

DETERMINING THE COST OF COMMUNITY COLLEGE IN TEXAS

MAKING
RESEARCH
RELEVANT

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Agenda

- Motivation for Performing Research on Community College Funding
- Introduction to Texas Community College Funding
- Methodology Used to Investigate Community College Funding in Texas
- Results from Texas Research
- Questions and Answers

Motivation for Performing Research on Community College Funding

Motivation – Community colleges serve as an engine for social mobility

- There has been a consistent decline in social mobility in the US over several decades (Chetty et al., 2017).
- The US lags behind many other developed countries in terms of social mobility (Reeves and Krause, 2017).
- Private returns to community college education are high (Marcotte, 2019).
- Public returns to community college education are also high (Levin and Garcia, 2018).

Motivation – Community colleges struggle with funding and outcomes

- Funding – Community colleges are clearly funded less than their public and private research university counterparts (Desrochers and Hurlburt, 2016).
- Outcomes – A large share of community college enrollees fail to complete a two- or four-year program of study after six years (Shapiro et al., 2017).

Motivation – Community college funding mechanisms should be cost-based

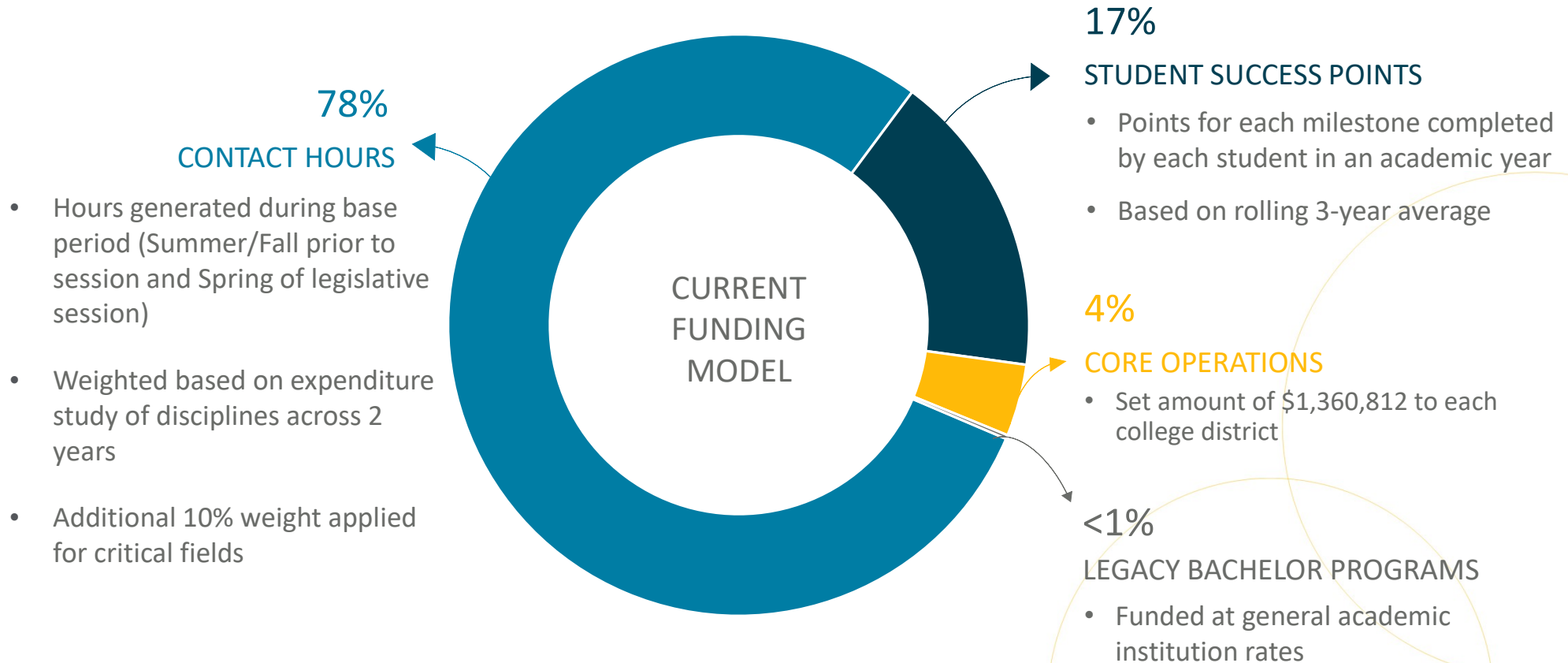
- Funding should be provided that allows all students an equal opportunity to succeed at a common level that is aligned with state goals (Baker and Levin, 2019).
- Adjustments in funding mechanisms should represent the differential costs in generating outcomes for different types of students served in different contexts.
- The imperative to develop cost-based adjustments becomes even more important in the context of funding mechanisms that have a performance-based component such as Texas and California (Hagood, 2019).

Introduction to Texas Community College Funding

Texas community college context

- Second largest state in terms of community college enrollment.
- Approximately 50 community colleges that vary widely with respect to:
 - Size
 - Geographic Location
 - Types of Students Served
 - Programs Offered
- State operates a performance-based funding system based on a variety of *success points milestones*:
 - Passing a college-level course
 - Earning 15 or 30 credit hours
 - Attaining a credential
 - Transferring to a four-year institution

Current Texas community college funding allocations



Texas community college enrollment and perspectives

- Enrollments has been declining over the past decade:
 - Decrease in academic education enrollment from 2011 peak of 416,167 to 315,439 in 2021 (a 24% decline).
 - Traditional and continuing workforce enrollment decrease from 2010 peak of 285,890 to 172,710 in 2021 (a 60% decline).
 - An overall 10.7% decline in enrollment in two-year institutions from 2019-2022.
- Policy makers recognize that a majority of jobs in Texas will require postsecondary education.
- There is positive public sentiment for Texas community colleges with a majority feeling:
 - Community college credentials are valuable.
 - Credentials should align with employer needs.
 - Funding should be based on student outcomes.

