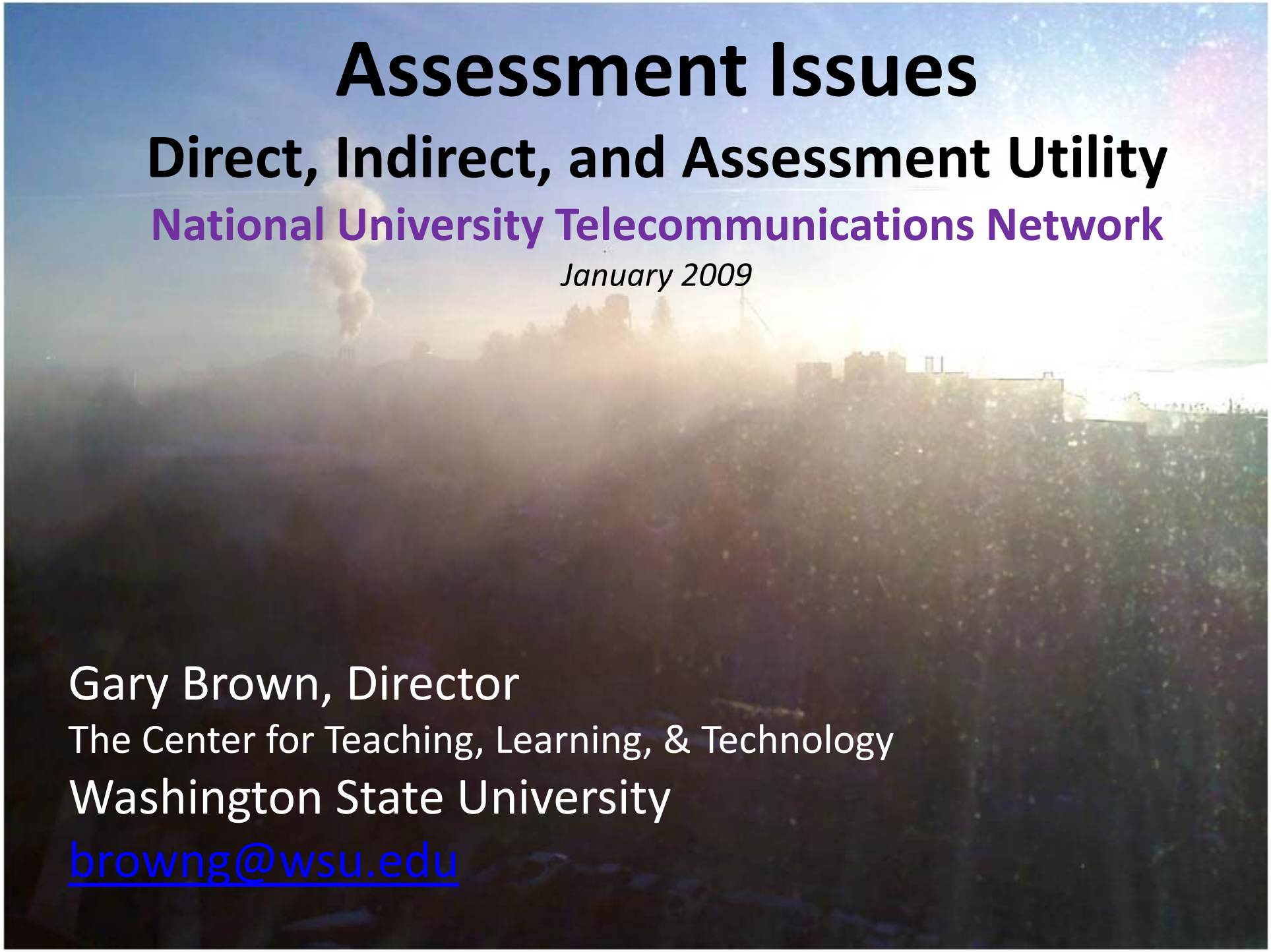
1-26-2009

Assessment Issues Direct, Indirect, and Assessment Utility

Gary R. Brown
Portland State University



Assessment Issues

Direct, Indirect, and Assessment Utility

National University Telecommunications Network

January 2009

Gary Brown, Director

The Center for Teaching, Learning, & Technology

Washington State University

browng@wsu.edu

A Direct Method for Assessing ABET Professional Skills in Engineering Programs

BOB OLSEN, COLLEGE OF ENGINEERING & ARCHITECTURE
ASHLEY ATER-KRANOV AND LAURA GIRARDEAU, THE CENTER FOR TEACHING, LEARNING, & TECHNOLOGY

INTRODUCTION

Until recently, student focus groups have been used to assess the ability of engineering programs to prepare graduating seniors for careers in the field. More objective and accurate data is needed to assess how well students are actually prepared to meet professional challenges. To assess these skills in practice, WSU's College of Engineering & Architecture (CEA) collaborated with WSU's Center for Teaching, Learning, and Technology (CTLT) to develop an innovative and effective method of measuring ABET professional skills. These skills include ABET criteria 3f through 3j:

3f: understanding of professional and ethical responsibility

3g: ability to communicate effectively

3h: ability to understand the impact of engineering solutions in global, economic, environmental, and societal contexts

3i: ability to engage in life-long learning

3j: knowledge of contemporary issues.

Responding to a National Call

"As evidence of student learning, indirect measures are not as strong as direct measures because assumptions must be made about what exactly the self-report means.... [The] use of multiple assessment methods provides converging evidence of student learning."

Gloria Rogers
ABET's Associate Executive Director of Professional Services

Assessing Skills through Collaboration

- Are WSU engineering seniors adequately prepared for their careers? Can they collaborate on teams to address real-world issues, considering not only design, but ethical, global, societal, economic, and environmental implications? This study seeks to answer these questions.
- This college-wide, program-specific project has increased faculty involvement in assessment and collaboration between departments.
- Faculty in 8 engineering programs and assessment experts collaboratively assess student professional skills and apply results to program improvements.

