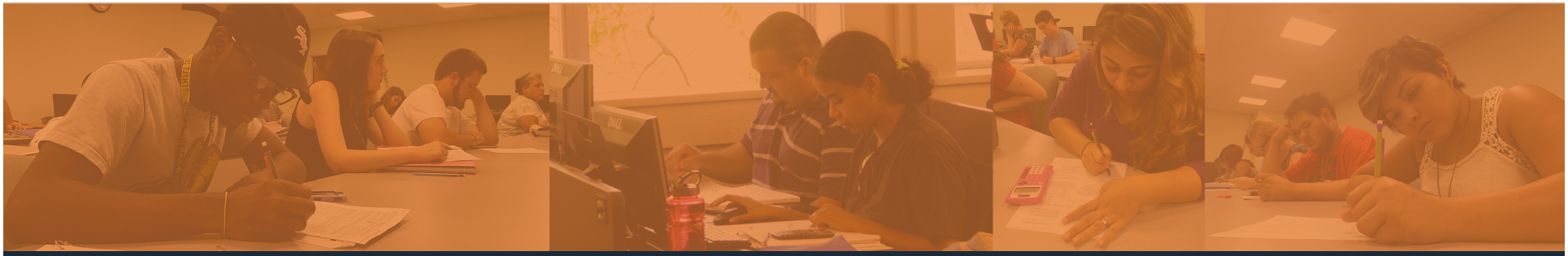
Dana Center
Mathematics
PATHWAYS

HB 2223 Co-Requisite Support Workshop

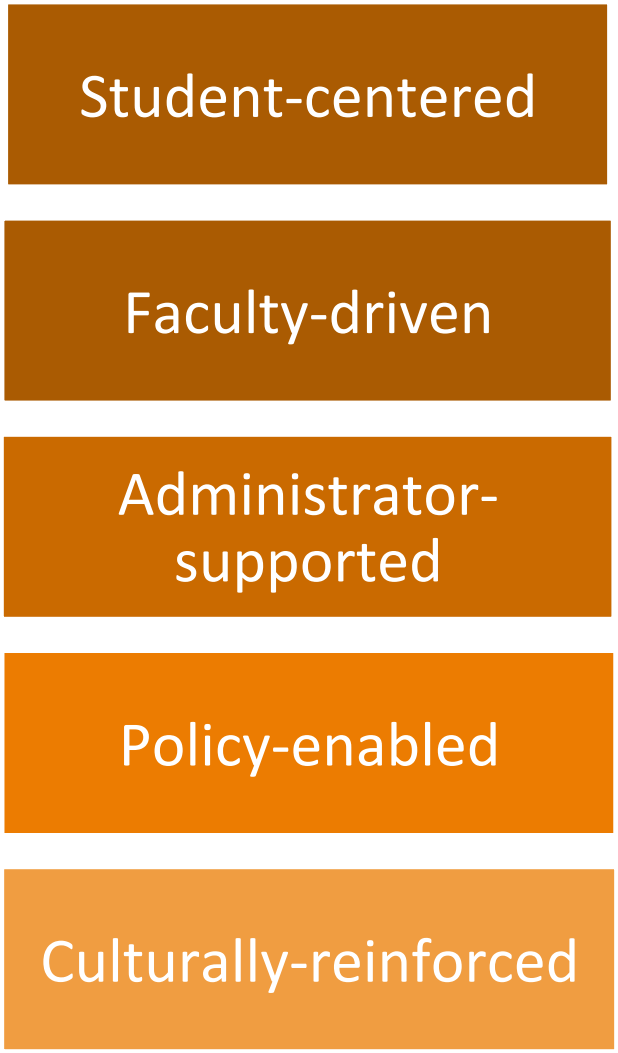
October 5-6, 2017



DCMP Vision

The DCMP seeks to ensure that **ALL** students in higher education will be:

- **Prepared** to use mathematical and quantitative reasoning skills in their careers and personal lives,
- **Enabled** to make timely progress towards completion of a certificate or degree, and
- **Supported** and **Empowered** as mathematical learners.


Student-centered
Faculty-driven
Administrator-supported
Policy-enabled
Culturally-reinforced

Introduction to the Dana Center's Role

- Provide information from successful programs.
- Support planning by facilitating structured discussions among campus teams.
- Foster cross-institutional learning and collaboration.
- Surface questions and concerns.

Outcomes

Participants will:

- Make progress toward determining the structure of co-requisite courses.
- Make progress toward determining broad, holistic placement policies.
- Make progress toward determining the content of co-requisite courses.
- *Do all of the above with a vision toward scale.*

60x30TX

The four goals in the *60x30TX* Plan are essential to the future prosperity of Texas.

THE OVERARCHING GOAL: 60x30

At least 60 percent of Texans ages 25-34 will have a certificate or degree.

- *Supports the economic future of the state*

THE SECOND GOAL: COMPLETION

At least 550,000 students in 2030 will complete a certificate, associate, bachelor's, or master's from an institution of higher education in Texas.

- *Requires large increases among targeted groups*

THE THIRD GOAL: MARKETABLE SKILLS

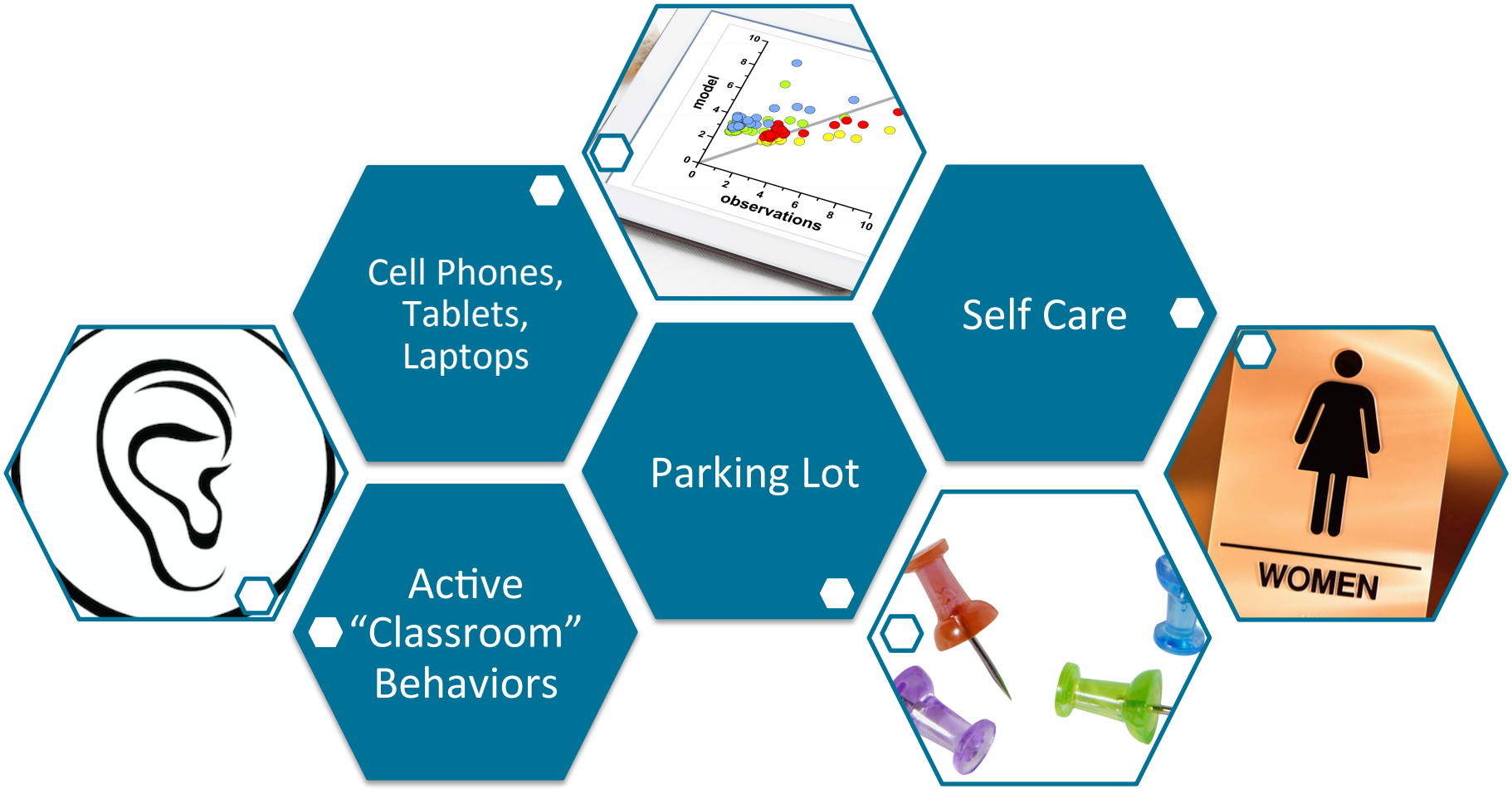
All graduates from Texas public institutions of higher education will have completed programs with identified marketable skills.

- *Emphasizes the value of higher education in the workforce*

THE FOURTH GOAL: STUDENT DEBT

Undergraduate student loan debt will not exceed 60 percent of first-year wages for graduates of Texas public institutions.

