

Achievement CRT, Gateway, EXPLORE, and PLAN

Relationships

Purpose of the Presentation

- To show **relationships** between **EXPLORE** and **CRT**
- To show **relationships** between **PLAN** and **Gateway Test**
- To present important **Reporting Categories** to predict **EXPLORE** college readiness
- To address **college readiness benchmark**
- To present how to **compare school to nation**

Data

- **Spring 2007 CRT (Grade 7)**
- **Spring 2008 and 2009 CRT (Grade 8)**
- **Spring 2008 Algebra I (Grade 9*)**
- **Fall 2008 Algebra I, Biology I, & English II (Grade 10)**
- **Spr 2009 Algebra I, Biology I, & English II (Grade 10)**
- **Fall 2007 and 2008 EXPLORE (Grade 8)**
- **Fall 2008 PLAN (Grade 10)**

* Majority of test takers of Algebra I were 9th and 10th graders.

Methods: Statistics

- Mean, Standard Deviation, & Glass's δ
- Pearson Product Moment Correlation (r)
- Equipercentile Method for Concordance Tables:
Linking with Equivalent Group or Single Group Design
(LEGS, Brennan, 2004)
- Latent Class Analysis (Lanza, Collins, Lemmon, & Schafer, 2007)
- Multivariate Analysis of Variance
- Correspondence Analysis
- Logistic Regression

Descriptive Statistics for *EXPLORE*

| Explore (Fall 2008) | N | Mean | | Tennessee | | |
|-------------------------------|----------|-------------|---------------|------------------|------------|------------|
| | | Tenn | Nation | SD | Min | Max |
| E-SS | 41224 | 14.0 | 14.2 | 4.1 | 1 | 25 |
| M-SS | 41211 | 14.6 | 15.1 | 3.6 | 1 | 25 |
| R-SS | 41175 | 13.7 | 13.8 | 3.5 | 1 | 25 |
| S-SS | 41157 | 15.9 | 15.9 | 3.0 | 1 | 25 |
| C-SS | 41056 | 14.7 | 14.9 | 3.1 | 3 | 25 |

Correlation between

EXPLORE and *CRT*

| EXPLORE (Fall 2008) | TCAP CRT (Spr 2009) | | | |
|-------------------------------|----------------------------|--------------|----------------|---------------|
| | RLA | Math | Science | Social |
| E-SS | 0.753 | 0.695 | 0.676 | 0.682 |
| M-SS | 0.687 | 0.768 | 0.689 | 0.673 |
| R-SS | 0.700 | 0.628 | 0.638 | 0.654 |
| S-SS | 0.663 | 0.670 | 0.635 | 0.630 |
| C-SS | 0.802 | 0.788 | 0.752 | 0.754 |

All coefficients are significant at $p = 0.0001$.

Expectancy Table for **E-SS** and **RLA**

| <i>EXPLORE</i> | | RLA: CRT (Spring 2008) | | |
|--------------------------------------|--------------------|-------------------------------|------------------------|----------------------|
| English <i>(Fall 2007)</i> | SS Range | Below % | Proficient % | Advanced % |
| | 01 - 06 | 40.6 | 53.0 | 6.4 |
| | 07 - 12 | 10.6 | 68.0 | 21.4 |
| | 13 (CB)-19 | 0.4 | 24.9 | 74.7 |
| | 20 - 25 | 0.0 | 1.2 | 98.8 |

CB = College Readiness Benchmark Score. N = 51,153.

Expectancy Table for **M-SS** and **Math**

EXPLORE

Math: CRT (Spring 2008)

| Math (Fall 2007) | SS Range | Below % | Proficient % | Advanced % |
|-----------------------------------|---------------------------|--------------------------|-------------------------------|-----------------------------|
| | 01 - 07 | 57.8 | 41.0 | 1.2 |
| | 08 - 14 | 15.1 | 77.7 | 7.2 |
| | 15 (CB)-19 | 0.6 | 35.9 | 63.5 |
| | 20 - 25 | 0.0 | 2.4 | 97.6 |

CB = College Readiness Benchmark Score. N = 51,177.

Expectancy Table for **R-SS** and **RLA**

| EXPLORE | | RLA: CRT (Spring 2008) | | |
|--------------------------------|---------------------|-------------------------------|-------------------------|-----------------------|
| Reading (Fall 2007) | SS Range | Below % | Proficient % | Advanced % |
| | 01 - 09 | 21.2 | 68.0 | 10.8 |
| | 10 - 16 | 5.4 | 48.0 | 46.6 |
| | 17 (CB)-19 | 0.2 | 5.3 | 94.5 |
| | 20 - 25 | 0.1 | 1.4 | 98.5 |

CB = College Readiness Benchmark Score. N = 51,153.

Expectancy Table for **S-SS** and **Science**

| <i>EXPLORE</i> | | Science: CRT (<i>Spring 2008</i>) | | |
|--------------------------------------|--------------------|--|------------------------|----------------------|
| Science <i>(Fall 2007)</i> | SS Range | Below % | Proficient % | Advanced % |
| | 01 - 09 | 66.8 | 30.1 | 3.1 |
| | 10 - 14 | 51.1 | 43.3 | 5.5 |
| | 15 - 19 | 13.3 | 52.2 | 34.5 |
| | 20 (CB)-25 | 1.8 | 9.5 | 88.7 |

CB = College Readiness Benchmark Score. N = 51,106.

EXPLORE: College Readiness Benchmark by Subject

EMRS (E=Eng, M=Math, R=Reading, S=Science)

| Subject | 2007 | 2008 |
|-------------|--------------|--------------|
| EMRS | n = 66,311 | n = 68,245 |
| NNNN | 36.41 | 38.01 |
| NNNY | 0.01 | 0.05 |
| NNYN | 2.15 | 1.77 |
| NNYY | 0.05 | 0.03 |
| NYNN | 1.33 | 1.62 |
| NYNY | 0.02 | 0.02 |
| NYYN | 0.48 | 0.37 |
| NYYY | 0.06 | 0.03 |
| YNNN | 19.23 | 18.4 |
| YNNY | 0.15 | 0.25 |
| YNYN | 10.61 | 10.94 |
| YNYN | 1.05 | 1.26 |
| YYNN | 5.76 | 6.31 |
| YYNY | 0.41 | 0.53 |
| YYYN | 12.39 | 11.97 |
| YYYY | 9.89 | 8.44 |

Comparison to

EXPLORE National Norms

| School | Content | N | School | | | | Nation | | Tennessee | | Effect Size (Glass's δ) | |
|-----------|------------|-----|-------------|-----|-----|-----|-------------|-----|-------------|-----|---------------------------------|--------------|
| | | | Mean | SD | Min | Max | Mean | SD | Mean | SD | S-N | S-T |
| <i>D1</i> | ESS | 148 | 20.2 | 3.3 | 13 | 25 | 14.2 | 4.1 | 14.1 | 4.1 | 1.47 | 1.50 |
| | MSS | 148 | 19.4 | 2.8 | 14 | 25 | 15.1 | 4.0 | 14.7 | 3.7 | 1.07 | 1.26 |
| | RSS | 148 | 19.2 | 3.4 | 12 | 25 | 13.8 | 3.7 | 13.8 | 3.6 | 1.47 | 1.51 |
| | SSS | 148 | 20.0 | 3.0 | 13 | 25 | 15.9 | 3.0 | 16.0 | 3.1 | 1.37 | 1.30 |
| | CSS | 148 | 19.8 | 2.4 | 14 | 25 | 14.9 | 3.3 | 14.8 | 3.2 | 1.49 | 1.57 |
| <i>P1</i> | ESS | 198 | 10.3 | 2.7 | 2 | 18 | 14.2 | 4.1 | 14.1 | 4.1 | -0.95 | -0.93 |
| | MSS | 198 | 10.8 | 3.5 | 2 | 18 | 15.1 | 4.0 | 14.7 | 3.7 | -1.08 | -1.06 |
| | RSS | 196 | 10.9 | 2.1 | 1 | 16 | 13.8 | 3.7 | 13.8 | 3.6 | -0.77 | -0.79 |
| | SSS | 193 | 13.5 | 2.9 | 5 | 18 | 15.9 | 3.0 | 16.0 | 3.1 | -0.80 | -0.81 |
| | CSS | 193 | 11.6 | 2.2 | 6 | 17 | 14.9 | 3.3 | 14.8 | 3.2 | -1.01 | -1.01 |

Small (.20), Mid (.50), Large (.80)

Descriptive Statistics for Algebra I & PLAN (Fall 2008)

| Test | N | Mean | SD | Min | Max | <i>r</i> |
|------------------|-------|--------------|-------------|------------|------------|--------------|
| Algebra I | 27367 | 537.3 | 41.7 | 300 | 700 | |
| E-SS | 27436 | 15.5 | 3.9 | 1 | 32 | 0.515 |
| M-SS | 27429 | 15.9 | 3.2 | 1 | 32 | 0.605 |
| R-SS | 27374 | 15.2 | 4.0 | 1 | 30 | 0.411 |
| S-SS | 27318 | 16.7 | 2.9 | 1 | 32 | 0.481 |
| C-SS | 27284 | 16.0 | 2.9 | 4 | 30 | 0.602 |

All correlation coefficients (*r*) are significant at $p = .0001$.
 In Algebra I, 10th (9th) graders and 1st time takers in SY 08-09 (07-08).

Descriptive Statistics for

English II & PLAN (Fall 2008)

| Test | N | Mean | SD | Min | Max | <i>r</i> |
|-------------------|-------|--------------|-------------|------------|------------|--------------|
| English II | 39188 | 540.6 | 39.3 | 300 | 700 | |
| E-SS | 39377 | 16.4 | 4.4 | 1 | 32 | 0.704 |
| M-SS | 39357 | 16.8 | 4.0 | 1 | 32 | 0.612 |
| R-SS | 39281 | 15.9 | 4.4 | 1 | 30 | 0.611 |
| S-SS | 39182 | 17.4 | 3.4 | 1 | 32 | 0.564 |
| C-SS | 39139 | 16.8 | 3.5 | 4 | 31 | 0.725 |

All correlation coefficients (*r*) are significant at $p = .0001$.
In English II, 10th graders and 1st time takers in SY 08-09.

Descriptive Statistics for

Biology I & PLAN (Fall 2008)

| Test | N | Mean | SD | Min | Max | <i>r</i> |
|------------------|-------|--------------|-------------|------------|------------|--------------|
| Biology I | 26375 | 539.5 | 44.3 | 300 | 725 | |
| E-SS | 26579 | 15.7 | 4.1 | 1 | 32 | 0.604 |
| M-SS | 26564 | 16.1 | 3.6 | 2 | 32 | 0.593 |
| R-SS | 26519 | 15.4 | 4.1 | 1 | 30 | 0.530 |
| S-SS | 26457 | 16.9 | 3.1 | 1 | 32 | 0.537 |
| C-SS | 26424 | 16.2 | 3.2 | 4 | 31 | 0.669 |

All correlation coefficients (*r*) are significant at $p = .0001$.
In Biology I, 10th graders and 1st time takers in SY 08-09.

