XPRIZE DIGITAL LEARNING CHALLENGE

Sponsored by the Institute of Education Sciences (IES)

CHALLENGE GUIDELINES 1.0

March 22, 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 and Regulations**, **Competitor Agreement**, and other documents throughout the course of the challenge.

The Rules and 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.

1 OVERVIEW OF GUIDELINES

1.1 CHALLENGE GOALS

The Digital Learning Challenge seeks to catalyze developers of digital learning platforms to build infrastructure that can run rigorous experiments that can be implemented and replicated faster than traditional on-ground randomized control trials. The Challenge is an open innovation competition that incentivizes digital learning platforms to improve their capabilities and functionalities to host valid, systematic, and methodologically rigorous scientific experiments in the education sciences. These experiments can be run by platform developers on their own content or in collaboration with research institutions and external evaluators. In this way, we seek to catalyze learning platform developers to support rigorous empirical inquiry by developing capabilities that improve the breadth and quality of empirical data they can produce. 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 supporting replications is to test the efficacy of 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, 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.

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 platforms 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 rapid educational upheaval. 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 dramatically expand data collection methods in order to measure and improve learning and our understanding of how learning takes place. While many learning platforms already collect copious data and conduct substantive analyses, practices to collect data with the intention of understanding learning rather than for technical debugging 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 potentially improving learning outcomes for millions of students.

The winning team of the XPRIZE Digital Learning Challenge sponsored by IES will (a) build the best infrastructure to conduct rapid, reproducible experiments and (b) demonstrate the resilience and rigor of this infrastructure in a formal learning context.

The winning team must minimally demonstrate its ability to (a) conduct an Randomized Control Trial (RCT) or Quasi-Experimental Design (QED) using any meaningful and substantive educational intervention, and (b) systematically replicate that experiment multiple times with distinct subgroups in a condensed time frame. 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 subgroups 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.

IES and XPRIZE believe that great ideas can come from anyone and that providing a platform for those ideas to be shared and promoted can enable greater collaboration across educational institutions, nonprofit organizations, communities, and students.

1.2 CHALLENGE OVERVIEW

The XPRIZE Digital Learning Challenge is a two-year effort 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, which include public, private, or charter, nonprofit or for-profit pre-kindergarten, primary schools, secondary schools, colleges, universities, vocational schools, and career and technical education programs.

The challenge comprises four distinct Stages. In Stage 1, lasting seven months, competing Teams will register and submit an initial proposal. Teams that meet the challenge criteria will advance to Stage 2. Starting from the launch of the challenge, Teams will have nine months to develop or add features and instructional components to their platforms and submit technical submissions. Teams will submit prototypes of their platforms at or before the Stage 2 deadline. 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 Stage 3.

During Stage 3, Teams will have six months during which they will need to carry out a minimum one-month 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—and submit a report for judges' review. In this pilot, Teams must conduct at least one experiment and replicate that experiment at least once with at least one learner demographic. Judges will select up to five (5) Finalist Teams based

on criteria published in the Rules and Regulations for this challenge. Each Finalist Team will be eligible for an award of $50,000.

In Stage 4, Finalist Teams will have an additional six months to carry out robust testing of their platforms to fully demonstrate their capabilities for running and replicating experiments. Teams in this stage will need to demonstrate their ability to conduct an experiment and at least five systematic replications of that experiment with multiple new subgroups. Teams will submit verified reports on the findings of those experiments and replications. Judges will select a winner and a runner-up based on those results 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 platform 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 platform. 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 platforms to conduct experiments and *measure* learning processes and outcomes as described in the Rules and Regulations for this challenge.

1.3 PRIZE PURSE

A total of $1,000,000 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**	

To be eligible for the grand prize and the runner-up award, Teams must demonstrate that they have a clear path for further deployment of their tools for the improvement of the learning platform. Such plans can include, but are not limited to: a business plan showing how the winner will use its tool or method to generate revenue; open sourcing the codes, algorithms, and models of the winning solution as possible; and partnerships or joint ventures with research institutions.

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.

