DATA QUALITY INSTITUTE

Building State Capacity for Reporting Perkins Data

Data, Research, and Analytics: Career and Technical Education as Exemplar

Sharon Wendt

Matt Hastings

Paul Holbrook, Ph.D.

U.S. Department of Education
Office of Vocational and Adult Education
Division of Academic and Technical Education

Sharon Wendt

CTE Director

Wisconsin Department of Public Instruction

U.S. Department of Education
Office of Vocational and Adult Education
Division of Academic and Technical Education

Wisconsin's Secondary Data Quality Journey

- Increase understanding of *Perkins* accountability measures
- Connect professional development to *Perkins* accountability
- Provide state-level advocacy resources
- Build capacity for local leaders to develop resources

CTE Data Collection

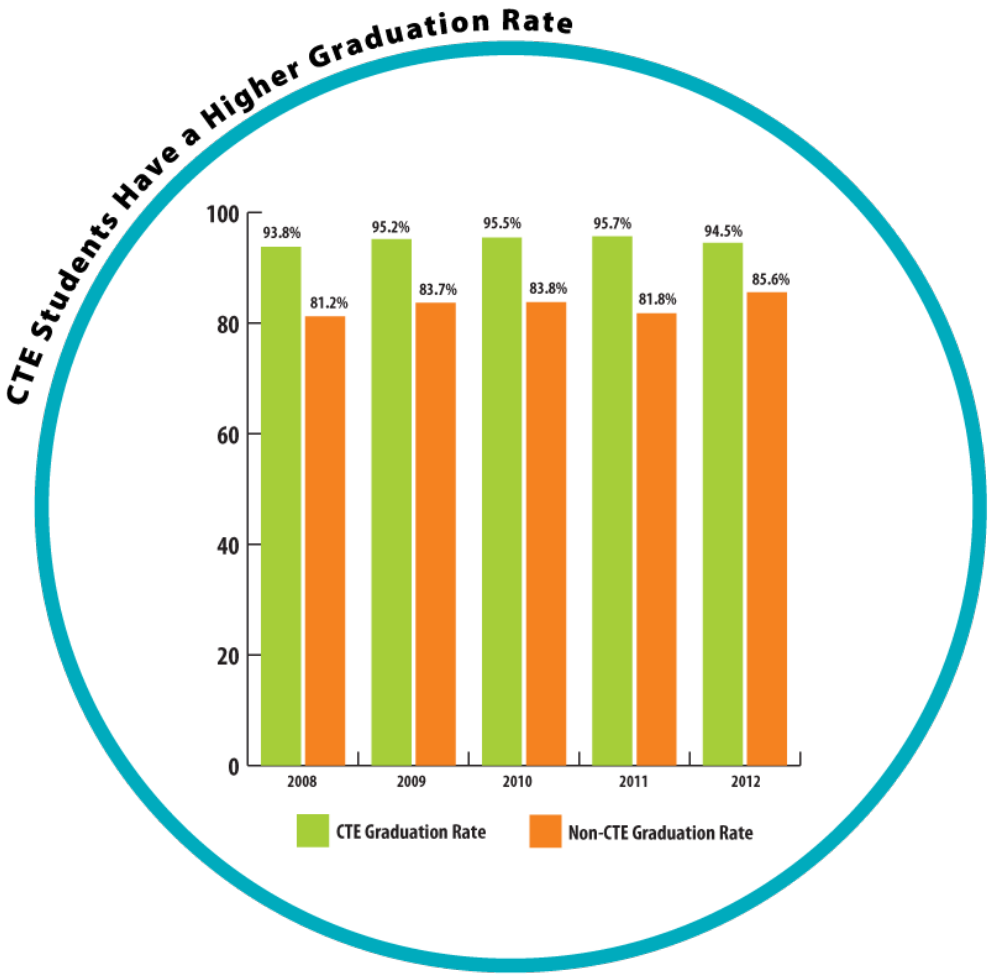
Universe of Students

11th & 12th graders

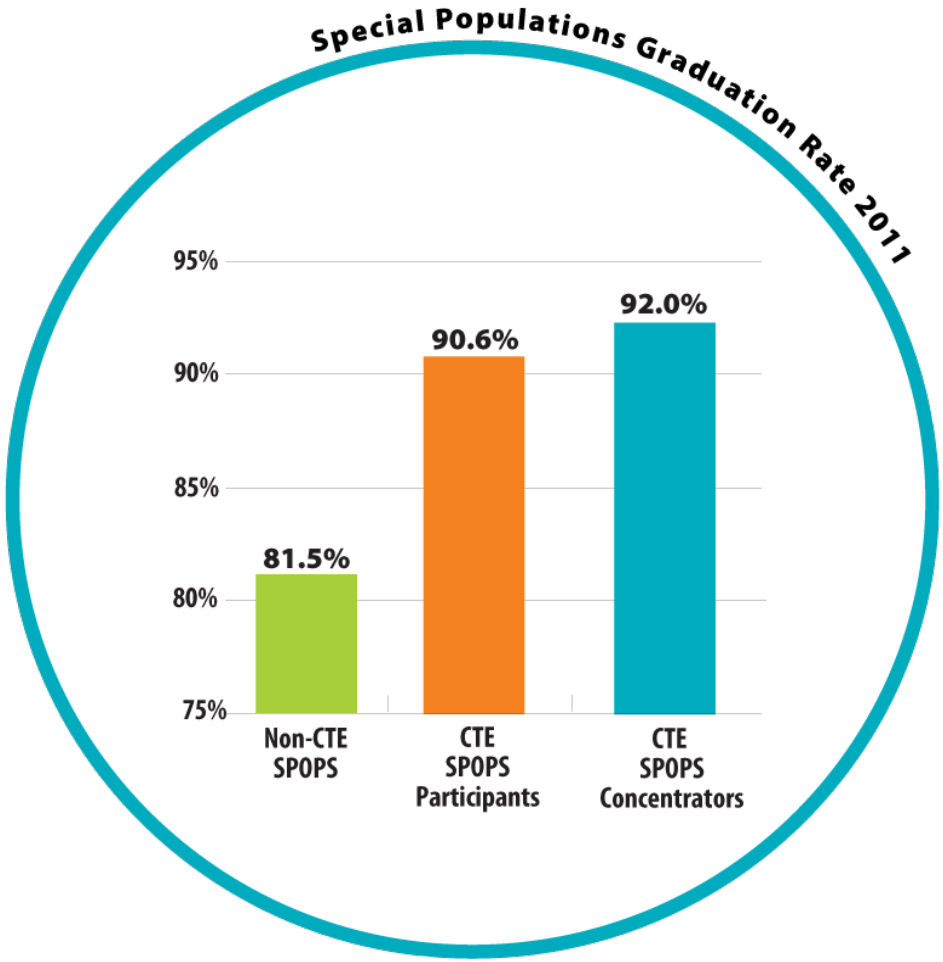
CTE Participants

CTE Concentrators

CTE Concentrators Have a Higher Graduation Rate



Special Populations Graduation Rate



State-Level CTE Accountability & Advocacy

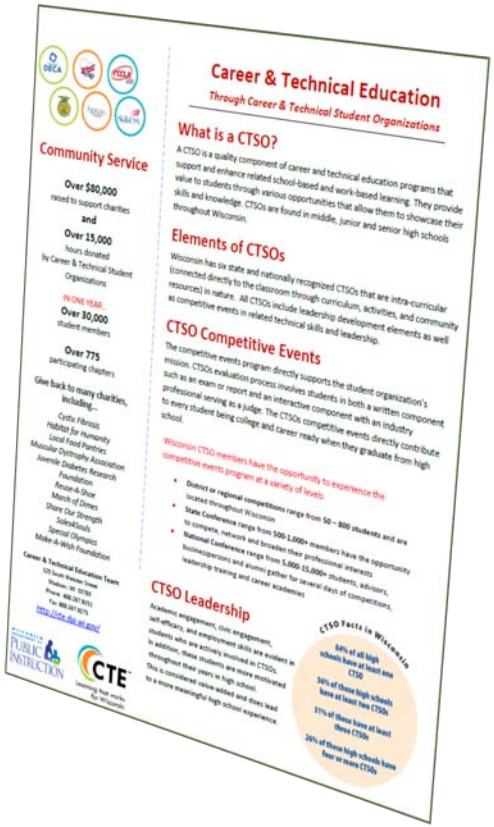
CTE Learning that works for Wisconsin

Career and Technical Education
Data & Accountability

Spring 2013

WISCONSIN DEPARTMENT OF PUBLIC INSTRUCTION

The Career and Technical Education Team
Department of Public Instruction
www.dpi.wi.gov



http://cte.dpi.wi.gov/cte_dataresources

Data One-Pager
Providing Inspiration

Your School Logo Here

Wisconsin's Graduation Rates

CTE Concentrators – 95.8%

CTE Content Area – insert information

State Graduation Rate – 89.9%

Local Successes and Highlights

- Grants awarded
- CTSO specific awards
- Equivalency credit availability

Your School District's Graduation Rates

Non-CTE Students

CTE Concentrators

Professional Involvement of Instructor(s)

- Professional Teacher Organizations
  - WBEA Member
- Continuing Education Involvement
  - Welding Course
- Local Community Organizations
  - LIONS Club
- Serve on Board of Directors
  - FFA Board of Directors
- Professional Committee Involvement
  - Equivalency Workgroup

Enrollments

Overall School Enrollment vs. Department Enrollment

Student Performance Data

- Local Science Scores
- Local Reading Scores
- Local Math Scores

