ARCC NETWORK
ACCELERATING RECOVERY IN COMMUNITY COLLEGES

ARCC Network Brief
August 2025

The Price of Flexibility?

Evaluating the True Cost of Distance Education

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Distance education (DE) or online education has become an integral component of community colleges' offerings, fundamentally reshaping access and instructional delivery. In Fall 2022, approximately 57% of community college students nationally and 54% of students in California were enrolled in at least one DE course (IPEDS, 2024; CCCCO, 2024). Accelerated by the COVID pandemic, this widespread continued adoption is driven by the capacity of DE to reach a broader student base, provide personalized and self-paced learning experiences, cater effectively to high-needs student populations, and accommodate adults of many ages seeking workforce development (Jaggars, 2014; O'Neill et al., 2022). Given these benefits and persistent student demand, community colleges may expect that DE is not a transient trend but a lasting shift in student preferences, underscoring the need for its sustainable and effective implementation (Hart et al., 2024).

A thorough understanding of the costs and cost drivers is critical for informed decision-making by institutions as they respond to this new reality. Recent evidence on the cost of delivery of DE courses is limited. A study based in the University of North Carolina System (2010) suggests that there are no substantial differences in the cost of providing DE courses (an asynchronous courses costs $5,400 to deliver while in-person course costs $5,100). A report from Florida suggests that delivering DE has a $41 incremental cost per student credit hour (Florida Board of Governors, 2016). These and similar studies pre-date the COVID-19 pandemic and major advances in digital instructional technology, both of which have impacted the scale and cost of providing DE courses. Importantly, neither of the studies provide a sense of the relative faculty work required to deliver instruction in different

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modalities.

This cost analysis of DE course delivery is set in the Los Angeles Community College District. Using data provided by the district and interviews with teaching faculty, we answer two questions:

1. What are the differences in faculty time spent in course delivery activities across different modalities?
2. What are the differences in the total costs of delivering courses across these modalities?

This study compares the three most common modalities at LACCD: in-person courses (both student and faculty are present in the classroom), synchronous courses (taught live over Zoom), and asynchronous courses (DE courses with no live lecture component). This cost analysis aims to provide clarity about the relative resources required to deliver each type of instruction—clarity which is essential for budget planning, efficient resource allocation, and choices regarding the delivery process and quality assurance of DE programs. Crucially, this includes an examination of the time faculty and staff spend across each of these modalities and the associated costs of that time. As colleges consider their distance learning strategies, understanding the relative effort for each type of course will be critical for planning workloads, compensation models, targeted investments in academic and technical support, and mitigating faculty turnover.

We find that asynchronous classes require the most time for teaching while in-person classes take the least amount of time, even when class sizes are the same. As asynchronous sections in LACCD tend to be larger than sections in the other two modalities, this difference is expanded for faculty teaching an average-sized asynchronous section relative to in-person and synchronous sections. The modalities also differ in terms of the digital and physical resources needed to provide instruction. The non-faculty costs of in-person instruction are driven by the classroom infrastructure needed to hold the classes while non-faculty costs of synchronous and asynchronous costs are mostly driven by costs of management and quality assurance of DE. Even so, the non-faculty costs of instruction across modalities are much smaller than the costs of faculty time, which is not surprising given the labor-intensive nature of teaching. We find that if DE courses follow the same organizing principles and structures as in-person courses, they are unlikely to benefit from the cost-reduction possible through technology-assisted scaling.

Methodology

Setting

This study is set in the Los Angeles Community College District (LACCD). LACCD

stands as one of the largest community college districts in the United States, encompassing nine colleges. It serves about 200,000 students annually and employs nearly 4,000 instructors. LACCD's diverse student body is predominantly Latino/a/x or Hispanic (around 62%), with significant Black, White, and Asian populations. Nearly half of LACCD students are first-generation college attendees from underrepresented backgrounds. Like many other community colleges in the country, 47% of LACCD's students are older (aged 25 years or more) and balance education with work, family, or other responsibilities. In response to student needs and evolving educational landscapes, LACCD has significantly expanded its DE offerings. Before the pandemic, only 14% of all course sections were taught asynchronously and none were taught synchronously. By 2023-2024, 44% of all course sections were taught asynchronously and 10% were taught synchronously. While the District centrally manages most digital resources and professional development for DE, individual campuses can vary due to their local resources and personnel to support DE.

Approach

We utilize time-driven activity-based costing (Kaplan & Anderson, 2007) to estimate the faculty time spent and its associated costs for each mode of delivery. This allows for the specific activities of faculty to vary across modalities rather than assuming the effort spent on a course is the same across all forms of course delivery. To establish other costs of each modality, we use the "ingredients method" (Belfield et al., 2018) to inventory all relevant resources used in delivering a class in that modality and then assign costs to each identified "ingredient." Recognizing that compensation and other costs are likely to be higher in Los Angeles than in other locales, we used national average estimates for identified costs when possible.

Faculty Time and Cost

Sample

We collected data regarding how much time instructors spend on various instructional activities through structured time interviews. Interviewees were recruited from sixty-two faculty who had participated in focus groups as a part of the Leveraging Technology and Engaging Students project. Faculty were offered $25 for their participation in an hour-long interview. Sampling for faculty time interviewees aimed to achieve variation in campus, subject taught, and experience with different modalities. Interviews were conducted until data saturation was reached; that is, when estimates from at least two consecutive interviews for a modality fell within the range of estimates from all previous interviews.