Expectancy Table for PLAN Math and Algebra I

| PLAN: Math | Algebra I (Spr 08, Fall 08, & Spr 09) | | | |
|---------------------|--|-------------------|-----------------|--------------|
| Grade = 10 | Below | Proficient | Advanced | Total |
| Fall 2008 | % | % | % | N |
| 01 - 09 | 45.12 | 43.55 | 11.33 | 953 |
| 10 - 18 | 11.58 | 43.60 | 44.83 | 22320 |
| 19 (CB) - 24 | 0.33 | 6.95 | 92.73 | 3382 |
| 25 - 29 | 0.17 | 1.99 | 97.85 | 604 |
| 30 - 32 | 0.00 | 8.00 | 92.00 | 25 |

CB = College Readiness Benchmark Score.

In Algebra I, 10th (9th) graders and 1st time takers in SY 08-09 (07-08).

Expectancy Table for PLAN English and English II

| PLAN: Eng Grade = 10 Fall 2008 | English II (Fall 08 & Spr 09) | | | Total N |
|--------------------------------------|-------------------------------|-----------------|---------------|------------|
| | Below % | Proficient % | Advanced % | |
| 01 - 09 | 12.63 | 58.35 | 29.02 | 1575 |
| 10 - 14 | 3.48 | 38.70 | 57.82 | 11359 |
| 15 (CB) - 20 | 0.09 | 6.73 | 93.18 | 19418 |
| 21 - 27 | 0.02 | 0.17 | 99.81 | 6286 |
| 28 - 32 | 0.00 | 0.22 | 99.78 | 461 |

CB = College Readiness Benchmark Score.

In English II, 10th graders and 1st time takers in SY 08-09.

Expectancy Table for PLAN Science and Biology I

| PLAN: Sci | Biology I (Fall 08 & Spr 09) | | | |
|---------------------|---|-------------------|-----------------|--------------|
| Grade = 10 | Below | Proficient | Advanced | Total |
| Fall 2008 | % | % | % | N |
| 01 - 09 | 6.88 | 53.85 | 39.27 | 247 |
| 10 - 20 | 2.41 | 31.45 | 66.13 | 22874 |
| 21 (CB) - 25 | 0.00 | 2.03 | 97.97 | 2761 |
| 26 - 29 | 0.00 | 0.90 | 99.10 | 223 |
| 30 - 32 | 0.00 | 1.32 | 98.68 | 76 |

CB = College Readiness Benchmark Score.

In Biology I, 10th graders and 1st time takers in SY 08-09.

PLAN: College Readiness Benchmark by Subject

EMRS (E=Eng, M=Math, R=Reading, S=Science)

| Subject | 2007 | 2008 |
|-------------|-------------------|-------------------|
| EMRS | n = 61,962 | n = 64,614 |
| NNNN | 34.69 | 32.30 |
| NNNY | 0.09 | 0.10 |
| NNYN | 2.69 | 2.08 |
| NNYY | 0.08 | 0.07 |
| NYNN | 0.51 | 0.56 |
| NYNY | 0.03 | 0.03 |
| NYYN | 0.15 | 0.15 |
| NYYY | 0.04 | 0.04 |
| YNNN | 20.99 | 23.28 |
| YNNY | 0.68 | 0.82 |
| YNYN | 14.66 | 15.21 |
| YNY Y | 2.71 | 2.97 |
| YYNN | 3.23 | 3.49 |
| YYNY | 0.99 | 0.98 |
| YYYN | 7.19 | 6.72 |
| YYYY | 11.27 | 11.20 |

Comparison to

PLAN National Norms

| School Name | Content | N | School | | | | National Norm | | | | Tennessee | | | | Effect Size (Glass's δ) | | | |
|-------------|---------|-----|------------|-----|-----|-----|---------------|-----|---------|-----|-----------|-----|---------|-----|-------------------------------------|-------|-------|-------|
| | | | Statistics | | | | Total | | College | | Total | | College | | Small (.20), Mid (.50), Large (.80) | | | |
| | | | Mean | SD | Min | Max | Mean | SD | Mean | SD | Mean | SD | Mean | SD | S-NT | S-NC | S-TT | S-TC |
| <i>D1</i> | ESS | 216 | 22.4 | 3.8 | 13 | 32 | 16.9 | 4.6 | 17.6 | 4.5 | 16.2 | 4.5 | 17.1 | 4.5 | 1.21 | 1.08 | 1.39 | 1.19 |
| | MSS | 216 | 22.6 | 4.3 | 15 | 32 | 17.4 | 4.6 | 17.9 | 4.5 | 16.6 | 4.3 | 17.4 | 4.2 | 1.13 | 1.05 | 1.40 | 1.24 |
| | RSS | 216 | 21.2 | 3.8 | 10 | 30 | 16.9 | 4.6 | 17.4 | 4.5 | 15.9 | 4.4 | 16.7 | 4.5 | 0.92 | 0.83 | 1.19 | 0.99 |
| | SSS | 216 | 21.5 | 3.7 | 15 | 32 | 18.2 | 3.5 | 18.5 | 3.5 | 17.4 | 3.5 | 17.9 | 3.6 | 0.96 | 0.87 | 1.18 | 1.01 |
| | CSS | 216 | 22.1 | 3.2 | 15 | 31 | 17.5 | 3.8 | 18.0 | 3.8 | 16.7 | 3.8 | 17.4 | 3.6 | 1.20 | 1.07 | 1.41 | 1.30 |
| <i>P1</i> | ESS | 256 | 12.7 | 3.3 | 4 | 25 | 16.9 | 4.6 | 17.6 | 4.5 | 16.2 | 4.5 | 17.1 | 4.5 | -0.91 | -1.09 | -0.77 | -0.97 |
| | MSS | 255 | 12.9 | 3.0 | 1 | 22 | 17.4 | 4.6 | 17.9 | 4.5 | 16.6 | 4.3 | 17.4 | 4.2 | -0.97 | -1.10 | -0.85 | -1.06 |
| | RSS | 254 | 12.7 | 3.2 | 4 | 22 | 16.9 | 4.6 | 17.4 | 4.5 | 15.9 | 4.4 | 16.7 | 4.5 | -0.90 | -1.04 | -0.72 | -0.88 |
| | SSS | 253 | 14.9 | 2.2 | 4 | 21 | 18.2 | 3.5 | 18.5 | 3.5 | 17.4 | 3.5 | 17.9 | 3.6 | -0.93 | -1.02 | -0.71 | -0.83 |
| | CSS | 253 | 13.5 | 2.1 | 6 | 21 | 17.5 | 3.8 | 18.0 | 3.8 | 16.7 | 3.8 | 17.4 | 3.6 | -1.06 | -1.19 | -0.85 | -1.09 |

Concordance Between CRT Math & EXPLORE Math: CRT Gr. 7 to Exp Gr. 8 to CRT Gr. 8

Concordance Between Achievement Math and EXPLORE Math Scores for Individual Students

| Math Spr 2008 Gr=7 | | EXPLORE (Fall 2008) Equivalents Smoothed | | | Math Spr 2009 Gr=8 | | EXPLORE (Fall 2008) Equivalents Smoothed | | | | |
|--------------------------|-------|--|-----|-----|--------------------------|-----|--|----|-----|-----|-----|
| x | f(x) | 0 | 0.3 | 1.0 | 0.0 | x | f(x) | 0 | 0.3 | 1.0 | 0.0 |
| 330 | 0.003 | 1 | 1 | 3 | | 340 | 0.006 | 2 | 2 | 3 | |
| 345 | 0.002 | 2 | 2 | 4 | | 393 | 0.003 | 4 | 4 | 4 | |
| 396 | 0.003 | 4 | 4 | 4 | | 422 | 0.004 | 5 | 5 | 5 | |
| 417 | 0.003 | 5 | 5 | 5 | | 439 | 0.006 | 5 | 5 | 5 | |
| 431 | 0.005 | 5 | 5 | 5 | | 451 | 0.007 | 6 | 6 | 6 | |
| 441 | 0.006 | 6 | 6 | 6 | | 460 | 0.008 | 7 | 7 | 6 | |
| 449 | 0.007 | 6 | 6 | 6 | | 468 | 0.011 | 8 | 8 | 8 | |
| 456 | 0.007 | 7 | 7 | 8 | | 475 | 0.012 | 9 | 9 | 9 | |
| 462 | 0.009 | 8 | 8 | 8 | | 481 | 0.014 | 9 | 9 | 9 | |
| 468 | 0.009 | 8 | 8 | 8 | | 486 | 0.015 | 9 | 9 | 9 | |
| 473 | 0.010 | 9 | 9 | 9 | | 491 | 0.015 | 10 | 10 | 10 | |
| 477 | 0.011 | 9 | 9 | 9 | | 496 | 0.016 | 10 | 10 | 10 | |
| 481 | 0.011 | 9 | 9 | 10 | | 500 | 0.018 | 11 | 11 | 11 | |
| 485 | 0.012 | 10 | 10 | 10 | | 504 | 0.019 | 11 | 11 | 11 | |
| 488 | 0.012 | 10 | 10 | 10 | | 507 | 0.019 | 11 | 11 | 11 | |
| 492 | 0.012 | 10 | 10 | 11 | | 511 | 0.020 | 11 | 11 | 11 | |
| 495 | 0.013 | 11 | 11 | 11 | | 514 | 0.021 | 12 | 12 | 11 | |
| 498 | 0.013 | 11 | 11 | 11 | | 518 | 0.022 | 12 | 12 | 12 | |
| 501 | 0.015 | 11 | 11 | 11 | | 521 | 0.021 | 12 | 12 | 12 | |
| 504 | 0.015 | 11 | 11 | 11 | | 524 | 0.021 | 13 | 13 | 13 | |
| 507 | 0.016 | 11 | 11 | 11 | | 527 | 0.022 | 13 | 13 | 13 | |
| 509 | 0.016 | 11 | 12 | 11 | | 530 | 0.021 | 13 | 13 | 13 | |
| 512 | 0.018 | 12 | 12 | 12 | | 533 | 0.022 | 14 | 14 | 14 | |
| 515 | 0.017 | 12 | 12 | 12 | | 535 | 0.022 | 14 | 14 | 14 | |
| 517 | 0.018 | 12 | 12 | 12 | | 538 | 0.022 | 14 | 14 | 14 | |
| 520 | 0.019 | 13 | 13 | 13 | | 541 | 0.023 | 14 | 14 | 14 | |
| 522 | 0.019 | 13 | 13 | 13 | | 544 | 0.023 | 14 | 14 | 14 | |
| 525 | 0.020 | 13 | 13 | 13 | | 546 | 0.023 | 14 | 14 | 15 | |
| 527 | 0.021 | 14 | 14 | 14 | | 549 | 0.024 | 15 | 15 | 15 | |
| 530 | 0.021 | 14 | 14 | 14 | | 552 | 0.024 | 15 | 15 | 15 | |
| 532 | 0.022 | 14 | 14 | 14 | | 555 | 0.025 | 15 | 15 | 15 | |
| 534 | 0.022 | 14 | 14 | 14 | | 557 | 0.024 | 15 | 15 | 15 | |
| 537 | 0.023 | 14 | 14 | 14 | | 560 | 0.025 | 15 | 15 | 15 | |
| 539 | 0.024 | 14 | 14 | 14 | | 563 | 0.025 | 16 | 16 | 16 | |
| 542 | 0.025 | 15 | 15 | 15 | | 566 | 0.025 | 16 | 16 | 16 | |
| 545 | 0.026 | 15 | 15 | 15 | | 569 | 0.025 | 16 | 16 | 16 | |
| 547 | 0.026 | 15 | 15 | 15 | | 572 | 0.025 | 16 | 16 | 16 | |
| 550 | 0.028 | 15 | 15 | 15 | | 575 | 0.024 | 16 | 16 | 16 | |
| 553 | 0.028 | 15 | 15 | 15 | | 578 | 0.026 | 17 | 17 | 17 | |
| 555 | 0.028 | 16 | 16 | 16 | | 581 | 0.025 | 17 | 17 | 17 | |
| 558 | 0.028 | 16 | 16 | 16 | | 584 | 0.024 | 17 | 17 | 17 | |
| 561 | 0.028 | 16 | 16 | 16 | | 587 | 0.024 | 17 | 17 | 17 | |
| 564 | 0.029 | 16 | 16 | 16 | | 591 | 0.024 | 18 | 18 | 17 | |
| 568 | 0.030 | 16 | 16 | 17 | | 594 | 0.023 | 18 | 18 | 18 | |
| 571 | 0.029 | 17 | 17 | 17 | | 598 | 0.022 | 18 | 18 | 18 | |
| 575 | 0.030 | 17 | 17 | 17 | | 602 | 0.021 | 19 | 19 | 19 | |
| 579 | 0.031 | 17 | 17 | 17 | | 607 | 0.021 | 19 | 19 | 19 | |
| 583 | 0.031 | 18 | 18 | 18 | | 612 | 0.019 | 19 | 19 | 19 | |
| 588 | 0.030 | 18 | 18 | 18 | | 617 | 0.018 | 20 | 20 | 19 | |
| 594 | 0.030 | 19 | 19 | 19 | | 625 | 0.016 | 21 | 21 | 21 | |
| 601 | 0.028 | 19 | 19 | 19 | | 634 | 0.014 | 22 | 22 | 22 | |
| 610 | 0.025 | 20 | 20 | 21 | | 647 | 0.011 | 24 | 23 | 24 | |
| 623 | 0.021 | 22 | 22 | 22 | | 671 | 0.007 | 24 | 24 | 25 | |
| 646 | 0.014 | 24 | 24 | 24 | | 750 | 0.003 | 25 | 25 | 25 | |
| 730 | 0.006 | 25 | 25 | 25 | | | | | | | |