This space is reserved for a student success story you can share with your community.

Local School Example

WILMOT CTE

Graduation Rates

ADVANCED STANDING

TRANSCRIPTED CREDITS

CTSO - Career & Technical Student Organizations Benefits

THE CTE STORY

AROUND CAMPUS

CTE PARTNER STORIES: PLTW & CULINARY

DPI Research Questions

- What is the effect of CTE participation on likelihood of graduation?
  - This is a **different question** than "What is the difference in graduation rates of CTE vs. non-CTE?"
- Are these effects different for concentrators vs. participants?
- Are CTE participants characteristically different than non-participants?
- Are there any significant differences in CTE participation rates among subgroups?

Answering the Research Questions: Statistical Methods

- Matching
  - Compare students with similar demographic characteristics—prior achievement, school environments, etc.
  - Key difference: One group is treated (CTE participation), other is not
  - Compare outcomes: Difference in outcomes is associated to CTE participation
  - Controls for latent (unobservable) differences between the two groups
- **Best attempt at attributing <u>causality</u> to CTE participation**

Summary of Findings

- CTE participation appears to do very good things for students:
  - Increases likelihood of on-time graduation by 5.7–7.7%
    - Stronger effects for concentrators
- Contrary to prior research, CTE participants in Wisconsin have similar educational attainment as non-participants.
- Large disparities in participation rates among different groups:
  - White student participation: 73%
  - Black student participation: 59% (-14%)
  - Hispanic student participation: 62% (-11%)
  - ELL student participation: 63% (-10%)

Matt Hastings

Data and Research Specialist

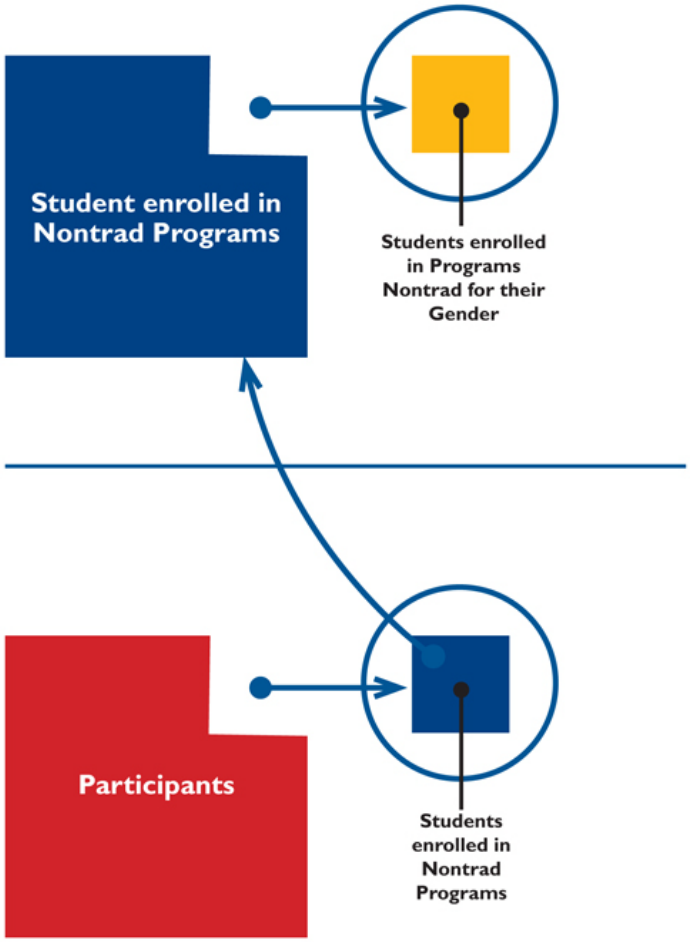
Nebraska Department of Education

Presentation Objectives

- Recognize the challenges in relying *solely* on federal accountability measures
- Gain practical instruction about how to implement ratio measures of association to assess *relative* differences in student outcomes
- Appreciate the value in utilizing measures of association, such as ratios, in addition to federal performance indicators as a way of assessing CTE