As a result, we interviewed ten instructors from LACCD, representing six of the nine campuses and multiple disciplines (including agricultural and life sciences; health sciences; languages, humanities, and communication;

performing arts and entertainment; social and behavioral science). Half of the instructors were tenured or on tenure track while the other half were adjuncts. The teaching experience varied from 9 years to 35 years and faculty mostly taught foundational and intermediate level courses. Seven interviewed faculty had in-person experience, seven had asynchronous experience, and six had synchronous teaching experience. Table 1 summarizes the characteristics and the mix of modalities taught by the faculty.

Table 1. Details of faculty time interviewees

Discipline	Number of interviewees	Teaching Experience	Taught In-person	Taught Synchronous	Taught Asynchronous
Agricultural and life sciences	1	12 years	1	0	0
Health sciences	1	18 years	1	1	1
Languages, humanities, and communication	2	17 years	1	1	1
Performing arts and entertainment	1	12 years	0	1	1
Social and behavioral science	4	9 to 24 years	3	2	4
STEM	1	35 years	1	1	0
Total	**10**		**7**	**6**	**7**

Note: Some faculty taught in more than one modality.

Data Collection and Analysis

The interview protocols sequentially identified specific instructional activities needed to deliver a course and asked respondents to estimate the frequency of activity and time spent doing it. Instructional activities included preparatory activities before term starts (updating syllabus, Canvas shells, and assessments), weekly preparation for class (preparing lecture content, updating Canvas for the week), course delivery activities (lectures, office hours, seeking IT/technology support), communication and engagement with students (responding to student emails, engaging with discussion boards), and grading (long assessments and short assessments).

We calculated the total time spent on each core activity by asking respondents for the "unit time" required to do an activity once (e.g., time to grade one assignment) and multiplying that time by the relevant cost drivers (e.g., number of students and assignments). For instance, a one-hour lecture delivered three times a week for 16 weeks results in 48 total lecture hours. The cost driver here is the number of lectures given—regardless of the number of students in the class section. In contrast, if grading a single assignment takes 15 minutes (0.25 hours), the total time spent grading three assignments for a class of 40 students would be 30 hours. The cost drivers here are both the number of assignments given and the number of students in the class. Activity unit frequency ranged

from per-term (e.g., preparing the syllabus) to per-section-per-week (e.g., preparing lecture materials) to per-assignment (e.g., number of quizzes). We also collected relevant information such as the subject, course level, average number of students in the section, and credits associated with the course. In constructing their time estimates, faculty were asked to respond with time estimates relative to 16-week long courses taught in spring or fall terms.

We did not include time spent on professional development (PD), as all faculty have the same requirements, regardless of the modalities in which they teach. Full-time LACCD faculty are required to undertake 33.5 hours of PD each year, also called "flex hours."[1] DE faculty can use this time for PD related to teaching DE courses. Focus group discussions and faculty time interviews suggest that few instructors participate in PD exceeding flex hours. We collected but did not analyze data on commute time for in-person faculty, as commute times are not paid for by the District. Importantly, the faculty time analysis in this report excludes the initial time required to create a new course or to transition a course from in-person to DE modalities for the first time. In fact, all of the faculty included in the faculty time analysis had taught their courses at least a few times in DE modalities.

All the interviews except one were conducted over Zoom during Spring 2024 and Fall 2024. After each interview, researchers tabulated and reviewed the estimates of frequencies and times corresponding to each of the twelve instructional activities shared by the interviewees. If the course was more or less than 3 credits, the appropriate multiplier was applied to scale the response to a 3-credit class. Similar activities were combined to create a set of five instructional activity groupings, shown in Table 3. We calculated averages of the total time spent and the percentage of time on each instructional activity across all the respondents for a modality. We calculate two sets of time estimates, one using a prototypical class size of 25 that remains the same across modalities and one using actual average class sizes seen in LACCD. In calculating these estimates, we scale by class size the time spent in instructional activities that vary by number of students, such as grading, managing discussion groups, and responding to student emails. To determine the total cost of delivering a section, we estimate the cost of faculty time associated with delivering each section. To do so, we estimate the per hour compensation for community college faculty based on the national average available from the Bureau of Labor Statistics (see Appendix for details).

We triangulate data collected for the cost study with two other data sources on faculty teaching experiences collected as a part of the Leveraging Technology and Engaging Students project: focus groups with 62 faculty conduced in Spring 2023 and Spring 2024 and faculty surveys administered in Spring 2024. The focus groups included detailed conversations amongst faculty about teaching experiences which add nuance to the data collected in the faculty time interviews. The surveys provide more representative data on key questions about faculty perceptions regarding teaching as they include responses from 1,000 faculty

(25% of LACCD faculty). In this brief, we use quotes from faculty focus groups and refer to findings from the surveys to elaborate upon or corroborate our findings.

