

*California Education Learning Lab*  
**Frequently Asked Questions**

for

**“Using Research and Technology to Transform  
Undergraduate STEM Education”**

1. Why science of human learning?.....	2
2. Why adaptive learning technologies? .....	3
3. May proposals include pedagogical innovations that support improved learning outcomes but do not employ learning technology or other data and technology tools? .....	3
4. Why online and hybrid learning environments? .....	3
5. What do we mean by online courses and hybrid courses? .....	4
6. Why intersegmental? .....	4
7. What STEM disciplines are eligible for this RFP? .....	5
8. Are faculty who teach a contextualized version of an introductory STEM course in a department outside the STEM disciplines named above eligible to apply? .....	5
9. Why is the focus on lower division courses/instruction? What is considered a lower-division course? .....	5
10. Is the RFP intended to address individual lower division courses or lower division course sequences? May proposals include gateway courses from multiple STEM disciplines? .....	5
11. Does Learning Lab support projects that focus on implementation or on research? .....	6
12. How do I apply for Learning Lab 2019-20 funding? .....	6
13. What does Learning Lab mean by a project’s “host institution?” .....	7
14. Are project teams required to submit a Letter of Intent? .....	7
15. May faculty submit Letters of Intent even if they have not yet identified or confirmed additional co-PIs? .....	7
16. What information should be provided about PIs/co-PIs to establish basic qualifications and eligibility? What faculty members are eligible as principal investigators? .....	8
17. What institutional information should be provided in the Institutional Cover Letter? .....	8
18. What if a faculty team is unable to obtain Institutional Cover Letters from all the partner institutions or unable to obtain the required Institutional Cover Letter signatures from all the partner institutions? May the team still submit an application for a Learning Lab grant? .....	9
19. Is there a limit on the number of proposals that may come from one institution? .....	9
20. What can award funds be spent on? .....	9
21. What are Learning Lab guidelines regarding indirect costs for awardees? .....	10
22. What OER requirements and intellectual property arrangements will appear in the grant agreements? .....	10
23. How will money flow for awarded projects? .....	11
24. What if I still have questions about RFP instructions or requirements, or if I have questions about using Learning Lab’s application submission portals? .....	11

## 1. *Why science of human learning?*

“The goal of learning sciences is to better understand the cognitive and social processes that result in the most effective learning, and to use this knowledge to redesign classrooms and other learning environments so that people learn more deeply and more effectively.”

-- R. Keith Sawyer, Washington University

Learning science, or the science of human learning, is the study of how human learning takes place. Interdisciplinary in nature, drawing from fields such as cognitive science, neuroscience, computer science, education, psychology, sociology, design studies and more,<sup>1</sup> the science of learning strives to understand how people learn, how to support learning, how to facilitate and enhance learning, discipline-based learning, and the role of technology in enhancing learning and collaboration.<sup>2</sup> The science of learning addresses how people process, gather, and interpret information; how they develop knowledge, skills, and expertise; and the extent to which social and physical context and design environments influence learning.<sup>3</sup> Scaffolding, inquiry or problem-based learning, collaborative learning, game and simulation-based learning, metacognition are all examples of how teaching methods and approaches to curriculum can be influenced by what we understand about learning. Additionally, strategies linked to social psychology and multicultural education emphasize the importance of attending to students’ identity and culture when addressing achievement gaps—we view such achievement gaps as invitations to apply the science of learning in new or improved ways.

One of the goals of the science of learning is to create a positive feedback/continuous improvement loop between theories of learning and practice, which would result in improved student learning and advance the field of learning science.<sup>4</sup> For the purposes of Learning Lab, as public higher education strives to educate more students with diverse backgrounds in a rapidly changing world, leveraging, increasing and applying our knowledge of human learning is a challenge we must embrace.

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<sup>1</sup> Sawyer, R.K. (2006). *The Cambridge Handbook of the Learning Sciences*. Cambridge, U.K.: Cambridge University Press.

<sup>2</sup> Sommerhoff, D., Szameitat, A., Vogel, F., Chernikova, O., Loderer, K. & Fischer, F. (2018). What Do We Teach When We Teach the Learning Sciences? A Document Analysis of 75 Graduate Programs. *Journal of the Learning Sciences*, 27:2, 319-351. <https://doi.org/10.1080/10508406.2018.1440353>.

<sup>3</sup> Ibid.