Washington State University
World Class. Face to Face.

METHODS

CEA and CTLT designed "curricular debrief" sessions for teams of discipline-specific seniors. During the spring semester of 2007, CTLT is facilitating and analyzing 9 curricular debrief sessions across specific engineering disciplines at WSU. Students work together to address a real-world engineering scenario developed from current news stories, and then discuss what aspects of the WSU engineering program or other experiences contributed to their skills exhibited on the scenario. Analysis of results will allow the CEA to more directly assess the professional skills of graduating seniors, and to further improve the WSU engineering program's attention to ABET skills in the classroom. This project also provides fertile ground for dissemination and further research, and may act as a model for engineering assessment across the nation.

PRELIMINARY RESULTS

In an interdisciplinary pilot, 8 students from 5 WSU Pullman engineering programs discussed the Hanford nuclear waste site, which involves complex ethical, environmental, economic, societal, and global issues as well as engineering design issues.

- A score of 4 represents competency for WSU engineering seniors
- Students received an average score of 3.5 on a 6 point scale
- Students performed best (an average of 4) on life-long learning
- Students needed the most improvement on knowledge of contemporary issues
- Students neared competency, with scores of 3.5, on all other ABET skills.

Results from each of the 8 engineering programs at WSU Pullman will be analyzed in Summer 2007 and used to design a longitudinal assessment program.

In later years, assessment teams may include professionals in the field, undergraduates and graduate students, and advisory board members.

AMERICAN RECOVERY AND REINVESTMENT

"Unprecedented Accountability:

A historic level of transparency, oversight and accountability will help guarantee taxpayer dollars are spent wisely and Americans can see results for their investment."

Rather, we should ask, "Are we analyzing the real drivers of quality and cost and then vigorously exploiting the opportunities that we've unearthed?"

—George Kuh

Measures to Consider

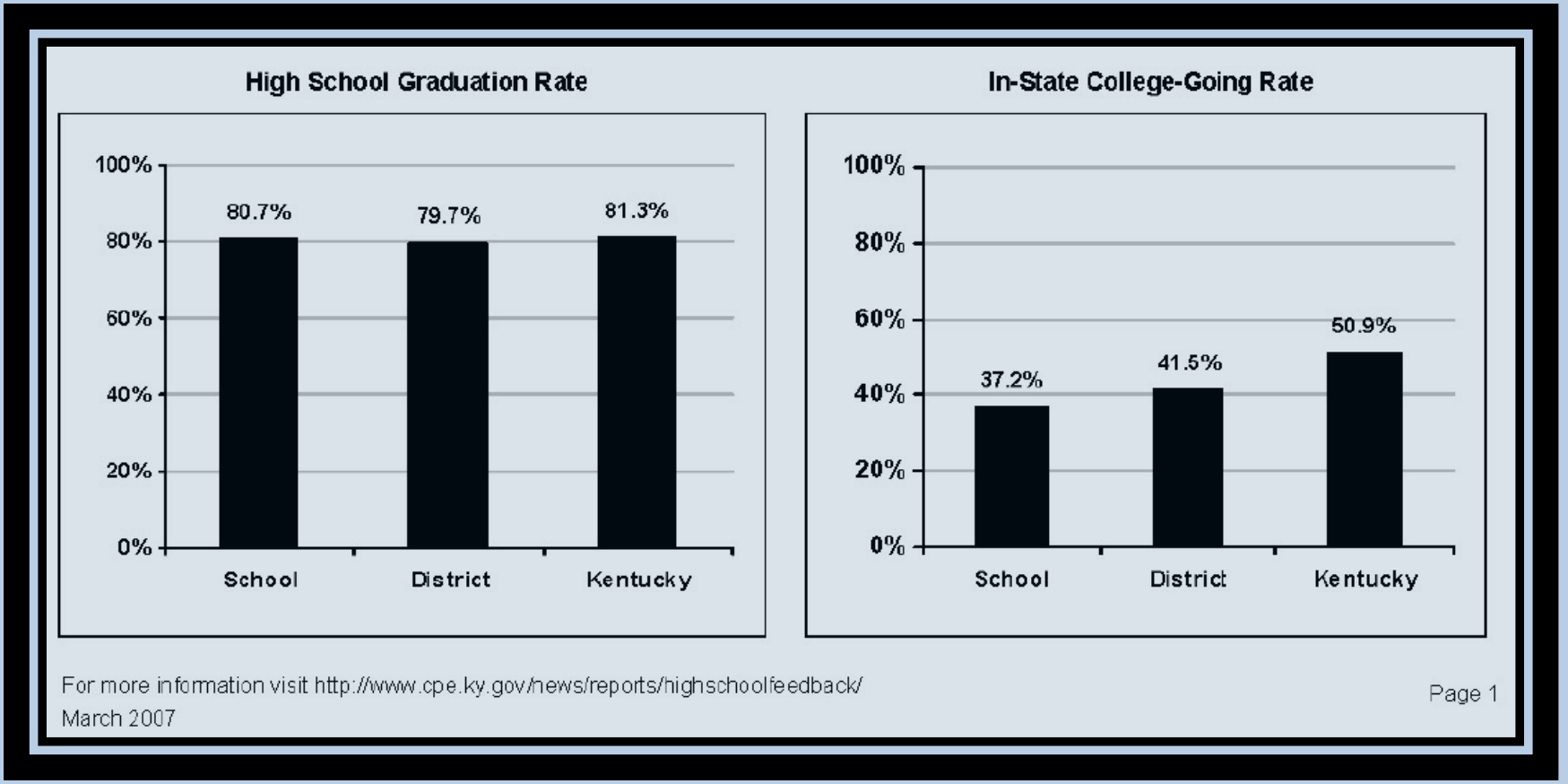


Figure 3. Results of the State University of New York's General Education Assessment Review of Natural Science Curricula