Other Costs

We analyze non-faculty costs using the ingredients method, which involves defining the program parameters for the analysis, identifying all the components in delivering the program, and identifying sources of cost estimates (Belfield et al., 2018). For this analysis, the program parameters are limited to estimating ongoing direct costs of course delivery that vary across in-person, synchronous, and asynchronous modalities. The analysis does not include indirect costs common to all modalities such as administrative and departmental expenses, tutoring and other support services, or library and lab facilities. Normally, DE course-development costs form a part of any estimation of course delivery costs but we exclude them because most DE courses at LACCD transitioned from in-person to online during the pandemic and the costs incurred for their development (such as uncompensated faculty time or neglected tasks or responsibilities) cannot be accurately estimated. Thus, our estimates reflect the costs of delivering already designed and developed courses. Given the administrative structure of LACCD, we also differentiate costs by the level at which they are incurred (district or campus).

Data Sources

For non-faculty costs, we primarily rely on interviews with two key district administrators dealing with DE to identify cost categories, data sources, and documented expenses. Wherever possible, we prioritize using documented expenses shared by the district administrators (such as IT contract costs and professional development stipends). If these were not available, we used budgetary documents and web sources to derive cost estimates. We identify eight main non-faculty ingredients used in providing instruction across the three modalities of interest. Table 2 details these costs, the extent to which they apply to all modalities, and the source of the data.

Table 2. Types of Distance Education Costs at LACCD

Annual costs	In-person	Synchronous	Asynchronous	Source
Digital infrastructure costs	Applies	Applies	Applies	District IT office
Hardware costs	Applies	Applies	Applies	District IT office
Learning Management System costs*	Applies	Applies	Applies	Web sources
Teleconferencing software cost*	No	Applies	Applies	Web sources
DE technology/software cost	No	Applies	Applies	District DE office
DE management cost at district	No	Applies	Applies	District DE office, web sources
DE management cost at campus	No	Applies	Applies	District DE office, web sources
Classroom & materials costs	Applies	No	No	Web sources
Average class size	25	23	30	
Total number of sections (2023–24)	14,900	3,250	14,500	

Note: Average class size and number of sections calculated using LACCD administrative data. *Resources provided by the Chancellor of California Community Colleges Office for all community colleges in the state.

Digital infrastructure costs represent the annual cost of maintaining an expanded infrastructure necessary for at-scale DE (see Appendix for details). These costs were shared by the IT office of the district and are applicable to students in all three modalities. Similarly, hardware costs are applicable to all modalities (see Appendix for details). Irrespective of the modality taken in a term, students and faculty at LACCD are eligible to get laptops and Wi-Fi hotspots. Next, we include two costs that are not directly incurred by LACCD. The Learning Management System (LMS) and teleconferencing software costs are provided to all colleges by the Chancellor of California Community Colleges Office.[2] As this arrangement is unique to California, we estimated the costs for these components using web sources and included them in our estimates to ensure comparability with community colleges across the country. As LMSs are used even in in-person classes to share the syllabus, host quizzes, or accept assignments, this cost applies to all modalities. We only include teleconferencing costs for the synchronous classes where they are used for weekly instruction and for asynchronous classes where they may be used for office hours.

Apart from LMS and teleconferencing, teaching DE courses requires tools and software aimed at other aspects of instruction, such as proctoring, messaging students, accessibility, plagiarism checks, or discipline-specific teaching software. At LACCD, these tools are procured centrally for all students and mainly used for synchronous and asynchronous courses. These annual contract costs were shared by the District. According to the information shared, management of digital teaching resources and coordination of professional development for faculty is a key ingredient in the delivery of DE in LACCD. Our estimate for management costs at the District includes the payroll cost for the DE coordination team and the cost of delivering professional development courses. We also include aggregate payroll costs for all campus-

level administrators and staff supporting DE (see Appendix for details of this estimation). These costs are only applicable to the two DE modalities. Lastly, in-person classes require a classroom for delivery. We therefore estimate the cost of using classroom facilities required to provide in-person instruction. We estimate the occupancy cost of a 30-person classroom with appropriate furnishings and materials. We do so by taking an average of estimated rent and amortized cost of construction of a reasonable sized classroom (details in the Appendix).

Period and Unit of Analysis

We calculate annual costs for each ingredient for the 2023-24 academic year. Wherever available, we use the annual contract costs and payroll costs. When this is not possible, we assume an appropriate useful life of the investment (such as laptops, digital infrastructure upgrade, and classroom facilities) to calculate the annual amortization. Using administrative data from LACCD, we are able to calculate the number of sections and average size of sections in each modality offered during 2023-24. This allows us to do the cost analysis at a per-section and per-section per-student level. We derive the per-section costs by dividing the annual cost of the ingredient among all the sections in a year to which the cost applies. For instance, the LMS costs apply to all sections, but the District DE management costs are only applied to synchronous and asynchronous classes. For per student estimates, we divide the per-section estimates by the average size of the sections in that modality.

Limitations

This study has several limitations. First, our faculty interview sample is small, creating potential for selection bias that may over-represent faculty who are highly conscientious or hold strong views on DE instruction. Second, the findings are context-specific to LACCD and its particular infrastructure for DE teaching support; results may not be generalizable to institutions with vastly different resource structures. Finally, this analysis is intentionally focused on only the costs of course delivery and does not address potential revenue implications. The impact of modality choice on overall enrollment, and therefore on enrollment-based funding, while critical for institutional finances, is beyond the scope of this analysis.