- *Helps students graduate with manageable debt*


Cell Phones, Tablets, Laptops
model
observations
Self Care
Parking Lot
WOMEN
Active "Classroom" Behaviors

Capturing Current Interventions

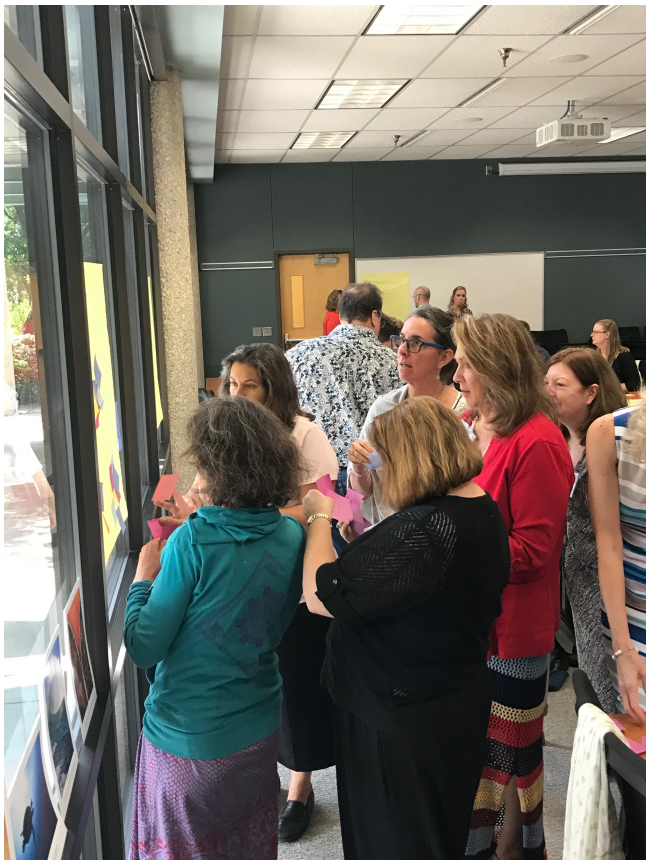
- **Poster 1:** What are your current interventions for underprepared students?
- **Poster 2:** What are your current plans for interventions to start Fall 2018?
- Resource:
  - Data Collection Tool (Webinar Homework)

Gallery Walk

As you rotate with your campus team:

- Record ideas that resonate with *you* based on your role on your campus team

- As a team, identify ideas that you are excited about or want to learn more about



Comprehensive Redesign

Core elements:

- Aligned math pathways with default or recommended math requirements
- Meta-majors with default or recommended math requirements
- Multiple measures placement
- Enhanced advising for those students still deemed underprepared
- Co-requisite supports for those students

Quick Recap: Data at a Glance

National Data

Table 1. Number of Remedial Courses Taken Among Students Who Graduated From High School in 2003 and Enrolled in College in 2003–04, by College Type

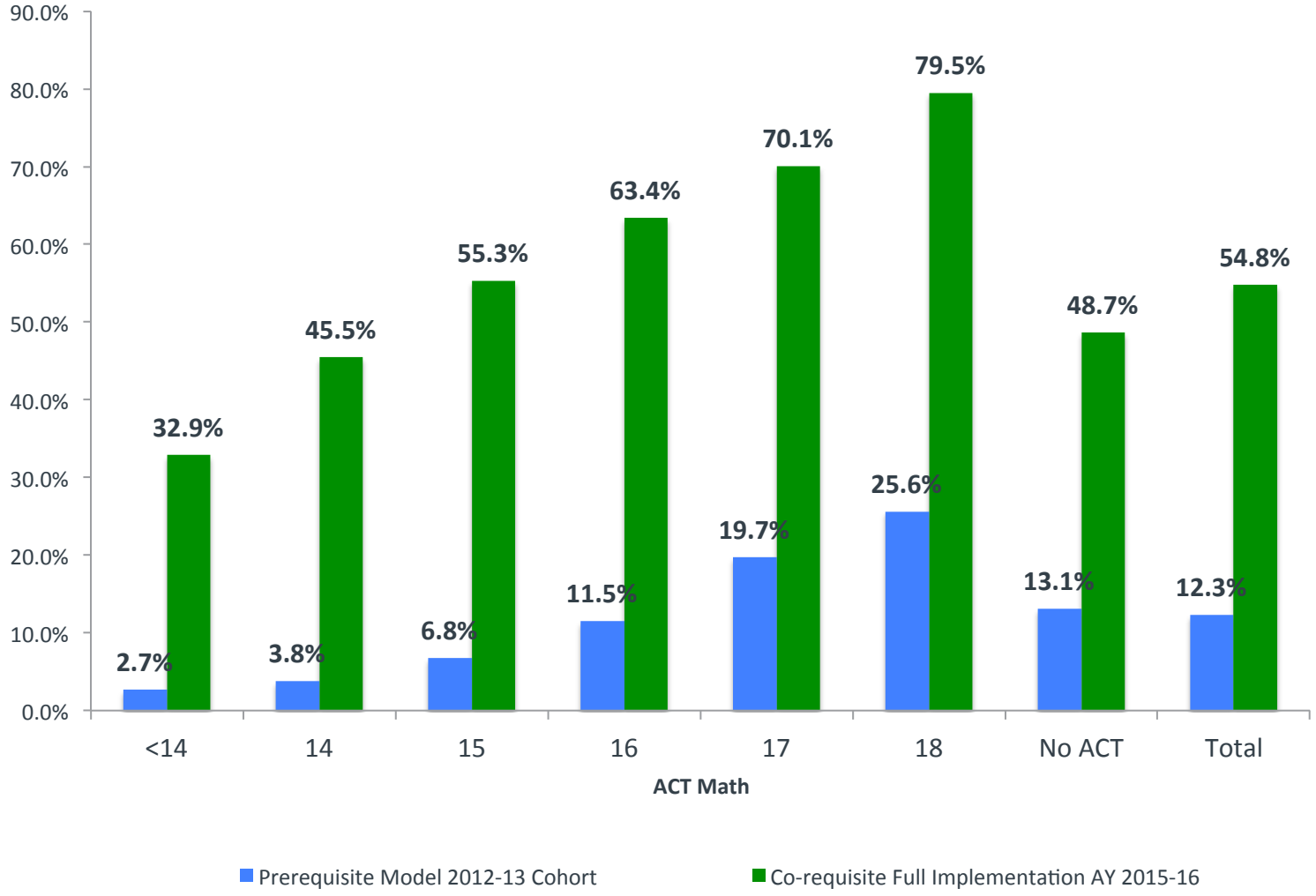
	Number of Remedial Courses Taken				
College Type	0 (%)	1 (%)	2 (%)	3+ (%)	Total (%)
Four-year	65.4	17.7	8.3	8.6	100
Two-year	32.1	20.7	16.0	31.2	100
Less-than-two-year	57.5	10.6	9.9	22.0	100
Total	52.6	18.6	11.3	17.5	100

Source: Author generated NCES QuickStats table using U.S. Department of Education, National Center for Education Statistics, BPS:2009 Beginning Postsecondary Students data. BPS: 2009 is transcript-level data for the 2003–04 cohort, tracked to 2009.

Table from Hodara (2013). *Improving Students' College Math Readiness: A Review of the Evidence on Postsecondary Interventions and Reforms*

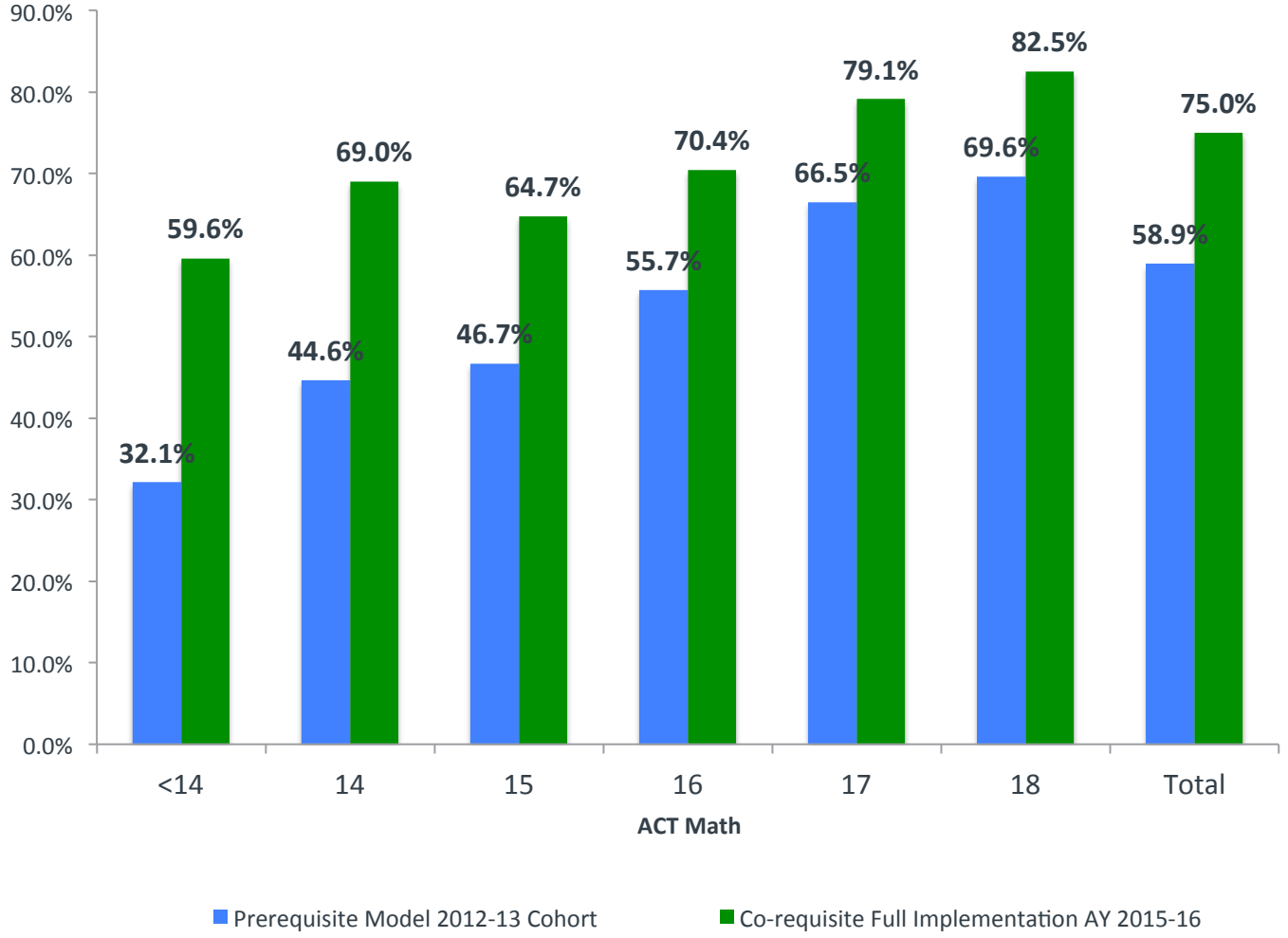
Do Co-requisites Work for All Students?