<sup>4</sup> The Simon Initiative Learning Engineering Ecosystem at Carnegie Mellon University emphasizes: 1) building and leveraging cognitive models of expertise to inform the design of effective student-centered instructional materials; 2) collecting rich data on student interactions and learning outcomes; 3) data analysis via state-of-the-art machine learning and analytic methods; 4) data-informed iterative improvement of the instructional materials; and 5) leveraging these assets to drive fresh insights in learning science.

<https://chronicle-assets.s3.amazonaws.com/5/items/biz/pdf/SimonLearningEngineeringEcosystem.pdf>.

## **2. *Why adaptive learning technologies?***

Adaptive learning is defined by statute to mean “a technology-mediated environment in which the learner’s experience is adapted to learner behavior and responses.” Adaptive learning deploys technology to better understand learner experience/learner gaps and assets and use this information to modify learning environments, pedagogical approaches and/or available resources. Adaptive learning solutions have the potential to provide a more personalized learning experience and to produce better learning outcomes for students. Adaptive learning technology also offers opportunities to collect and analyze data on student learning and can support the integration of learning research and teaching practice by encouraging instructors to respond and adapt iteratively to student learning.

In order to have the potential for large-scale impact, Learning Lab understands adaptive learning technologies in the broad sense of deploying technology to better understand learner experience/learner gaps and assets, and to use such information to modify learning environments, pedagogical approaches and/or available resources. We are particularly interested in using such adaptive learning technologies to help students most likely to leave the sciences (such as first-generation college-going students and underrepresented students in the sciences) and to produce better learning outcomes across the broad range of students.

## **3. *May proposals include pedagogical innovations that support improved learning outcomes but do not employ learning technology or other data and technology tools?***

No, proposals must demonstrate commitment to the use of robust data and technology tools to improve pedagogy and/or curriculum, or to improve a program of professional development, in addition to any other specified requirements.

## **4. *Why online and hybrid learning environments?***

Technological change and the development of online learning environments has transformed the learning experience for both students and faculty. In addition to the growth of online education, students now commonly access course materials and resources electronically and interact with instructors and with one another remotely. Hybrid approaches to course instruction, which integrate online interfaces and content with face-to-face pedagogy, have become increasingly common.

Learning Lab has two interrelated goals in addressing online and hybrid learning environments. First, Learning Lab aims to leverage the pedagogical and curricular possibilities of online and hybrid learning environments. Online course environments provide opportunities to collect student learning data and use that data to support iterative improvement in teaching. They also offer opportunities for innovation in how students interact with course material and resources, as well as with instructors and one another. Learning Lab supports the development of

practices, resources, and tools that take advantage of the possibilities of online and hybrid learning environments to improve learning outcomes for students and advance understanding of human learning.

Second, Learning Lab seeks to improve learning outcomes and to close equity and achievement gaps in online and hybrid courses. Enrollment in online courses has increased substantially in recent years and continues to grow. Colleges and universities have identified online courses as means of addressing and reducing course bottlenecks and of expanding access to students who may be unable to attend classes during traditional course hours. Gaps in student performance between online and traditional courses have narrowed, and Learning Lab supports the development of resources, pedagogical practices, tools, and courses and course series that aim to promote continued improvement in student success in online course environments, especially for students who have traditionally been less likely to succeed in online learning environments.

#### **5. *What do we mean by online courses and hybrid courses?***

Learning Lab takes a broad view of what qualifies as an online or hybrid course. Online courses allow students to interact, either synchronously or asynchronously, with the course material/lecture/lab work and with other participants and/or instructors/TAs in a technology-mediated, remote environment. Learning Lab understands hybrid courses or blended courses as those that use both “online” and in-person interactions as part of the formal course environment or requirements. A hybrid course would allow some component of the course to be available or accessible in an online environment. For the purposes of the Learning Lab’s 2019-20 RFP, a course does not have to be officially designated by the institution or department as “hybrid” to be eligible for Learning Lab grant funding, so long as it conforms to the definition above.

#### **6. *Why intersegmental?***

The State of California invests significant resources into its public higher education institutions, as well as independent colleges and universities through the Cal Grant program. Intersegmental collaboration (i.e., collaboration across segments, such as between University of California and community college faculty, or California State University and community college faculty, or University of California and California State University faculty) will draw more deeply from diverse faculty experiences with various student populations, as well as make articulation of courses more seamless and widespread adoption of successful pedagogies more likely and robust. Ideally, intersegmental faculty teams will include, STEM faculty members, social and/or behavioral scientists and instructional designers on the proposal team.

**7. What STEM disciplines are eligible for this RFP?**

For this RFP, eligible disciplines include life and biological sciences, engineering, computer science, information/data science, math and statistics, and the physical sciences (including earth and environmental sciences, as well as physics and chemistry).

