

***Looking Beneath the Surface  
What we can learn from the  
Minnesota TIMSS Science  
Results***

William H. Schmidt  
Michigan State University

# 2007 Grade 4 Mathematics

| Nation                   | Mean       |
|--------------------------|------------|
| Hong Kong SAR            | 607        |
| Singapore                | 599        |
| Chinese Taipei           | 576        |
| <b>Massachusetts, US</b> | <b>572</b> |
| Japan                    | 568        |

| Nation               | Mean       |
|----------------------|------------|
| <b>Minnesota, US</b> | <b>554</b> |
| Kazakhstan           | 549        |
| Russian Federation   | 544        |
| England              | 541        |

| Nation                | Mean       |
|-----------------------|------------|
| Latvia                | 537        |
| Netherlands           | 535        |
| Lithuania             | 530        |
| <b>United States</b>  | <b>529</b> |
| Germany               | 525        |
| Denmark               | 523        |
| Australia             | 516        |
| Hungary               | 510        |
| Italy                 | 507        |
| Austria               | 505        |
| Sweden                | 503        |
| Slovenia              | 502        |
| Armenia               | 500        |
| Slovak Republic       | 496        |
| Scotland              | 494        |
| New Zealand           | 492        |
| Czech Republic        | 486        |
| Norway                | 473        |
| Ukraine               | 469        |
| Georgia               | 438        |
| Iran, Islamic Rep. of | 402        |
| Algeria               | 378        |
| Colombia              | 355        |
| Morocco               | 341        |
| El Salvador           | 330        |
| Tunisia               | 327        |
| Kuwait                | 316        |
| Qatar                 | 296        |
| Yemen                 | 224        |

|                                     |
|-------------------------------------|
| Significantly Higher than MN        |
| Not Significantly Different from MN |
| Significantly Lower than MN         |

# 2007 Grade 8 Mathematics

| Nation                   | Mean       |
|--------------------------|------------|
| Chinese Taipei           | 598        |
| Korea, Rep. of           | 597        |
| Singapore                | 593        |
| Hong Kong SAR            | 572        |
| Japan                    | 570        |
| <b>Massachusetts, US</b> | <b>547</b> |

| Nation               | Mean       |
|----------------------|------------|
| <b>Minnesota, US</b> | <b>532</b> |

|                                     |
|-------------------------------------|
| Significantly Higher than MN        |
| Not Significantly Different from MN |
| Significantly Lower than MN         |