Tennessee Community Colleges
Gateway Math Success in One Year



Tennessee Board of Regents Brief #3: *Co-requisite Remediation Full Implementation 2015-16*

Tennessee Universities
Gateway Math Success in One Year



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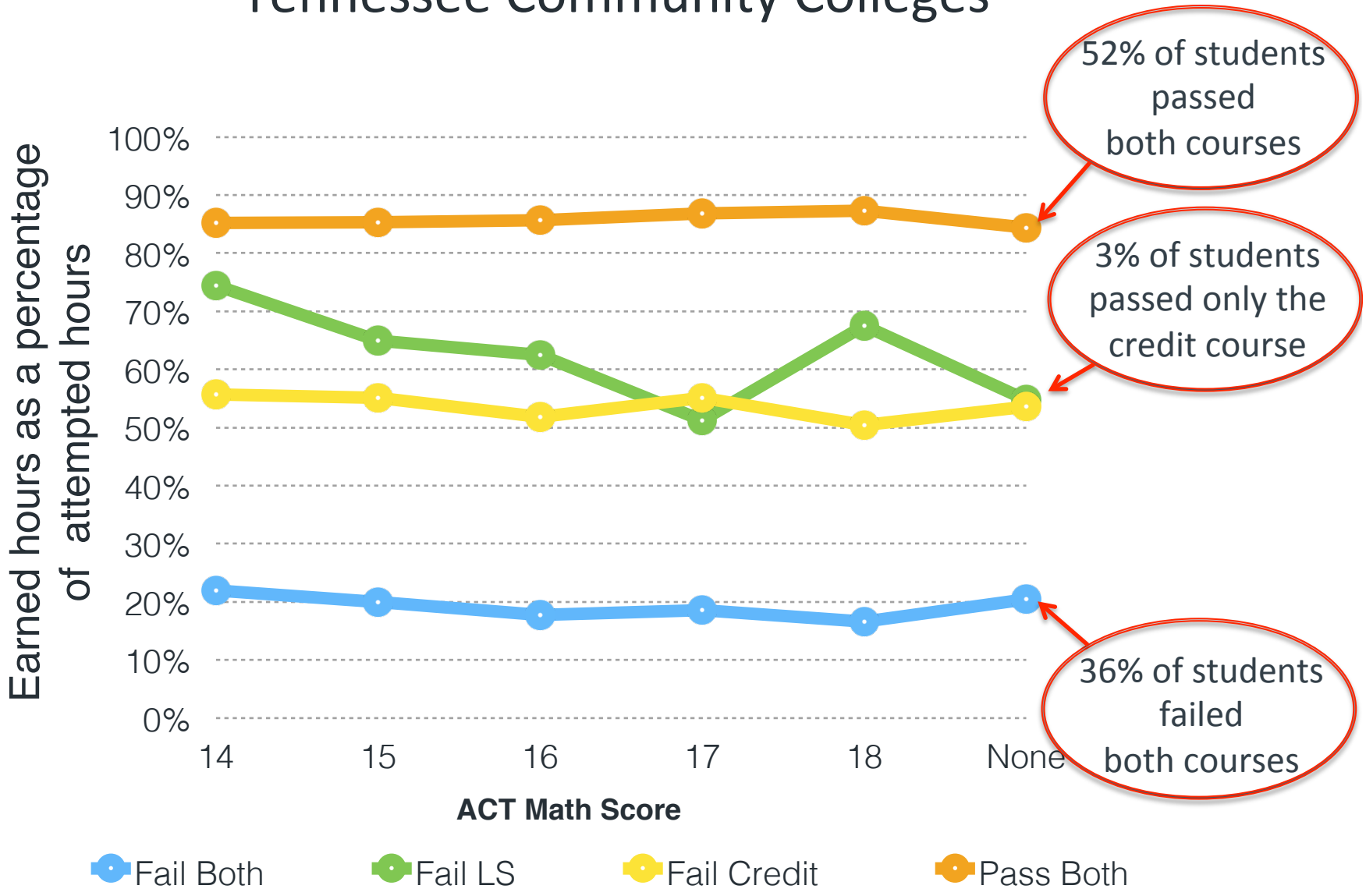


Adapted from TBR Brief #3: *Co-requisite Remediation Full Implementation 2015-16*

Example Results: Austin Peay University

	Liberal Arts Math (Math 1010)	Elementary Statistics (Math 1530)
Traditional *Requires passing Intermediate Algebra prior to taking Math 1530*	43%	28%
Co-requisite *Single semester*	84%	71%

Cost: Tuition for Intermediate Algebra used to be $834. The supplementary instruction in the new format is $75.

Reference: AASCU Innovation Exchange Innovation Case Illustration

Example: California Acceleration Project

Incoming Students	Placed Into Gateway Math (2015)	Placed Into Gateway Math (2016)
All	24%	84%
African American	9%	73%
Hispanic	21%	85%
White	27%	84%
Asian	36%	90%

Reference: Improving Completion and Equity in Gateway English and Math.

Example: California Acceleration Project

Placement in Traditional Sequence	Success in Gateway (w/Support) (Fall 2016)		Complete Gateway within 2 years (Fall 2013)	
All Levels	364	67%	850	40%
Gateway Math	35	77%	255	79%
One Level Below	102	69%	215	36%
Two Levels Below	110	66%	296	19%
Three or More Levels Below	47	62%	84	4%

Reference: Improving Completion and Equity in Gateway English and Math.

HB 2223 Co-Requisite Planning Placemat

HB 2223 Co-Requisite Planning Placemat

Goals: Fall 2020 _____% Fall 2019 _____% Fall 2018 _____%

		Number of incoming freshmen in each TSI band					
		TSI < 336 ABE 1 – 4 or equivalent	TSI < 336 ABE 5 – 6 or equivalent	TSI 336 – 339 or equivalent	TSI 340 – 344 or equivalent	TSI 345 – 349 or equivalent	TSI 350+ or equivalent
Gateway Course	Business Math						
	College Algebra						
	Contemporary Math/ Quantitative Reasoning						
	Elementary Statistical Methods						
	Technical Math						

HB 2223 Co-Requisite Planning Placemat

Gateway Course	Number of incoming freshmen in each TSI band					
	TSI < 336 ABE 1 – 4 or equivalent	TSI < 336 ABE 5 – 6 or equivalent	TSI 336 – 339 or equivalent	TSI 340 – 344 or equivalent	TSI 345 – 349 or equivalent	TSI 350+ or equivalent
Business Math						
College Algebra						
Contemporary Math/ Quantitative Reasoning						
Elementary Statistical Methods						
Technical Math						

Action Plan: Capturing Action Items

- Periodic opportunities to stop and capture action items.

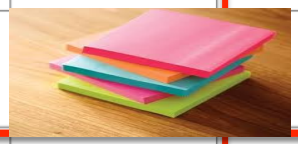
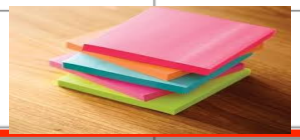
- You will use these ideas to
  - Inform discussions back on your own campuses
  - Set a timeline and goals for continuing this work

- Resources:
  - Day 1 packet, pages 017-020

Action Plan: Data Questions

- Do you feel comfortable with this data?
- What other data might be useful as you do this long term planning?
  - How can you collect it?
  - Use it?
  - Who needs to be involved?

HB 2223 Co-Requisite Planning Placemat

Gateway Course	Number of incoming freshmen in each TSI band					
	TSI < 336 ABE 1 – 4 or equivalent	TSI < 336 ABE 5 – 6 or equivalent	TSI 336 – 339 or equivalent	TSI 340 – 344 or equivalent	TSI 345 – 349 or equivalent	TSI 350+ or equivalent
Business Math						
College Algebra						
Contemporary Math/ Quantitative Reasoning						
Elementary Statistical Methods						
Technical Math						

Lunch

What are some different needs your team identified?

HB 2223 Co-Requisite Planning Placemat

		Number of incoming freshmen in each TSI band					
		TSI < 336 ABE 1 – 4 or equivalent	TSI < 336 ABE 5 – 6 or equivalent	TSI 336 – 339 or equivalent	TSI 340 – 344 or equivalent	TSI 345 – 349 or equivalent	TSI 350+ or equivalent
Gateway Course	Business Math						
	College Algebra						
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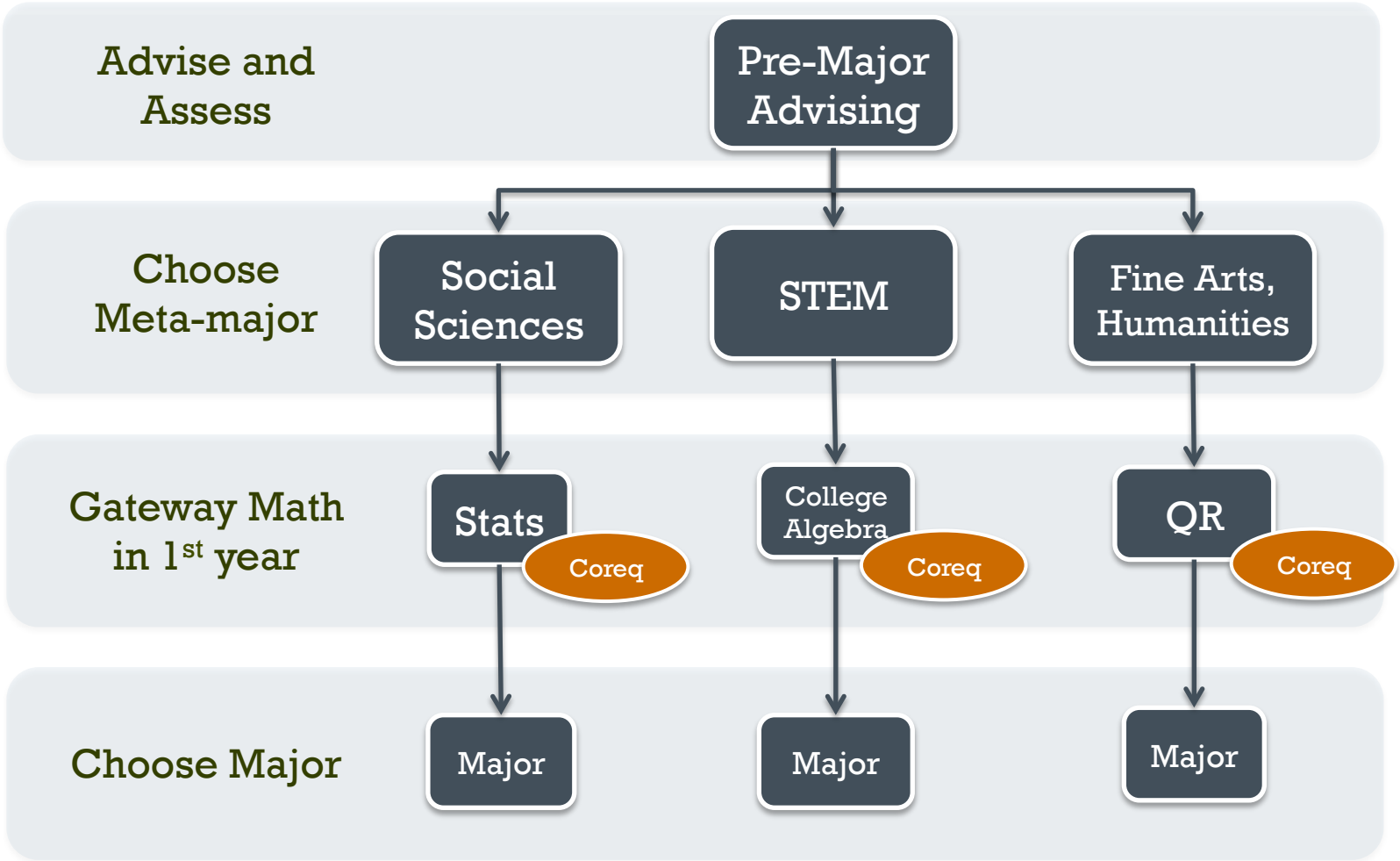
	Elementary Statistical Methods						
	Technical Math						