**8. Are faculty who teach a contextualized version of an introductory STEM course in a department outside the STEM disciplines named above eligible to apply?**

A faculty member/co-principal investigator who teaches a contextualized version of a lower division course in life and biological sciences, engineering, computer science, information/data science, math and statistics, or the physical sciences (including earth and environmental sciences, as well as physics and chemistry) in a department outside of the primary disciplines named above (e.g., a psychology or economics professor who teaches an introductory statistics course) is eligible to apply. PIs/co-PIs should be able to demonstrate that equity gaps in student performance exist in the contextualized course and that this differential success serves as a barrier to students from underrepresented groups entering the major and/or as a barrier to those students' retention and academic progress in their institution of higher education.

**9. Why is the focus on lower division courses/instruction? What is considered a lower-division course?**

For the purposes of this RFP, lower division courses are understood as courses that students ordinarily take in their first or second years and that provide essential foundational knowledge for advancement in a program of study. These courses are generally highly enrolled and commonly characterized by high withdrawal and non-passage rates. Because of the potential for large impact, the Learning Lab through this RFP seeks to incentivize the creation of accessible and welcoming foundational courses in which all students can succeed, and which will form the basis of future scientific inquiry, reasoning and evaluation regardless of a student's chosen major or career.

**10. Is the RFP intended to address individual lower division courses or lower division course sequences? May proposals include gateway courses from multiple STEM disciplines?**

Proposals may address either a single STEM lower division course (e.g., Calculus I); or a sequence of courses (e.g., Calculus I, II and III) where that series acts as a gateway to participation in a STEM major or program of study; or a program of professional development tailored toward instruction of these courses. Proposals that address a sequence of courses should establish that the completion of the sequence is a pre-requisite for progress in a STEM

major/majors and that equity gaps in student performance and/or high rates of attrition are present or develop across the sequence.

Proposals may address lower division courses or instruction in a single discipline or from multiple disciplines. Proposals that involve lower division courses from multiple disciplines should explain how the proposed project will work coherently across disciplines. For example, co-principal investigators in chemistry and physics may describe how they will apply jointly developed pedagogies and shared adaptive learning technologies in lower division courses in their respective disciplines. Proposals that bring together lower division courses from different disciplines should characterize the discipline-specific problems that co-PIs are trying to solve and/or investigate, and explain how they will address discipline-specific challenges.

### ***11. Does Learning Lab support projects that focus on implementation or on research?***

Learning Lab seeks to encourage the development and dissemination of pedagogical practices, learning resources, technological tools, courses, and course series that demonstrate success in improving learning outcomes and closing equity gaps, **and** that contribute to fundamental understanding of human learning. A key goal of Learning Lab is to bridge the traditional divide between research into human learning and teaching practice. As a result, Learning Lab supports projects that develop and implement innovative pedagogy and curricula and that also include rigorous research design as an integral part of the project plan. That research design should evaluate the implementation and effectiveness of the project approach, support iterative improvement during the grant period, and also aim to contribute to fundamental understanding of human learning through project research or through the collection and dissemination of student learning data for purposes of supporting research into human learning.

### ***12. How do I apply for Learning Lab 2019-20 funding?***

Applicants will submit all application materials through the Learning Lab's application management system. Applicants should use the following links to access the grant-specific submission portals:

#### **Innovation Grants**

[https://webportalapp.com/sp/learninglabs\\_innovation\\_grant](https://webportalapp.com/sp/learninglabs_innovation_grant)

#### **Seed Grants**

[https://webportalapp.com/sp/learninglabs\\_seed\\_grant](https://webportalapp.com/sp/learninglabs_seed_grant)

#### **Professional Development Grants**

[https://webportalapp.com/sp/learninglabs\\_profdevelopment\\_grant](https://webportalapp.com/sp/learninglabs_profdevelopment_grant)

Applicants must set up an account in order to apply and will also be asked to provide contact and project information in advance of submitting their letter of intent. Applicants will upload institutional cover letters, concept and full proposals, and other application materials as single PDFs.

***13. What does Learning Lab mean by a project’s “host institution?”***

The project’s host institution is the college or university that will act as grantee and fiscal intermediary for purposes of grant administration. The host institution will enter into a grant agreement with the Governor’s Office of Planning and Research for receipt and management of grant funds, and will distribute funds to the partner institutions based on sub-award agreements.

