaluation panel for all aspects of this prize. Judges score the team submissions and make the all award determinations throughout the challenge.

PILOT STUDY
Teams will have approximately six months to conduct Pilot Studies in formal education settings to demonstrate the capabilities of their systems and the Judging Panel will select up to five (5) Finalist Teams to advance to the Demonstration Phase of the challenge and split a Milestone Prize of $250,000 (up to $50,000 awarded to each team) based on evaluations of each team's Pilot Study submission.

PRIZE OPERATIONS PLATFORM (POP)
The standard XPRIZE portal for teams to input data, documents, and other information for use in the Digital Learning Challenge.

PRIZE PURSE
Money offered, won, or received as a prize from competing in this challenge.

RULES & REGULATIONS
Document detailing the testing protocols, specific rules, dates/times, and other details that will govern the challenge and will be binding on teams.

SOLUTION
A team's specific submission (including all technical documentation and physical prototypes) that the Judging Panel will evaluate for this challenge.

SYSTEMATIC REPLICATIONS
Systematic Replications are defined as those that implement and evaluate the interventions in an original experiment in ways that systematically vary at least one aspect of the prior study, such as the geographical location; the population of learners, educators, and/or schools; and/or the intervention implementation. As Teams may use third-party learning content, we consider revisions to the intervention to include revisions to the systems' ability to conduct a study, not only revisions to the learning content. Considering the time limitations during later phases of the Challenge, competing Teams should also consider developing systems that can run multiple experiments simultaneously with different subgroups. More information about Systematic Replications can be found at https://ies.ed.gov/funding/pdf/2021_84305R.pdf.

TEAM DEFINITIONS
- **Pre-Registered Team:** A team or individual that is interested in participating in the competition and has created a profile in the XPRIZE POP system.

- **Registered Team:** A team that has provided a complete Team Questionnaire submission and has signed the Competitor Agreement will be deemed eligible to submit a Technical Submission for the Judging Panel's review.

- **Finalist Team:** Up to 5 Finalist Teams will be selected by the Judging Panel to proceed to the Demonstration Phase of the challenge based on the strength of their Technical Submission and Pilot Study Submission. Finalist Teams will split a prize purse of $250,000 (up to $50,000 per Team).

- **Runner Up Prize Winner:** The second place Team selected by the Judging Panel to receive the $250,000 Runner Up Prize based on the strength of their submissions throughout the challenge.

- **Grand Prize Winner:** The team that has successfully demonstrated their solution's ability to meet and/or exceed the goals of this challenge and selected by the Judging Panel to receive the $500,000 Grand Prize for this challenge.

TEAM QUESTIONNAIRE

The Team Questionnaire is the initial submission where Teams will provide details about the current capabilities of their system and will be screened by XPRIZE and/or the Judging Panel for both the completeness of the proposals and for meeting minimum requirements outlined in the Rules & Regulations for this challenge.

TECHNICAL SUBMISSION

Teams will submit a free-to-use version of their systems as well as any technical documentation on the system (such as diagrams, drawings, schematics) and other written explanations of the functionality and architecture of the system in the form of the Technical Submission for this Challenge.

All submissions will be screened by XPRIZE for completeness and the Judging Panel will then review the Technical Submissions and select Teams to advance to the Pilot Study phase of the challenge.

RANDOMIZED CONTROLLED TRIALS (RCT) AND QUASI-EXPERIMENTAL DESIGNS (QED)

While Randomized Controlled Trials (RCTs) rely on random assignment to form intervention and comparison groups, Quasi-Experimental Designs (QEDs) form these groups using methods other than random assignment. Instead of randomly assigning subjects to intervention and control groups, they are split by some other means, with two groups formed through various, non-random processes such as using non-equivalent groups organized through non-random selection, relying on statistical methods to create a comparison group through matching, or relying on before and after time-series. More information on evaluation criteria for RCTs and QEDs can be found in the What Works Clearinghouse Standards Handbook. Consistent with IES' goal to understand the generalizability of interventions, teams will be required to demonstrate their ability to deploy replications across at least three subgroups.

WHAT WORKS CLEARINGHOUSE STANDARDS AND SEER PRINCIPLES

Competitors should use rigorous research designs that will meet What Works Clearinghouse standards with or without reservations, as well as IES-wide Standards for Excellence in Education Research (SEER).

The WWC standards can be accessed at https://ies.ed.gov/ncee/wwc/Docs/referenceresources/WWC-Standards-Handbook-v4-1-508.pdf.

IES has also laid out principles for conducting rigorous education research that is transparent, actionable, and focused on consequential outcomes, and which has the potential to dramatically improve student achievement. IES's SEER Principles encourage researchers to:

1. Pre-register studies
2. Make findings, methods, and data open
3. Identify interventions' core components
4. Document treatment implementation and contrast
5. Analyze interventions' costs
6. Focus on meaningful outcomes
7. Facilitate generalization of study findings
8. Support scaling of promising results

Competing Teams are highly encouraged to demonstrate their adherence to these principles. You can learn more about IES's SEER Principles at https://ies.ed.gov/seer/ where you can explore in greater detail information about each of these principles.