Need for investigating community college costs in Texas

- Texas Commission on Community College Finance convened to make recommendations regarding state funding formula and funding level for Texas community colleges.
- The Texas Higher Education Coordinating Board (THECB) was interested in using data-driven evidence to make decisions about how to fund community colleges.
- There was a need for rigorous analyses of the degree to which the current system used to fund Texas community colleges is equitable and based on the differential costs associated with producing outcomes for different types of students.
- The findings from our research were intended to inform this legislative policy debate surrounding community college funding.

Methodologies Used to Investigate Community College Funding in Texas

Introduction to cost analysis methodologies

- Our research agenda draws upon methods used for decades to examine costs in K-12 education to inform policy focused on the provision of adequate and equitable funding (Baker & Levin, 2019).
- Two general approaches to cost analysis:
 - Input Oriented – Determine the personnel and non-personnel resources and corresponding costs associated with the educational services used to generate student outcomes. [Ingredients Method (Levin et al., 2018; Baker & Morphey, 2007)]
 - Outcome Oriented – Evaluate aggregated spending per-student as a function of student outcomes and several cost factors including needs, labor price levels, scale of operations and other institutional characteristics. [Education Cost Function Analysis (Duncombe & Yinger, 2011; Levin et al., 2022)]

Illustration of input-oriented approach to cost analysis

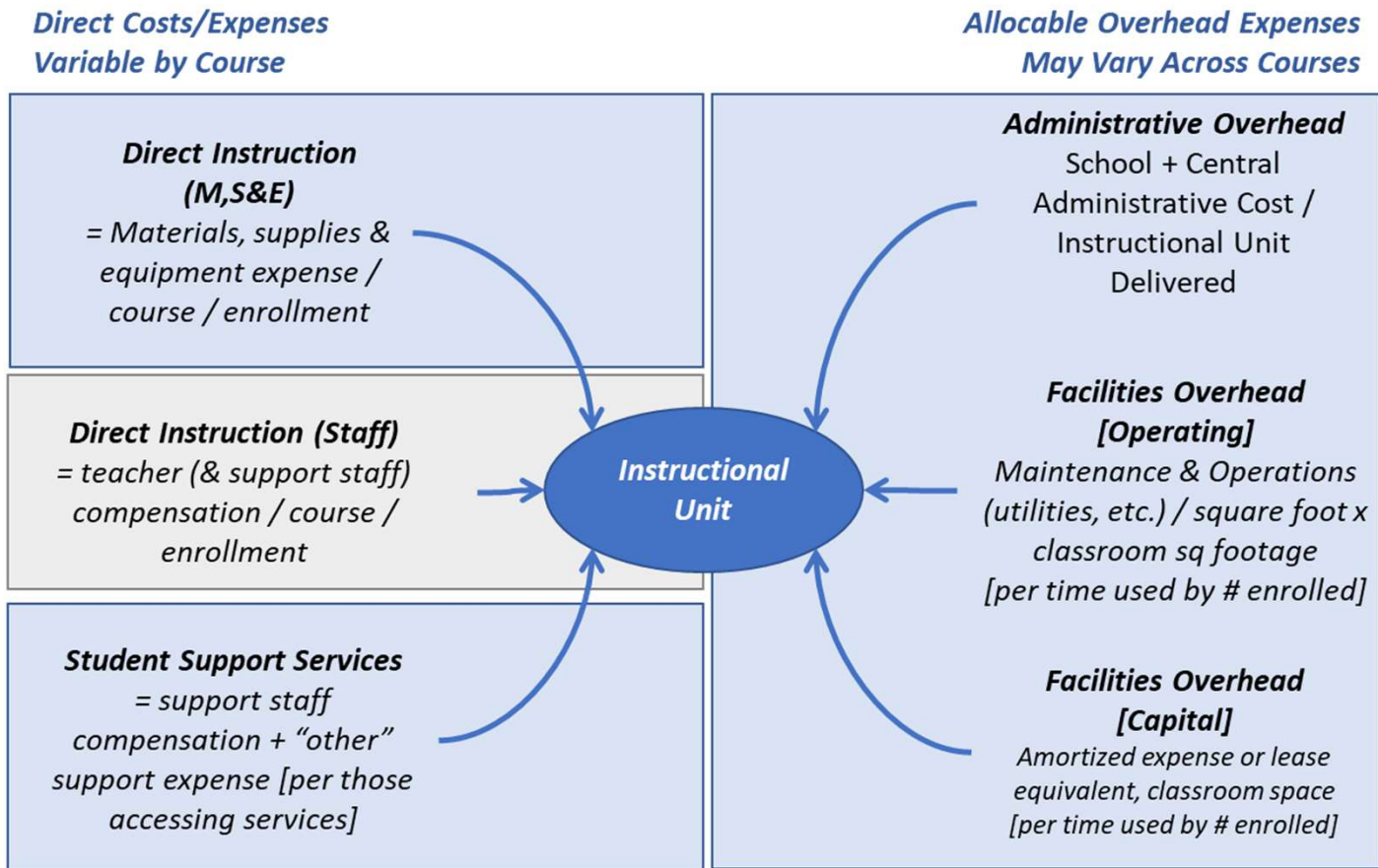
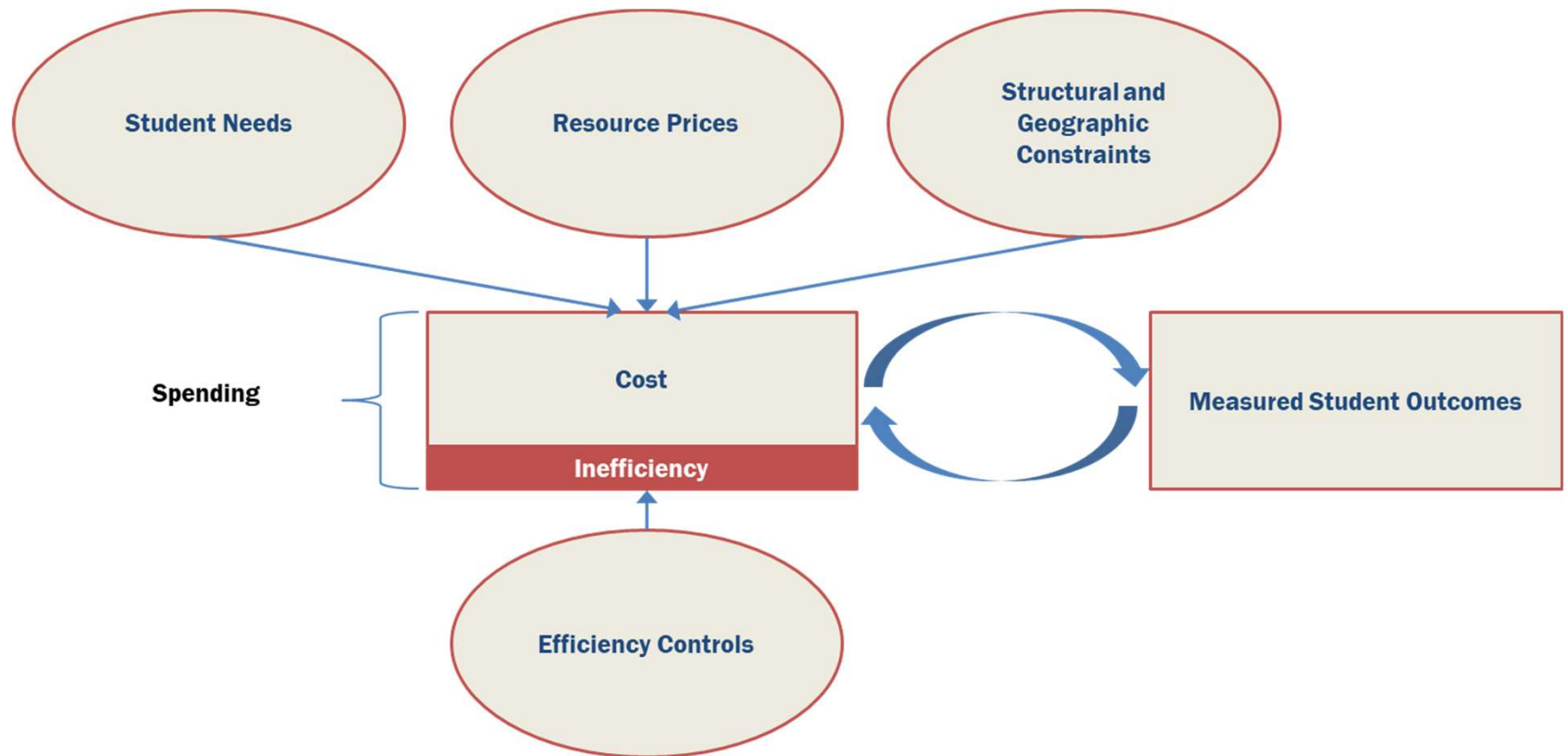