Outcome: Understanding of the methods scientists use to explore natural phenomena, including observation, hypothesis development, measurement and data collection, experimentation, evaluation of evidence, and employment of mathematical analysis				
	Exceeding	Meeting	Approaching	Not Meeting
Doctoral Institutions	29.70	38.00	20.73	11.59
Comprehensive Colleges	40.10	29.27	17.12	13.03
Colleges of Technology	23.20	31.00	12.13	33.00
Community Colleges	40.26	27.48	11.62	20.45
Average	37.10	29.09	13.19	20.35
Outcome: Application of scientific data, concepts, and models in one of the natural sciences				
	Exceeding	Meeting	Approaching	Not Meeting
Doctoral Institutions	17.36	42.43	19.86	20.36
Comprehensive Colleges	52.60	33.70	8.80	4.90
Colleges of Technology	15.00	37.67	15.67	31.67
Community Colleges	37.35	28.40	13.56	20.55
Average	32.98	31.31	14.23	21.37

Source: Master Plan 2004–2008, The State University of New York, p. 88.
http://www.suny.edu/provost/Master%20Plan%202004-08%20(final).pdf

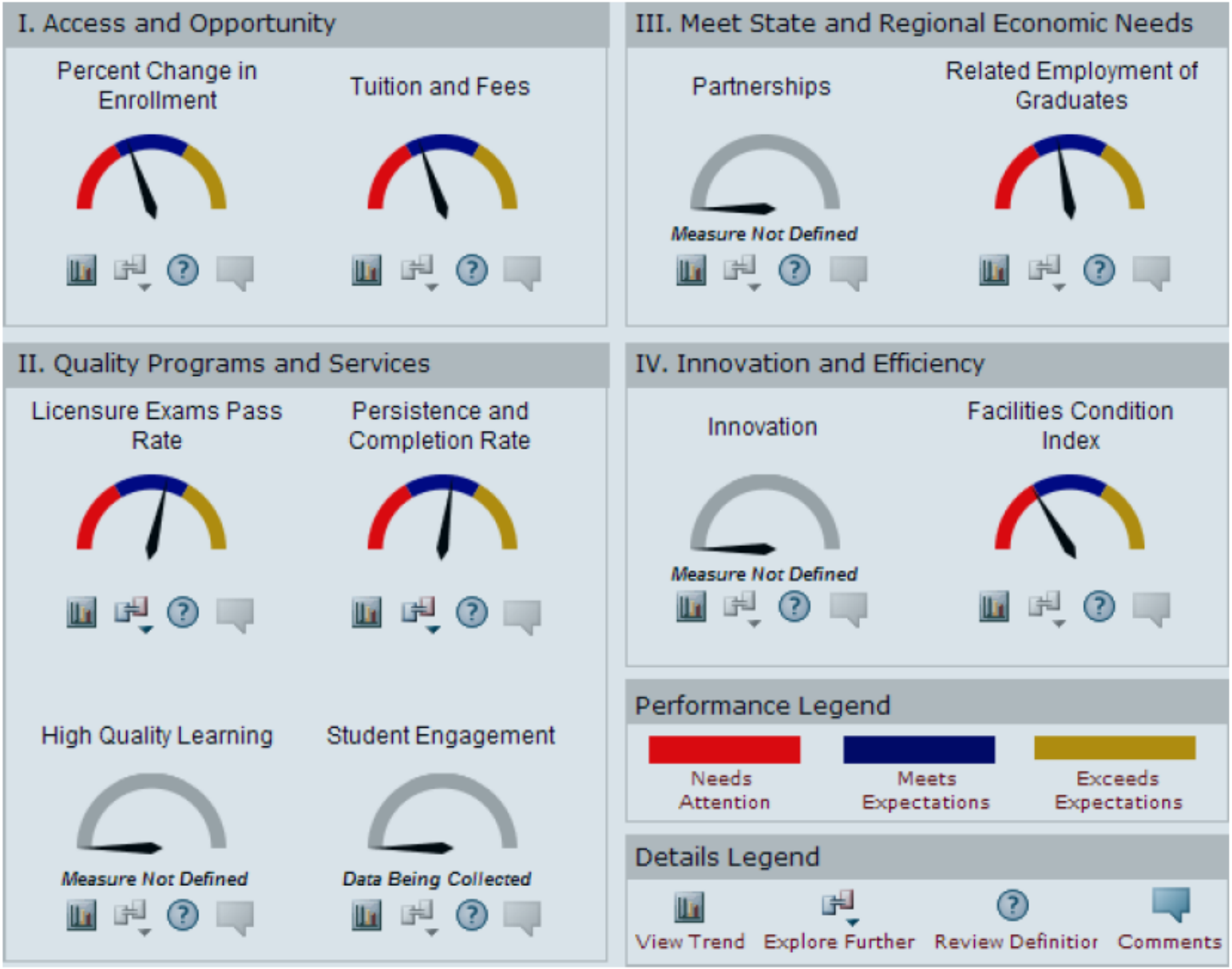
Complementary Direct and Indirect

Figure 13. Wisconsin's Achieving Excellence Accountability Report

Goal III: Improve learning competencies and provide learning experiences that foster the development of critical thinking skills.				
Fostering Critical Thinking Skills	**Benchmark**: Utilize national survey benchmarks to assess critical thinking.	UW seniors rated their education at or above the national average in contributing to their ability to think critically, analyze the basic elements of an idea, and apply theories or concepts to practical problems or new situations.	√	11
Assessing Learning Competencies and Outcomes	**Benchmark**: Utilize national and state benchmarks to rate performance on professional examinations.	UW System students performed above state and national averages on CPA, GRE, and MCAT examinations. On the Nursing Licensure Examination, UW System students had a pass rate within 1 percentage point of the national average.	√	11