Concordance between CRT RLA and EXPLORE English: CRT Gr. 7 to Exp Gr. 8 to CRT Gr. 8

Concordance Between Achievement RLA and EXPLORE English Scores for Individual Students

| R/LA Spr 2008 Gr=7 | | EXPLORE (Fall 2008) Equivalents Smoothed | | | | R/LA Spr 2009 Gr=8 | | EXPLORE (Fall 2008) Equivalents Smoothed | | | |
|--------------------------|--------|--|-----|-----|-----|--------------------------|--------|--|-----|-----|-----|
| x | f(x) | 0 | 0.3 | 1.0 | 0.0 | x | f(x) | 0 | 0.3 | 1.0 | 0.0 |
| 335 | 0.005 | 1 | | 1 | 4 | 340 | 0.003 | 1 | | 1 | 4 |
| 373 | 0.003 | 6 | | 6 | 6 | 419 | 0.002 | 5 | | 5 | 5 |
| 424 | 0.003 | 7 | | 7 | 6 | 440 | 0.003 | 6 | | 6 | 6 |
| 442 | 0.005 | 8 | | 8 | 8 | 451 | 0.004 | 7 | | 7 | 6 |
| 454 | 0.007 | 8 | | 8 | 8 | 460 | 0.005 | 8 | | 8 | 8 |
| 462 | 0.008 | 8 | | 8 | 9 | 467 | 0.005 | 8 | | 8 | 8 |
| 469 | 0.009 | 9 | | 9 | 9 | 472 | 0.007 | 8 | | 8 | 8 |
| 474 | 0.010 | 9 | | 9 | 9 | 477 | 0.008 | 8 | | 8 | 9 |
| 479 | 0.012 | 9 | | 9 | 9 | 481 | 0.008 | 9 | | 9 | 9 |
| 483 | 0.012 | 9 | | 9 | 9 | 485 | 0.009 | 9 | | 9 | 9 |
| 487 | 0.013 | 9 | | 9 | 9 | 489 | 0.010 | 9 | | 9 | 9 |
| 490 | 0.014 | 9 | | 9 | 9 | 492 | 0.011 | 9 | | 9 | 9 |
| 493 | 0.015 | 9 | | 9 | 9 | 495 | 0.011 | 9 | | 9 | 9 |
| 496 | 0.015 | 10 | | 10 | 10 | 498 | 0.012 | 9 | | 9 | 9 |
| 499 | 0.016 | 10 | | 10 | 10 | 501 | 0.013 | 9 | | 9 | 9 |
| 502 | 0.016 | 10 | | 10 | 10 | 504 | 0.013 | 10 | | 10 | 10 |
| 504 | 0.017 | 10 | | 10 | 10 | 507 | 0.015 | 10 | | 10 | 10 |
| 507 | 0.018 | 10 | | 10 | 10 | 509 | 0.015 | 10 | | 10 | 10 |
| 509 | 0.018 | 11 | | 11 | 11 | 512 | 0.016 | 10 | | 10 | 10 |
| 512 | 0.019 | 11 | | 11 | 11 | 514 | 0.017 | 10 | | 10 | 10 |
| 514 | 0.020 | 11 | | 11 | 11 | 517 | 0.018 | 10 | | 10 | 10 |
| 516 | 0.020 | 11 | | 11 | 11 | 520 | 0.019 | 11 | | 11 | 11 |
| 518 | 0.021 | 11 | | 11 | 11 | 522 | 0.020 | 11 | | 11 | 11 |
| 520 | 0.023 | 12 | | 12 | 12 | 525 | 0.020 | 11 | | 11 | 11 |
| 523 | 0.023 | 12 | | 12 | 12 | 527 | 0.021 | 11 | | 11 | 11 |
| 525 | 0.022 | 12 | | 12 | 12 | 530 | 0.023 | 11 | | 11 | 11 |
| 527 | 0.025 | 12 | | 12 | 12 | 532 | 0.024 | 12 | | 12 | 12 |
| 529 | 0.025 | 12 | | 12 | 12 | 535 | 0.026 | 12 | | 12 | 12 |
| 531 | 0.026 | 13 | | 13 | 13 | 537 | 0.026 | 12 | | 12 | 12 |
| 533 | 0.027 | 13 | | 13 | 13 | 540 | 0.027 | 12 | | 12 | 12 |
| 535 | 0.028 | 13 | | 13 | 13 | 543 | 0.029 | 13 | | 13 | 13 |
| 537 | 0.027 | 14 | | 14 | 14 | 545 | 0.030 | 13 | | 13 | 13 |
| 540 | 0.029 | 14 | | 14 | 14 | 548 | 0.031 | 13 | | 13 | 13 |
| 542 | 0.031 | 14 | | 14 | 14 | 551 | 0.032 | 14 | | 14 | 14 |
| 544 | 0.030 | 15 | | 15 | 15 | 553 | 0.034 | 14 | | 14 | 14 |
| 547 | 0.030 | 15 | | 15 | 15 | 556 | 0.034 | 14 | | 14 | 14 |
| 549 | 0.031 | 15 | | 15 | 15 | 559 | 0.035 | 15 | | 15 | 15 |
| 551 | 0.032 | 16 | | 16 | 16 | 562 | 0.036 | 15 | | 15 | 15 |
| 554 | 0.031 | 16 | | 16 | 16 | 566 | 0.036 | 16 | | 16 | 16 |
| 557 | 0.032 | 17 | | 17 | 17 | 569 | 0.036 | 17 | | 17 | 17 |
| 560 | 0.031 | 17 | | 17 | 17 | 572 | 0.035 | 17 | | 17 | 17 |
| 563 | 0.030 | 18 | | 18 | 18 | 576 | 0.033 | 17 | | 17 | 17 |
| 566 | 0.029 | 18 | | 18 | 18 | 579 | 0.032 | 18 | | 18 | 18 |
| 569 | 0.027 | 19 | | 19 | 19 | 583 | 0.031 | 19 | | 19 | 19 |
| 573 | 0.024 | 21 | | 21 | 21 | 588 | 0.028 | 20 | | 20 | 19 |
| 577 | 0.022 | 21 | | 21 | 21 | 592 | 0.025 | 21 | | 21 | 21 |
| 581 | 0.018 | 22 | | 22 | 22 | 597 | 0.021 | 22 | | 22 | 22 |
| 585 | 0.016 | 23 | | 23 | 23 | 602 | 0.017 | 23 | | 23 | 23 |
| 591 | 0.013 | 23 | | 23 | 23 | 608 | 0.013 | 23 | | 23 | 23 |
| 597 | 0.009 | 24 | | 24 | 24 | 615 | 0.010 | 24 | | 24 | 24 |
| 604 | 0.006 | 24 | | 24 | 24 | 623 | 0.006 | 24 | | 24 | 24 |
| 614 | 0.004 | 24 | | 24 | 25 | 632 | 0.003 | 24 | | 24 | 25 |
| 629 | 0.002 | 24 | | 24 | 25 | 646 | 0.002 | 25 | | 25 | 25 |
| 655 | 0.001 | 25 | | 25 | 25 | 668 | 0.001 | 25 | | 25 | 25 |
| 720 | 0.0001 | 25 | | 25 | 25 | 740 | 0.0001 | 25 | | 25 | 25 |

Concordance:

CRT Math & EXPLORE Math

| Test | Tested | Grade | Performance Level | CRT SS | EXPLORE SS |
|------|--------|-------|-------------------|--------|------------|
| Math | Spring | 7 | Proficient | 488 | 10 |
| | | | College | 542 | 15 |
| | | | Advanced | 571 | 17 |
| Math | Spring | 8 | Proficient | 496 | 10 |
| | | | College | 549 | 15 |
| | | | Advanced | 578 | 17 |

Concordance:

CRT RLA & EXPLORE English

| Test | Tested | Grade | Performance Level | CRT SS | EXPLORE SS |
|------|--------|-------|-------------------|--------|------------|
| RLA | Spring | 7 | Proficient | 490 | 9 |
| | 2008 | | College | 531 | 13 |
| | | | Advanced | 544 | 15 |
| RLA | Spring | 8 | Proficient | 495 | 9 |
| | 2009 | | College | 543 | 13 |
| | | | Advanced | 548 | 13 |

Research 1: *Identifying Underlying Student Subgroups*

- To identify the underlying student subgroups (or classes) of academic performance based on a set of student levels of 14 RCPs (Reporting Category Performance) and examining the relations between individual RCPs (or characteristics) and subgroup membership using latent class analysis (LCA).
- LCA is commonly used *to classify cases (students) into a set of latent classes (subgroups)*, based on categorical indicator variables such as performance levels (Below, Proficient, or Advanced) or demographic variables.