Illustration of outcome-oriented approach to cost analysis



Comparison of input- and outcome-oriented approaches

	Input-Oriented	Outcome-Oriented
Data Needs	Requires detailed data on quantities and prices of staff, institutional spending and student course enrollments	Requires campus-level aggregate data on spending per student, student outcomes and cost factors associated with student needs and institutional characteristics
Analysis Needs	Involves descriptive analysis of granular data on personnel and non-personnel resources to determine costs	Involves conditional regression modelling of aggregated data that attempts to control for institutional efficiency and simultaneous determination of outcomes and spending in empirically deriving costs
Applicability and Limitations	<ul style="list-style-type: none"> • Can be applied to any community college system or individual community college where required data on staff, spending and enrollment can be merged • Obtaining detailed information on spending devoted to indirect supports for students is challenging and often requires primary data • Not particularly useful for developing funding formulas or high-level funding policy 	<ul style="list-style-type: none"> • Can only be applied in cases where there are enough community colleges to support a regression analysis (e.g., cannot be applied in states with few colleges) • Method does not provide information on <i>how</i> resources are used by colleges, only on how aggregate spending relates to outcomes and cost factors
Strengths	<p>Provides detailed information on the following:</p> <ul style="list-style-type: none"> • Cost of course combinations (pathways) taken to achieve outcomes • How costs vary both within and across different outcomes • How pathways and their costs are associated with specific student needs 	<p>Provides direct empirical evidence for constructing need and cost-based simulations and formulas:</p> <ul style="list-style-type: none"> • Provides estimates of “base” funding needed for achieving desired outcomes for the average student • Generates need weights to be applied to student population characteristics • Yields additional cost weights for addressing economies of scale and regional wage variation

Input-Oriented Analysis of Texas Community College Costs

Research questions

1. What is the distribution of credentials awarded by Texas community colleges across type (Associates Degree, Core Curriculum Completer, Certificate, etc.)?
2. What are the most prevalent majors for those Associate Degrees that are awarded?
3. How are the most prevalent Associate Degrees awarded distributed according to student gender, age and race/ethnicity?
4. What are the average costs of the most prevalent Associate Degrees awarded and to what extent do these costs vary?