Source: Achieving Excellence: Accountability Report 2006–2007, The University of Wisconsin System, p. iii.
http://www.uwsa.edu/opar/accountability/achieve07/ae_06-07.pdf

Figure 14. Minnesota's Accountability Dashboard (Winona State University)

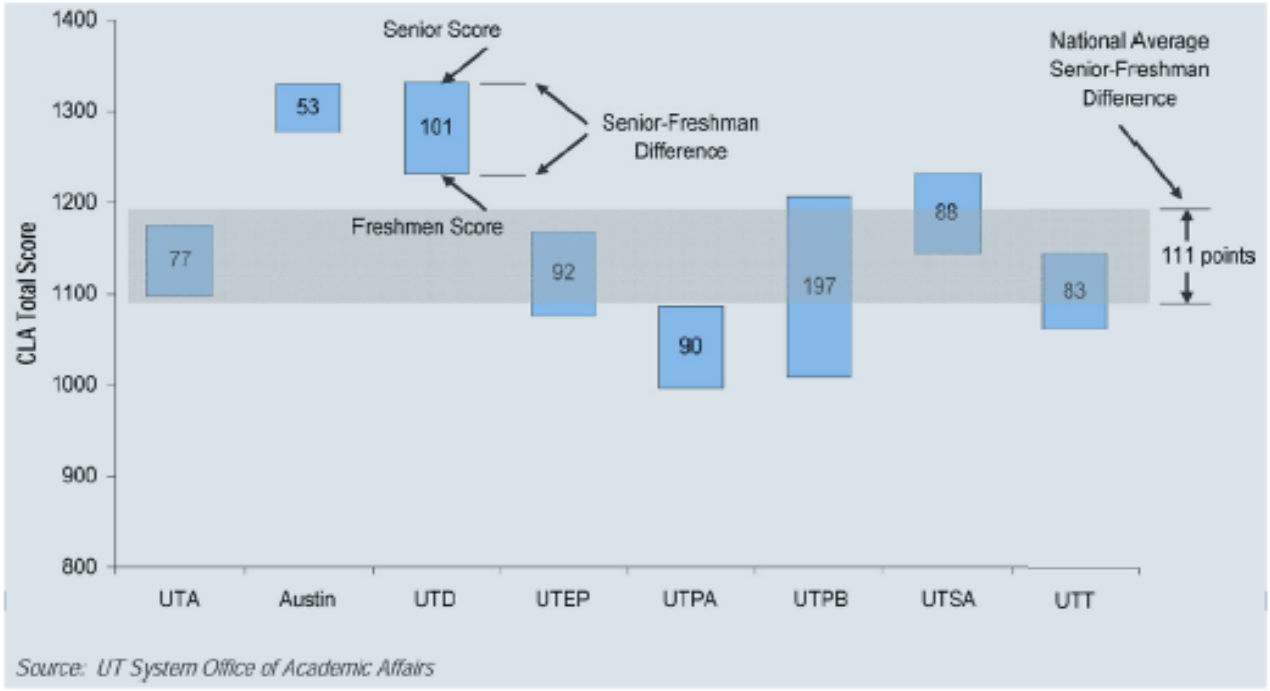


Source: http://www.mnscu.edu/board/accountability/index.html

The Question of Utility

Does the Measure Guide Improvement?

Figure 2. University of Texas Collegiate Learning Assessment Gains



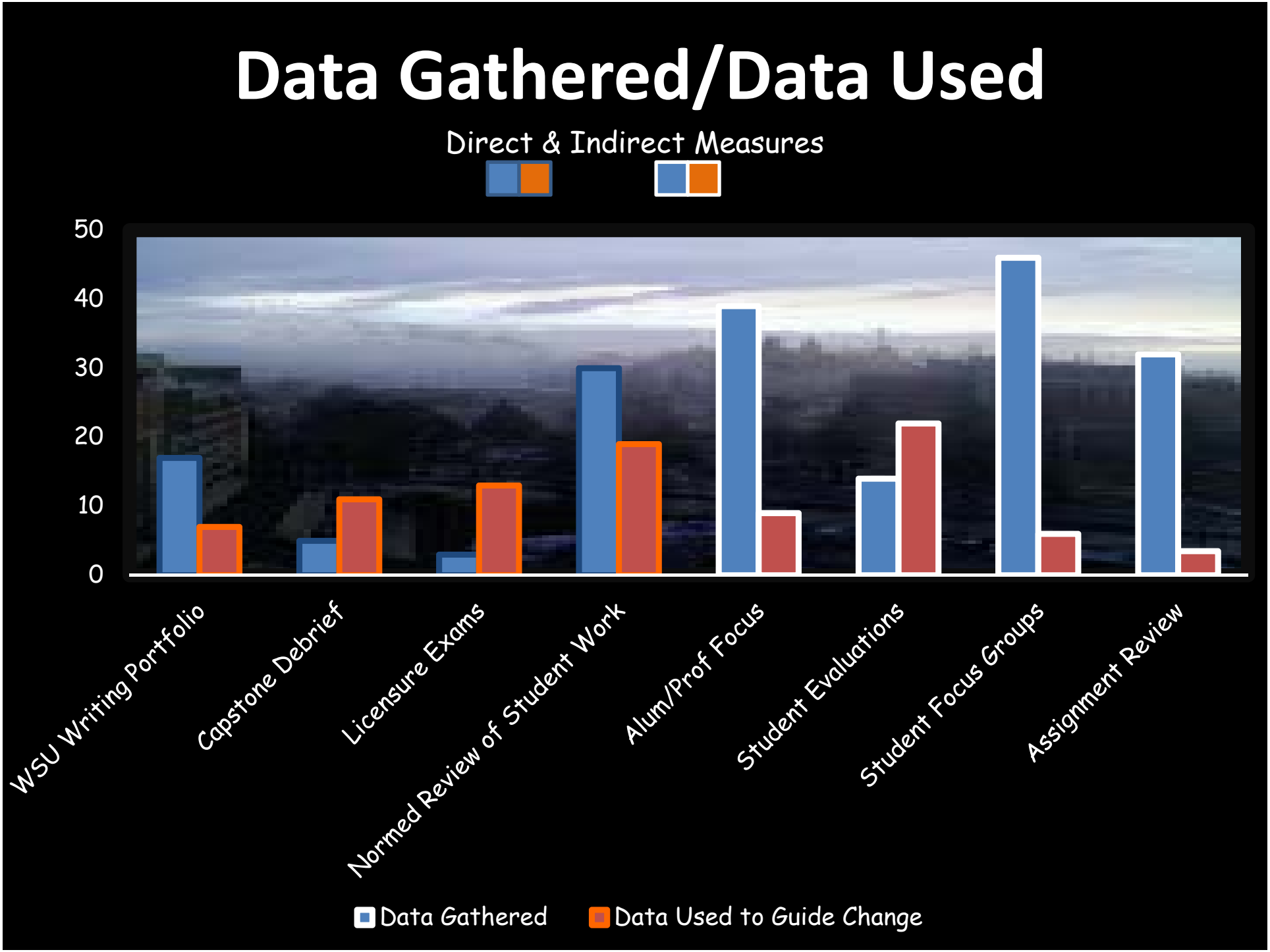
Source: Accountability and Performance Report 2007–08, The University of Texas System, Figure I-8, Section 1: I.15.