Classes (clusters or subgroups) from **RCPs**

- Performance levels of RLA and Math **RCPs** in **Grade 7 (Spring 2007 CRT)**
- *Five classes* are meaningful and statistically acceptable based on G Squared, BIC, & AIC (calibration sample, $n = 12,000$)
- Confirmed by a validation sample ($n = 12,000$)
- Results were from the matched data set (Spring 2007 **CRT** (Grade=7) and **Fall 2007 EXP** (Grade=8))

Who Are They?

| Class | Mean Scale Scores | | | | | Performance Level | | | |
|-------|-------------------|-----|------|---------|--------|-------------------|---|----|----|
| | Gamma | RLA | Math | Science | Social | R | M | Sc | So |
| 1 | 0.089 | 482 | 455 | 179 | 177 | B | B | B | B |
| 2 | 0.051 | 476 | 510 | 186 | 183 | B | P | B | B |
| 3 | 0.113 | 551 | 534 | 210 | 208 | A | P | P | P |
| 4 | 0.315 | 519 | 522 | 199 | 196 | P | P | P | P |
| 5 | 0.432 | 559 | 580 | 221 | 216 | A | A | A | A |

Gamma: Class Membership Probabilities

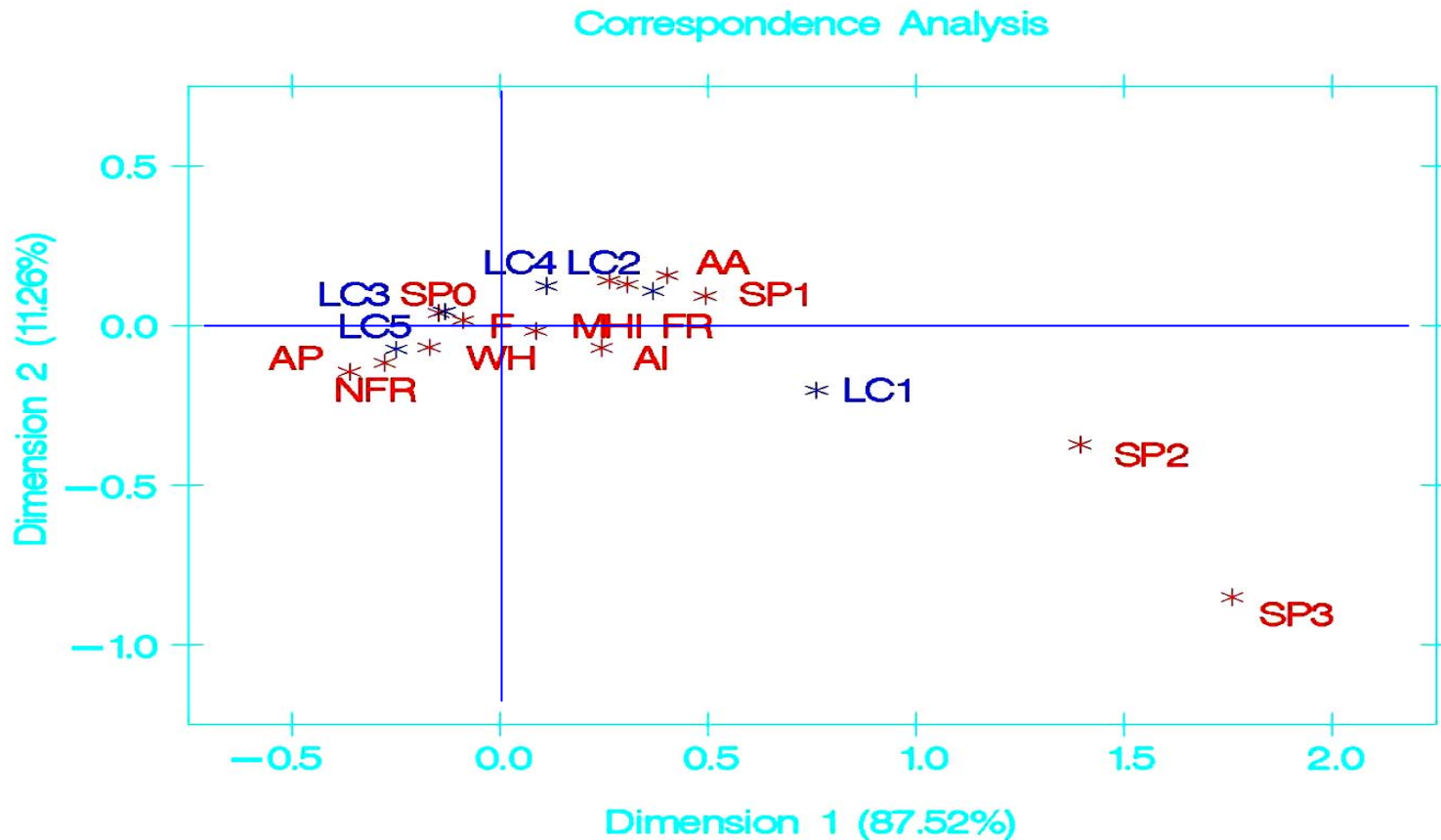
Who Are They?

Row %

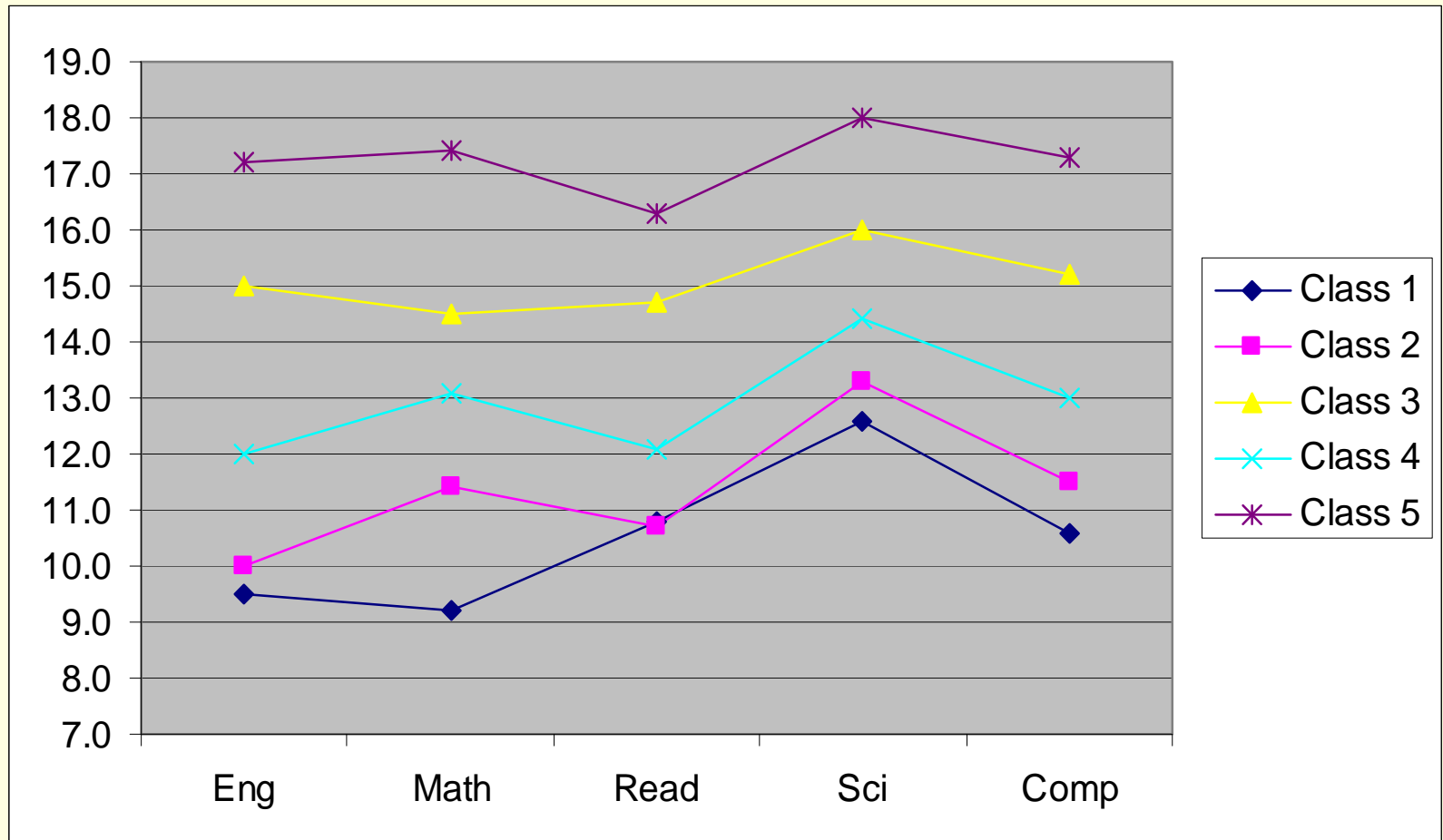
| Subgroup (%) | Class | | | | | Total |
|------------------|-------|-------|-------|-------|-------|----------|
| | 1 | 2 | 3 | 4 | 5 | <i>n</i> |
| <i>Female</i> | 6.96 | 3.73 | 13.10 | 31.38 | 44.83 | 5978 |
| <i>Male</i> | 10.79 | 6.34 | 9.61 | 31.77 | 41.48 | 6022 |
| <i>Am Ind</i> | 14.29 | 10.71 | 7.14 | 28.57 | 39.29 | 28 |
| <i>Asian/Pa</i> | 2.91 | 2.33 | 9.88 | 23.26 | 61.63 | 172 |
| <i>Afro Am</i> | 15.46 | 7.86 | 10.47 | 42.33 | 23.88 | 3182 |
| <i>Hispanic</i> | 11.60 | 10.08 | 7.98 | 38.40 | 31.94 | 526 |
| <i>White</i> | 6.23 | 3.65 | 11.96 | 27.09 | 51.08 | 8092 |
| <i>Spec 1</i> | 17.75 | 11.24 | 8.28 | 38.46 | 24.26 | 169 |
| <i>Spec 2</i> | 46.44 | 11.30 | 2.37 | 35.14 | 4.75 | 885 |
| <i>Spec 3</i> | 63.01 | 10.96 | 2.74 | 19.86 | 3.42 | 146 |
| <i>F/R Lunch</i> | 13.65 | 7.54 | 10.55 | 39.86 | 28.40 | 5687 |
| <i>Not F/R</i> | 4.59 | 2.79 | 12.07 | 24.11 | 56.44 | 6313 |

Who Are They?