Mathematics Pathways with Co-requisites



Adapted from Complete College America 2016

What are institutions using to guide placement decisions?

Table 3 Ranges of mathematics test scores below which entering students were identified as in need of developmental or remedial courses in mathematics, for selected tests reported by postsecondary institutions, by institution level and type: Fall 2011

Institution level and type	Ranges of scores for mathematics tests											
	ACT		SAT[1]		ACCUPLACER				COMPASS			
	Mathematics		Mathematics		Elementary Algebra		College-Level Mathematics		Algebra		College Algebra	
	Lowest score	Highest score	Lowest score	Highest score	Lowest score	Highest score	Lowest score	Highest score	Lowest score	Highest score	Lowest score	Highest score
All institutions[2]	10	25	330	600	25	110	30	93	15	86	20	76
Institution level[2]												
2-year	10	25	380	600	25	110	33	93	15	86	26	76
4-year	12	24	330	600	29	109	30	86	25	76	—	—
Institution type[2]												
Public 2-year	10	25	380	600	25	110	33	93	15	86	26	76
Public 4-year	12	24	330	600	34	109	30	75	26	76	—	—
Private not-for-profit 4-year	14	24	340	590	—	—	—	—	—	—	—	—

— Reporting standards not met; too few cases in cell or the coefficient of variation is greater than or equal to 50 percent.

[1] Some institutions reported interpolated SAT mathematics scores. Where applicable, the scores were rounded to the nearest ten for presentation in this table.

[2] Data for private for-profit 4-year institutions and all private 2-year institutions are included in the totals but are not shown by institution type because of small cell sizes.

SOURCE: National Assessment Governing Board. (Fall 2011). Evaluating Student Need for Developmental or Remedial Coursework at Postsecondary Education Institutions [Survey]. Washington, DC: Author.

Table 4 Percentiles for mathematics test cut scores below which entering students were identified as in need of developmental or remedial courses in mathematics, for selected tests reported by postsecondary institutions, by institution level and type: Fall 2011

Institution level and type	Percentiles for mathematics test cut scores																	
	ACT			SAT[1]			ACCUPLACER						COMPASS					
	Mathematics			Mathematics			Elementary Algebra			College-Level Mathematics			Algebra			College Algebra		
	25th	50th	75th	25th	50th	75th	25th	50th	75th	25th	50th	75th	25th	50th	75th	25th	50th	75th
All institutions[2]	17	19	20	440	470	500	61	71	81	45	51	63	38	45	64	36	40	46
Institution level[2]																		
2-year	18	19	21	450	480	500	57	67	76	45	49	63	39	50	65	35	40	46
4-year	17	18	19	440	460	500	62	72	84	45	61	72	38	40	47	—	—	—
Institution type[2]																		
Public 2-year	18	19	21	450	480	510	61	70	76	45	49	63	39	50	65	35	40	46
Public 4-year	18	19	19	450	460	500	63	72	82	46	59	63	38	40	47	—	—	—
Private not-for-profit 4-year	17	18	19	430	460	495	—	—	—	—	—	—	—	—	—	—	—	—

— Reporting standards not met; too few cases in cell or the coefficient of variation is greater than or equal to 50 percent.

[1] Some institutions reported interpolated SAT mathematics scores. Where applicable, the scores were rounded to the nearest ten for presentation in this table.

[2] Data for private for-profit 4-year institutions and all private 2-year institutions are included in the totals but are not shown by institution type because of small cell sizes.

SOURCE: National Assessment Governing Board. (Fall 2011). Evaluating Student Need for Developmental or Remedial Coursework at Postsecondary Education Institutions [Survey]. Washington, DC: Author.

Table 5 Estimated percentage of institutions using criteria other than postsecondary mathematics tests to evaluate entering students for developmental or remedial courses in mathematics, by institution level and type: Fall 2011

Institution level and type	Percentage of institutions using any criteria other than mathematics tests	Percentage of institutions using specific mathematics tests					
		High school graduation tests or end-of-course tests	High school grades (including grade point average)	Highest school mathematics course completed	Advanced Placement or International Baccalaureate scores	Faculty recommendation	Other criteria
All institutions	21	3	10	10	11	3	2
Institution level							
2-year	20	3	7	9	12	4	3
4-year	22	3	12	10	11	3	2
Institution type							
Public 2-year	27	4	8	12	17	5	4
Private 2-year	—	—	—	—	—	—	—
Public 4-year	27	5	8	8	15	4	4
Private not-for-profit 4-year	25	4!	17	14	11	4	1!
Private for-profit 4-year	—	—	—	—	—	—	—

! Interpret data with caution; the coefficient of variation is greater than or equal to 30 percent but less than 50 percent.

— Reporting standards not met; too few cases in cell or the coefficient of variation is greater than or equal to 50 percent.

NOTE: Details for the number of institutions may not sum to totals because of rounding.

SOURCE: National Assessment Governing Board. (Fall 2011). Evaluating Student Need for Developmental or Remedial Coursework at Postsecondary Education Institutions [Survey]. Washington, DC: Author.

MMA System Choices

POSSIBLE MEASURES	SYSTEM /APPROACH	TYPES OF PLACEMENT
<u>Administered by college</u>: 1. Placement test 2. Non-cognitive assessment 3. Career inventory 4. Writing assessment 5. Computer skills assessment <u>Obtained from outside of college</u>: 1. High school GPA 2. Other HS transcript info 3. Standardized test results (ACT, SAT, etc.)	1. Waiver system 2. Decision bands/rules 3. Algorithm 4. Directed self-placement	1. Placement into courses 2. Placement into alternative course models 3. Placement into support services

Possible Measures

Type	Great Lakes Scan Examples
Placement test	Accuplacer or Compass (All) ALEKS (IA, Math)
High school GPA, other information	Self-report (IA) From transcript (OH)
Non-cognitive assessments	College Student Inventory (OH, WI) GRIT Questionnaire (MN) SuccessNavigator (IA)
Computer skills	College developed test (OH)
Writing examples	Faculty-assessed portfolio (WI) Home-grown writing assessment (WI)

Instrument	Author/Publisher	URL	Factors Assessed	Administration Details
Academic Advising Inventory	Sandor, J. A. and Winston, R. B.	http://www.academic-advising.com/aais-software.html	• academic decision-making • academic majors and courses	• 57 items • 20 minutes
Achievement Motivatic Profile (AMP)				
ACT Engage				
EQ-i 2.0				
The California Critical Thinking Disposition Inventory (CCTDI)				

Instrument	Author/Publisher	URL	Factors Assessed	Administration Details
College Student Inventory, Form C	Ruffalo Noel Levitz	https://www.ruffalonl.com/college-student-retention/retention-management-system-plus/college-student-inventory	• academic motivation • general coping • receptivity to support services	• 74 items • 20 minutes • online format
College Success Factors Index 2.0 (CSFI)				
Community College Survey of Student Engagement (CCSSE)				
Community College Institutional Survey (CCIS)				
Grit Scale				
Learning and Study Strategies Inventory (LASSI)				
Mindset				

Instrument	Author/Publisher	URL	Factors Assessed
Motivated Strategies for Learning Questionnaire (MSLQ)	Pintrich, P., Smith, D., Garcia, T., and McKeachie, W.; The University of Michigan	http://stelar.edc.org/instruments/motivated-strategies-learning-questionnaire-mslq	• control of learning beliefs • critical thinking • effort regulation • elaboration • extrinsic goal orientation
Non-Cognitive Questionnaire (NCQ)			
Perceptions, Expectations, Emotions, and Knowledge about College (PEEK)			
Study Behavior Inventory (SBI)			

Instrument	Author/Publisher	URL	Fa
Student Adaptation to College Questionnaire (SACQ)	Baker, R., and Siryk, B. (1987); Western Psychological Services	http://www.wpspublish.com/store/p/2949/student-adaptation-to-college-questionnaire-sacq	• academic adj • attachment to • personal-emo • social adjustn
Student Readiness Inventory	Le, H., Casillas, A., Robbins, S., and Langley, R. (2005); ACT	https://www.act.org/sri/pdf/UserGuide.pdf	• academic dis • academic sel • commitment • communicati • general deter • goal striving • social activity • social connec • steadiness • study skills
SuccessNavigator	ETS	https://www.ets.org/successnavigator/about/	• academic ski • commitment • self-manager • social suppor
Survey of Students Assessment of Study Behaviors (SSASB)	Paterra, M. E.; The Cambridge Stratford Study Skills Institute (1991)	http://www.cambridgestratford.com/studyskills/prepost.html	• comprehensi • effective test • efficient learn • high performa • positive attitu • useful work h
Transition to College Inventory (TCI)	Calliote, J., Pickering, J. W., Zerwas, S. C., and Macera, A. C. (2003); Old Dominion University	http://ww2.odu.edu/ao/ira/assessment/tci/TCI_brochure.pdf	• athletic orient • college involv • independent • influences on • institutional c • personal/aca • self-confiden • socializing ori