Study data

- Student and staff data from the Education Research Center at the University of Texas at Dallas:
 - Student-level data on demographics, courses taken, and graduation status
 - Staff-level data on salaries
- Institutional expenditure data from the Texas Higher Education Coordinating Board:
 - Report of Fundable Operating Expenses
- Institutional expenditure data from the individual community colleges
 - Annual Financial Reports received for approximately 30 of the 50 community colleges

Results: Distribution of Texas community college credentials in 2020-21

Credential Type	Number of Credentials Awarded	Share of Credentials Awarded
Associate Degree	91,548	46.7%
Core Curriculum Completer	56,811	29.0%
Certificate	36,340	18.6%
Field of Study Completer	9,680	4.9%
Bachelor's Degree	853	0.4%
Advanced Technology Certificate	525	0.3%
Enhanced Skills Certificate	74	0.0%
Total	195,831	100.0%

Results: Distribution of associate degrees awarded by major in 2020-21

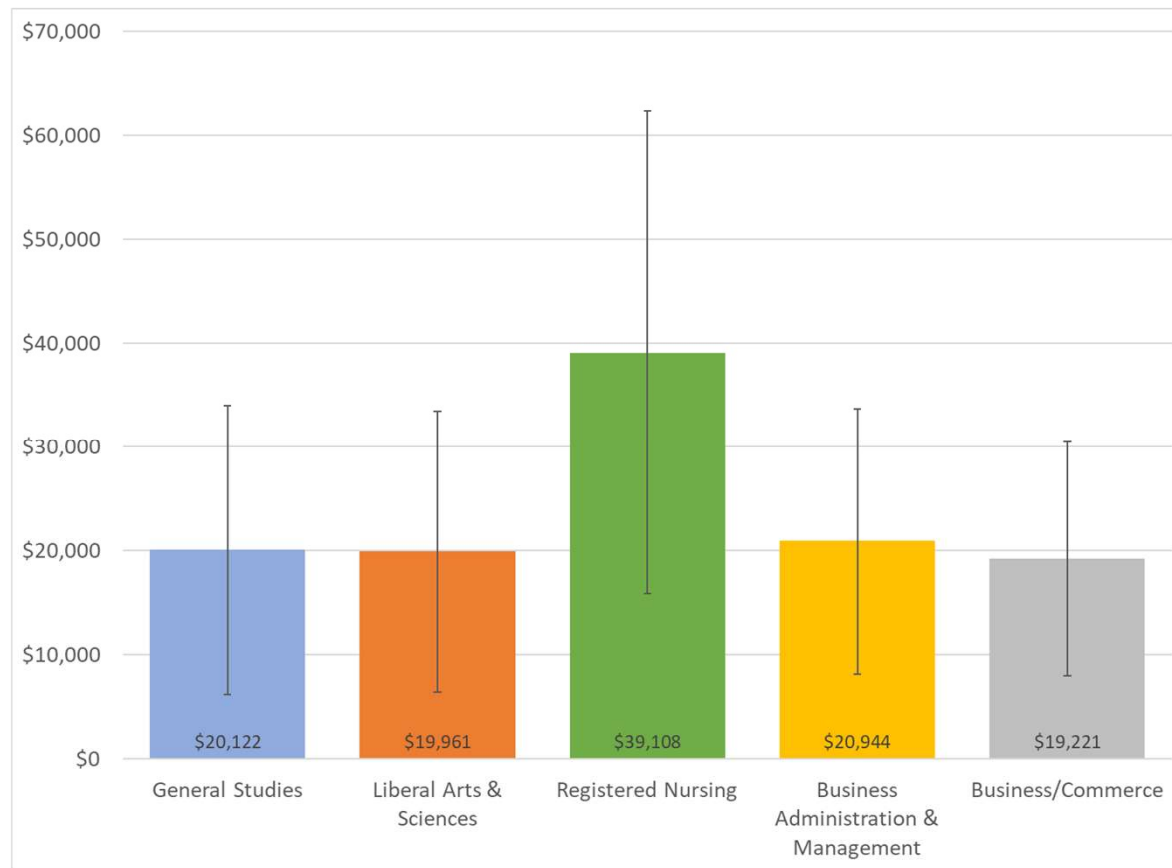
Highest/Lowest Prevalence	Major	Associate Degrees Awarded	Share of Associate Degrees Awarded	Cumulative Share of Associate Degrees Awarded
Highest Prevalence	General Studies	39,237	43%	43%
	Liberal Arts & Sciences	10,936	12%	54%
	Registered Nursing	5,552	6%	60%
	Business Administration & Management	3,092	3%	64%
	Business/Commerce	2,704	3%	67%
Lowest Prevalence	Early Childhood Education & Teaching	1,790	2%	69%
	Criminal Justice/Safety Studies	1,401	2%	70%
	Biological Sciences	1,368	1%	72%
	Teacher Education	1,064	1%	73%
	Chemical Technology	1,052	1%	74%
	Psychology	900	1%	75%
	Other	22,452	25%	100%
Total		91,548	100%	–

Results: Shares of student groups and average age of students awarded associate degrees by major in 2020-21

	General Studies	Liberal Arts & Sciences	Registered Nursing	Business Administration & Management	Business/Commerce	Highest Prevalence Majors
Female	65.9%	66.5%	86.7%	61.9%	58.8%	67.4%
Male	34.1%	33.5%	13.3%	38.2%	41.3%	32.6%
Asian	5.8%	5.9%	5.1%	5.6%	5.6%	5.7%
Black	11.6%	9.6%	11.8%	17.5%	6.7%	11.4%
Hispanic	48.5%	52.5%	38.2%	40.1%	57.2%	48.1%
White	27.7%	26.0%	40.6%	26.8%	24.7%	28.5%
Other Race	6.5%	6.0%	4.3%	10.0%	5.8%	6.3%
Average Age	22.7	22.3	29.6	28.2	24.1	23.7

Note: Highest shares/oldest average age highlighted in green and lowest shares/youngest average age highlighted in yellow.

Results: Average cost per associate degree awarded by major in 2020-21



Note: Bars denote range bounding the average cost per associate degree for each major (equal to +/- 1.96 times standard deviation).