The designation of an institution as “host” is for grant administration purposes only. Learning Lab expects awarded projects to exhibit meaningful, well-balanced collaboration among partner institutions.

Applicants will be asked to identify their anticipated host institution as part of their application submission.

***14. Are project teams required to submit a Letter of Intent?***

Applicants for Learning Lab grant opportunities must submit a letter of intent. Learning Lab’s application management system requires submission of a letter of intent for applicants to proceed to subsequent application stages. Project teams that do not submit a letter of intent will not be able to submit concept or full proposals.

Letters of intent will allow Learning Lab to gauge how many Innovation and Professional Development Grant concept proposals and how many Seed Grant proposals to expect and will assist with recruiting external reviewers. Letters of intent will not be subject to formal review by the Selection Committee.

***15. May faculty submit Letters of Intent even if they have not yet identified or confirmed additional co-PIs?***

Letters of intent **should** note the **expected** host institution and co-principal investigators. We will accept, however, letters of intent for proposals where faculty have not yet identified co-PIs.

Please note, however, that concept proposals for Innovation and Professional Development Grants (due November 15, 2019) **must** identify co-PIs. In addition, Seed Grant proposals (due December 9) and Innovation and Professional Development Grant full proposals (due February

3) **must both** identify co-PIs **and** be accompanied by an institutional cover letter(s) signed by the department chair and appropriate academic administrator for **each** co-PI.

***16. What information should be provided about PIs/co-PIs to establish basic qualifications and eligibility? What faculty members are eligible as principal investigators?***

These are institutional awards. Any individual with a permanent faculty appointment in the disciplines listed under item 7 above and who can demonstrate institutional support for the project through commitments from their department chair AND the appropriate academic administrator (such as a dean, vice chancellor/vice president of research or provost or equivalent), may apply as a PI/co-PI. The letter of intent only requires identification of the anticipated host institution, names of PIs/co-PIs and brief project information. Concept proposal submissions for the Innovation and Professional Development Grants should additionally and briefly describe each PI/co-PI's capacity, including any previous and/or current relevant grant funding received, strength of faculty and student engagement activities, and history of successful intersegmental partnerships, as well as their specific roles in the project. Full proposals for Innovation and Professional Development Grants and Seed Grant proposals should provide a detailed description of the project team and of the roles that different team members will play in the project.

For the purposes of this RFP, the Learning Lab does not limit the definition of "permanent faculty appointment" to tenured or tenure-track faculty. The Learning Lab requires, however, that principal investigators hold an appointment that provides assurance that they will be able to oversee the proposed project for the duration of the grant. Non tenure-track faculty who hold also administrative or departmental positions or long-term contracts that provide an equivalence to permanent appointment for the duration of the grant may be eligible, provided that they can also demonstrate institutional support from their department chair and appropriate academic administrator.

***17. What institutional information should be provided in the Institutional Cover Letter?***

Please include in the institutional cover letter a brief description of institution type and size and a description of each department/school/institution's commitment to the proposed project. In addition, cover letters for Innovation and Professional Development Grants should explain how the proposed project's innovation will be sustained after the end of the grant program. All cover letters for professional development programs should further explain how the program will complement the institution's existing programs of faculty professional development and how it will fit into the department/school/institution's existing system of professional development and of faculty promotion/reward.

The institutional cover letter should be signed by the PI/co-PI's department chair AND dean, vice chancellor/vice president of research or provost or equivalent. Project teams may either

supply an institutional cover letter from each partner institution or they may supply a single institutional cover letter with all required signatures and information from the partner institutions.

***18. What if a faculty team is unable to obtain Institutional Cover Letters from all the partner institutions or unable to obtain the required Institutional Cover Letter signatures from all the partner institutions? May the team still submit an application for a Learning Lab grant?***

Concept proposals for Innovation and Professional Development Grants must be accompanied by an institutional cover letter from the project's designated host institution that describes the institution's commitment to the proposed project and that includes the required institutional signatures (i.e., the appropriate department chair AND dean, vice chancellor/vice president of research or provost or equivalent). Applicant teams are strongly encouraged to provide cover letters and/or required signatures for all partner institutions with their concept proposal. Learning Lab understands, however, that obtaining cover letters and signatures can be time-consuming and that co-PIs may join the project team close to deadlines. Consequently, Learning Lab will accept and consider concept proposals so long as they are accompanied by a cover letter from the host institution.

Innovation and Professional Develop Grant full proposals, and Seed Grant proposals, **must** include institutional cover letters from all partner institutions that demonstrate institutional support for all project PIs/co-PIs, or a shared institutional cover letter with all required signatures and information from all partner institutions.