Cal-PASSPlus
A System of Data

theRPgroup
the Research & Planning Group for California Community Colleges

Potential use of self-reported high school info

- UC admissions uses self-report but verifies after admission
  - 2008: 9 campuses, 60,000 students. No campus had >5 discrepancies between reported grades and student transcripts: http://bit.ly/UCSelfReportGPA
- College Board: Shawn & Matten, 2009: "Students are quite accurate in reporting their HSGPA", r(40,299) = .73: http://bit.ly/CBSRGPA
- ACT research often uses self-reported GPA, generally find it to be a highly powerful predictor and highly correlated with students actual GPA: ACT, 2013: *r*(1978) = .84 http://bit.ly/ACTSRGPA

Cal-PASSPlus
A System of Data

theRPgroup
the Research & Planning Group for California Community Colleges

GPA vs. Self-reported HSGPA

HSGPA Level	N	Mean HSGPA		Mean diff.
		Actual	Self-reported	
3.50–4.00	599	3.79	3.75	–0.04
3.00–3.49	451	3.24	3.23	–0.01
2.50–2.99	408	2.81	2.76	–0.05
2.00–2.49	265	2.24	2.35	0.11
1.50–1.99	172	1.77	2.04	0.27
0.00–1.49	85	1.03	1.85	0.82
Total	1,980	2.95	3.02	0.07

ACT, 2013: http://bit.ly/ACTSRGPA

Under-reporting was 2-4X as common as over-reporting.

Placement Example: Southern Arkansas University

- High school GPA and ACT scores
- Stipulates Arkansas HS & graduation within 5 yrs
- Begins placement by determining appropriate mathematics pathway

Mathematics – Mathematical Literacy*

Initial Placement Using Math ACT & GPA

		Unweighted GPA		
		<2.51	2.51-2.99	3.00+
Math ACT or Equivalent	22+	MATH 1053 Mathematical Literacy & MATH 0051 Mathematical Literacy Lab	MATH 1053 Mathematical Literacy	
	18-21	MATH 1053 Mathematical Literacy & MATH 0051 Mathematical Literacy Lab		MATH 1053 Mathematical Literacy
	<18	MATH 1053 Mathematical Literacy & MATH 0051 Mathematical Literacy Lab		

MMA System Choices

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<u>Administered by college</u>: 1. Placement test 2. Non-cognitive assessment 3. Career inventory 4. Writing assessment 5. Computer skills assessment <u>Obtained from outside of college</u>: 1. High school GPA 2. Other HS transcript info 3. Standardized test results (ACT, SAT, etc.)	1. Waiver system 2. Decision bands/rules 3. Algorithm 4. Directed self-placement	1. Placement into courses 2. Placement into alternative course models 3. Placement into support services

Discussion: Layering on Placement

- What student-level information gives your institution the best data upon which to make a default mathematics course (and support structure) recommendation?

- What are the implications of varying placement decisions based on mathematics pathway?

Discussion: Layering on Placement

- What support will be made available to students who place directly into college level courses?
- Are there any modifications you want to make to your Post It notes regarding the different kinds of support needed?
- How will you evaluate the effectiveness of your placement policy?

Action Plan: Placement

Action Items

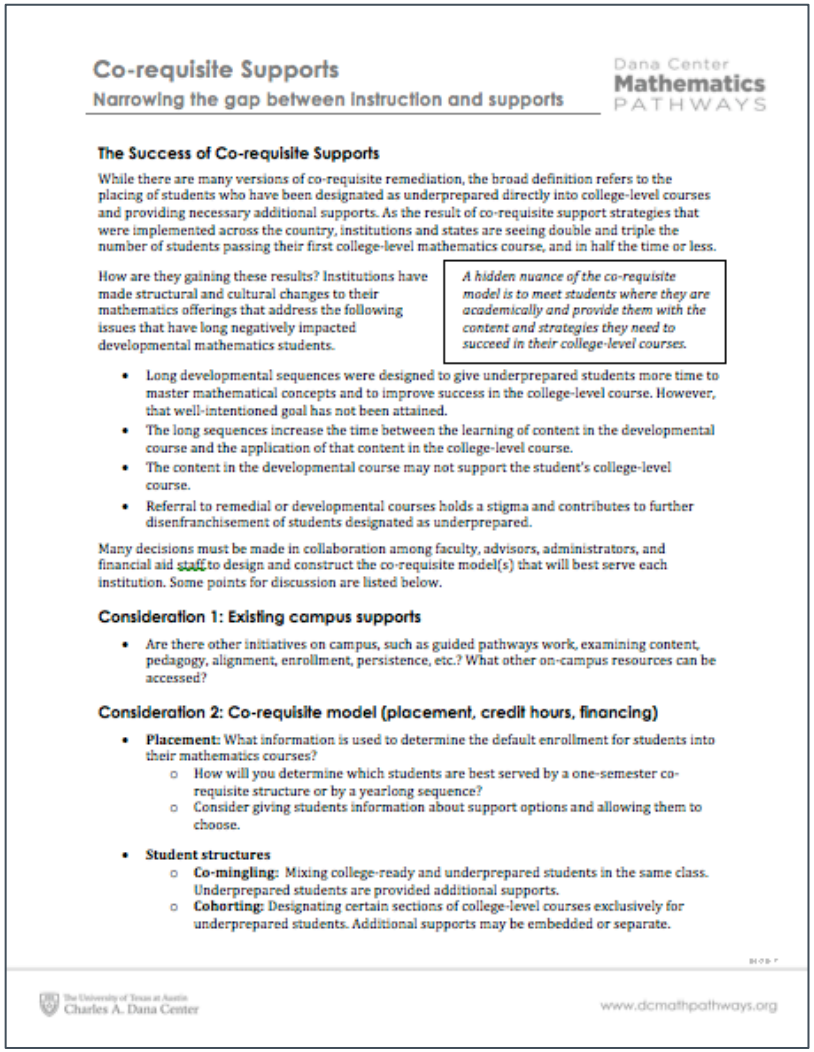
Implementing Co-Requisite Mathematics

Dana Center Mathematics PATHWAYS

Action Item	Who is responsible?	Who else needs to know?	Target Date

Break

Implementing Co-requisite Supports



Co-requisite Supports

Narrowing the gap between Instruction and supports

Dana Center Mathematics PATHWAYS

The Success of Co-requisite Supports

While there are many versions of co-requisite remediation, the broad definition refers to the placing of students who have been designated as underprepared directly into college-level courses and providing necessary additional supports. As the result of co-requisite support strategies that were implemented across the country, institutions and states are seeing double and triple the number of students passing their first college-level mathematics course, and in half the time or less.

How are they gaining these results? Institutions have made structural and cultural changes to their mathematics offerings that address the following issues that have long negatively impacted developmental mathematics students.

A hidden nuance of the co-requisite model is to meet students where they are academically and provide them with the content and strategies they need to succeed in their college-level courses.

- Long developmental sequences were designed to give underprepared students more time to master mathematical concepts and to improve success in the college-level course. However, that well-intentioned goal has not been attained.
- The long sequences increase the time between the learning of content in the developmental course and the application of that content in the college-level course.
- The content in the developmental course may not support the student's college-level course.
- Referral to remedial or developmental courses holds a stigma and contributes to further disenfranchisement of students designated as underprepared.

Many decisions must be made in collaboration among faculty, advisors, administrators, and financial aid staff to design and construct the co-requisite model(s) that will best serve each institution. Some points for discussion are listed below.

Consideration 1: Existing campus supports

- Are there other initiatives on campus, such as guided pathways work, examining content, pedagogy, alignment, enrollment, persistence, etc.? What other on-campus resources can be accessed?

Consideration 2: Co-requisite model (placement, credit hours, financing)

- **Placement:** What information is used to determine the default enrollment for students into their mathematics courses?
  - How will you determine which students are best served by a one-semester co-requisite structure or by a yearlong sequence?
  - Consider giving students information about support options and allowing them to choose.
- **Student structures**
  - **Co-mingling:** Mixing college-ready and underprepared students in the same class. Underprepared students are provided additional supports.
  - **Cohorting:** Designating certain sections of college-level courses exclusively for underprepared students. Additional supports may be embedded or separate.

The University of Texas at Austin Charles A. Dana Center

www.dcmathpathways.org

- **Consideration 1:** Existing campus supports
- **Consideration 2:** Co-requisite model
- **Consideration 3:** Co-requisite content
- **Consideration 4:** Cultural Shifts

www.tinyurl.com/UTDC-Co-req

Case Study #1: San Jacinto

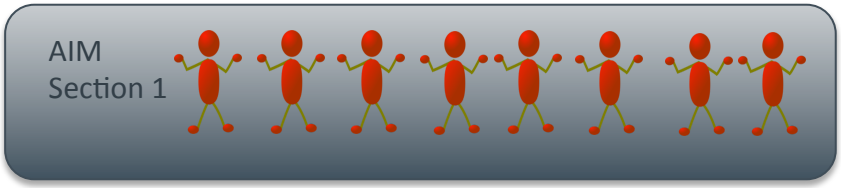
San Jacinto's Four Co-requisites

- **AIM - Acceleration in Mathematics (College Algebra)**
  - MATH 0314/1314
- **ASAP (Elementary Statistics)**
  - MATH 0342/1342
- **AcQuiRe (Quantitative Reasoning)**
  - MATH 0332/1332
- **Precalgebra (STEM pathway)**
  - MATH 1314/2412

San Jacinto Models

Just In Time Embedded Support: College-level classes with the developmental content embedded.