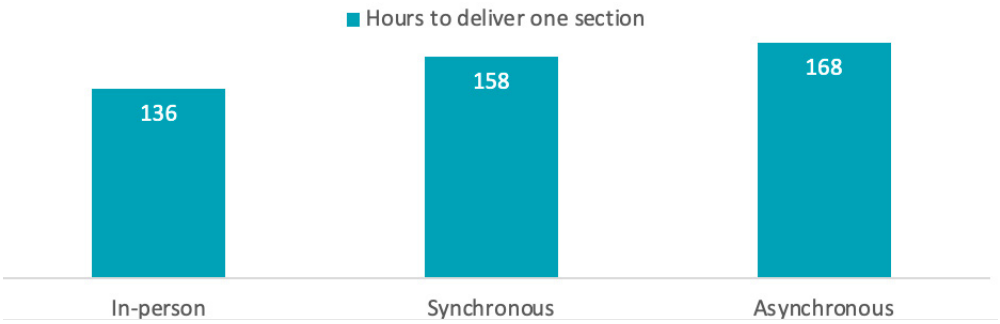
Findings

Faculty Time for Teaching

Same Class Size

We start by looking at estimates of faculty time for each modality, assuming the same prototypical section size of 25 students. As illustrated in Figure 1, the time needed to teach a 3-credit course section differs by modality. At the lowest end, teaching an in-person course requires about 136 hours per term (5.4 hours per student per term). Teaching synchronous courses requires 17% more time (158 hours per term of 6.3 hours per student per term) and asynchronous courses requires 24% more time (168 hours or 6.8 hours per term). A closer look at the instructional activities reveals the drivers of differences.

Figure 1. Average faculty time to deliver a section across each modality



Note: This model assumes the same section size (25 students) across all three modalities.

Table 3 shows that the time required for some instructional activities does not vary across modalities. For instance, faculty hold office hours for 18 to 22 hours per term (between 12% and 16% of their time). The relative time spent grading is also similar across modalities (between 32 and 37 hours). The bulk of the differences in total faculty time across modalities are driven by time spent in course preparation, delivery, and student engagement. In-person faculty spend a third of their time (48 hours) delivering lectures. They spend 22 hours updating their courses either before the term starts (5%) or while preparing for class during the term (11%). Faculty mention that course updates in in-person courses require less time due to the ease of incorporating new content or conducting a new class activity in live lectures. In-person classes also involve more interaction with students during the class and answers to questions are, by default, heard by all students. As a result, faculty only spend another 9 hours (7% of their time) communicating with students via email when delivering an in-person class. Only one out of the seven in-person faculty reported using online discussion boards. As a result, the average time spent managing them was just 2 hours.

Table 3: Distribution of time by instructional activities in a term (prototypical section size of 25)

	In person	Synchronous	Asynchronous	In person	Synchronous	Asynchronous
Class delivery	48	39	0	36%	25%	0%
Office hours	22	18	20	16%	12%	12%
Update syllabus, Canvas, assessments	7	13	31	5%	8%	19%
Preparation before class each week	15	22	31	11%	14%	18%
Grading	32	34	37	24%	21%	22%
Respond to emails, discussion boards	11	32	49	8%	20%	29%
Total number of hours	**136**	**158**	**168**	**100%**	**100%**	**100%**
Per student (hours)	**5.4**	**6.3**	**6.7**			

Source: Summary data from ten faculty time interviews.
Course updates before the term begins combines four activities (time spent in updating the syllabus, the LMS shell, assessments, and other class preparation before the term) and class preparation each week combines two activities (preparing or updating class materials each week and seeking technology support).

In comparison, the instructional work of asynchronous faculty looks quite different. Without a live lecture component, faculty are entirely dependent on using the LMS to deliver instruction. They spend substantially more time (37% or 62 hours) updating the LMS and syllabus during the term or before the term begins.[3] The LMS is the faculty's main tool for reflecting changes in pedagogy, course content, or assessment. Unlike instantaneous changes incorporated in an in-person lecture, making changes to the LMS takes more time as it involves writing and adding new text, recording video content, or updating the Canvas design. Creating courses that are accessible to students of differing abilities adds to the complexity and effort of using the LMS. A social and behavioral science instructor also noted that "there's so much more preparation time involved in online courses because there's so much of that course that is absolutely student facing at all times. [Students'] interface is with the course, the webpages, all the documentation, all that stuff … I have to spend a lot of time going through it to make sure it's consistent."

Similarly, because asynchronous courses do not have a live-interaction component, faculty spend more time answering students queries via emails (12 hours) and promoting interaction with peers and with faculty through discussion boards (36 hours). Thus, supporting student interactions accounts for nearly 29% of their time. The process of responding to and managing discussion boards is also more fragmented and makes faculty feel like they are on "24/7." Comparing their activities for in-person courses with asynchronous courses, a social and behavioral science instructor mentions that "in an online environment, I'm logging in and checking daily to see the activity of my students."