Results: Coefficient of variation of associate degree cost distributions by major in 2020-21

Major	Average	Standard Deviation	Coefficient of Variation
General Studies	\$20,122	\$7,099	0.353
Liberal Arts & Sciences	\$19,961	\$6,890	0.345
Registered Nursing	\$39,108	\$11,866	0.303
Business Administration & Management	\$20,944	\$6,521	0.311
Business/Commerce	\$19,221	\$5,741	0.299

Discussion

- Disclaimer: This work is currently in progress and there is still much to be done!
- The main cost findings suggest that there is significant variation in the costs of producing the five most prevalent associates degrees awarded to Texas community college students.
- The combinations of courses taken to complete a given type of associates degree were vast implying there are a number of more and less expensive routes.
- Future research includes exploring cost implications of the different courses taken and how subsequent costs may be associated with different student and institutional characteristics.

Outcome-Oriented (Cost Function) Analysis of Texas Community Colleges

Research questions

1. Which student need factors are most strongly associated with college outcomes?
2. To what extent does institutional spending vary with respect to differences in student need factors and institutional contextual factors?
3. What spending levels are associated with success point milestones earned by students with different needs attending community colleges in different contexts?
4. Do student outcomes improve as the gap between projected adequate cost and actual spending narrows?
5. How does the size of the gap between adequate projected cost and actual spending change with respect to incidence of specific student need factors and institutional contextual factors?

Study analyses

- **Needs analysis:** Identifies student need factors and institutional contextual factors that may be associated with student outcomes for consideration as candidates to include in the education cost function analysis.
- **Equity analysis:** Describes the degree to which community college spending per pupil varies with respect to student needs and institutional contextual factors for consideration as candidates to include in the education cost function analysis.
- **Education cost function analysis:** Determines the differential cost of providing an equal opportunity for students with different needs learning in different institutional contexts to achieve.

Study data

- Texas Higher Education Coordinating Board: Student outcomes, needs characteristics and enrollment
- College Scorecard: Student income level
- Integrated Postsecondary Education Data System: Enrollment of local competing institutions, faculty salaries, and institutional location
- School Finance Indicators Database: Median household income and housing value, population density, and incidence of K–12 students with disabilities

Results: Needs analysis

Negative relationships were found between student outcomes and the following: percentages of first-generation college students, academically disadvantaged students, students older than 24, English learner students, and students who attend medium-sized community colleges.

Student need factor or institutional contextual factor	Success points milestones earned per full-time equivalent student
	Coefficient
Need factor	
Percentage of students who are first-generation college students	-2.016***
Percentage of students who are from households earning less than \$30,000	0.084
Percentage of students who are academically disadvantaged	-0.188**
Percentage of students who are older than 24	-0.391*
Percentage of students who are English learner students	-0.345**
Percentage of students who are enrolled in dual-credit programs	0.142
Contextual factor	
Fewer than 4,001 students enrolled ¹	-0.100
4,001–30,000 students enrolled ¹	-0.080*
Local population density	-0.005
Constant	3.395***
<i>Number of observations</i>	300
<i>R²</i>	0.541

* Significant at $p < .05$. ** Significant at $p < .01$. *** Significant at $p < .001$.

¹ Reference group is a community college with enrollment greater than 30,000 students.

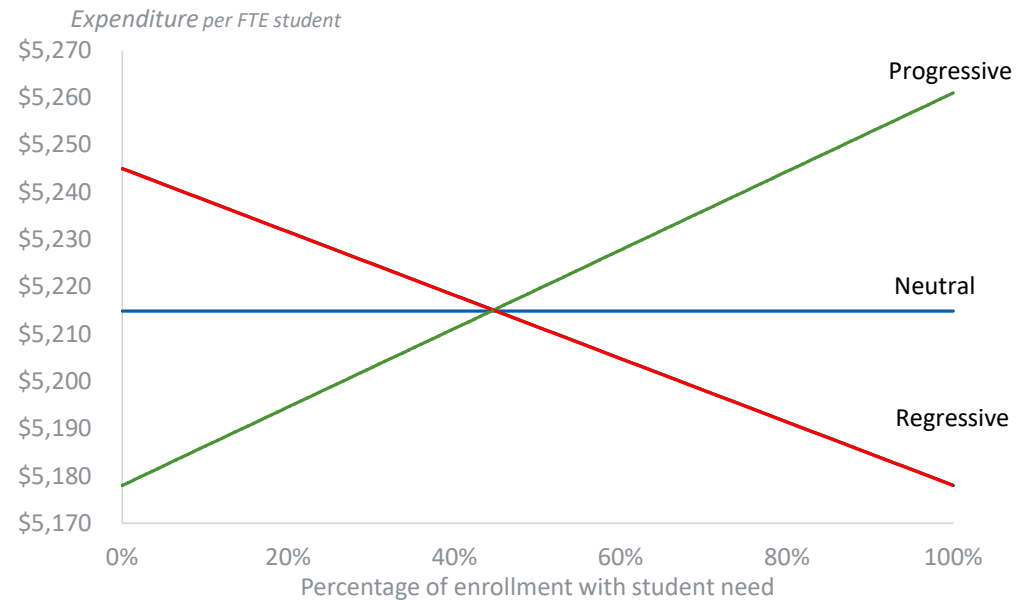
Results: Equity analysis

- Negative relationships were found between spending and the following: percentages of students who are academically disadvantaged and students who participated in dual-credit programs.
- Positive relationships were found between spending and the following: percentages of first-generation college students, economically disadvantaged students, students older than 24 years, English learner students, students who attend small or medium-sized community colleges, and competitor faculty salaries.