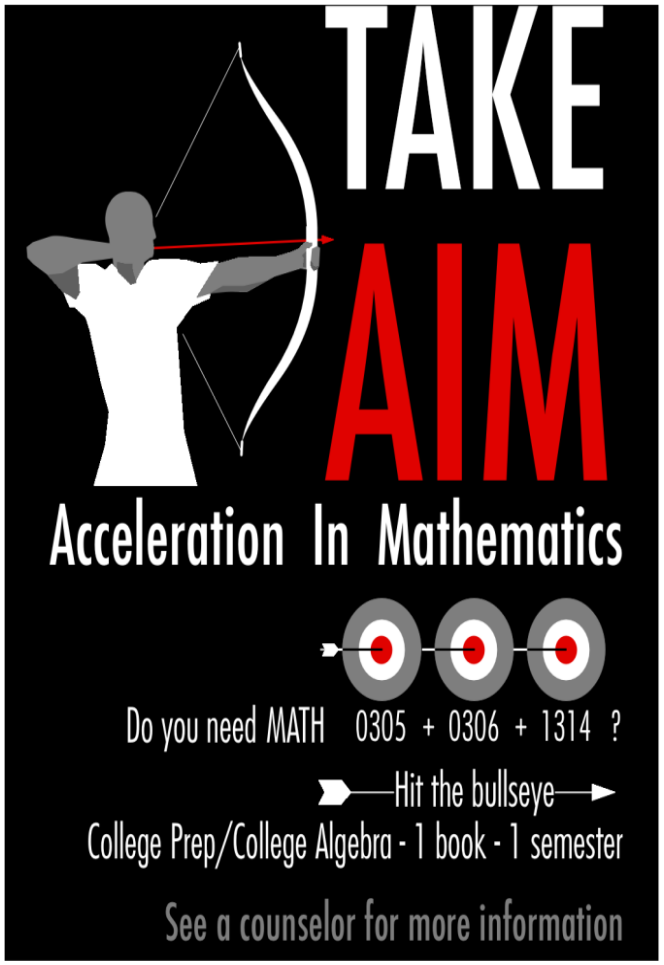
Cohorted model: Designating certain sections of college-level courses exclusively for underprepared students. Additional supports may be embedded or separate.



San Jacinto College: Acceleration in Mathematics

Co-requisite: MATH 0314/1314

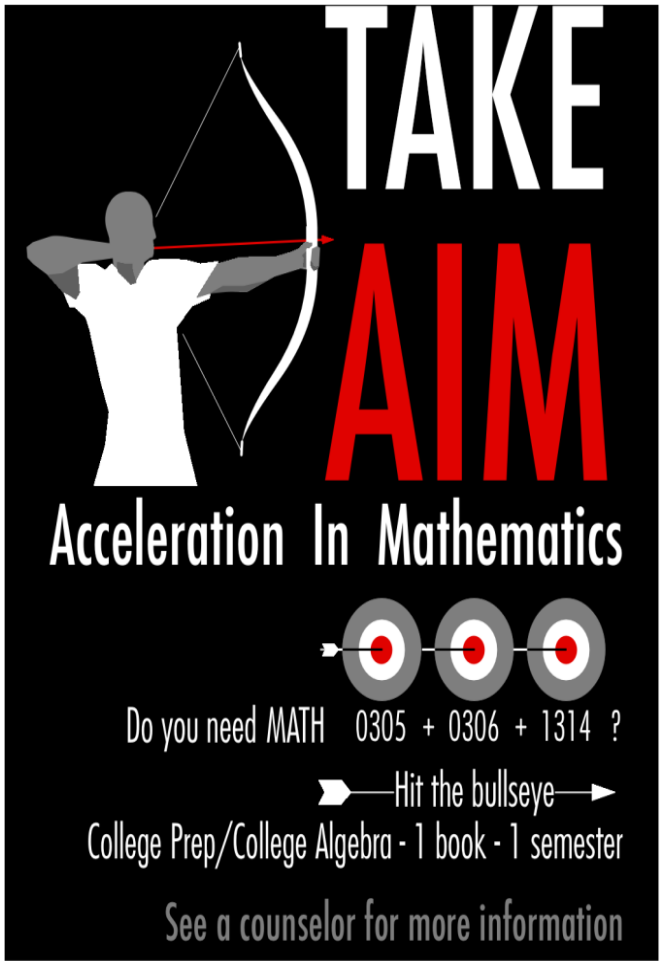
- One developmental course
  - Introductory Algebra
  - Intermediate Algebra
- One credit-bearing course
  - College Algebra (MATH 1314)
- Two instructors
  - One developmental
  - One academic
- Seven contact hours
  - Mon - Thurs: 80 min
  - Friday lab: 55 min



San Jacinto College: Acceleration in Mathematics

Co-requisite: MATH 0314/1314

- Frequent low stakes assessment
  - Daily graded worksheets, etc.
- Ongoing review and cumulative testing
- Two grades
  - 0314 by three exam average
  - 1314 by overall average
- "College Ready" after 0314

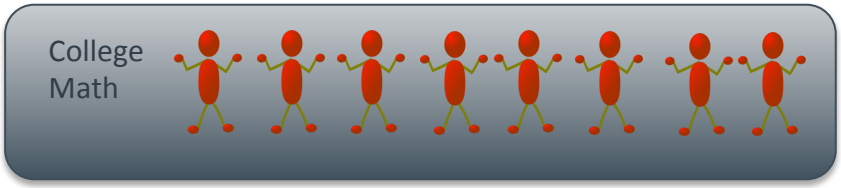


Case Study #2: University of Nevada - Reno

University of Nevada - Reno

Just In Time Embedded Support: College-level classes with the developmental content embedded.

Cohorted model: Designating certain sections of college-level courses exclusively for underprepared students. Additional supports may be embedded or separate.



University of Nevada - Reno

Co-requisite: MATH 120E and 96A

- Part of one developmental course
  - Applicable portion of Intermediate Algebra
  - 1 college level credit, 2 developmental credits
  - Grading: Satisfactory/Unsatisfactory
- One credit-bearing course
  - College Algebra (MATH 1314)
  - 3 college level credits
- One instructor
- Four contact hours
  - Four days a week, 50 min each day

Planning Co-requisite Content

Schedule of topics to be covered (topics in square brackets indicate Math 96A topics)

Week 1
- Syllabus and Course Info
- [1.1 The real numbers, the real number line, absolute value]
- [1.2 Working with polynomials]
- Quiz and discussion of homework problems

Week 2
- [1.3 Factoring polynomials]
- [1.4 Working with rational functions]
- [1.5 Exponents and radicals]
- Quiz and discussion of homework problems

Week 3
- [1.6 Solving first degree equations and equations with rational expressions]
- [1.7 Solving quadratic equations with factoring or the quadratic formula]
- Review
- Test 1

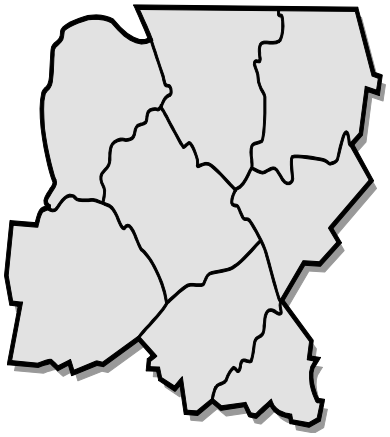
Week 4
- [2.1 Graphs of functions]
- [2.2 Equations of lines; slope-intercept form]
- [2.2 Equations of lines; point-slope form]
- Quiz and discussion of homework problems

Week 5
- **Holiday**
- 2.3 Applications of linear models
- Review
- Test 2

Case Study #3: Roane State

Co-Requisite Remediation in Statistics

Markus Pomper
Dean, Division of Math and Sciences
Roane State Community College
Harriman, TN

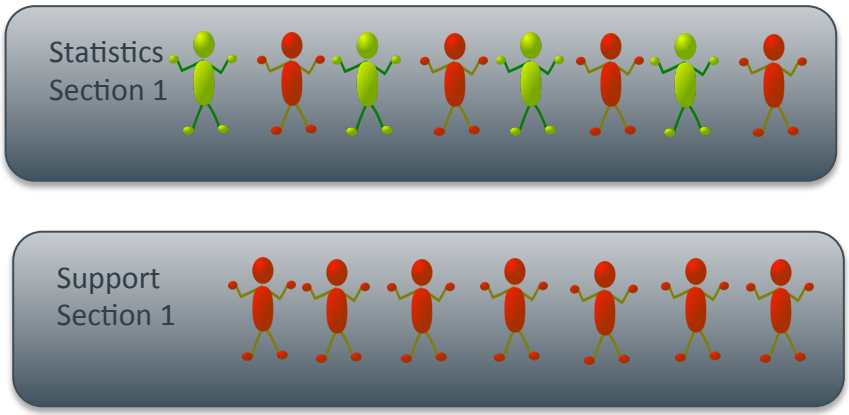


Roane State
COMMUNITY COLLEGE

Roane State Statistics Pathway

Just In Time Support Course: Separate, structured support courses that run before, after, or on opposite days to the college-level courses; completed within one semester

Co-mingled model: Mixing college-ready and underprepared students in the same class. Underprepared students are provided additional supports with maximum flexibility to suit their lives.



Co-Requisite Scheduling – Choose one from each column

MATH 1530

MW	8:00a-9:20a
MW	9:30a-10:50a
MW	11:00a-12:20p
MW	3:30p-4:50p
MW	5:00p-6:20p
TR	8:00a-9:20a
TR	11:00a-12:20p
TR	12:30p-1:50p
TR	2:00p-3:20p
TR	5:00p-6:20p
M	6:00p-9:00p
T	6:00p-9:00p
R	6:00p-9:00p
F	9:00a-12:00p

MATH 0530

MW	9:30a-10:50a
MW	3:30p-4:50p
TR	9:30a-10:50a
TR	11:00a-12:20p
TR	12:30p-1:50p
TR	6:30p-7:50p
S	8:30a-11:30a

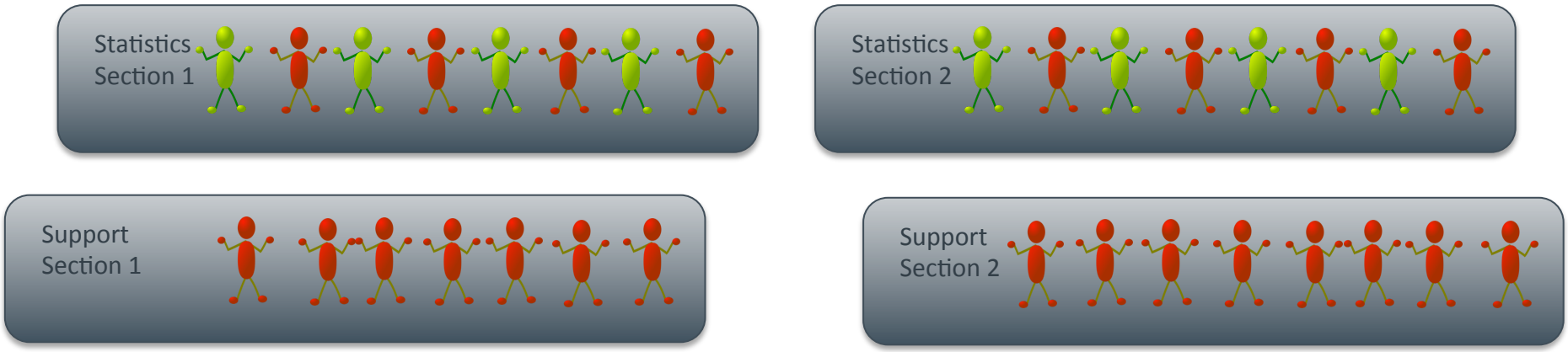
No Online or Accelerated courses.