Given that synchronous classes use a mix of live lecturing and LMSs, it is unsurprising that faculty instructional activities in this modality lie somewhere in between in-person and asynchronous courses. Synchronous faculty lecture 24% of the time (39 hours), a little less than their in-person peers. Instead, they supplement their in-class interaction with substantial LMS use in courses. As a result, respondents suggested that they spend 36 hours updating their Canvas before or during the term. This accounts for nearly 22% of their time. Synchronous faculty can answer many student questions live, so their email interactions take similar time compared to in-person courses (8 hours or 5%). However, they do use more discussion boards than in-person classes to support learning and spend 24 hours in a term managing them (15% of their time).

Varying Class Size

Our models assuming similar class sizes illustrate how certain instructional activities drive differences in faculty time across modalities. Assuming a prototypical section size of 25 students, faculty spend 5.4 hours on each in-person student, 6.3 hours for each synchronous student, and 6.7 hours for each asynchronous student. However, at LACCD, in-person and synchronous classes (23 to 25 students) have smaller average enrollments than asynchronous classes (30 students). Many of our interviewees noted that part of the workload in asynchronous classes is driven by the larger class sizes. To model the effect of class sizes on the total time required for instructional activities, we scale the faculty time estimates for grading, managing group discussions, and emailing students to actual section sizes at LACCD (see Table 4).

Taking actual class sizes into account has substantial effects on the estimated time requirements for asynchronous classes. On the one hand, the total estimated time needed to teach the class increases by 7% percent to 181 hours. This change is driven by activities that vary with the number of students, e.g., grading, responding to student emails, and managing discussion boards. On the other hand, a substantial number of activities represent fixed-time investments and do not respond to larger class sizes, e.g., updating course materials, delivering lectures, and office hours. As a result, the larger class sizes attenuate the differences in the amount of time spent per-student between in-person and asynchronous courses (5.4 hours for in-person students vs 6 hours for asynchronous students) while smaller synchronous class size increases the per student time for instruction (6.7 hours).

Table 4: Distribution of time by instructional activities in a term (actual section size)

	In person	Synchronous	Asynchronous	In person	Synchronous	Asynchronous
Section size	*25*	*23*	*30*	*25*	*23*	*30*
Class delivery	48	39	0	36%	25%	0%
Office hours	22	18	20	16%	12%	12%
Update syllabus, Canvas, assessments	7	13	31	5%	8%	19%
Preparation before class each week	15	22	31	11%	14%	18%
Grading	32	33	41	24%	21%	23%
Respond to emails, discussion boards	12	29	57	8%	19%	31%
Total number of hours	**136**	**154**	**180**	**100%**	**100%**	**100%**
Per student (hours)	**5.4**	**6.7**	**6.0**			

Source: Summary data from ten faculty time interviews.
Course updates before the term begins combines four activities (time spent in updating the syllabus, the LMS shell, assessments, and other class preparation before the term) and class preparation each week combines two activities (preparing or updating class materials each week and seeking technology support).

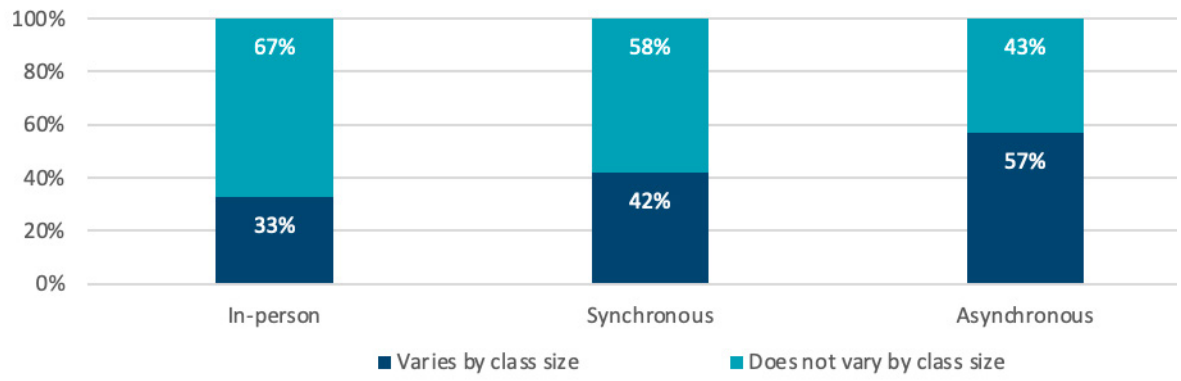
Our data highlights two key characteristics of teaching experiences across modalities. First, teaching DE courses fundamentally rearranges instructional work by "unbundling" it, and this affects the time needed to teach the course. Unlike an in-person lecture where content delivery and student interaction largely occur simultaneously, online platforms separate these functions. An in-person instructor combines these activities into 81 hours of class time and email correspondence (see Table 3). In an asynchronous course, however, that work is unbundled into two separate blocks that need substantial amount of time: 63 hours for creating and updating content on the LMS, and another 48 hours for facilitating student interaction via email and discussion boards. Synchronous courses show a similar pattern, requiring 74 hours spent on course delivery and updates in addition to the 32 hours for discussion management. As each task requires proportionally more time when it is unbundled, the total workload for DE modalities becomes substantially greater than for in-person teaching.