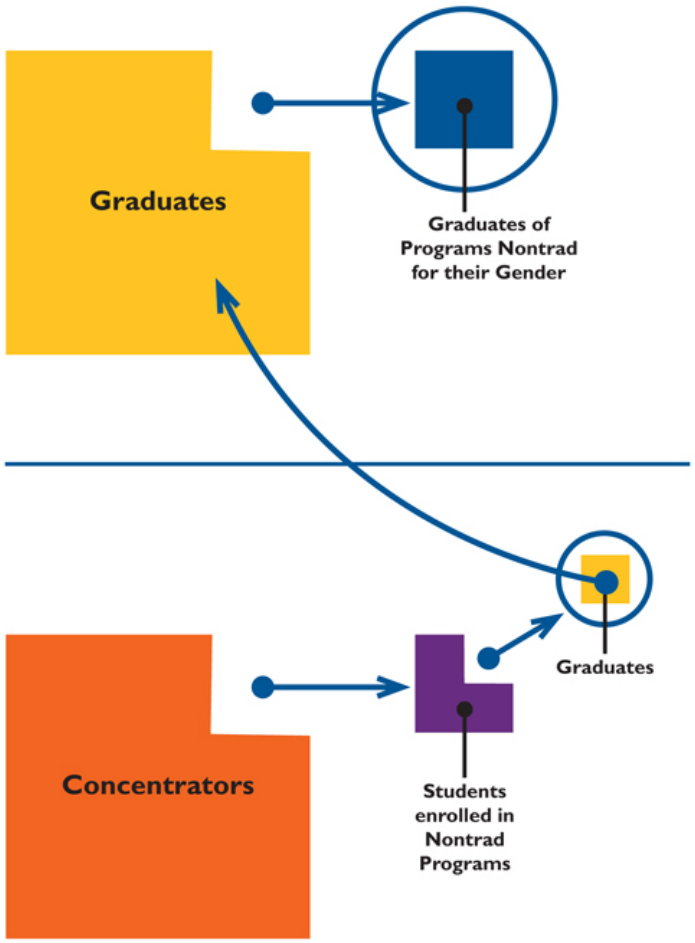
Fractions of Subpopulations (6S1)

- **Numerator:** Number of CTE participants from under-represented gender groups who participated in a program that leads to employment in nontraditional fields during the reporting year.
- **Denominator:** Number of CTE participants who participated in a program that leads to employment in nontraditional fields during the reporting year.

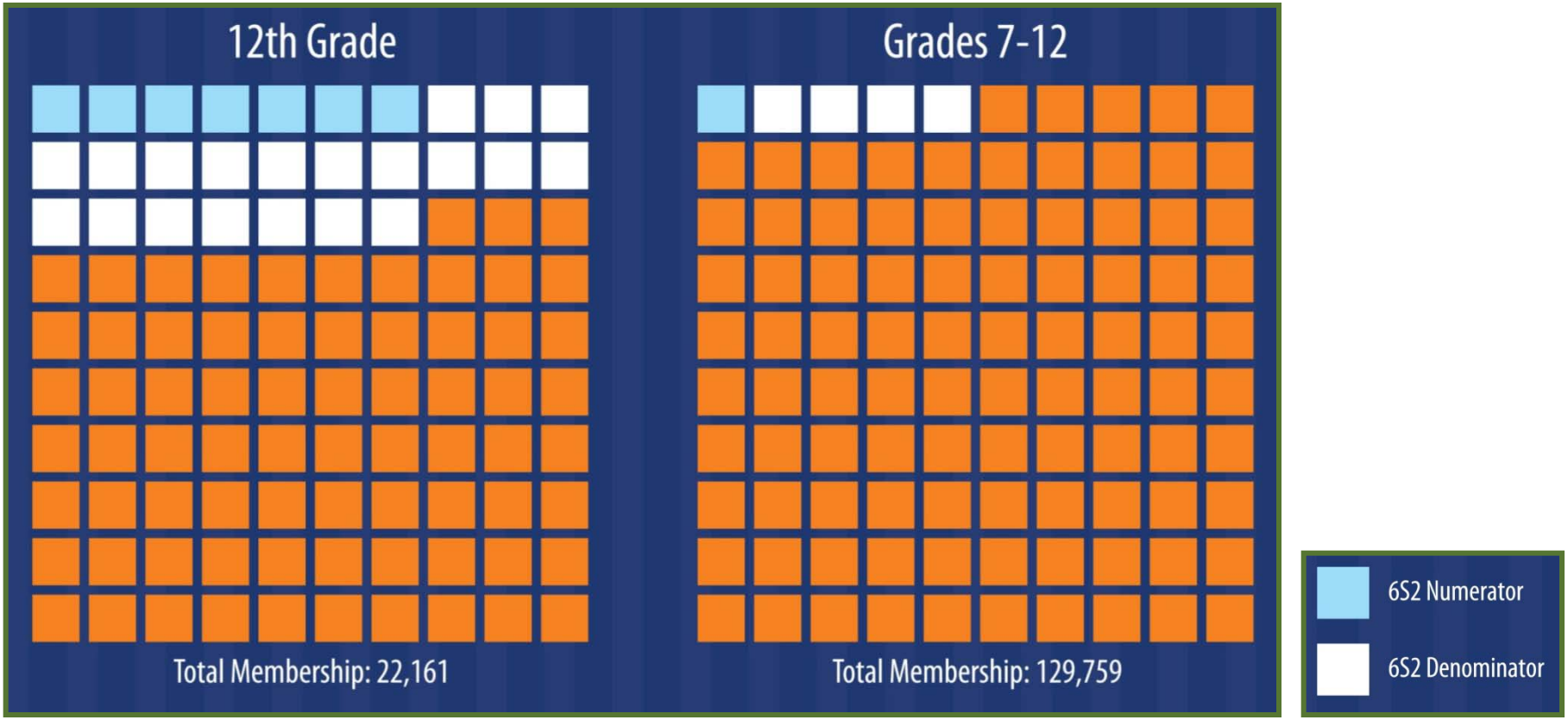


Fractions of Subpopulations (6S2)