Student need factor or institutional contextual factor	Expenditures per full-time equivalent student	
	Coefficient	
Need factor		
Percentage of students who are first-generation college students	4,263.74*	
Percentage of students who are from households earning less than \$30,000	2,803.16**	
Percentage of students who are academically disadvantaged	-4,284.23***	
Percentage of students who are older than 24	14,461.58***	
Percentage of students who are English learner students	3,761.93**	
Percentage of students who are enrolled in dual-credit programs	-3,748.80*	
Contextual factor		
Fewer than 4,001 students enrolled ¹	1,629.69***	
4,001–30,000 students enrolled ¹	1,000.13***	
Local population density	-17.49	
Monthly faculty salary (\$10,000s) in local market	1,463.15*	
Constant	-675.09	
Number of observations		
	300	
R²		
	0.477	
* Significant at p < .05. ** Significant at p < .01. *** Significant at p < .001.		
¹ Reference group is a community college with enrollment greater than 30,000 students.		

A note on equity

- Relationships between spending and student needs can be progressive/regressive or neutral:
 - Progressive: tendency for higher spending at colleges with higher student needs
 - Regressive: tendency for lower spending at colleges with higher student needs
- A progressive relationship between spending and student needs does not necessarily imply that all students are provided a level of funding that allows for an equal opportunity to achieve.



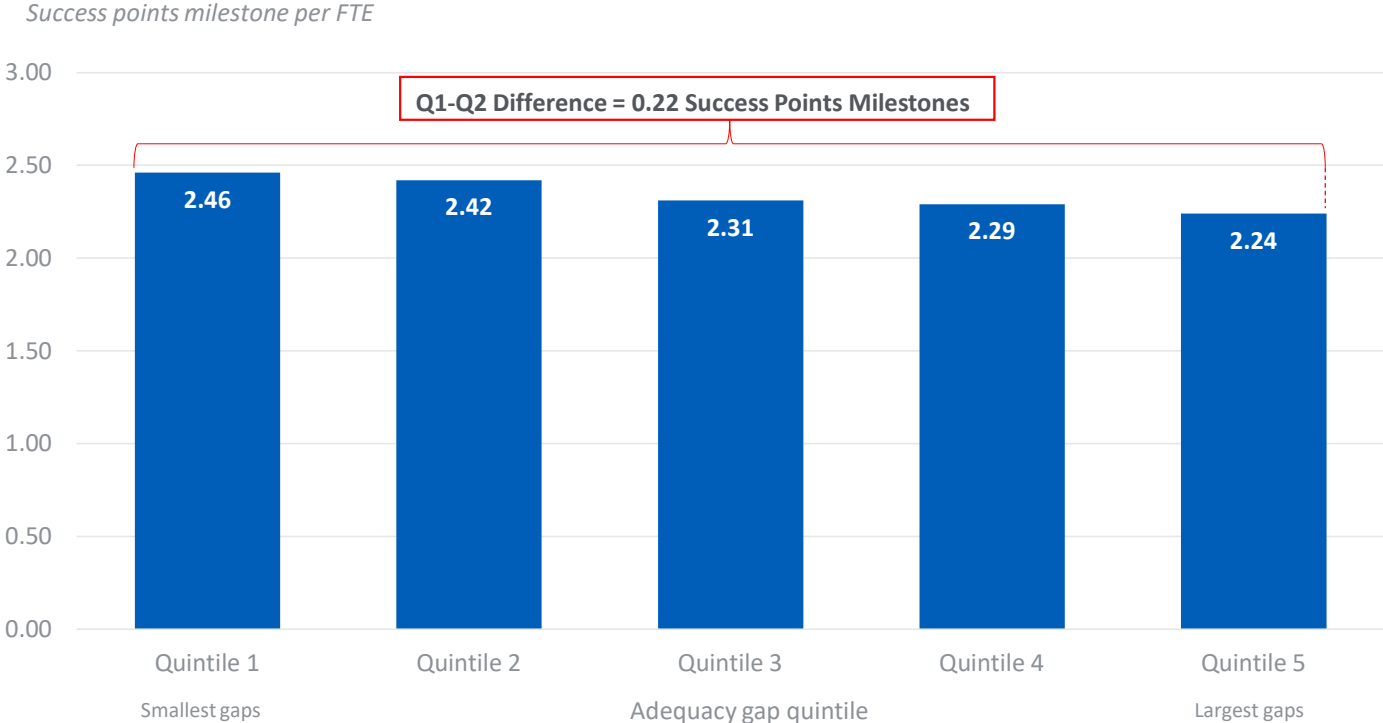
Results: Education cost function analysis

- The cost of achieving statewide average outcomes for a student with no needs attending a large-sized community college was \$4,537 (base per-student cost).
- To provide an equal opportunity to achieve the statewide average outcomes:
 - Students who are older than 24 years and first-generation college students cost more than twice as much as the estimated base per-student cost.
 - Students from low-income households, English learner students, and students attending small or medium-sized colleges cost 18 to 31 percent more than the estimated base per-student cost.
 - Students participating in dual-credit programs cost 16 percent less than the estimated base per-student cost.
- Example: It would cost 149 percent more for a first-generation college student with no additional need factors who attends a small college to have the same opportunity to earn success points milestones, or \$14,460 (equal to $\$4,537 \times 2.49 \times 1.28$).