Second, certain instructional activities inherently take longer in DE modalities than in live interaction. While activities like grading take the same per-student time across modalities, communicating with students over email and responding to their discussion board comments takes longer on a per-student basis than running discussions and answering questions in class. In focus groups as well as time interviews, faculty suggested that they take more time and caution in drafting written communication with students to avoid miscommunication than they do in verbal interactions. One instructor mentions that “typing [feedback or email responses] out, situating it in

context, and running it through Grammarly to make sure that it's readable" takes up more time than responding to students in person. Live interaction also allows faculty to address many students at the same time while answering questions or providing feedback, preempting the need for individualized written responses to similar queries. Similarly, it takes faculty less time to incorporate course content changes in lectures and in-class activities as compared to implementing the changes in the LMS and discussion boards.

As a result of these two characteristics, even when sections sizes are the same, asynchronous and synchronous teaching impose a larger workload on faculty. Importantly, changes in class size have a proportionally greater effect on asynchronous classes because faculty spend more time doing activities that vary by class size. Figure 2 illustrates that almost two-thirds of faculty time in asynchronous classes is spent on instructional activities that vary by class size. Thus, when asynchronous class size increases, the total time needed to teach an asynchronous course increases more than when in-person class size increases.

Figure 2: Distribution of instructional activities that vary by class size



Note: The share of time that varies by class size includes grading, managing discussion groups, and answering student emails. These shares are calculated assuming the same section size of 25 students for all three modalities.

Other Costs of Distance Education

Outside of instructional faculty costs, we find that LACCD spent about $349 per section to deliver DE classes while the cost of delivering in-person classes is about $808 per section. Table 5 summarizes other costs of instruction at the per section and district levels.

Table 5: Other costs of instruction

	Per section			Total Cost
	In-person	Synchronous	Asynchronous	
Digital infrastructure cost	$5	$5	$5	$174,000
Hardware cost	$6	$6	$6	$194,000
Learning Management System cost	*$110*	*$110*	*$110*	*$3,600,000*
Tele-conferencing software cost	*$0*	*$44*	*$44*	*$783,000*
DE technology/software cost	$0	$55	$55	$978,000
DE management cost at district	$0	$24	$24	$424,000
DE management cost at campus	$0	$105	$105	$1,860,000
Classroom/space cost	$687	$0	$0	10,256,000
Cost per section	$808	$349	$349	$18,270,000
Per student costs (prototypical section size of 25)	$32	$14	$14	
Per student costs (actual section sizes)	$32	$15	$12	

Source: Data shared by the district, web sources, LACCD administrative data.

The cost of physical infrastructure (classrooms and furnishings) used for in-person courses is the key driver of these cost differences, with occupancy costing about $687 per in-person section. The license fees for the LMS and teleconferencing software ($4.4 million) used to deliver digital instruction forms are another main cost. We note that LACCD itself does not incur the costs of the LMS or Zoom, as this is paid for by the California Community College Chancellor's Office. However, this is still a cost of the modality.

The third major cost center, accounting for $3 million, is the management, coordination, and delivery of professional development and quality assurance for DE instruction at the district and campuses. The professional development trainings themselves do not cost a lot to deliver ($2,000 per training totaling up to $100,000 per year for the district) because LACCD pays a per-training stipend to district and campus administrators to conduct these trainings. In their main roles, DE administrators identify and resolve online teaching challenges faced by faculty, identify training needs, develop new training materials, and coordinate ongoing professional development at campuses. Our interviews suggest that even four years after the pandemic, faculty rely on these teams for fielding queries regarding teaching software, accessing instructional design help, and liaising with the district about DE resources, practices, and policies. Teaching software that supports DE forms another large annual investment by the district ($978,000). Other costs include $174,000 spent annually on maintaining the digital infrastructure that allows students to seamlessly access multiple online services and applications and $194,000 spent on hardware for students and faculty. The district expects the hardware costs to decrease as the economic challenges posed by the pandemic ease.

Of these costs, three (digital infrastructure, hardware, and LMS access) are shared by all modalities, resulting in costs of $121 per section spent. The

remaining per-section costs are highest for delivering in-person courses. They are mainly driven by the occupancy costs of classrooms ($687 per section).[4] The per section costs for synchronous and asynchronous classes are identical as they use the same digital resources and support for delivering instruction. The DE instruction costs are mainly driven by payroll costs of DE management at the campus and district ($129 per section). The digital teaching software and teleconferencing software add another $100 to the per section cost.

Total Cost of Delivering Instruction Across Modalities

To estimate the total cost of instructional delivery by modality, we combine the monetary costs of faculty time with other costs. Based on national average salaries for community college faculty, we use $72 as the hourly cost of faculty time (see Appendix). Our model, shown in Table 6, suggests that for a prototypical 25-student class, an asynchronous courses costs about 18% more than in-person courses in terms of resources and synchronous classes cost 10% more. Because actual class sizes of asynchronous classes are larger in LACCD, the total cost of delivery per student is only 5% more than in-person courses. In contrast, synchronous courses that have smaller classes sizes have 18% higher per student cost of delivery.