***19. Is there a limit on the number of proposals that may come from one institution?***

There is no limit on the number of applications that may come from a particular institution, provided that PIs/co-PIs meet the institutional cover letter requirements. In reviewing proposals, the Selection Committee will consider, however, the geographic equity of awards and will seek a diversity of awarded institutions.

***20. What can award funds be spent on?***

Award funds may be spent on expert consultants, faculty release time, other staff time (such as for graduate students), technology resources and travel that are necessary for the execution of the project, including evaluation. The project plan and budget overview should include a description of how award funds would be spent. (Travel costs will be limited according to state rules and will be included in the grant agreement.) Learning Lab funds are intended to be used in California. If the project necessitates the use of Learning Lab funds outside of California, a

brief justification and estimate of the funding will need to be provided in the full proposal. The amount of funds that can be spent outside the state will be subject to the final award agreement.

***21. What are Learning Lab guidelines regarding indirect costs for awardees?***

Learning Lab allows for up to 8 percent in indirect costs (IDC). Learning Lab calculates the 8 percent IDC rate based on combined project direct costs and does not permit layering of IDC in excess of 8 percent of total direct costs. Combined direct and indirect costs cannot exceed the award amount. Consequently, for a project awarded a \$1 million grant, total combined IDC for the partner institutions cannot exceed \$74,074 (i.e., 8 percent of total direct costs of \$925,926, with combined indirect and direct costs totaling \$1 million). Partner institutions may, however, divide their respective shares of IDC, as long as they conform to the Learning Lab's overall limit on IDC (i.e., no more than 8 percent of total direct costs). For instance, the host institution may apply 8 percent IDC to a portion of a sub-award, but the sub-awardee cannot then apply IDC to that same portion of the sub-award, since that would lead to total IDC in excess of 8 percent of total project direct costs.

Learning Lab's IDC rate is lower than that contained in the California Model Agreement used by CSU and UC. Learning Lab views the lower rate as appropriate for its grants, because these awards support pedagogical research and demonstration projects involving courses that are normally and regularly offered as part of established departmental curricula. In addition, projects supported by Learning Lab awards generally do not involve substantial facilities or equipment use beyond that associated with normal instruction. As a result, Learning Lab expects projects supported with its funds to pose a lower burden on facilities and administration than the research projects anticipated by the Model Agreement.

***22. What OER requirements and intellectual property arrangements will appear in the grant agreements?***

Statute requires the Governor's Office of Planning and Research to establish terms and conditions that require Learning Lab courses and course series, and technology and technology platforms developed or redesigned with Learning Lab funds, to be available as open educational resources. Learning Lab considers "open educational resources" to be any educational resources released under one of the Creative Commons licenses (or its equivalent). Open educational resources include, but are not limited to, full courses, course materials, modules, textbooks, faculty-created content, streaming videos, tests, software, and any other tools, materials, or techniques used to support access to knowledge.

As part of the terms of grant agreements, awardees will agree to release all resources developed with Learning Lab grant funds under one of the Creative Commons licenses other

than CC-BY. The Learning Lab excludes the CC-BY license out of concern that this license would potentially allow outside entities to build upon products developed with Learning Lab funds for commercial purposes *and* restrict access to the resulting product. Learning Lab intends to avoid the possibility that modified or subsequent versions of resources developed with Learning Lab funds might be “walled off” by an entity using them for commercial purposes.

Learning Lab does not require that resources necessarily be free to users in order to be considered “open educational resources,” but instead encourages projects to make resources developed with Learning Lab funds available to additional users either at no cost or at minimal, necessary, reasonable cost depending on the expense necessary to support its use.

### ***23. How will money flow for awarded projects?***

Project teams should anticipate submitting invoices, based on expenditures made and according to the terms of the grant agreement and agreed-upon budget plan. Concept proposals require a budget overview for the award range; full proposals will require a more detailed budget proposal.

The “host institution” will act as the fiscal intermediary for purposes of grant administration and for receipt of grant funds. That institution will enter into a grant agreement with the Governor’s Office of Planning and Research and will distribute grant funds to the partner institutions on the basis of sub-awards.

### ***24. What if I still have questions about RFP instructions or requirements, or if I have questions about using Learning Lab’s application submission portals?***

If you have questions about RFP instructions or requirements that are not addressed above, or if you have questions about using Learning Lab’s application submission portals, please contact Learning Lab staff at [learninglab@opr.ca.gov](mailto:learninglab@opr.ca.gov).