1.4 WHO CAN COMPETE

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.

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.

1.5 DEFINITIONS

1.5.1 DIGITAL LEARNING PLATFORMS

We define digital learning platforms (DLPs) as any software that either organizes learning in both formal and informal settings or delivers content and pedagogical tools. DLPs 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.

1.5.2 EXPERIMENTS

We define an "experiment" 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.

1.5.3 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.

1.5.4 SYSTEMATIC REPLICATIONS

"Systematic replications" are 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 platforms' ability to conduct a study, not only revisions to the learning content. Considering the time limitations in Stages 3 and 4, competing Teams should also consider developing platforms that can run multiple experiments simultaneously with

different subgroups. More information on how IES defines “Systematic Replications” can be found at https://ies.ed.gov/funding/pdf/2021_84305R.pdf.

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

IES evaluates two major categories of group designs for intervention studies: RCTs and QEDs. While RCTs rely on random assignment to form intervention and comparison groups, 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.

1.6 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 should be able 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.

1.7 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.

1.8 DATA STANDARDS REQUIREMENTS

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.

1.9 INSTITUTIONAL REVIEW BOARD REQUIREMENTS

Competing Teams must obtain their own IRB approvals, if necessary, for conducting human subjects research. Competitors who declare that they are IRB exempt must provide documentation to that effect for Judges' review. Platforms must also comply with all other relevant regulations, such as COPPA.

2 CHALLENGE STRUCTURE AND REQUIREMENTS

2.1 CHALLENGE STRUCTURE

The challenge will comprise four distinct stages:

STAGE 1: Launch, recruitment, and initial submissions

STAGE 2: Platform development and submission

STAGE 3: Piloting and resubmission

STAGE 4: Demonstrations

In Stage 1, competing Teams will register and submit a proposal for the current capabilities of their platforms, a roadmap for what their platform will be able to do over the ensuing 18 months at quarterly intervals, and plans for how they would carry out pilot studies and full experiments with accredited education institutions.

Teams that submit proposals in Stage 1 will be screened both for the completeness of their proposals and for meeting minimum requirements outlined in the Rules and Regulations for this challenge. This screening process will last approximately four weeks and will overlap with Stage 2. All teams that meet the minimum criteria are eligible to participate in Stage 2.

In Stage 2, which opens at the start of the challenge, Teams will have an additional two months after the close of Stage 1 to finalize their platforms or prototypes and submit those for review by the Judging Panel. These technical submissions will include the digital version of the platforms and may be accompanied by evidence that the platforms can deliver high quality experiments and replications. Teams will also be required at this stage in the challenge to demonstrate progress on setting up pilot studies to be carried out in Stage 3.

Before being reviewed by the Judging Panel, these submissions will be screened again for completeness. Judging will take approximately 4 weeks and will not overlap with Stage 3. All Teams that meet the minimum criteria (to be defined in the theRules and Regulations for this challenge) will advance to Stage 3.

In Stage 3, Teams will have six months to carry out and report on a pilot experiment (of at least 4 weeks) in a formal education setting. Before the Stage Deadline, Teams will submit an updated write-up of how they carried out these pilot studies. The Judging Panel will review these reports over a period of approximately one-month and select up to five (5) Finalist Teams. Each finalist team will receive a milestone award of $50,000.

In Stage 4, the five Finalist Teams will have an additional six months to carry out a set of more robust experiments, including replications, to fully demonstrate the capabilities of their platforms and submit verified reports of those experiments for judging. A winner and a runner up will be selected by the Judging Panel based on which platform best fulfilled the challenge criteria.

2.1.1 REGISTRATION REQUIREMENTS

All Teams must register to compete for the challenge at pop.xprize.org. There is no registration fee, but Teams must be 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 December 15, 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 at a URL to be provided at a later date to those Teams.