Though other costs of instruction differ by modality, this model highlights that faculty time is the main driver of instructional costs. Depending on the modality, it accounts for 92% to 97% of the total cost of instruction. This is not surprising, given the inherently labor-intensive nature of education. However, this implies that efficient utilization of faculty time is likely to have a larger impact on total costs of instruction than other resources.

Table 6. Total cost of delivering instruction for a section

Class size	Per section costs	In-person	Synchronous	Asynchronous
Prototypical (25 students)	Non-faculty costs	$808	$349	$349
	Faculty costs	$9,782	$11,367	$12,154
	Total cost	$10,590	$11,716	$12,503
	Per student cost	$424	$469	$500
Average at LACCD	Non-faculty costs	$808	$349	$349
	Faculty costs	$9,809	$11,124	$13,010
	Total cost	$10,617	$11,473	$13,359
	Per student cost	$418	$497	$441

Note: Faculty costs calculated by multiplying per hour faculty costs with total instructional time based on faculty time interviews.

Discussion

This analysis reveals a critical tension in the expansion of DE within community colleges. While delivering courses online could reduce the costs associated with physical infrastructure (if colleges decided to shrink their footprint), it

increases the demand for a more expensive resource: faculty time. Our findings indicate that asynchronous courses, which some thought might be cheaper to deliver due to the absence of classroom/campus costs and the ability to create and reuse videos, are in fact more resource-intensive when accounting for faculty time.

These findings have implications for institutional strategy and the calculus of modality cost-effectiveness. The challenge is compounded by evidence that students in DE courses, on average, have slightly lower rates of completion and passing than their peers in in-person sections (Worsham et al., 2025). While this performance gap has narrowed following pandemic-era investments in technology and training, a gap remains, particularly in disciplines like the humanities. This creates a scenario where the most resource-intensive modality in terms of faculty labor also yields slightly poorer academic results, suggesting the asynchronous model is not cost-effective relative to the traditional in-person model. Given the importance of faculty time in the total cost of delivery, there are two ways for asynchronous courses to become less resource intensive than in-person classes. Either colleges could reduce the amount of time that individual faculty need to spend preparing online materials and interacting with students, or colleges could restructure how courses are designed and delivered.

As we saw above, asynchronous instructors currently spend almost 70% of their time preparing materials for online delivery and interacting with students on email, discussion boards, or other platforms. However, colleges and instructors are still relatively new to DE instruction, and the tools and processes are evolving over time. Additional training and further technological advances in teaching tools might substantially shrink the ongoing time required from instructors to maintain their classes, reducing their cost per student.

Alternatively, community colleges might consider transforming the structure of how classes are delivered. In an in-person setting, multiple instructional activities—delivering content, facilitating discussion, and providing immediate feedback—are bundled into the four hours of live class per week. In online, particularly in asynchronous courses, these activities become unbundled. Each component must be deliberately and separately constructed through the Learning Management System (LMS), written communication, and management of discussion boards. However, a single instructor is still responsible for all components of the class—from delivering lectures to producing videos to running discussion boards—each of which takes time and different skills to execute. This unbundling not only requires more total time but also changes the nature of faculty work, demanding constant digital presence and a heavier reliance on time-consuming written communication. One could imagine restructuring how courses are delivered to unbundle roles across instructors. Expert faculty could design courses with a single set of recorded lectures used for all sections of the class, with other instructors facilitating discussion boards and answering individual student questions.

Institutions such as Georgia Tech have developed online degree programs that follow a different delivery model compared to their traditional master's programs (Goodman et al., 2019). However, the costs of these models have not been firmly established, and the institutional context is quite different.

While it is not yet known whether redesigning how courses are delivered would be less costly in the community college context or optimal for student outcomes, it does highlight the importance of understanding the drivers of faculty time and how these drivers change across modalities. For DE to be sustainable and effective, institutions should view resource use comprehensively when making strategic decisions. This includes re-evaluating the utilization of physical campus spaces and potentially reallocating those savings to build a more robust human infrastructure for online learning, including instructional designers, dedicated tech support, and revised faculty workload models. Further research is essential to compare the cost-effectiveness of these alternative delivery models and to better understand the complex relationship between cost, instructional design, student learning, and faculty workload in the evolving landscape of higher education.

Endnotes

1 **https://mymission.lamission.edu/userdata/brownst/docs/FLEX%20Obligation%20-%20Hours%20Required.pdf**

2 CCCCO provides all colleges with access to Canvas as the main Learning Management Software for hosting their online courses and to Zoom as the teleconferencing tool for any live interactions between students and faculty.

3 Our surveys corroborate this finding. Faculty were asked to compare the workload of preparing for a class across different modalities (on a 1 to 5 scale from "No time at all" to "Moderate amount of time" to a "Great deal of time"). The average score for in-person courses was the lowest (3.7), while faculty perceived that synchronous courses (3.9) and asynchronous courses (4.1) required more time for preparation.

4 These are conservative estimates of physical infrastructure as they only include the cost of basic instructional space and assumes an occupancy rate of 85% for each classroom during the term. The estimates do not include the cost of maintaining or using resource intensive physical infrastructure like laboratories; common spaces open to all students such as libraries, tutoring centers, and the cafeteria; or faculty offices, administrative offices, etc.