http://www.utsystem.edu/osm/accountability/2007/AccountabilityReport07-08.pdf

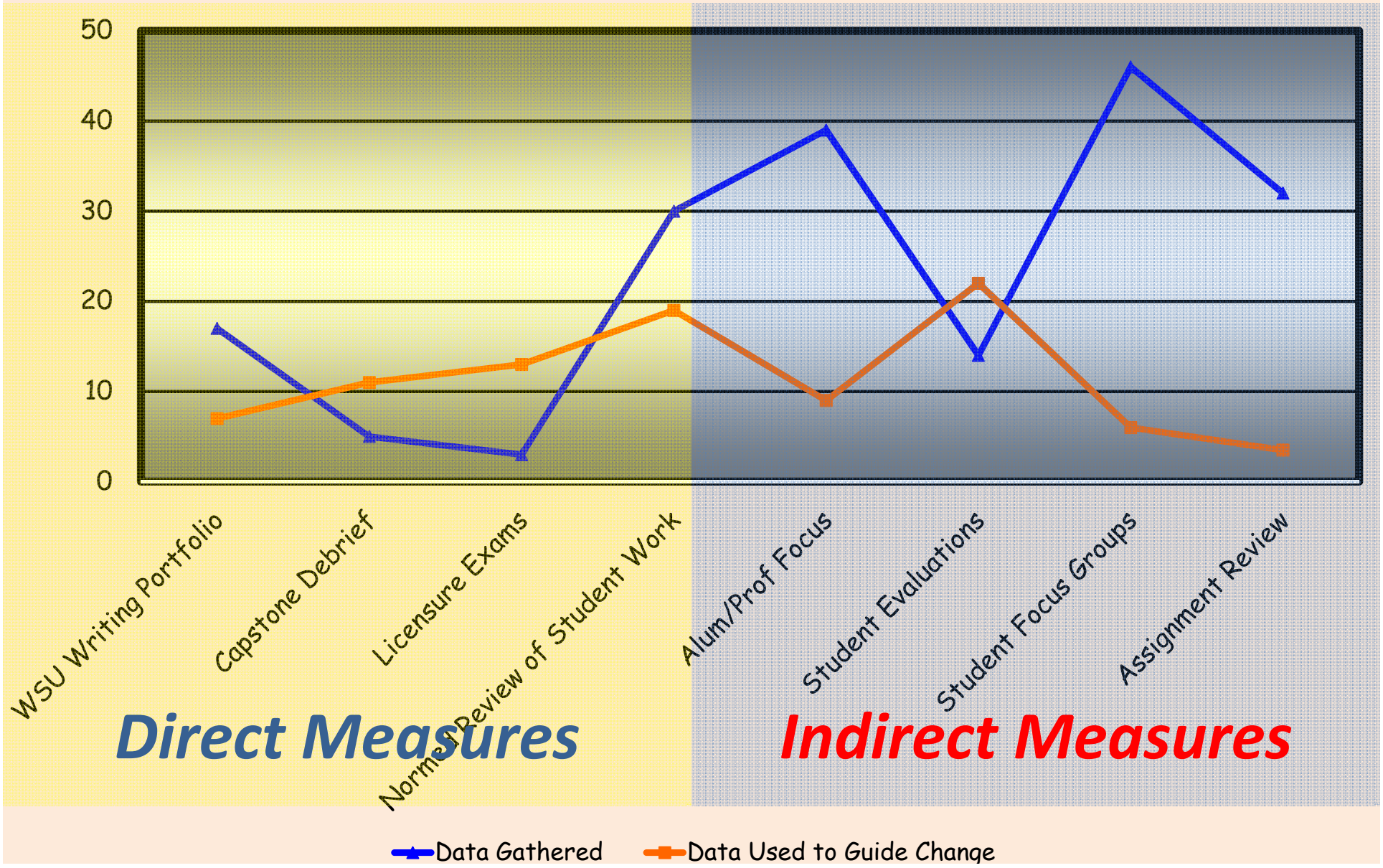
Weighing the lamb doesn't fatten the lamb