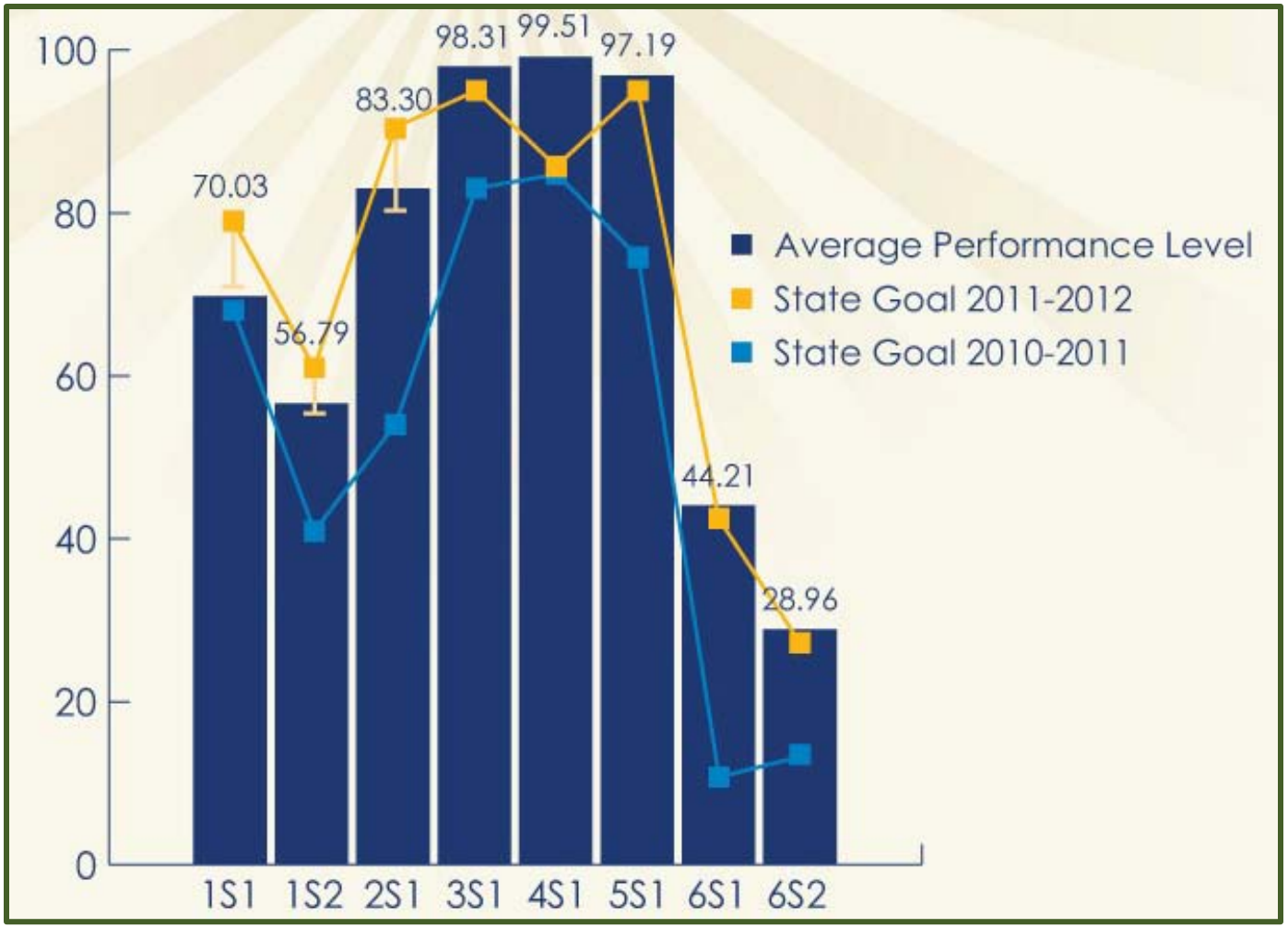
- **Numerator:** Number of CTE concentrators from under-represented gender groups who completed a program that leads to employment in nontraditional fields during the reporting year.
- **Denominator:** Number of CTE concentrators who completed a program that leads to employment in non-traditional fields during the reporting year.



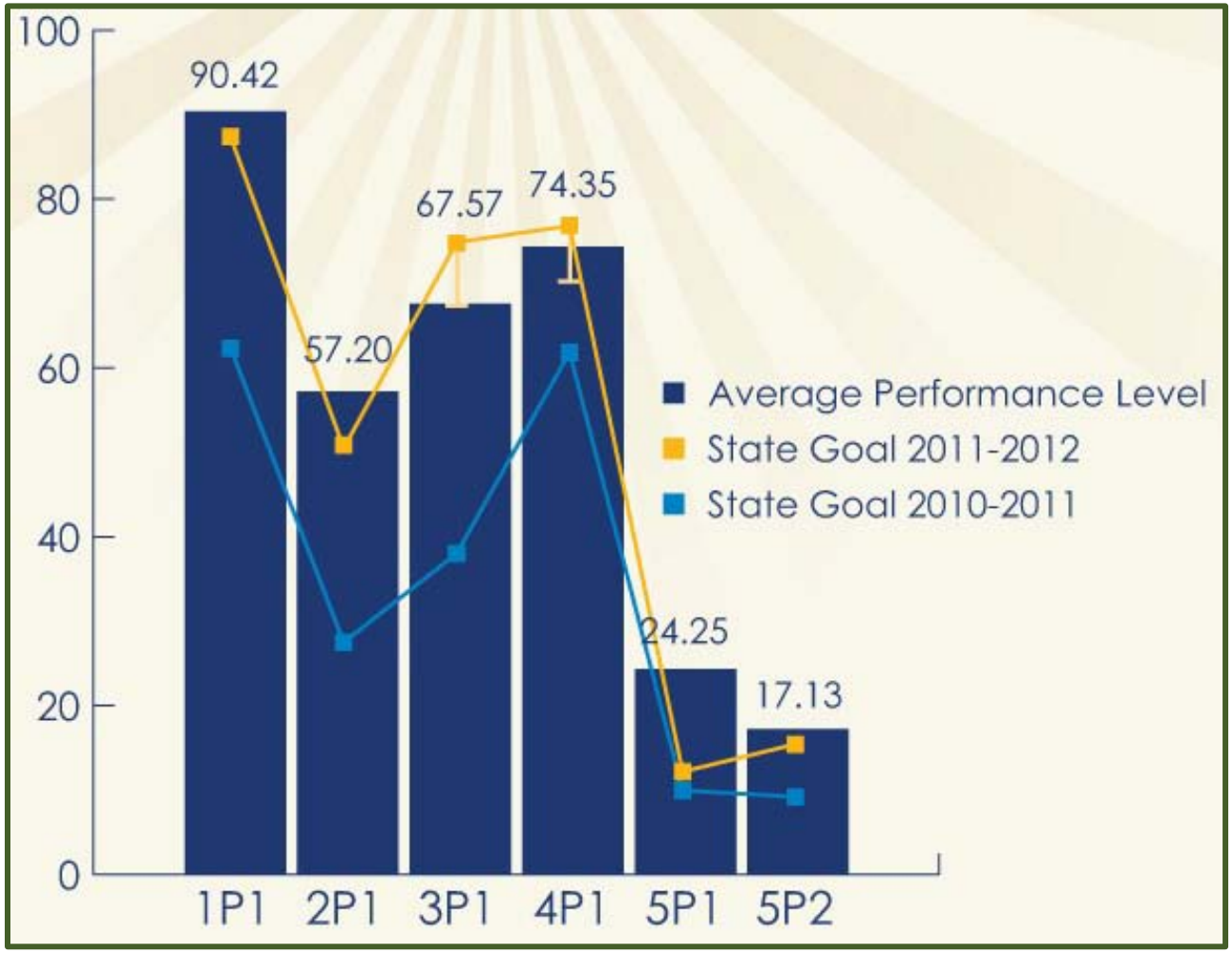
Nebraska Fall Membership
6S2: Nontraditional Completion



2011–12 Secondary Average Performance



2011–12 Postsecondary Average Performance



Challenges

1. Like many accountability frameworks, this *Perkins* system *becomes* the mechanism for understanding and evaluating CTE student performance/learning
   - Via the use of "performance" indicators
   - Performance relative to what?
     - An arbitrary state goal?

Challenges (continued)

2. Force an accountability system into a dual-purpose role:
   - Accountable for a federal investment
   - Assessment of student learning/outcomes
     - Are these the same thing?
     - Challenging and costly to develop such a system

Challenges (continued)

3. Thus, we judge the success or failure of CTE student learning/outcomes based on the *Perkins* accountability system—designed by policymakers for, perhaps, very different purposes
   - And, because *Perkins IV* is the product of a legislative process, these policy objectives—while well-intentioned—may not be fully coherent in practice

Beyond Accountability Alone

- Do these accountability measures help us
  - Make decisions about CTE?
  - Improve the quality of our decisions?
- Too often, we limit our use of education data to accountability purposes only.
- To enhance the quality of our decisions, we suggest diversifying analytic strategies beyond the federal accountability framework alone.