Biplot by Correspondence Analysis



Mean Scores of **EXPLORE** Tests by Five Latent Classes



MANOVA Results

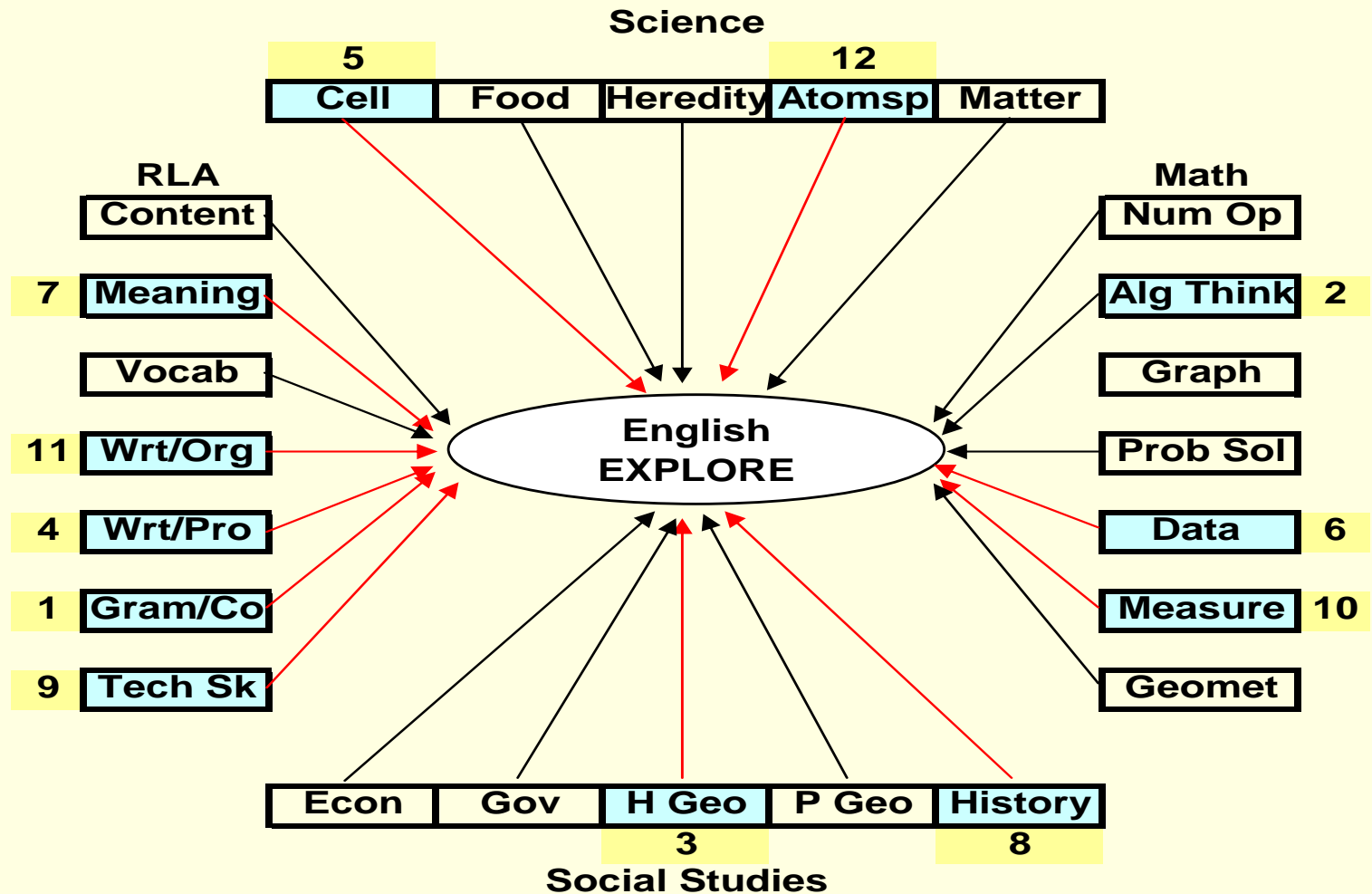
| | Means for EXPLORE | | | | |
|----------------------|-------------------|----------------|---------------|---------------|------------------|
| | E | M | R | S | |
| Class | 13 | 17 | 15 | 20 | |
| 1 | 9.5 | 9.2 | 10.8 | 12.6 | |
| 2 | 10.0 | 11.4 | 10.7 | 13.3 | |
| 3 | 15.0 | 14.5 | 14.7 | 16.0 | |
| 4 | 12.0 | 13.1 | 12.1 | 14.4 | |
| 5 | 17.2 | 17.4 | 16.3 | 18.0 | |
| Statistic | Value | F Value | Num DF | Den DF | Pr > F |
| Wilks' Lambda | 0.400 | 800.9 | 16 | 36637 | <.0001 |

Research 2: *Identifying Important RCPs for Predicting College Readiness*

- ***Twenty four RCPs*** (*predictors* or independent variables) of Grade 7 and College Readiness of ***EXPLORE*** *four tests* (*responses* or dependent variables)
- ***Logistic Regression*** (binary responses: *met* or *not met*) with *stepwise* selection and *backward* elimination.
- There are some statistical methods for identifying important variables: *Canonical Correlation*, *Structural Equation Modeling* (e.g. *Confirmatory Factor Analysis*), or *Discriminant Analysis*.

English:

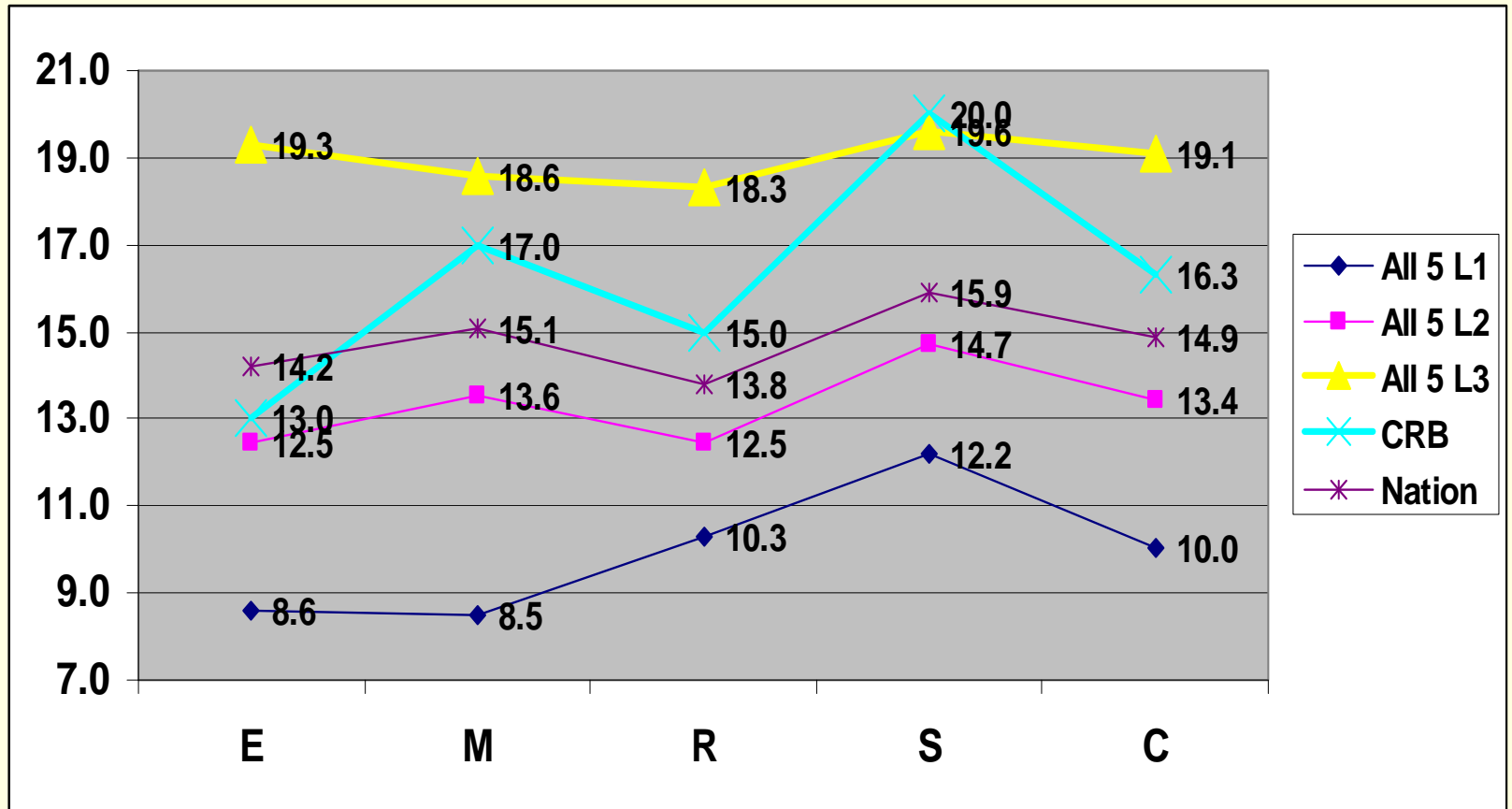
Stepwise Logistic Regression Results



Ranks of Variables into the Model

| RCP | EXPLORE Tests | | | | Remark |
|-----------|---------------|----|----|----|--------|
| | E | M | R | S | |
| Content | | | 12 | | 1 |
| Meaning | 7 | | 4 | | 2 |
| Vocab | | | 1 | 2 | 2 |
| Wrt/Org | 11 | 2 | 10 | 10 | 4 |
| Wrt/Pro | 4 | 11 | 7 | 7 | 4 |
| Gram/Co | 1 | 8 | | | 2 |
| Tech Sk | 9 | | | | 1 |
| Num Op | | 1 | | 11 | 2 |
| Alg Think | 2 | 6 | 5 | 4 | 4 |
| Graphs | | | | | 0 |
| Prob Sol | | | | | 0 |
| Data | 6 | 12 | 11 | | 3 |
| Measure | 10 | 5 | | 8 | 3 |
| Geomet | | | | | 0 |
| Cell | 5 | | | | 1 |
| Food | | | 3 | 3 | 2 |
| Heredity | | | 13 | | 1 |
| Atomsp | 12 | 9 | 8 | | 3 |
| Matter | | 4 | | 6 | 2 |
| Econ | | | | | 0 |
| Gov | | | 6 | 1 | 2 |
| H Geo | 3 | 7 | 9 | 9 | 4 |
| P Geo | | 10 | | | 1 |
| History | 8 | 3 | 2 | 5 | 4 |