Student need factor or institutional contextual factor	Expenditure per full-time equivalent student	Weight
Need factor		
Percentage of students who are first-generation college students	2.49	
Percentage of students who are from households earning less than \$30,000	1.31	
Percentage of students who are older than 24	2.63	
Percentage of students who are English learner students	1.19	
Percentage of students who are enrolled in dual-credit programs	0.84	
Contextual factor		
Fewer than 4,001 students enrolled	1.28	
4,001–30,000 students enrolled	1.18	
Base per-student cost (constant)	\$4,536.86	

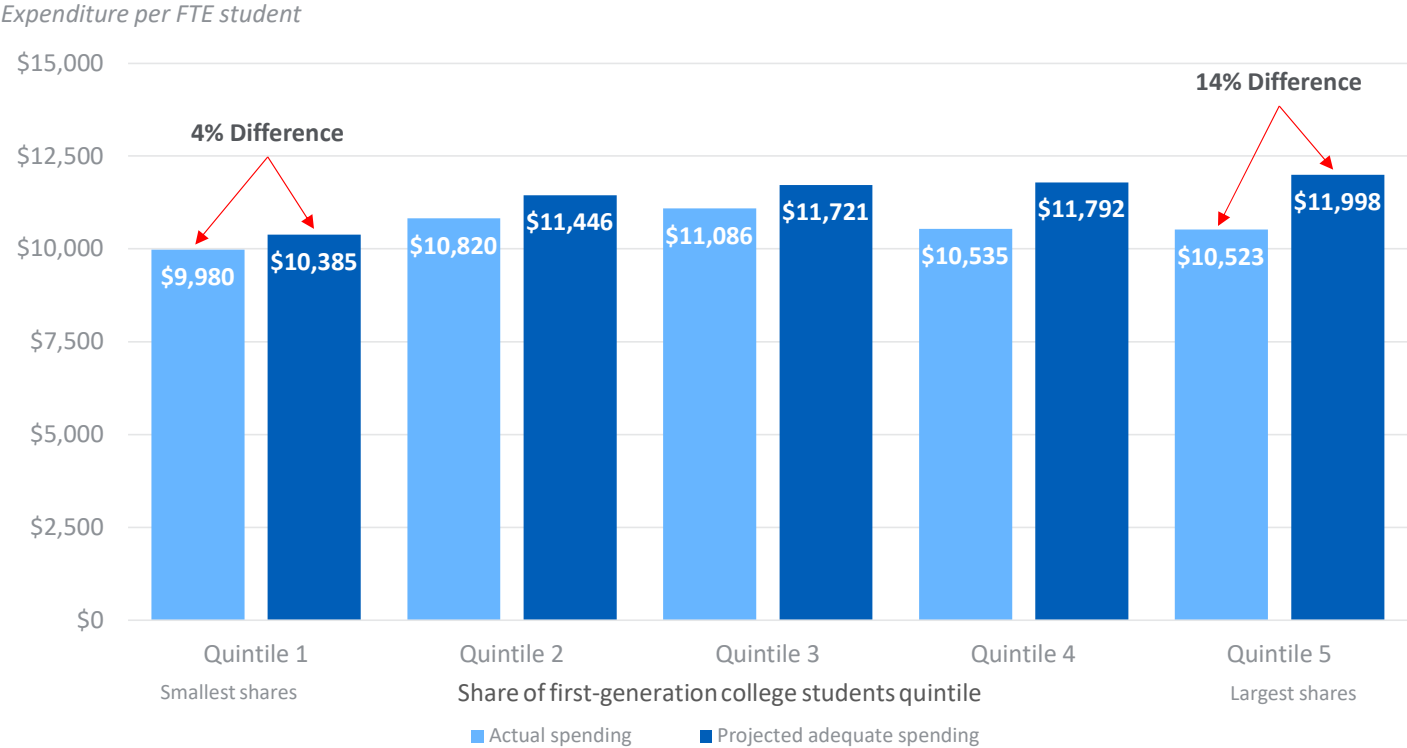
Results: Adequacy gaps and outcomes

- Colleges with larger differences between projected adequate cost and actual spending (adequacy gaps) had lower outcomes measured as fewer success points milestones per full-time equivalent student than colleges with smaller adequacy gaps.



Results: Student needs factors and outcomes

- Actual spending levels among colleges with higher shares of first-generation college students tended to be further below their projected adequate cost compared with colleges with lower percentages of first-generation students.



Implications of findings

- The study found that Texas's current funding system is progressive in some respects, as demonstrated by higher per-student spending in community colleges serving higher percentages of first-generation college students, English learner students, and students older than 24.
- However, the additional amount of spending for students with these characteristics may not be enough to provide an equal opportunity for their students to meet statewide average success points milestones.
- Funding adjustments for particular student needs and institutional contextual factors should be considered to improve the adequacy and equity with which funding for Texas community colleges is allocated.

Simulator tool: Funding projections made easy



Regional Educational
Laboratory Southwest
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Texas Community College Funding Simulator Tool v1.0 (TX-CCFS) User Guide

Jesse Levin, Bruce Baker, Jason Lee, Drew Atchison, and Robert Kelchen

October 2022

This guide provides user documentation for the Texas Community College Funding Simulator Tool (TX-CCFS) v1.0. The tool is designed to emulate community college per-student funding projections using a formula derived from the REL Southwest report *An Examination of the Costs of Texas Community Colleges*.