Measures of Association

- Is there a relationship between two variables?
  - For our purposes, often we see nominal variables
    - That is, a situation where each person is a member of a discrete category as opposed to each person receiving a numeric score on a continuous scale
  - Is career education status related to dropout status?
    - Discrete categories:
      - Participant – Non-Participant
      - Concentrator – Non-Concentrator
      - Dropout – Non-Dropout

Hypothetical Example

- The Contingency Table
  - AKA cross tabulation or "cross tabs"
  - For example, consider 100 high school students, their CTE concentration status, and an indicator of dropout status

	Non-Dropout	Dropout	Total
Non-Concentrator	20	40	60
Concentrator	20	20	40
Total	40	60	100

Risk or Probability

	Non-Dropout	Dropout	
Non-Concentrator	a	b	a+b
Concentrator	c	d	c+d
	a+c	b+d	n=a+b+c+d

*The probability of dropout varies as a function of CTE concentration status.

Probability that a student drops out = $\frac{b+d}{n}$ = 0.60

Probability that a concentrator drops out = $\frac{d}{c+d}$ = 0.50

Probability that a non-concentrator drops out = $\frac{b}{a+b}$ = 0.67

Odds

	Non-Dropout	Dropout	
Non-Concentrator	a	b	a+b
Concentrator	c	d	c+d
	a+c	b+d	n=a+b+c+d

*Again, the odds of dropout vary as a function of CTE concentration status.

Odds that a student drops out = $\frac{b+d}{a+c} = 1.5$

Odds that a concentrator drops out = $\frac{d}{c} = 1$

Odds that a non-concentrator drops out = $\frac{b}{a} = 2$

Interpretation

- **The difference between a risk and odds calculation is rooted in the denominator**
  - As a result, this influences the interpretation of these statistics
- Risk (or probability) interpretation
  - On average, concentrators drop out of school about 50% of the time
  - On average, non-concentrators drop out of school about 67% of the time
  - On average, students drop out of school about 60% of the time

Interpretation (continued)

- Odds interpretation
  - The odds of a concentrator dropping out of school is 1:1
  - The odds of a non-concentrator dropping out of school is 2:1
  - The odds of a student dropping out of school is 1.5:1
- For the most part, probabilities are simple to understand, but odds can be a bit more tricky

The Value of Ratios

- We are generally interested in ratios as opposed to probabilities or odds alone
  - Ratios provide insight into the *relative* analytic component largely lacking in the *Perkins* performance indictors
    - Relative risk (probability) ratios
    - Odds ratios
- Hypothetical research question:
  - Are concentrators at greater risk (or greater odds) of dropping out of school compared to non-concentrators?
    - Relative risk—divide probability of concentrators by non-concentrators
    - Odds ratio—divide odds for concentrators by non-concentrators

Risk or Probability Ratios

	Non-Dropout	Dropout	
Non-Concentrator	a	b	a+b
Concentrator	c	d	c+d
	a+c	b+d	n=a+b+c+d

Risk (Probability) Ratio of concentrator dropping out =

$$\frac{d}{c+d} \Big/ \frac{b}{a+b} = 0.75 \text{ (reciprocal = 1.34)}$$

Odds Ratios

	Non-Dropout	Dropout	
Non-Concentrator	a	b	a+b
Concentrator	c	d	c+d
	a+c	b+d	n=a+b+c+d

Odds Ratio of concentrator dropping out =

$$\frac{d}{c} \Big/ \frac{b}{a} = 0.50 \text{ (reciprocal = 2)}$$

Interpretation (continued)

- Risk (probability) ratio
  - Concentrators are 0.75 times as likely to drop out of school as non-concentrators, or put another way
  - Non-concentrators are 1.34 times as likely to drop out of school as concentrators (taking the reciprocal)
- Odds ratio
  - But using the odds ratio we CANNOT say that non-concentrators are 2 times as *likely* to drop out of school
  - More accurately, the *odd*s of dropping out of school are 2 times greater for non-concentrators relative to concentrators
  - For every non-concentrator not *dropping out* of school, 1.34 times as many non-concentrators will drop out as the number of concentrators

Interpretation (continued)

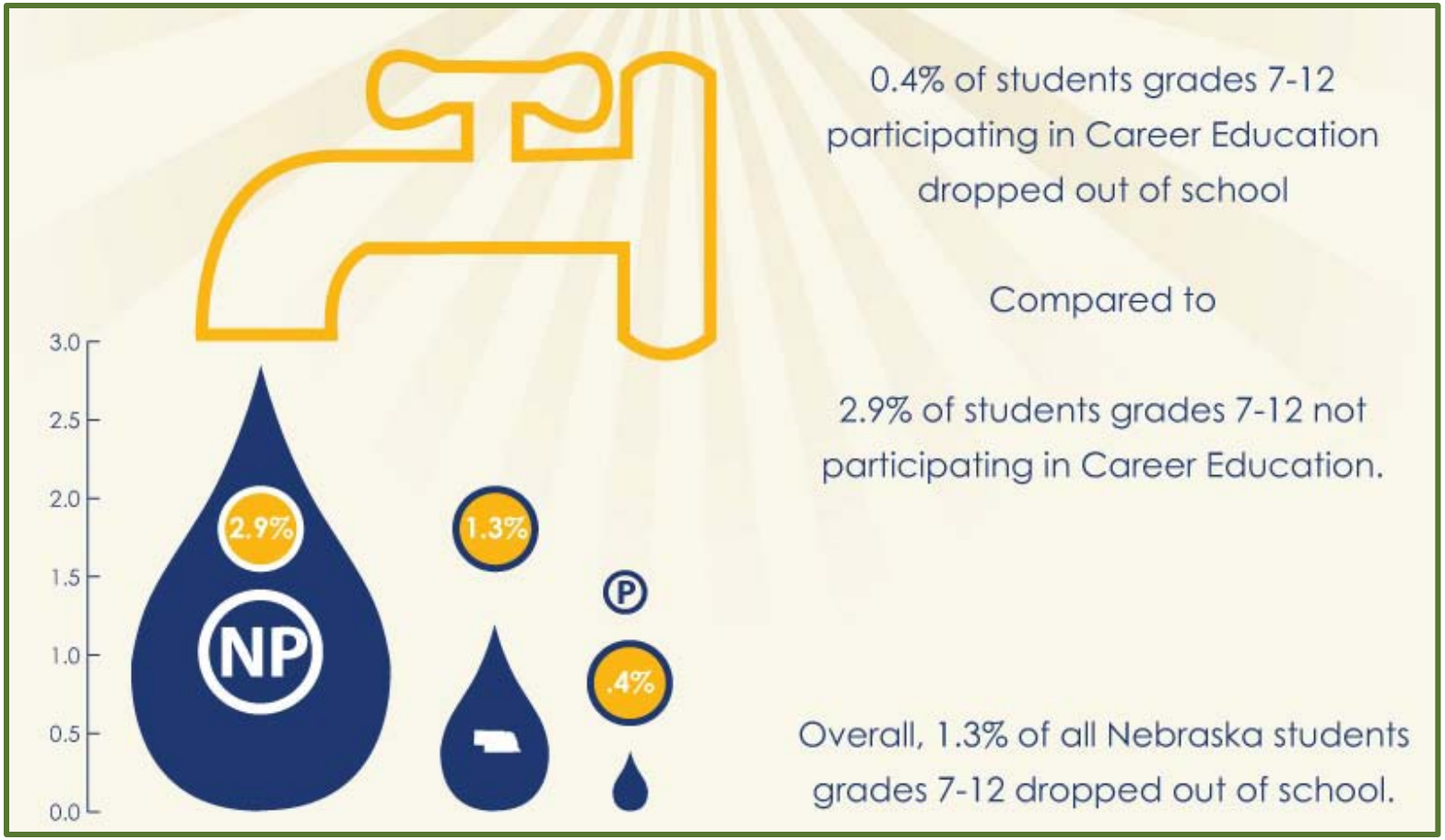
- For most, risk (probability) ratios tend to be more straightforward to interpret than odds ratios
- A value of 1.0 means no difference between groups for both risk and odds ratios
  - Ratios less than 1.0 mean that being in the selected group *decreases* the risk/odds of experiencing the outcome
  - Ratios greater than 1.0 mean that being in the selected group *increases* the risk/odds of experiencing the outcome