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Appendix: Cost Estimation Assumptions

- **Digital infrastructure:** LACCD updated its digital infrastructure in order to improve access to a range of online services. This includes investments in servers and annual contracts required to maintain seamless access to email, Canvas, and library for students and manage IT customer service for the district. These costs were shared by the IT office of the district.
- **Hardware:** During COVID-19, the district provided laptops and Wi-Fi hotspots for both students and faculty. The actual expenditure on these items was shared by the IT office of the district. We amortize these costs assuming a useful life of seven years for electronic hardware, slightly more than the five-year life suggested by Internal Revenue Service guidelines on property depreciation.
- **Learning Management System and teleconferencing software costs**: We use web sources to estimate the per-student annual cost of accessing digital resources. We use estimates of $20 per student per year for LMS access and $4 per student per year for Zoom access. Annual district-level costs are calculated for 170,000 students, the unique number of students enrolled in LACCD in 2023-2024 according to LACCD administrative data.
- **District-level DE management:** The delivery of DE at LACCD is managed and supported by a district-level DE office and some campus-level administrators. The district office is headed by a DE coordinator and includes a few instructional designers/multimedia specialists. This office delivers training and professional development related to DE teaching and coordinates policy implementation with campuses. The costs for DE management include the salaries for the district staff and the stipends paid to professional development instructors. We received data about the staffing levels from the district officials. To ensure our estimates are comparable for institutions outside the Los Angeles Area, we use national averages for salaries of community college faculty and administrators from the Bureau of Labor Statistics and a fringe benefit rate of 30%.
- **Campus-level DE management:** Each campus in LACCD has varied human resource capacity to manage DE. By and large, each campus has a DE Coordinator. A few campuses also have multimedia specialists that support faculty in delivering DE courses and Peer Online Course Review Leads that support faculty in undergoing a course quality review process for asynchronous courses. Details about staffing levels (full time equivalent load) for these positions were shared by the district and payroll costs were estimated using national sources discussed above.
- **Physical infrastructure:** We calculate the cost of physical infrastructure by assuming a reasonable classroom size and the cost of occupying it.

For the size of space, we use the minimum amount of space needed per student specified in CCCCO building standards to calculate the classroom size needed for 30 students (600 square ft). We add a 15% common area multiplier for spaces such as corridors and shared facilities. Next, we estimate the number of sections that can use a classroom in a year assuming that each 3-credit section uses a classroom for 4 hours per week. We apply an 85% occupancy rate (more than the minimum standards defined by CCCCO) and use reasonable hours of operation in a week and determine that one 30-student classroom can be used to deliver 35 sections over the course of one academic year.

Next, we calculate the costs of occupying a classroom. We use an average of two sources:

1) Amortized cost of an instructional building—We determine the cost of construction using per square feet construction cost estimates from the Cummings (2023) price list that includes an average of high and low construction prices across major cities in U.S. We add an up-rate of 21% to account for additional expenses such as furniture, furnishings, and professional fees. We based the building's annual depreciation on a 30-year useful life (Shand & Bowden, 2022). A sensitivity test confirmed a minimal impact from this assumption, as extending the useful life to 45 years only lowered the per-section infrastructure cost to $586.

2) Rental estimates—We use the average per square feet rent for commercial properties across various Los Angeles neighborhoods released by major real estate firms operating in the area. We exclude higher-end neighborhoods where LACCD does not have a campus.

We average the amortization rate and rental rate to get a reasonable estimate of the cost of facilities ($687 per section). The annual cost at the district level accounts for the total number of sections taught in a year and the number of sections using one classroom.

- **Faculty per hour cost:** To estimate the per hour cost of faculty time, we determine the total number of working days in a year and national average of annual faculty salary and benefits. We assume that faculty work for 16 weeks in the Spring and Fall terms and 12 weeks in the summer for 5 days a week, 8 hours a day. Subtracting holidays and vacation days gives us a total of 196 working days and 1,568 hours of work. To keep our estimates comparable to other community college districts in the country, we use national salary averages to determine the cost of faculty time. According to the Bureau of Labor Statistics, the average salary for community college instructors was about $86,500 in 2023. Assuming a fringe benefit rate of 30%, the annual cost of faculty time is $113,000 and the per hour cost is $72. It is important to note that our calculations reflect the costs of tenure or tenure-track faculty and may not reflect the payment structures of adjunct faculty.

The LTES team is comprised of Chris Avery, Jon Fullerton, Maury Pearl, Deborah Harrington, Elise Swanson, Rachel Worsham, and Soumya Mishra. We are also grateful to Tatiana Melguizo, a founding co-PI of the project who shaped the direction of this work and tragically passed away in 2024. All errors are those of the authors.

The LTES project was partially funded by the Institute of Education Sciences, U.S. Department of Education, through Grant R305X220018 to the President and Fellows of Harvard College. This work additionally benefited from the support of the Accelerating Recovery in Community Colleges (ARCC) Network through Grant R305X220022 to Columbia University. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.

For more information about the ARCC Network, visit **ccrc.tc.columbia.edu/arccnetwork/**

For more information on the LTES project, visit **cepr.harvard.edu/leveraging-technology-and-engaging-students-ltes**

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