Mean Scores by Levels (33333, 22222, 11111) of Five Predictors (Wrt/Org, Wrt/Proc, Alg Think, H Geo, & History)



Example of School Comparison

| PLAN | School* | 'State' | TN | TN | Nation | Effect |
|---------|---------|---------|------|------|-----------|--------|
| Test | 2007 | 2007 | 2007 | 2008 | Norm:2005 | Size |
| Eng | 16.8 | 15.3 | 15.9 | 16.2 | 16.9 | -0.02 |
| Math | 18.2 | 16.2 | 16.5 | 16.6 | 17.4 | 0.17 |
| Read | 17.3 | 16.1 | 16.0 | 15.9 | 16.9 | 0.09 |
| Science | 18.5 | 17.2 | 17.2 | 17.4 | 18.2 | 0.09 |
| Comp | 17.8 | 16.3 | 16.5 | 16.7 | 17.5 | 0.08 |

* *School* from top 20 accountability indexes for HS on 2008

Effect size: Glass's δ , School Vs. Nation

Effect Size for Mean: Glass's delta

- School A: Mean Comp = 17.8
- Nation : Mean Comp = 17.5 (SD = 3.8)
- Glass's delta = $(17.8 - 17.5)/3.8 = .079$
 - Use a SD from reference group
 - The value .079 is less than .20. Thus, there is no small effect or no "substantial" or trivial effect.
 - Cohen's *d* used a pooled SD instead of the reference group's SD.
 - Small = .20 to .49; Medium = .50 to .79;
Large $\geq .80$; Trivial = 0.0 to .19

Summary (1)

- *Highly correlated* (positively) between TCAP CRT (**Gateway**) and **EXPLORE (PLAN)**
- *Approximately 9%* of students did meet all four college readiness benchmarks in EXPLORE and **38%** did not meet for all four tests.
- *Approximately 11%* of students did meet all four college readiness benchmarks in PLAN and **33%** did not meet for all four tests.

Summary (2)

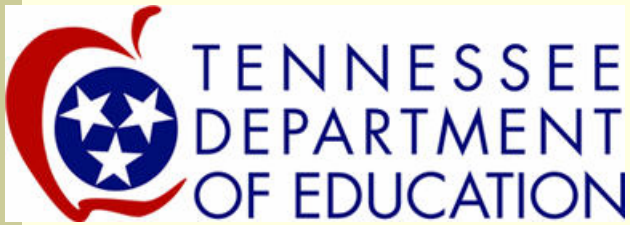
- In grade **7 (8)**, ***CRT Math 542 (549)*** scale score is concordant to the **College Readiness Benchmark** (CRB) of ***EXPLORE Math***. ***CRT RLA 531 (543)*** is concordant to the CRB of ***EXPLORE English***.
- Eighth graders can be classified as ***five groups*** based on performance levels of 14 RCPs (RLA and Math).

Summary (3)

- A major demographic characteristic of the latent *class 1* was Special Education program (the lowest academic performance in both CRT and EXPLORE).
- Major demographic characteristics of the latent *class 5* were *White*, *Not Special Ed.* and *Not Free/Reduced Lunch*. This class showed the highest academic performance in both CRT and EXPLORE.

Summary (4)

- *Writing/Organization, Writing/Process, Algebraic Thinking, Human Geography, and History* were the important RCPs for predicting CRBs for all four EXPLORE tests.
- Next important variables were *Atmospheric Cycles, Data Analysis*, and *Measurement* that appeared on three tests.
- ***NOTE***: All RCPs were influential predictors. The selected RCPs were statistically more influential than others.



Thank You!

**Office of Assessment, Evaluation,
and Research**

**October 6, 2009
LEAD 2009**

Appendices

- **Remarks**
- **EXPLORE: Comparison of Local and National Composite Means**
- **PLAN: Comparison of Local and National Composite Means**
- **RCP Level Probabilities (Rho Estimates)**
- **MANOVA Results**
- **Table for Correspondence Analysis**
- **The Logistic Regression Model**
- **Six Important RCPs to Predict Composite Levels**
- **Statistics Measuring Predictive Power**
- **Models for Three Tests (Math, Reading, & Science)**
- **Reporting Categories**

Remarks

- Based on test results of **EXPLORE** or **PLAN**, we may compare Tennessee schools (middle & HS) to national norms or other states' schools.
- In an ACT study, *if ≥ 25 of **PLAN** composite score, then **Chance of a 3 or Higher AP Score is $\geq .75$.***
- The percentage of students who have ≥ 25 in **PLAN** composite:
 $1775/61962 = .029$ (**2.9%**) in 2007 and $2167/64614 = .035$ (**3.5%**) in 2008 (10th-grade students in Tennessee who participated in PLAN).
- Study for Educational Data Mining (International EDM Conferences):
Students had not met a certain RCP, also not met some RCPs.
- Research for non-cognitive variables (*School Environment, Learning Style, Motivation, and Personality*) are needed.
- Studies for feasibility for finding “student trait”-”low academic performance” associations under culture/family/teacher/school environments.

EXPLORE: Comparison of Local and National Composite Means

| Institute | Effect Size | Mean Composite | | | Local Percentile | | | | | | | Tested |
|-----------|------------------|----------------|-------|-----|------------------|----|----|----|----|----|-----|--------|
| | Glass's δ | Nation (SD) | Local | SD | Min | 5 | 25 | 50 | 75 | 95 | Max | |
| Tenn | -0.03 | 14.9 (3.3) | 14.8 | 3.2 | 3 | 10 | 12 | 15 | 17 | 21 | 25 | OCT 08 |
| School 1 | 1.75 | 14.9 (3.3) | 20.7 | 2.5 | 15 | 16 | 19 | 21 | 23 | 24 | 25 | OCT 07 |
| | 1.68 | 14.9 (3.3) | 20.4 | 2.3 | 16 | 16 | 18 | 21 | 23 | 24 | 24 | OCT 08 |
| School 2 | 1.56 | 14.9 (3.3) | 20.0 | 2.5 | 14 | 16 | 19 | 20 | 22 | 24 | 25 | OCT 07 |
| | 1.52 | 14.9 (3.3) | 19.9 | 3.0 | 13 | 14 | 18 | 20 | 22 | 24 | 24 | OCT 08 |
| School 3 | 1.44 | 14.9 (3.3) | 19.6 | 2.5 | 14 | 16 | 18 | 19 | 21 | 24 | 25 | OCT 07 |
| | 1.51 | 14.9 (3.3) | 19.9 | 2.4 | 14 | 16 | 18 | 20 | 22 | 24 | 25 | OCT 08 |

PLAN: Comparison of Local and National Composite Means

| Institute | Effect Size | Mean Composite | | | Local Percentile | | | | | | | Tested |
|-----------|------------------|-------------------|-------------|------------|------------------|-----------|-----------|-----------|-----------|-----------|-----------|---------------|
| | Glass's δ | Nation (SD) | Local | SD | Min | 5 | 25 | 50 | 75 | 95 | Max | |
| Tenn | 0.55 | 18.0 (3.8) | 16.7 | 3.6 | 3 | 12 | 14 | 16 | 19 | 24 | 31 | OCT 08 |
| School 1 | 1.42 | 18.0 (3.8) | 22.9 | 3.2 | 15 | 18 | 20 | 23 | 25 | 29 | 30 | OCT 07 |
| | 1.57 | 18.0 (3.8) | 23.5 | 2.5 | 18 | 20 | 22 | 23 | 25 | 28 | 30 | OCT 08 |
| School 2 | 1.21 | 18.0 (3.8) | 22.1 | 3.2 | 15 | 17 | 20 | 22 | 24 | 28 | 30 | OCT 07 |
| | 1.20 | 18.0 (3.8) | 22.1 | 3.2 | 15 | 17 | 20 | 22 | 24 | 28 | 31 | OCT 08 |
| School 3 | 1.07 | 18.0 (3.8) | 21.6 | 3.1 | 11 | 17 | 19 | 21 | 24 | 27 | 30 | OCT 07 |
| | 0.98 | 18.0 (3.8) | 21.2 | 3.2 | 14 | 17 | 19 | 21 | 23 | 27 | 30 | OCT 08 |

RCP Level Probabilities (Rho Estimates)

Response Category 1: Below

| RCPI | C-1 | C-2 | C-3 | C-4 | C-5 |
|------|--------------|--------------|-------|-------|-------|
| RLA1 | 0.477 | 0.824 | 0.012 | 0.006 | 0.002 |
| RLA2 | 0.443 | 0.726 | 0.002 | 0.002 | 0.001 |
| RLA3 | 0.497 | 0.796 | 0.016 | 0.005 | 0.003 |
| RLA4 | 0.491 | 0.856 | 0.015 | 0.007 | 0.002 |
| RLA5 | 0.508 | 0.869 | 0.010 | 0.013 | 0.002 |
| RLA6 | 0.473 | 0.806 | 0.012 | 0.002 | 0.004 |
| RLA7 | 0.493 | 0.841 | 0.008 | 0.005 | 0.002 |
| Mat1 | 0.965 | 0.047 | 0.011 | 0.020 | 0.000 |
| Mat2 | 0.960 | 0.055 | 0.009 | 0.022 | 0.000 |
| Mat3 | 0.947 | 0.048 | 0.017 | 0.028 | 0.005 |
| Mat4 | 0.927 | 0.074 | 0.012 | 0.029 | 0.001 |
| Mat5 | 0.934 | 0.045 | 0.007 | 0.022 | 0.001 |
| Mat6 | 0.959 | 0.075 | 0.017 | 0.038 | 0.001 |
| Mat7 | 0.917 | 0.046 | 0.010 | 0.021 | 0.002 |