Subject to availability of open seats

Roane State Statistics Pathway

Just In Time Support Course: Separate, structured support courses that run before, after, or on opposite days to the college-level courses; completed within one semester

Co-mingled model: Mixing college-ready and underprepared students in the same class. Underprepared students are provided additional supports with maximum flexibility to suit their lives.



Corequisite Model for Mathematics: Structure

MATH 1530
Probability and
Statistics

- College Level: MATH 1530
  - 3 credit hours
  - The same course for students with or without learning support needs
  - Blended class of students with and without learning support needs
  - Sequence of topics is prescribed

MATH 0530
Statistical
Principles

- Remedial: MATH 0530
  - 3 credit hours
  - May contain students from several different sections of MATH 1530

Co-Requisite Model for Mathematics: Grades

- College Level: MATH 1530
  - Grade is based on assignments in MATH 1530
  - Common Final Exam; 4 tests; other assignments are at discretion of instructor

MATH 1530
Probability and Statistics

- Remedial: MATH 0530
  - Grade is based on assignments in MATH 0530
  - Common Quizzes, Homework assignments, Notebook exercises; other assignments at discretion of instructor

MATH 0530
Statistical Principles

Co-Requisite Model for Mathematics: Grades

MATH 1530 / MATH 0530	Pass	Fail
Pass	Gen Ed requirement satisfied Unless other math courses are needed, remediation requirements are satisfied	Student repeats Stats Repetition of remedial class is optional.
Fail	Gen Ed requirement satisfied Unless other math courses are needed, remediation requirements are waived	Student repeats both classes Student is very likely to lose Tenn. Promise scholarship

Planning Co-requisite Content

Introduction to Statistics and Co-requisite Support Course Sample Timeline
Adapted from and with thanks to Roane State Community College

Day	Co-requisite Notebook Topics	On-line Lab	*Essentials of Statistics* Triola 5th ed.		MyLabsPlus Assignment
1	Orientation, study habits, time mgmt.; converting between fractions, decimals, percentages; finding a percentage of a number	1	1.1 – 1.2	Orientation; introduction to statistical terms and statistical thinking	1
2	Rounding; estimating; calculating means,	2	1.3 – 1.4	Types of data; collecting sample data	2
3	Decimals, ratios, percent, conversions	3	2.2 – 2.3	Frequency distributions; histograms	3
4	Applications of percent, squares, square roots; order of operations	4	2.4	Graphs that enlighten and graphs that deceive	4
5	Operations on real numbers	5	3.2	Measures of center	5
6	Review of types of data, sampling methods, types of graphs	6	3.3 – 3.4	Measures of variation; measures of relative standing and boxplots	6
7	Review of measures of center and variation	7	Practice Test 1		
8	Comprehensive review of chapters 1 – 3 & basic skills	8	**Test 1**		

Planning Co-requisite Content

15	Area of a rectangle, lower/upper boundaries of regions, identify specified area under a curve, shade the area representing a percentile	15	6.2 – 6.3	Standard normal distribution; applications	11
16	Uniform distribution, standard normal curve, find z-scores, find critical values, determine type of problem	16	6.5	Central Limit Theorem	12
17	Probability/proportion/percent, calculate critical values, deconstruct intervals, identify parts of proportion problems	17	7.2	Estimating a population proportion	13
18	Find the best point estimate, calculate CI estimate for proportion, determine the required sample size	18	7.3	Estimating a population mean	14
19	Review of normal probability distributions and confidence intervals	19	Practice Test 3		
20	Comprehensive review: chapters 6 – 7 and basic skills	20	**Test 3**		
21	Coordinate system, intercepts, graph lines, compare & round decimals	21	8.2	Basics of hypothesis testing	15
22	Slope from graph & points, average rate of change, $\hat{p}$, x *and* n	22	8.3	Testing a claim about a proportion	16
23	Concepts of slope and analyzing linear relationships	23	8.4	Testing a claim about a mean	17
24	Scattergrams and concepts of linear equations	24	10.2 – 10.3	Correlation; regression	18
25	Review statistical concepts: hypothesis testing, correlation,	25	Practice Test 4		

Structures & Staffing

	Co-mingle students designated prepared and students designated underprepared	Cohort of only students designated as underprepared
Embedded supports in extended hours (e.g. 4, 5, or 6 hours)	Not possible	Need the same instructor for the full time
Separate course, (e.g. 3 credits + 3 credits)	Can be same instructor or different instructors	Can be same instructor or different instructors

Discussion: Campus Implementation

Quick review: Post-it note thinking and goals

- Are there revisions you want to make to your "Post It Note" thinking regarding the different kinds of support needed?

- What structures and policies could help meet the needs of these different groups?
  - *Consider: student structures (cohort, comingle), high level staffing considerations, calendar structures, grading, credit hours*

Action Plan

- Questions to consider:
  - Redesign and Support
  - Campus Outreach
  - Assessment of Co-Requisite Redesign

Up Next Tomorrow

- 8:00: Announcements
- 8:15: Breakouts
  - Administrators

    Focus: planning supports for faculty doing this work and communications
  - Faculty

    Focus on content of co-requisite courses to ensure rigor is maintained and supports to help students develop as learners are embedded

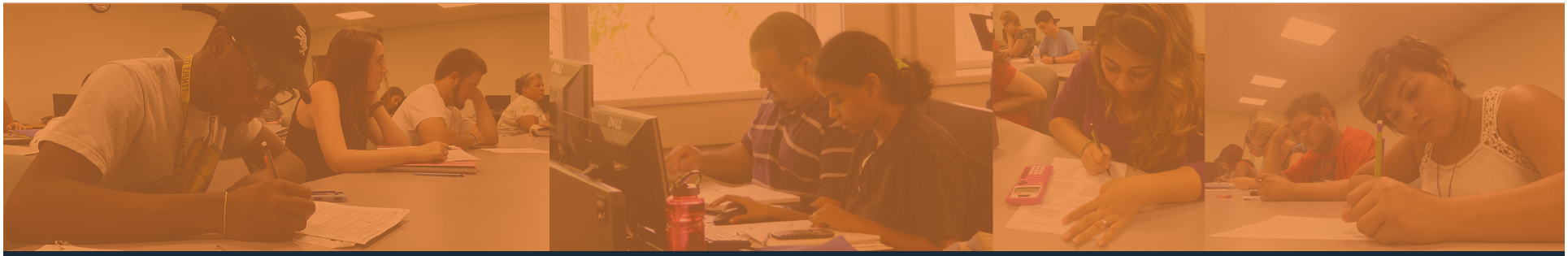
Questions Remain:
Let's Capture Them Now


This will be challenging.
It won't be perfect
It will get better.
We will all learn a lot.
It will be worth it.
~ Amy Getz

Dana Center
Mathematics
PATHWAYS

HB 2223 Co-requisite Support Workshop

Welcome to Day 2!



Where you are going next

- Administrators, Advisors, and Support Services

  Fill this in!

- Faculty

  College Algebra & Business Math:

  Contemporary (QR) and Elementary Statistics:

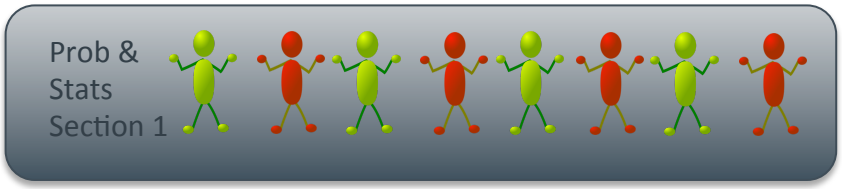
Continuing the Discussion

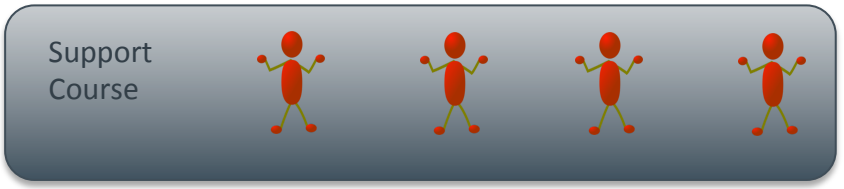
Back at your campus team tables:

- Share out what resonated with you.
- Deepen the discussion and consider the following as a team:
  - How might this structure be perceived by other mathematics department faculty?
  - How might this structure impact students' sense of belonging and connection?
  - How might this structure impact students' success?
  - How might this structure be impacted by your institution's context?
  - What other issues or questions does this structure raise?

Structure definitions

Co-mingling: Mixing college-ready and underprepared students in the same class. Underprepared students are provided additional supports.