Interpretation (continued)

- Risk (probability) ratio vs. odds ratio
  - When the group of interest is relatively small (e.g., CTE concentrators), the odds ratio will approximate the relative risk ratio
  - As the frequency for the group of interest increases, the odds ratio will increasingly overestimate the risk ratio >1 and underestimate the risk ratio <1 (bias)

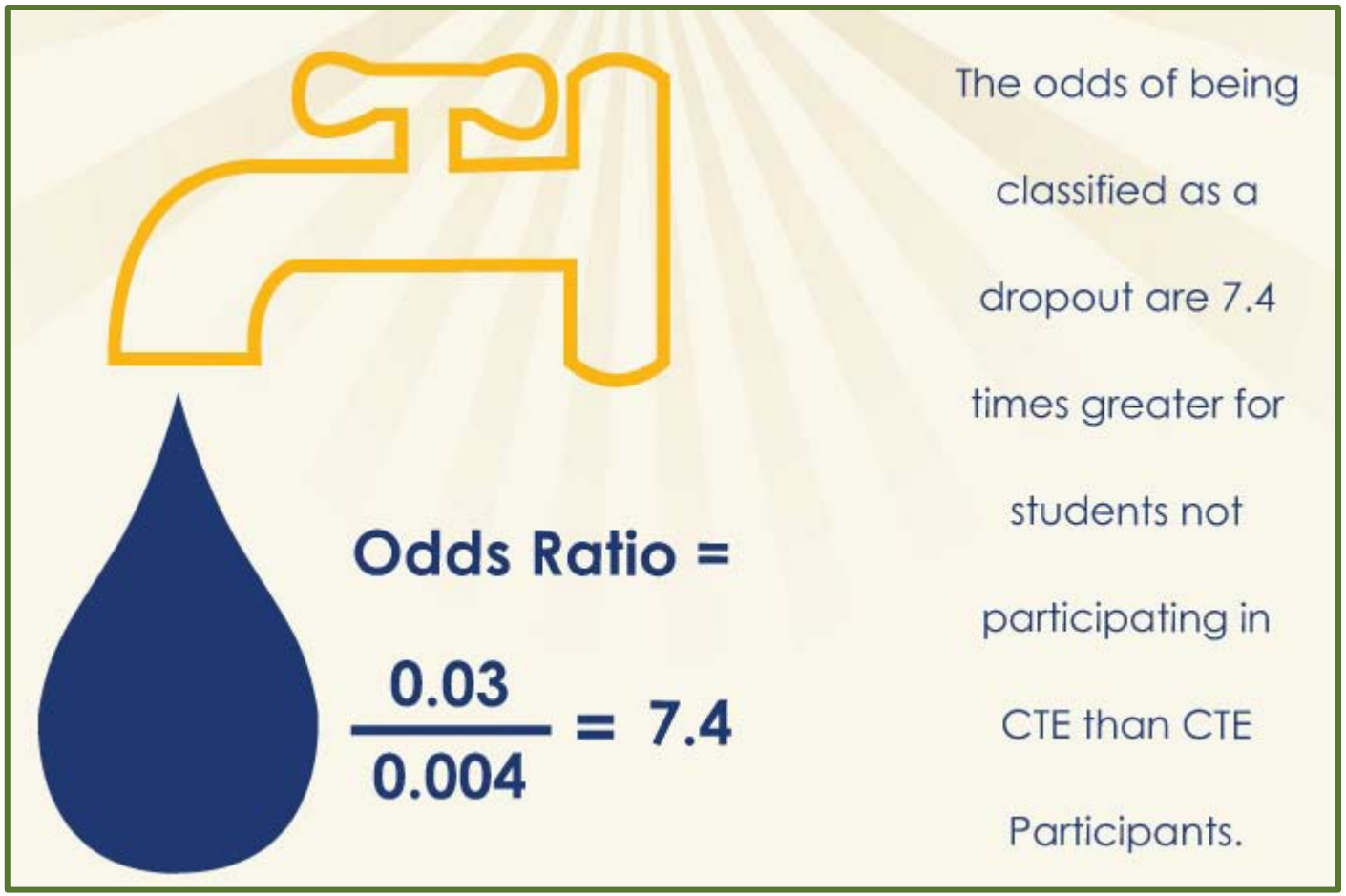
Descriptive Statistics: Dropouts

Non-Participants, All Students Grades 7–12, Participants



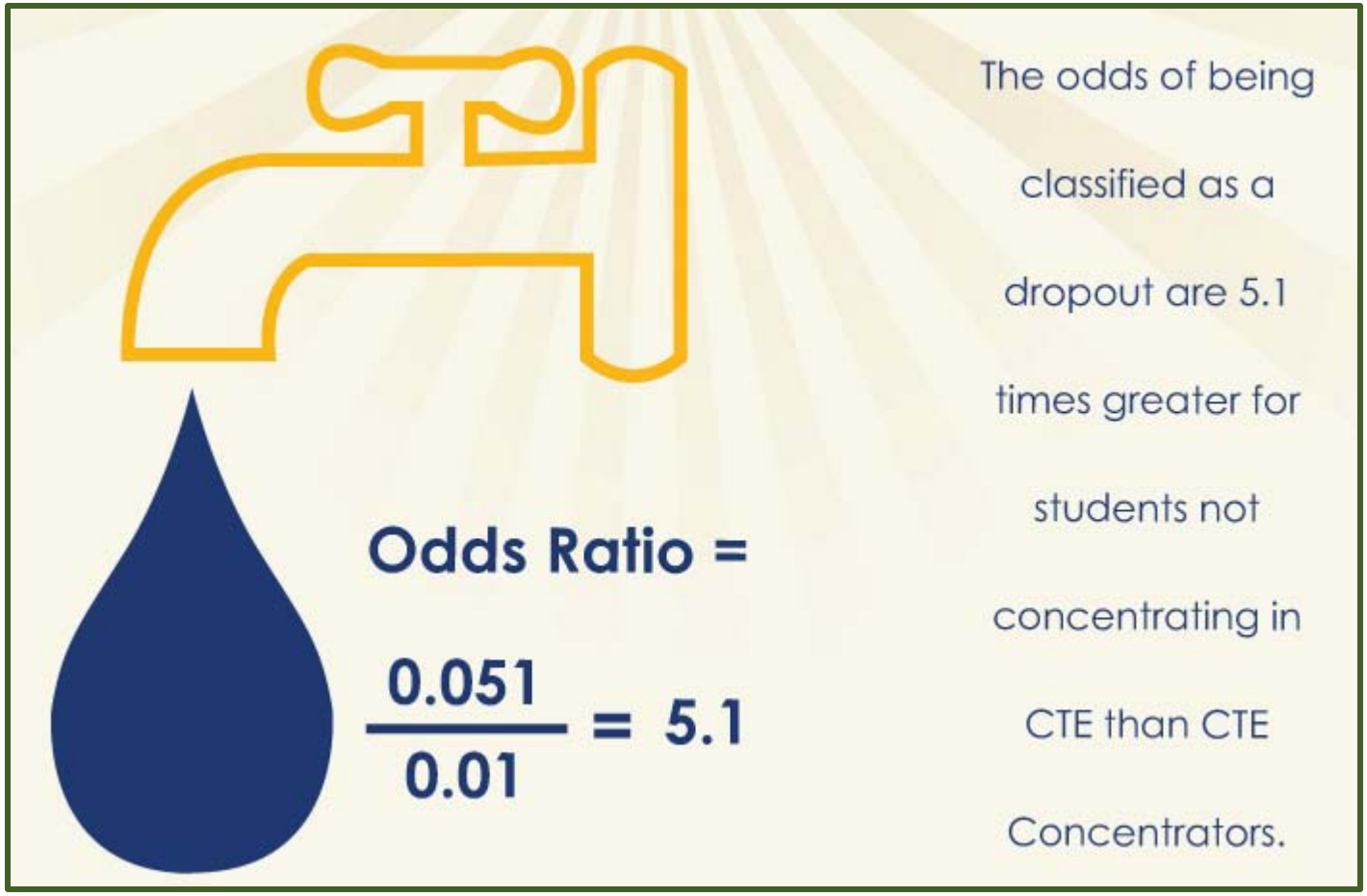