RCP Level Probabilities (Rho Estimates)

Response Category 2: Proficient

| RCPI | C-1 | C-2 | C-3 | C-4 | C-5 |
|------|-------|--------------|--------------|--------------|-------|
| RLA1 | 0.514 | 0.165 | 0.136 | 0.987 | 0.216 |
| RLA2 | 0.544 | 0.225 | 0.069 | 0.993 | 0.205 |
| RLA3 | 0.495 | 0.185 | 0.185 | 0.993 | 0.233 |
| RLA4 | 0.499 | 0.131 | 0.119 | 0.992 | 0.213 |
| RLA5 | 0.486 | 0.122 | 0.187 | 0.984 | 0.235 |
| RLA6 | 0.521 | 0.158 | 0.130 | 0.997 | 0.210 |
| RLA7 | 0.494 | 0.135 | 0.091 | 0.986 | 0.199 |
| Mat1 | 0.035 | 0.921 | 0.920 | 0.936 | 0.027 |
| Mat2 | 0.038 | 0.912 | 0.887 | 0.930 | 0.024 |
| Mat3 | 0.042 | 0.899 | 0.912 | 0.912 | 0.014 |
| Mat4 | 0.072 | 0.892 | 0.935 | 0.935 | 0.033 |
| Mat5 | 0.062 | 0.919 | 0.900 | 0.920 | 0.008 |
| Mat6 | 0.041 | 0.893 | 0.930 | 0.927 | 0.028 |
| Mat7 | 0.078 | 0.912 | 0.893 | 0.921 | 0.013 |

RCP Level Probabilities (Rho Estimates)

Response Category 3: Advanced

| RCPI | C-1 | C-2 | C-3 | C-4 | C-5 |
|------|--------------|-------|--------------|-------|--------------|
| RLA1 | 0.010 | 0.011 | 0.853 | 0.008 | 0.782 |
| RLA2 | 0.014 | 0.049 | 0.929 | 0.004 | 0.794 |
| RLA3 | 0.008 | 0.019 | 0.799 | 0.002 | 0.764 |
| RLA4 | 0.010 | 0.013 | 0.866 | 0.001 | 0.785 |
| RLA5 | 0.006 | 0.009 | 0.803 | 0.003 | 0.763 |
| RLA6 | 0.006 | 0.037 | 0.859 | 0.002 | 0.786 |
| RLA7 | 0.013 | 0.025 | 0.901 | 0.009 | 0.799 |
| Mat1 | 0.000 | 0.033 | 0.069 | 0.044 | 0.973 |
| Mat2 | 0.002 | 0.033 | 0.105 | 0.049 | 0.976 |
| Mat3 | 0.012 | 0.054 | 0.072 | 0.061 | 0.981 |
| Mat4 | 0.000 | 0.034 | 0.053 | 0.036 | 0.966 |
| Mat5 | 0.004 | 0.036 | 0.093 | 0.059 | 0.991 |
| Mat6 | 0.000 | 0.033 | 0.053 | 0.035 | 0.972 |
| Mat7 | 0.005 | 0.042 | 0.097 | 0.059 | 0.985 |

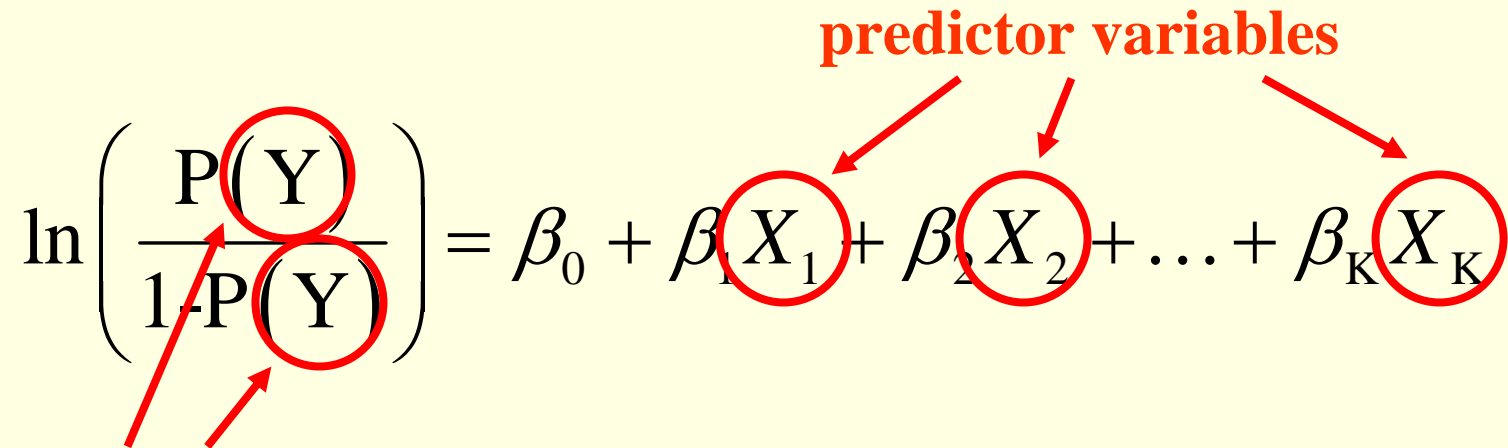
MANOVA Results

| | Means | | | | |
|---------------|---------|---------|---------|---------|--------|
| | RLA | Math | Sci | Social | |
| Class | 490/543 | 487/550 | 193/216 | 194/216 | |
| 1 | 483.3 | 455.0 | 178.9 | 177.1 | |
| 2 | 476.5 | 509.8 | 186.1 | 182.7 | |
| 3 | 551.1 | 534.1 | 210.2 | 208.0 | |
| 4 | 519.1 | 521.8 | 198.6 | 196.5 | |
| 5 | 559.0 | 580.4 | 221.4 | 216.5 | |
| Statistic | Value | F Value | Num DF | Den DF | Pr > F |
| Wilks' Lambda | 0.193 | 1609.1 | 16 | 36145 | <.0001 |

Table for Correspondence Analysis

| Subgroup | | Class | | | | |
|------------|-----------|-------|-----|------|------|------|
| | | 1 | 2 | 3 | 4 | 5 |
| F | Female | 416 | 223 | 783 | 1876 | 2680 |
| M | Male | 650 | 382 | 579 | 1913 | 2498 |
| FR | F/R Lunch | 776 | 429 | 600 | 2267 | 1615 |
| NFR | Not F/R L | 290 | 176 | 762 | 1522 | 3563 |
| AI | Am Indian | 4 | 3 | 2 | 8 | 11 |
| AP | Asian/Pac | 5 | 4 | 17 | 40 | 106 |
| AA | Afro Am | 492 | 250 | 333 | 1347 | 760 |
| HI | Hispanic | 61 | 53 | 42 | 202 | 168 |
| WH | White | 504 | 295 | 968 | 2192 | 4133 |
| SP0 | Not Spec | 533 | 470 | 1323 | 3384 | 5090 |
| SP1 | Spec 1 | 30 | 19 | 14 | 65 | 41 |
| SP2 | Spec 2 | 411 | 100 | 21 | 311 | 42 |
| SP3 | Spec 3 | 92 | 16 | 4 | 29 | 5 |

The Logistic Regression Model

$$\ln \left(\frac{P(Y)}{1-P(Y)} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_K X_K$$


dichotomous outcome

$\ln \left(\frac{P(Y)}{1-P(Y)} \right)$ is the log(odds) of the outcome.

Six Important RCPs to Predict Composite Levels (< 16.3 or > 16.2)

- The mean of CRBs = 16.3 (= (13+17+15+20)/4)
- Selected following six RCPs by stepwise and backward: **Vocabulary**, **Writing/Process**, **Number & Operation**, **Algebraic thinking**, **Governance and Civics**, and **World History**.
- Generalized R-Square = .459, Max-rescaled R-Square = .655, and C statistic (ROC) = .932.
- Hosmer and Lemeshow Goodness-of-Fit Test was significant at $p = .0001$.

Five or Three Important RCPs to Predict Composite Levels

- When applied the five predictors, the results are as follows: Generalized R-Square = .455, Max-rescaled R-Square = .651, and C statistic (ROC) = .930.
- When applied the *three* predictors (*Writing/Process*, *Algebraic thinking* and *World History*), the results are as follows: Generalized R-Square = .448, Max-rescaled R-Square = .640, and C statistic (ROC) = .925.
- Statistically the model with five predictors were better fitted than the three-predictor model (delta $df = 2$, delta $-2\log L = 673.8$).

Statistics Measuring Predictive Power

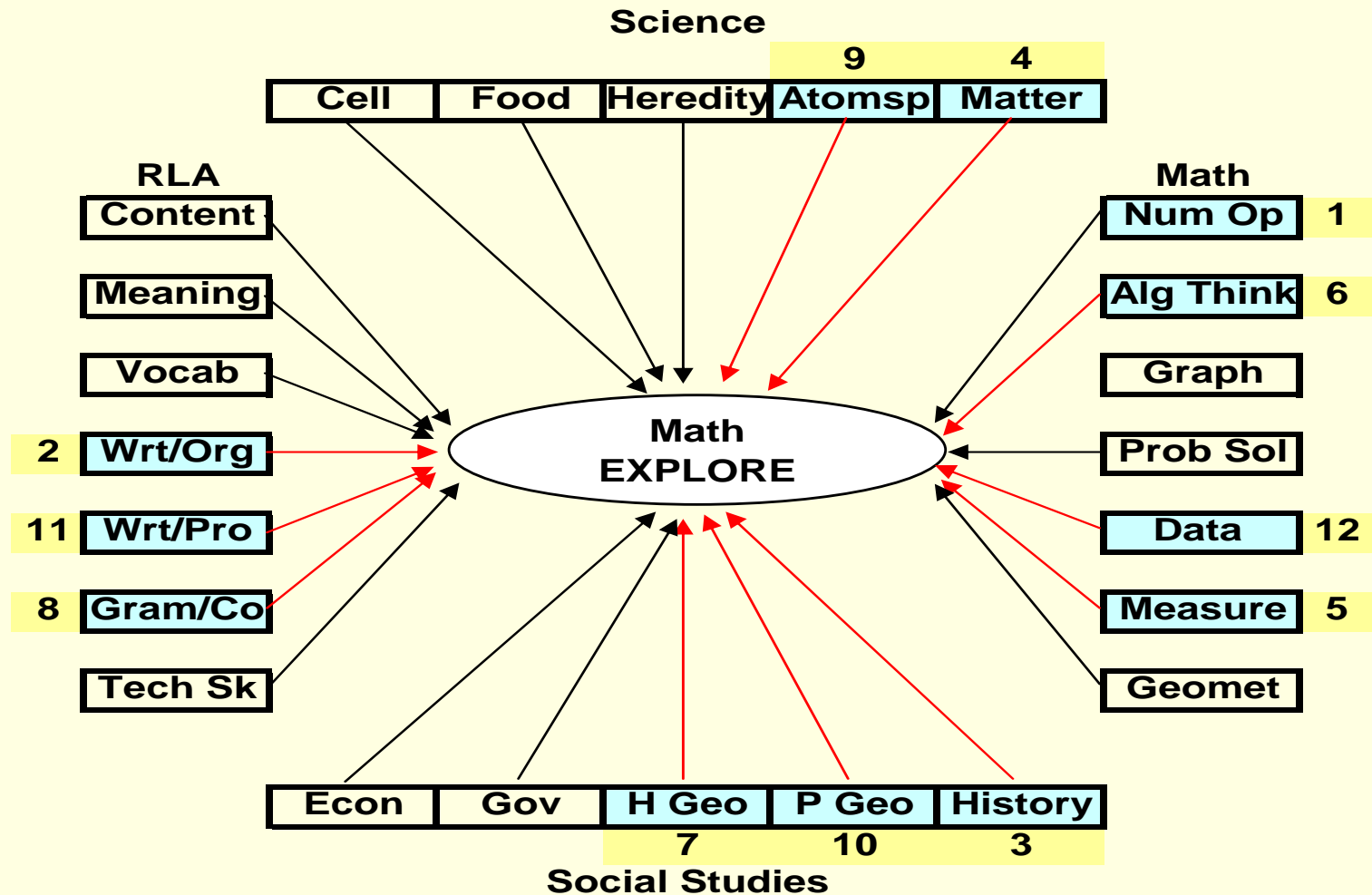
| | Generalized | Max-Rescaled | C |
|----------------|--------------------|---------------------|-------------------|
| Model | R-Square | R-Square | Statistics |
| English | 0.405 | 0.549 | 0.886 |
| Math | 0.412 | 0.582 | 0.907 |
| Reading | 0.392 | 0.536 | 0.885 |
| Science | 0.248 | 0.490 | 0.915 |