—Jonathan Kozol

Data Gathered/Data Used

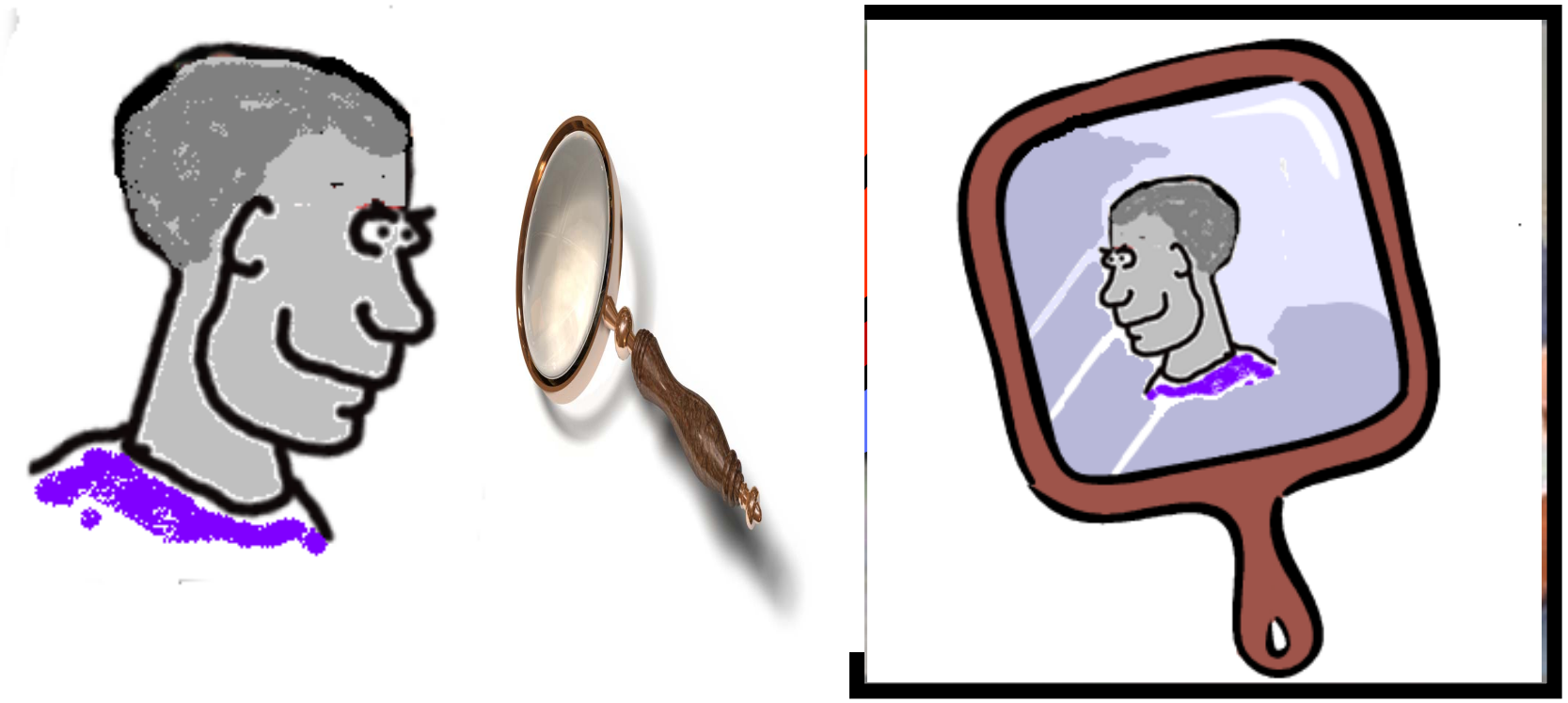


Data Gathered/Data Used

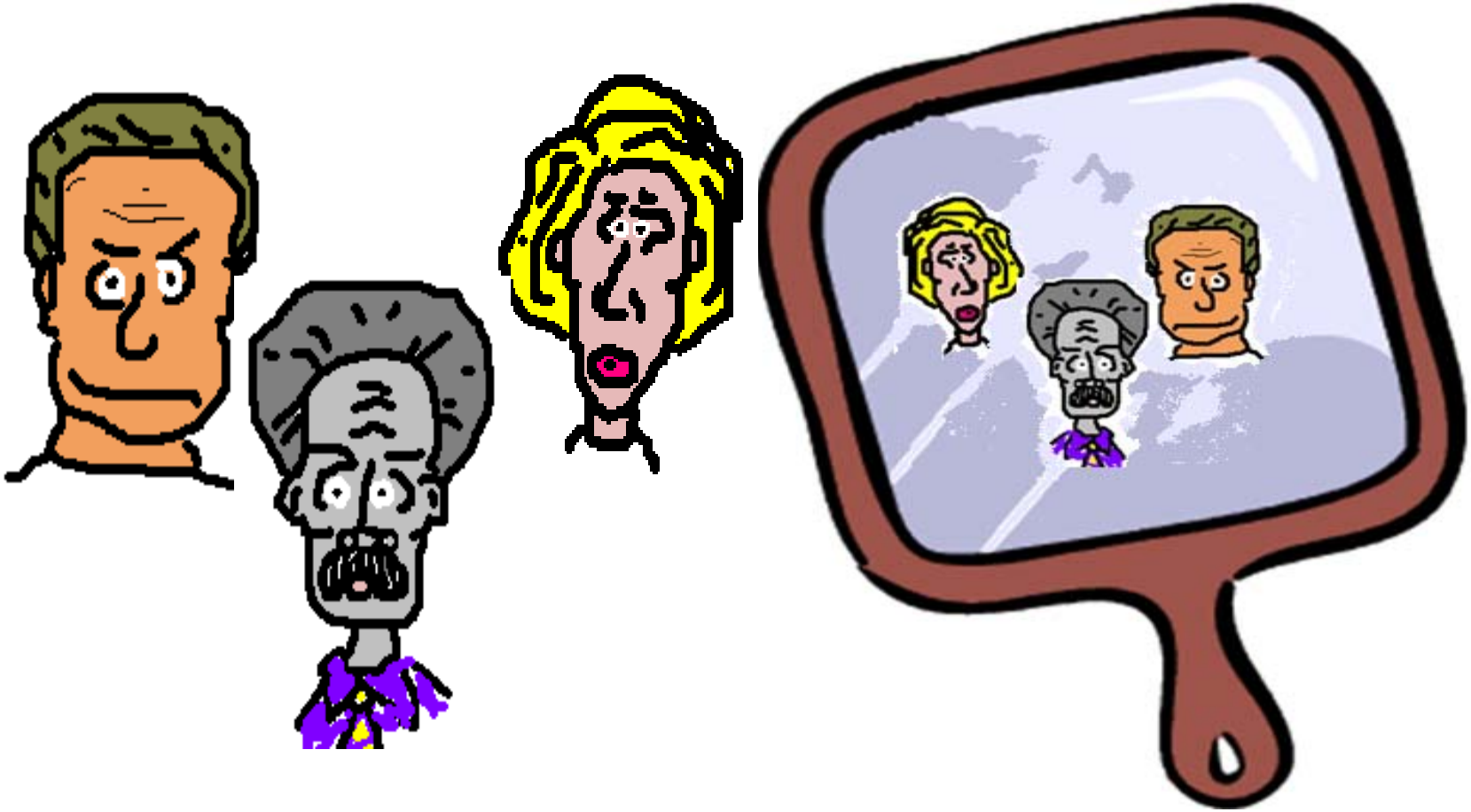


Data Use?