Dropouts: Odds Ratio

Non-Participants vs. Participants



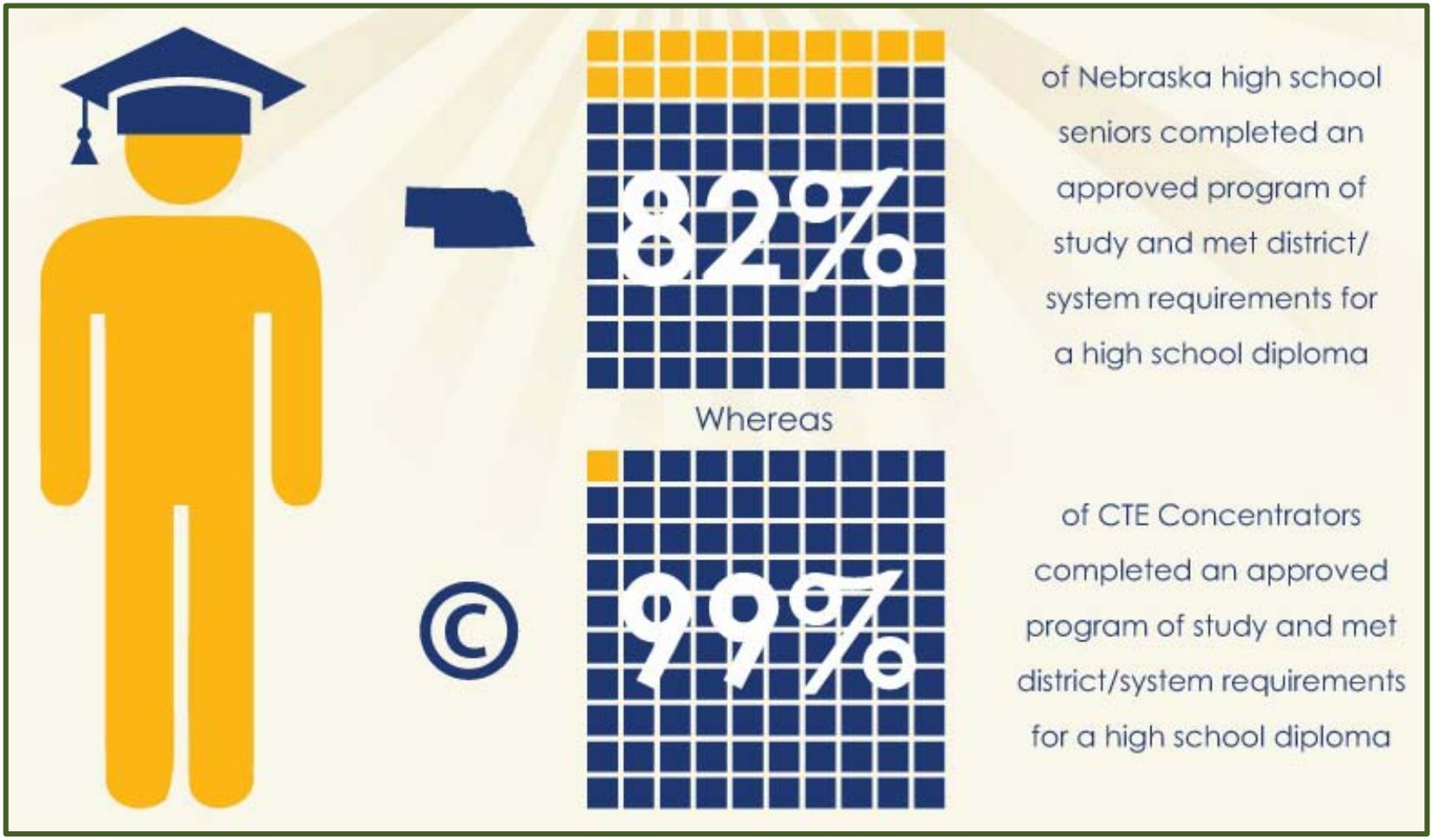
Dropouts: Odds Ratio

Non-Concentrators vs. Concentrators



Descriptive Statistics: Completer with Diploma

All High School Seniors vs. Concentrators



Completer with Diploma: Odds Ratio

Concentrators vs. Non-Concentrators

The odds of completing an approved program of study and meeting district/system requirements for a high school diploma are 25.6 times greater for CTE Concentrators than students not concentrating in CTE.