It cannot be interpreted as a portion of variance explained by the predictors.

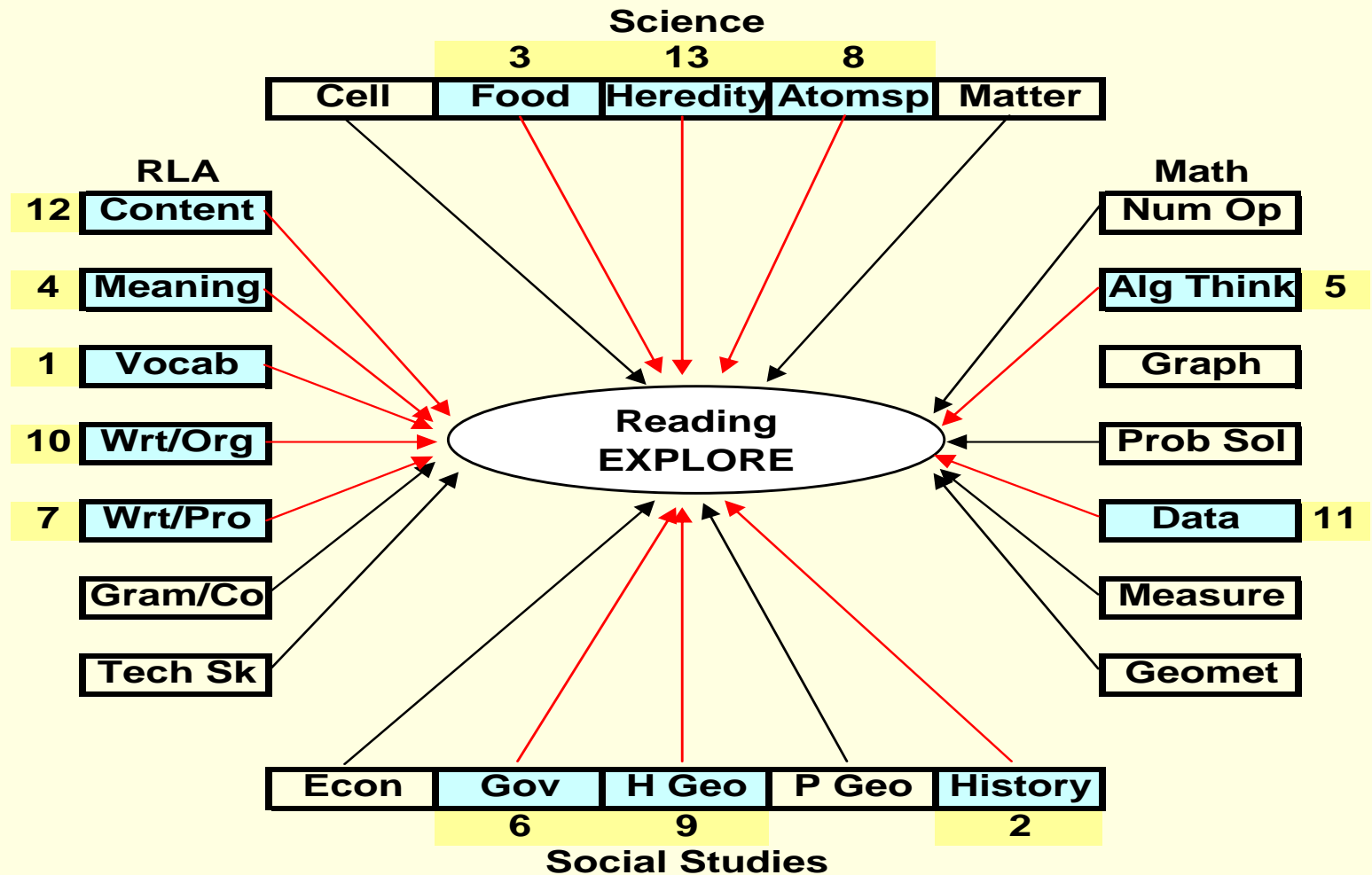
The C statistics is defined as the area under the curve for receiver operating characteristic (ROC) curve.

Math:

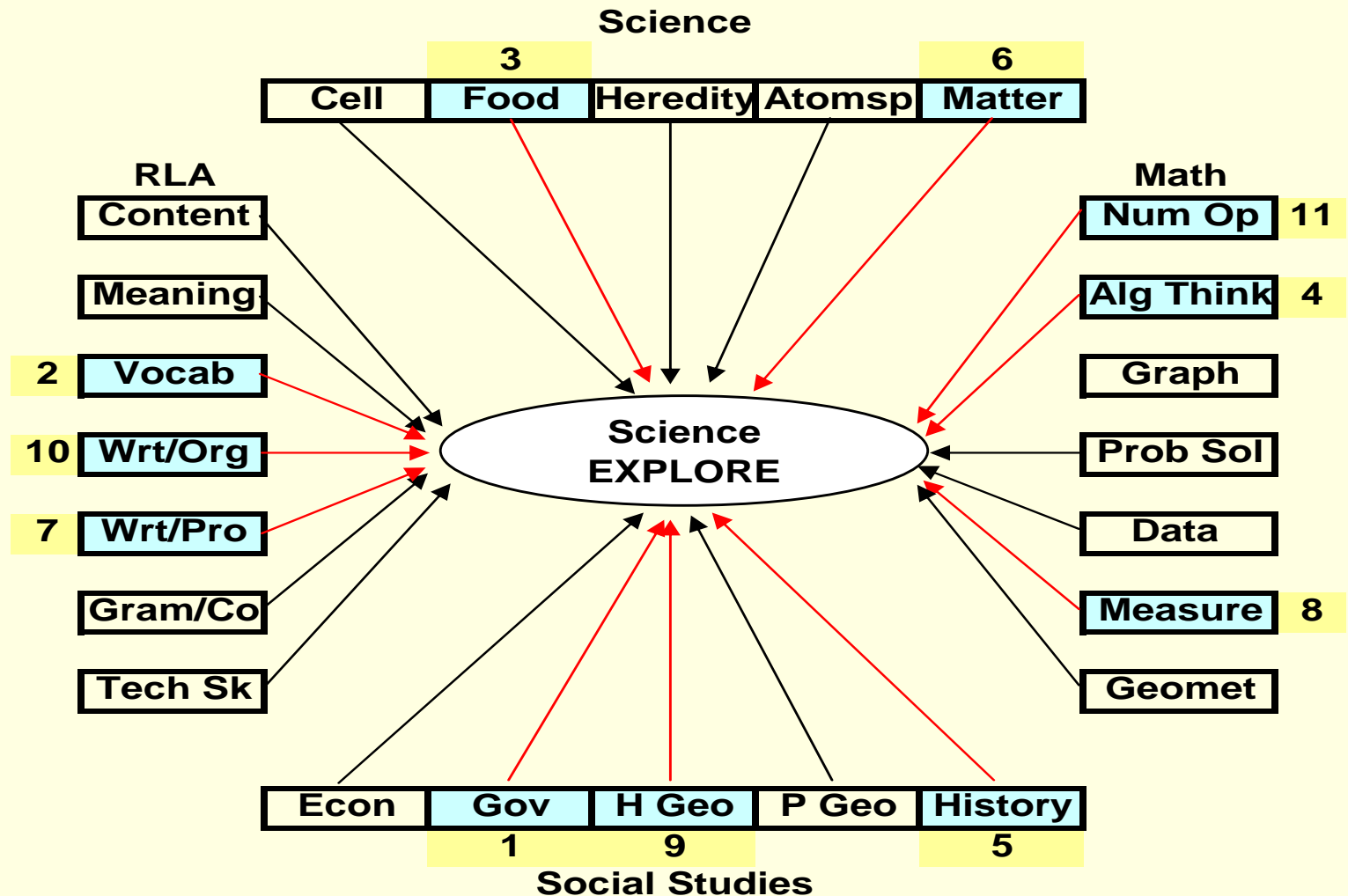
Stepwise Logistic Regression Results



Reading: Stepwise Logistic Regression Results



Science: Stepwise Logistic Regression Results



Reporting Categories: Grade 7

RLA

1. Content
2. Meaning
3. Vocabulary
4. Writing/organization
5. Writing/process
6. Grammar/conventions
7. Techniques and skills

Science

1. Cell structure and function
2. Food production and energy for life
3. Heredity and reproduction
4. Atmospheric cycles
5. Structure and properties of matter

Math

1. Number and operations
2. Algebraic thinking
3. Graphs and graphing
4. Real world problem solving
5. Data analysis and probability
6. Measurement
7. Geometry

Social Studies

1. Economics
2. Governance and civics
3. Human geography
4. Physical geography
5. History