The Three Lenses of Assessment

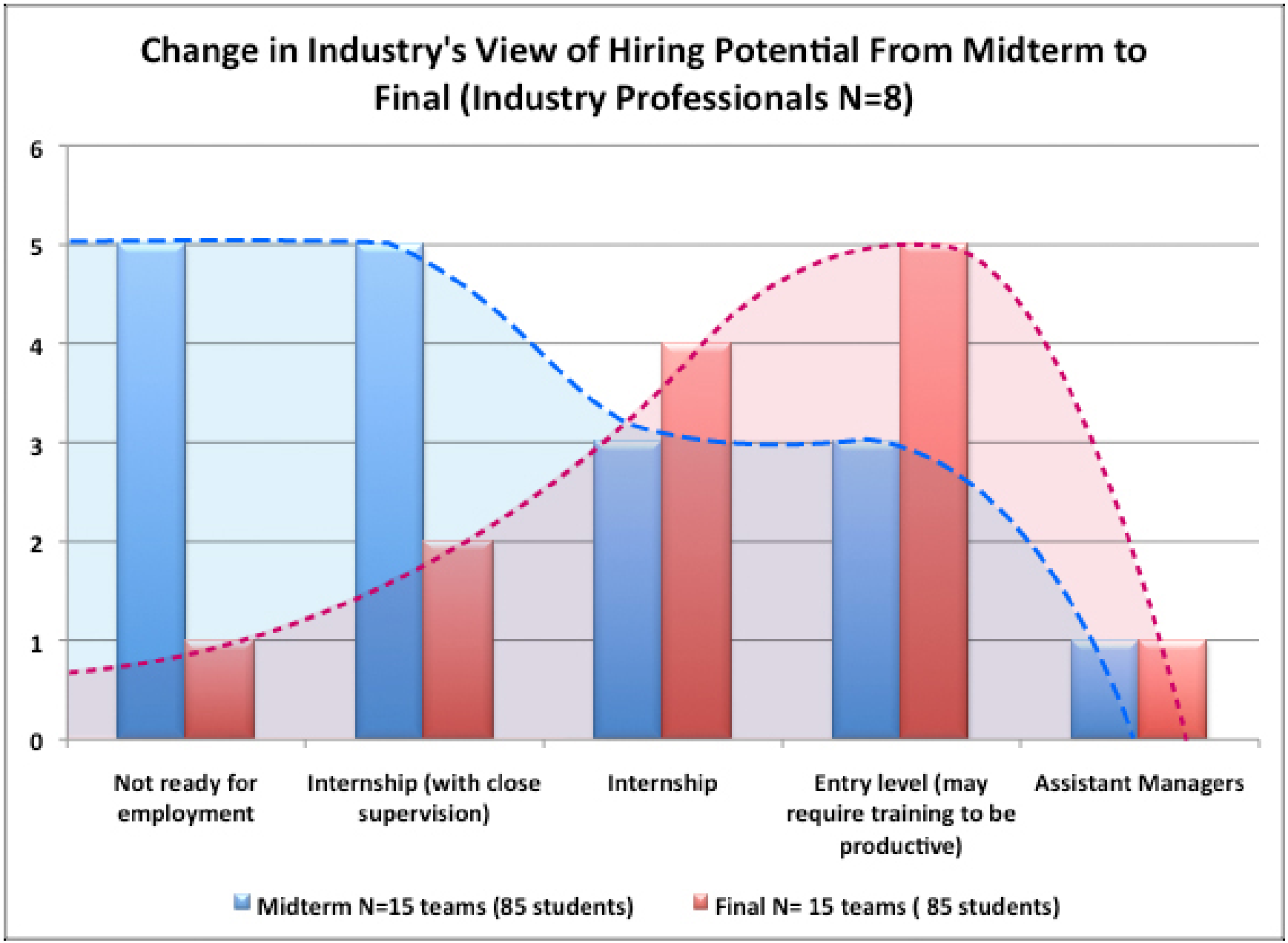


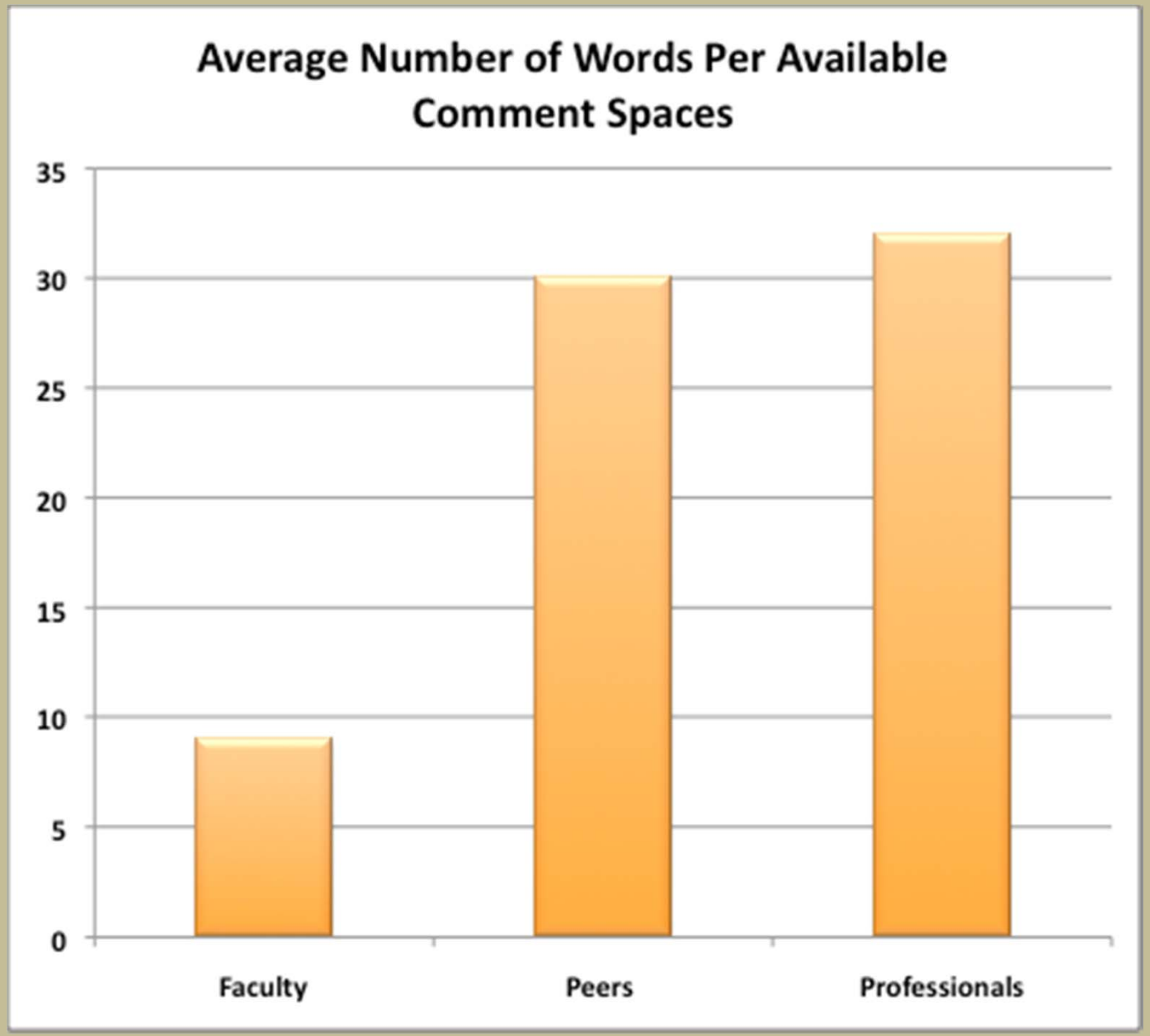
Assessment That Reflects Curricula



Used by Whom?


Shapiro, Canad
General Mills
Program Faculty
Gary Brown
Perpetual Student
Fashion Forecasting
Next Generation Handbags
Team Orange
Fall 2009
Forecasting fashion is more analysis and less hunch than most people are aware. The analysis requires a market analysis that includes variables drawn from multiple sources, with regional as well as temporal considerations. The variables we used in the analysis were selected according to principles
Criteria for Critical & Integrative Thinking
Nordstrom's
WASHINGTON STATE UNIVERSITY
World Class. Face to Face.
ervices
Carlin International
Requirements
Download
Institutional ePort
Butler Bag
Career Service Library
Career vices Program Outcomes
Spring 2006*
100a
100b
300
MyWSU
Contacts
Courses
Employers
Finances
Accountability
Learning Outcomes
Development
Employers
Critical Thinking
Symbolic Reasoning
Information Literacy
Communication
Self & Societ
Specialit
Apparel Merchandising
Outcomes Report
2009
Change in Industry's View of Hiring Potential From Midterm to Final (Industry Professionals N=8)
Not ready for employment
Internship (with close supervision)
Internship
Entry level (may require training to be productive)
Assistant Managers
Midterm N=15 teams (85 students)
Final N= 15 teams (85 students)


Change in Industry's View of Hiring Potential From Midterm to Final (Industry Professionals N=8)
6
5
4
3
2
1
0
Not ready for employment
Internship (with close supervision)
Internship
Entry level (may require training to be productive)
Assistant Managers
Midterm N=15 teams (85 students)
Final N= 15 teams (85 students)


Average Number of Words Per Available Comment Spaces
35
30
25
20
15
10
5
0
Faculty
Peers
Professionals