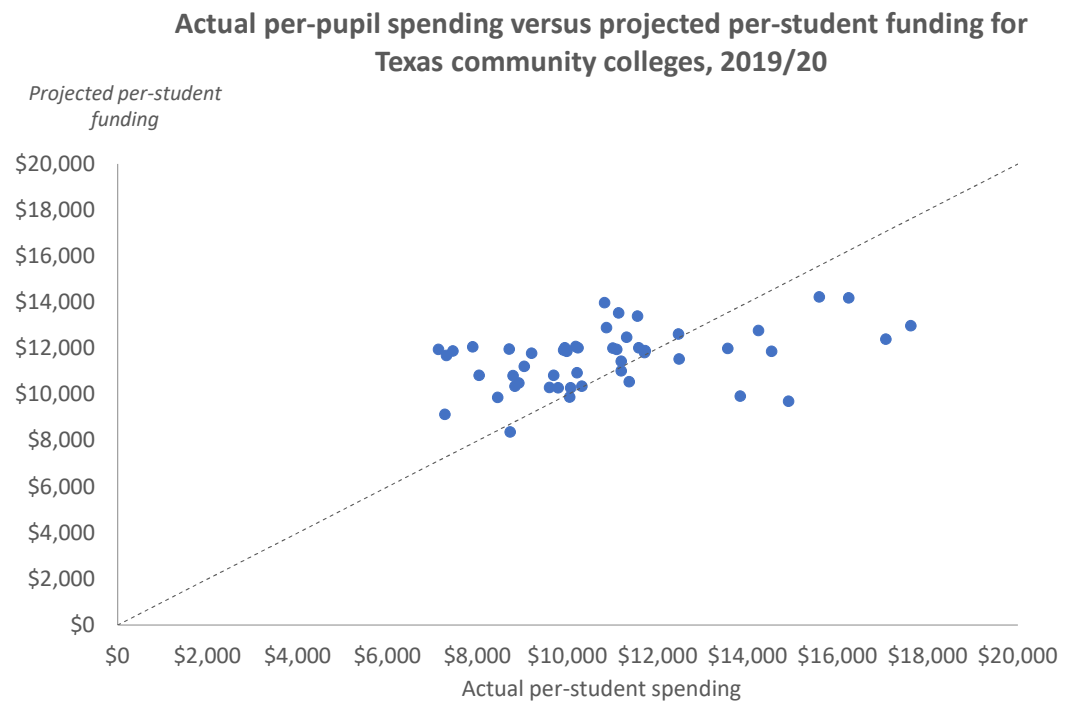
Simulator tool: Customizable weights

- Texas policymakers can use the Texas Community College Funding Simulator Tool v1.0 (TX-CCFS) to consider potential changes to how community colleges are funded to ensure that institutions serving students from different backgrounds are equitably and adequately funded. The tool is capable of:
 - Emulating the community college per-student funding projections generated by the study analysis.
 - Generating alternative funding scenarios by changing key formula settings such as base per-pupil cost and funding adjustments related to student need characteristics and institution enrollment size.

A. Set Custom Funding Weights									
	Custom/Suggested Funding Weights and Base Per-Student Funding Definitions	Percent First Generation	Percent Income Less Than \$30,000	Percent Older Than 24	Percent English Learner	Percent Dual Credit	Enrollment Less Than 4,001	Enrollment Between 4,001 and 30,000	Base Per-Student Funding
A1. Set Custom Funding Weights (Use Up/Down Arrows To Adjust Values)	Custom Funding Weights	▲ 2.49 ▼	▲ 1.31 ▼	▲ 2.63 ▼	▲ 1.19 ▼	▲ 0.84 ▼	▲ 1.28 ▼	▲ 1.18 ▼	▲ \$4,537 ▼
	Suggested Funding Weights	2.49	1.31	2.63	1.19	0.84	1.28	1.18	\$4,537
A2. Select Funding Weight Type (Choose From Pull-Down Menu) ----->	Suggested Funding Weights								

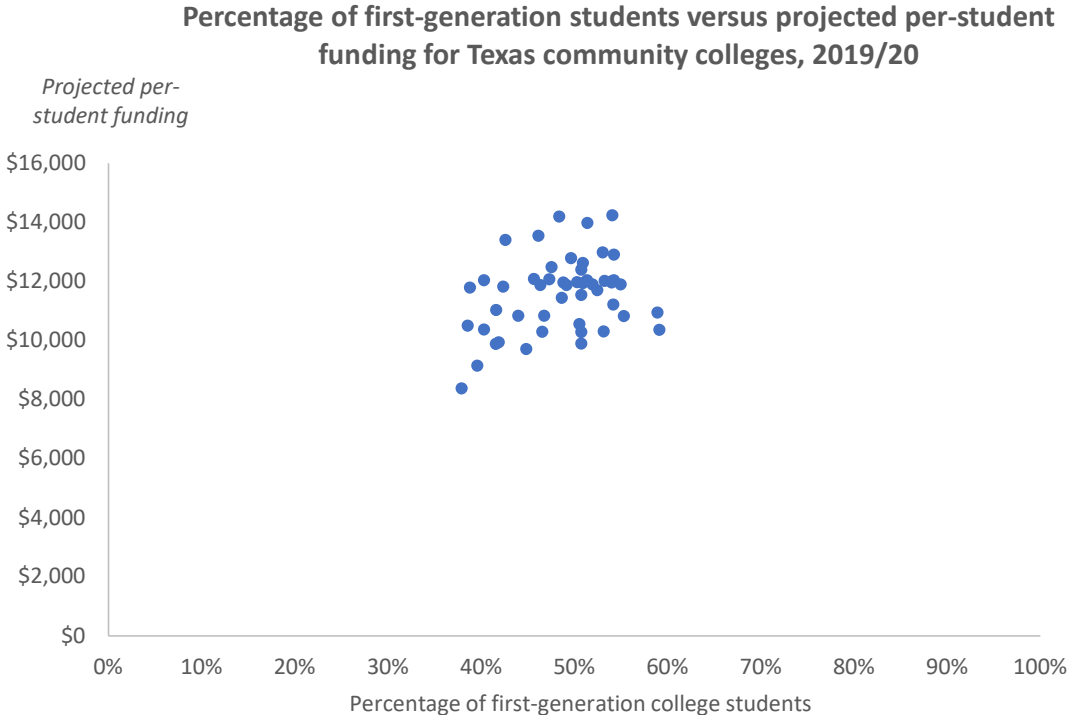
Simulator tool: Dynamic figures of spending versus projected funding

- The simulator tool includes various dynamic figures that update when the user makes changes to the weights or base per-student cost. As an example, this chart maps projected funding and spending for each of the state's 50 community colleges and provides a dashed line as a reference that indicates when projected per-student funding and actual per-student spending are equal.



Simulator tool: Dynamic figures of projected funding by student needs

- The simulator tool also produces a series of dynamic figures that plot projected per-student funding by student needs for each of the study community colleges. This example dot plot depicts projected per-student funding by the percentage of first-generation college students.



Questions and Answers

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