2.1.2 STAGE 1 PROPOSAL SUBMISSION

After registration, Teams will have until October 22, 2021 to submit proposals for the challenge using an online form. In their proposals, competitors will detail the current capabilities of their platforms to gather and analyze data on learning outcomes, as well as a roadmap for features they will add to their platforms during the life of the challenge. Competing Teams will also outline how they will collect data during Stage 3 and Stage 4 of the challenge. More details regarding submission requirements will be provided at a later date.

All submissions will be screened for completeness. Teams that have advanced to Stage 2 will be notified within approximately four weeks of the submission deadline as Stage 2 overlaps with the screening process.

2.1.3 STAGE 2 TECHNICAL SUBMISSIONS

In Stage 2, Teams will need to submit a free-to-use version of their platforms for judges' review, as well as any technical documentation on those platforms. Technical documentation may include diagrams, drawings, schematics, and other written explanations of the functionality and architecture of the platform, with particular reference to how the platform conducts experiments and replications.

Teams will also have the option to include any data from pilots or experiments they have already performed in order to demonstrate that their platforms function as designed. Teams will also be required to demonstrate progress in setting up pilot studies in Stage 3.

All submissions will be screened for completeness. Complete submissions will be reviewed by the Judging Panel and all Teams that meet the minimum requirements will advance to Stage 3 of the challenge. Teams that have advanced to Stage 3 will be notified within approximately four weeks of the submission deadline.

2.1.4 STAGE 3 PILOT STUDY SUBMISSIONS

In Stage 3, Teams will conduct pilot studies to demonstrate the capabilities of their platforms. 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. In this stage, Teams must conduct at least one experiment and at least one replication with at least one learner demographic by the Stage Deadline.

Submissions will be reviewed by the Judging Panel and up to five (5) Finalist Teams will be selected to advance to Stage 4 of the challenge based on criteria to be defined in the Rules and Regulations for this challenge. Finalist Teams that have advanced to Stage 4 will be notified within approximately four weeks of the submission deadline.

2.1.5 STAGE 4 EXPERIMENT SUBMISSIONS

In Stage 4, Teams will conduct experiments that demonstrate the full capabilities of their platforms. 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 prize purse, Teams must demonstrate the ability to conduct an experiment and at least five replications with at least three learner demographics in no more than 30 days.

Submissions will be reviewed by the Judging Panel to select a Grand Prize Winner and a Runner-Up Team for the challenge.

2.1.6 CHALLENGE TIMELINE

The challenge will run for 24 months, launching March 22, 2021, and concluding March 2023.

March 22, 2021	Challenge Launch: Team Registration Opens & Guidelines Released
April 2021	Final Updated Guidelines Published
April 22, 2021	Stage 1: Team Proposal Submission Opens
May - June 2021	Rules and Regulations Released
June 22, 2021	Stage 2: Technical Submission Opens
October 22, 2021	Stage 1: Team Proposal Submission Deadline

October - November 2021	Stage 1: Team Proposal Submission Judging
November 2021	Qualified Teams Notified
December 15, 2021	Team Registration Deadline
December 15, 2021	Stage 2: Technical Submission Deadline
January 2022	Stage 2: Technical Submission Judging
January 2022	Teams Notified of Approval to Proceed to Pilot Stage
January 2022	Stage 3: Pilot Submission Opens
July 2022	Stage 3: Pilot Submission Deadline
July - August 2022	Stage 3: Pilot Submission Judging
August 2022	Finalist Teams Notified (up to 5 Finalist Teams split up to $250,000)
August 2022	Stage 4: Demonstration Phase Opens
February 2023	Stage 4: Demonstration Phase Deadline
February - March 2023	Stage 4: Demonstration Judging
March 2023	Grand Prize Winners Announced

*All dates subject to change.

2.2 EXAMPLE TESTING CRITERIA

At each challenge Stage, Team submissions will be measured against a set of criteria aligned with the challenge goals. Some judging criteria are binary. For example, Teams must demonstrate adherence to open data requirements and data standards. Other criteria will be ranked based on a scoring rubric developed by XPRIZE, IES, and the challenge 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.

2.2.1 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/or otherwise allocate or choose not to allocate one or more of the Awards and/or any other Award associated with the challenge.

2.3 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.