Odds Ratio =

$$\frac{72.09}{2.81} = 25.6$$

Paul Holbrook, Ph.D.
Department Chair for Business and Education
Coconino Community College, Arizona

Department of Business and Education Goals

- The goal was to offer college classes at the high school and ensure the instruction at the high school met the college's standards.

Course Standards

- Our standards are measured by student achievement for course competencies. These standards overlap the departmental academic and degree standards that are more general. The standards include critical thinking, problem solving, technology, and communication, which were determined as the most important.
- Semiannually these standards are reviewed and revised if necessary at out advisory council meetings.

Tools for Measurement

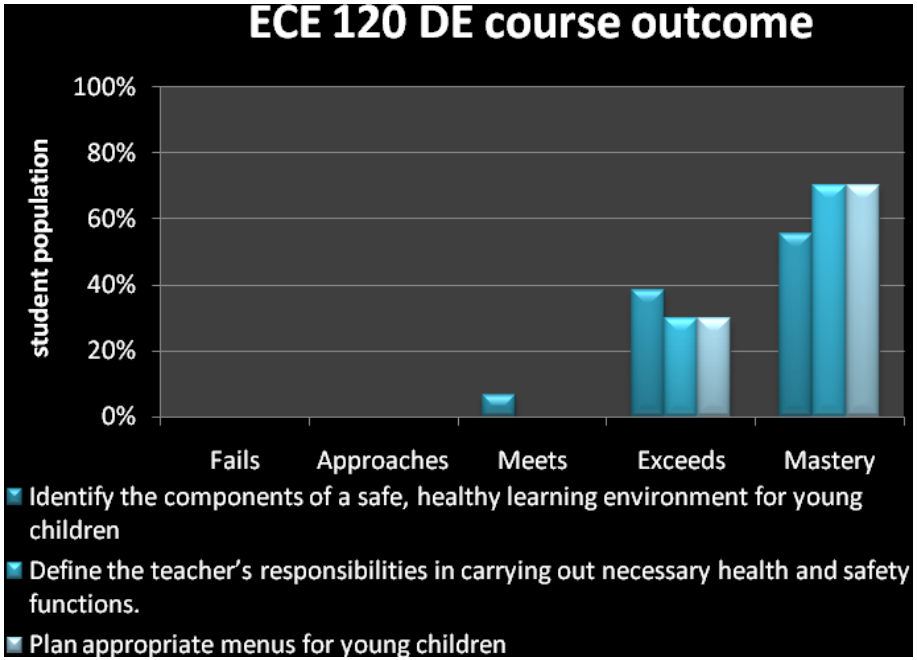
- To ensure student achievement was consistent, we developed a 5-point scale to measure student performance. High school classes and college classes used the same measurement tool. The results are consolidated, analyzed, and compared for further adjustments to teaching strategies.

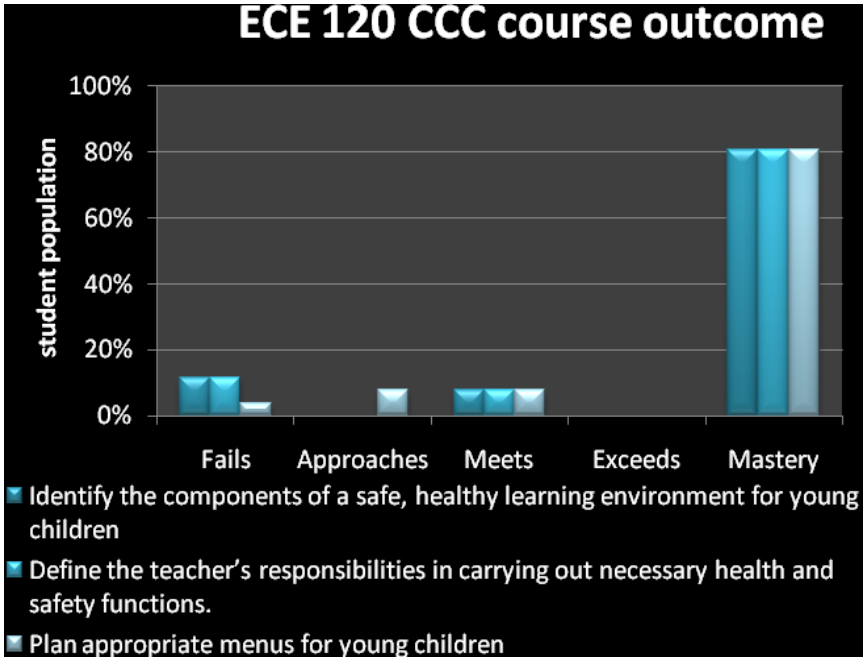
Reporting Form

Dual Enrollment		Intro to Early Childhood Education			ECE 100	
Outcome		Fails	Approaches	Meets	Exceeds	Mastery
Recognize the roles of families and teachers and their impact on early childhood education		Cannot recognize the roles of families and teachers and their impact on early childhood education.	Gross errors, lack of ability to recognize the roles of families and teachers and their impact on early childhood education.	Some errors in recognizing the roles of families and teachers and their impact on early childhood education.	Only minor errors in recognizing the roles of families and teachers and their impact on early childhood education.	Demonstrates a thorough ability to recognize the roles of families and teachers and their impact on early childhood education.
Student	a					
	b					
	c					

CCC		Intro to Early Childhood Education			ECE 100	
Outcome		Fails	Approaches	Meets	Exceeds	Mastery
Recognize the roles of families and teachers and their impact on early childhood education		Cannot recognize the roles of families and teachers and their impact on early childhood education.	Gross errors, lack of ability to recognize the roles of families and teachers and their impact on early childhood education.	Some errors in recognizing the roles of families and teachers and their impact on early childhood education.	Only minor errors in recognizing the roles of families and teachers and their impact on early childhood education.	Demonstrates a thorough ability to recognize the roles of families and teachers and their impact on early childhood education.
Student	1					
	2					
	3					

Results


ECE 120 DE course outcome
student population
100%
80%
60%
40%
20%
0%
Fails
Approaches
Meets
Exceeds
Mastery
Identify the components of a safe, healthy learning environment for young children
Define the teacher's responsibilities in carrying out necessary health and safety functions.
Plan appropriate menus for young children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Evaluation

- Initially the results revealed that the level of rigor was insufficient. This led to discussions with all faculty on department expectations that student learning usually forms a normal bell curve and that job security was not subject to all students achieving all competencies. Once this was achieved, we could review course results and develop teaching strategies for improving specific competencies.
- Competencies are measured for a minimum of three years before we change to measure other competencies. This strategy will help teachers create a behavioral change.

Thank You

Sharon Wendt
Director, Career & Technical Education Team
Department of Public Instruction
608-267-9251
Sharon.wendt@dpi.wi.gov

Matt Hastings
Data and Research Specialist
Nebraska Department of Education
402-471-3104
matt.hastings@nebraska.gov

Dr. Paul Holbrook
Department Chair, Business and Education
Coconino Community College
928-226-4248
paul.holbrook@coconino.edu

Robin A. Utz
Branch Chief, DATE/OVAE
U.S. Department of Education
202-245-7767
robin.utz@ed.gov