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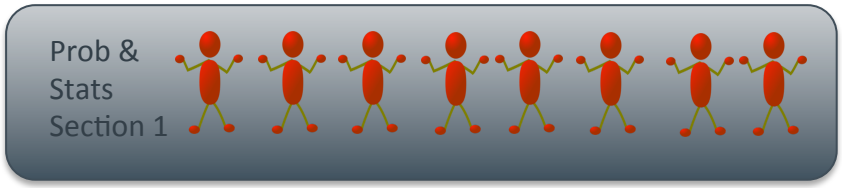
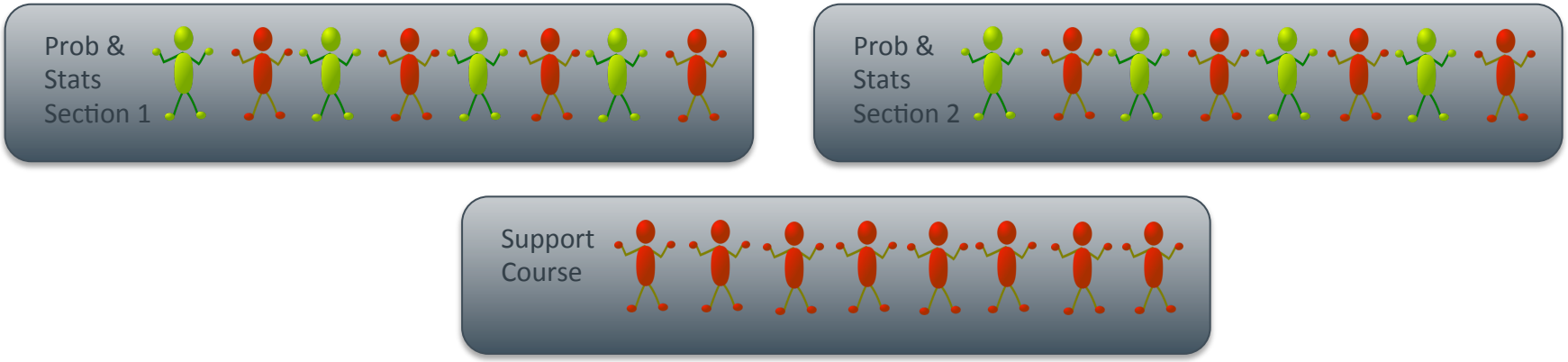
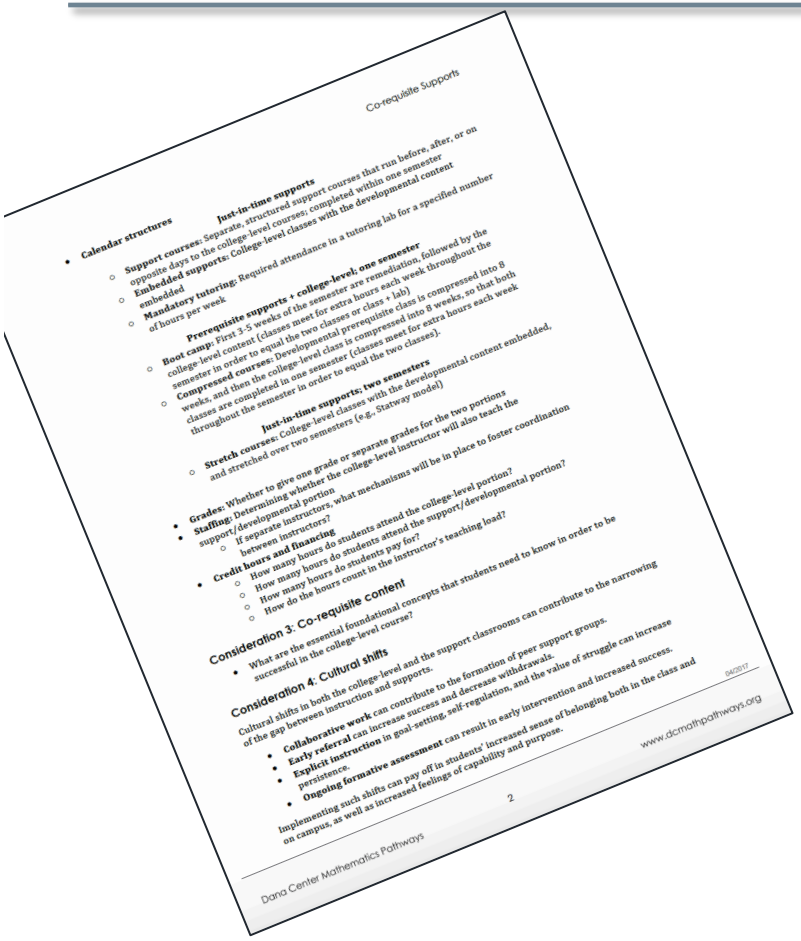


Structure definitions

Co-mingling:



Calendar Structures



Co-requisite Supports

- **Calendar structures**
  - **Support courses:** Separate, structured support courses that run before, after, or on opposite days to the college-level courses; completed within one semester
  - **Embedded supports:** College-level classes with the developmental content embedded
  - **Mandatory tutoring:** Required attendance in a tutoring lab for a specified number of hours per week

Prerequisite supports + college-level; one semester

- **Boot camp:** First 3-5 weeks of the semester are remediation, followed by the college-level content (classes meet for extra hours each week throughout the semester in order to equal the two classes or class + lab)
- **Compressed courses:** Developmental prerequisite class is compressed into 8 weeks, and then the college-level class is compressed into 8 weeks, so that both classes are completed in one semester (classes meet for extra hours each week throughout the semester in order to equal the two classes).

Just-in-time supports; two semesters

- **Stretch courses:** College-level classes with the developmental content embedded and stretched over two semesters (e.g., Stateway model)

- **Grades:** Whether to give one grade or separate grades for the two portions
- **Staffing:** Determining whether the college-level instructor will also teach the support/developmental portion
  - If separate instructors, what mechanisms will be in place to foster coordination between instructors?
- **Credit hours and financing**
  - How many hours do students attend the college-level portion?
  - How many hours do students attend the support/developmental portion?
  - How many hours do students pay for?
  - How do the hours count in the instructor's teaching load?

Consideration 3: Co-requisite content

- What are the essential foundational concepts that students need to know in order to be successful in the college-level course?

Consideration 4: Cultural shifts

Cultural shifts in both the college-level and the support classrooms can contribute to the narrowing of the gap between instruction and supports.

- **Collaborative work** can contribute to the formation of peer support groups.
- **Early referral** can increase success and decrease withdrawals.
- **Explicit instruction** in goal-setting, self-regulation, and the value of struggle can increase persistence.
- **Ongoing formative assessment** can result in early intervention and increased success.

Implementing such shifts can pay off in students' increased sense of belonging both in the class and on campus, as well as increased feelings of capability and purpose.

04/2017

www.dcmathpathways.org

2

Dana Center Mathematics Pathways

- **Just-in-time supports:**
  Support courses
  Embedded supports
  Mandatory tutoring

- **Prerequisite supports + college-level; one semester:**
  Boot camp
  Compressed courses

Calendar Structures

Just-in-time supports:

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Calendar Structures

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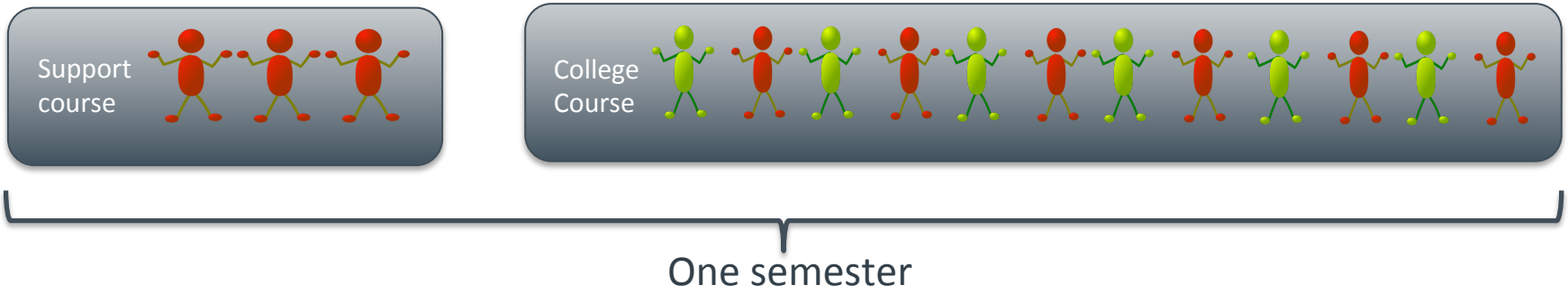
- **Compressed courses:** Developmental prerequisite class is compressed into 8 weeks, and then the college-level class is compressed into 8 weeks, so that both classes are completed in one semester (classes meet for extra hours each week throughout the semester in order to equal the two classes).

Calendar structures

Boot Camp:

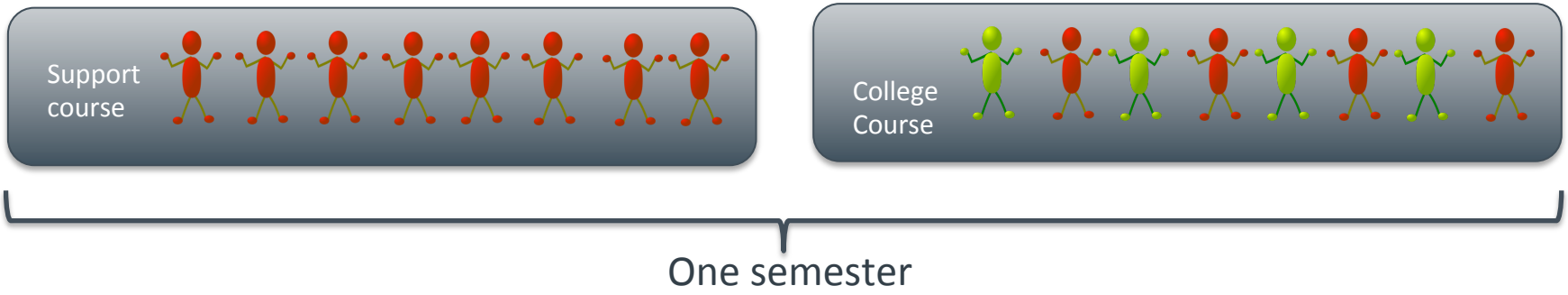
~4-week support course (6 hours),
followed by ~12-week college course (4-5 hours).



Calendar structures

Compressed:

8-week support course (6 hours), followed by an 8-week college course (6 hours).



Structure definitions

Hybrid Boot Camp/Support Course

16-week support course (3 hours),

Late start 12-week college course (4 hours).