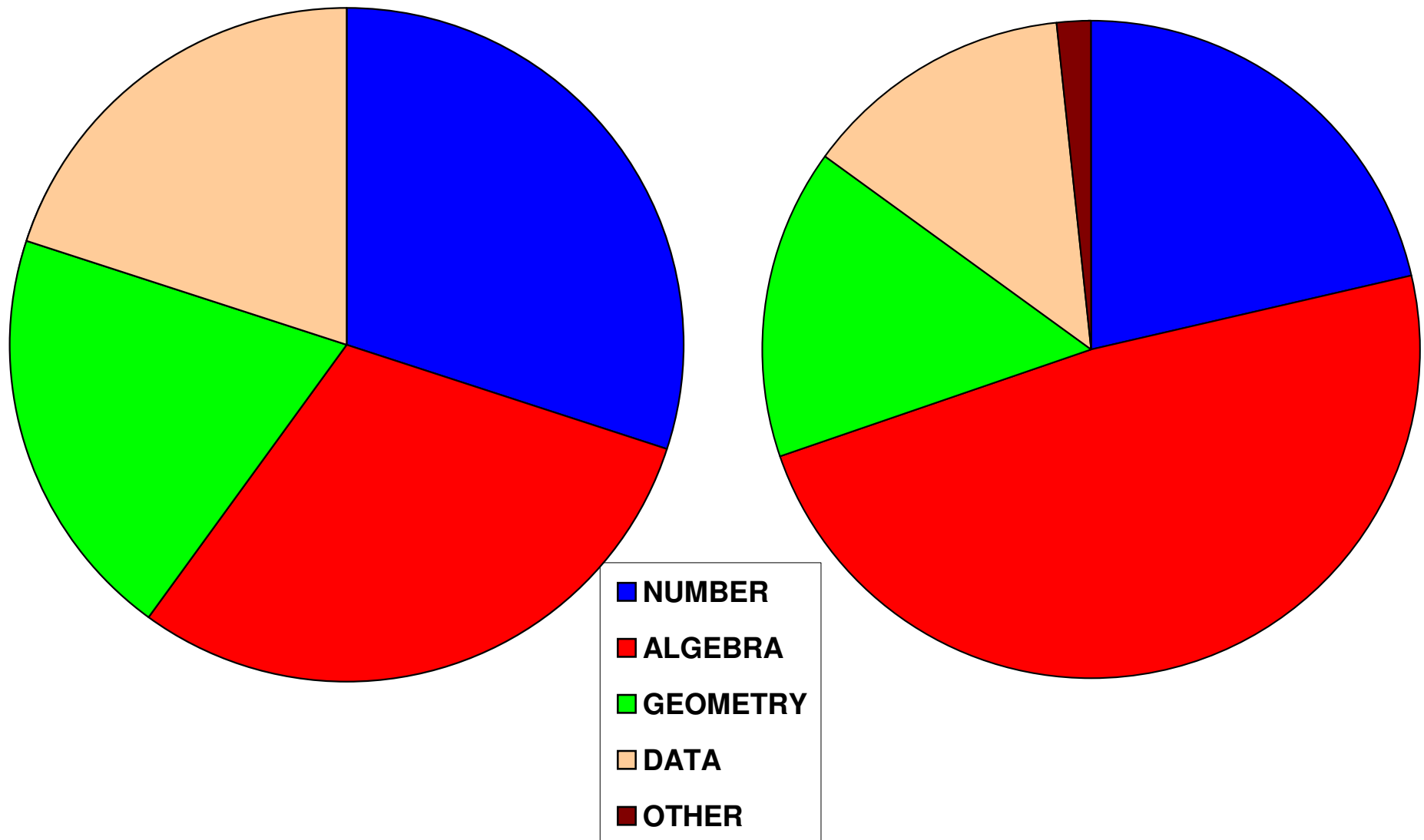
| Nation                 | Mean       |
|------------------------|------------|
| Hungary                | 517        |
| England                | 513        |
| Russian Federation     | 512        |
| <b>United States</b>   | <b>508</b> |
| Lithuania              | 506        |
| Czech Republic         | 504        |
| Slovenia               | 501        |
| Armenia                | 499        |
| Australia              | 496        |
| Sweden                 | 491        |
| Malta                  | 488        |
| Scotland               | 487        |
| Serbia                 | 486        |
| Italy                  | 480        |
| Malaysia               | 474        |
| Norway                 | 469        |
| Cyprus                 | 465        |
| Bulgaria               | 464        |
| Israel                 | 463        |
| Ukraine                | 462        |
| Romania                | 461        |
| Bosnia and Herzegovina | 456        |
| Lebanon                | 449        |
| Thailand               | 441        |
| Turkey                 | 432        |
| Jordan                 | 427        |
| Tunisia                | 420        |
| Georgia                | 410        |
| Iran, Islamic Rep. of  | 403        |

| Nation                  | Mean |
|-------------------------|------|
| Bahrain                 | 398  |
| Indonesia               | 397  |
| Syrian Arab Republic    | 395  |
| Greece                  | 391  |
| Romania                 | 387  |
| Lithuania               | 381  |
| Colombia                | 380  |
| Oman                    | 372  |
| Palestinian Nat'l Auth. | 367  |
| Botswana                | 364  |
| Kuwait                  | 354  |
| El Salvador             | 340  |
| Saudi Arabia            | 329  |
| Ghana                   | 309  |
| Qatar                   | 307  |

# Grade 8 Mathematics Mean Teaching Emphasis

2007 TIMSS TEST EMPHASIS

2007



# 2007 Grade 4 Science

| Nation                   | Mean       |
|--------------------------|------------|
| Singapore                | 587        |
| <b>Massachusetts, US</b> | <b>571</b> |

| Nation               | Mean       |
|----------------------|------------|
| Chinese Taipei       | 557        |
| Hong Kong SAR        | 554        |
| <b>Minnesota, US</b> | <b>551</b> |
| Japan                | 548        |
| Russian Federation   | 546        |
| Latvia               | 542        |
| England              | 542        |
| <b>United States</b> | <b>539</b> |

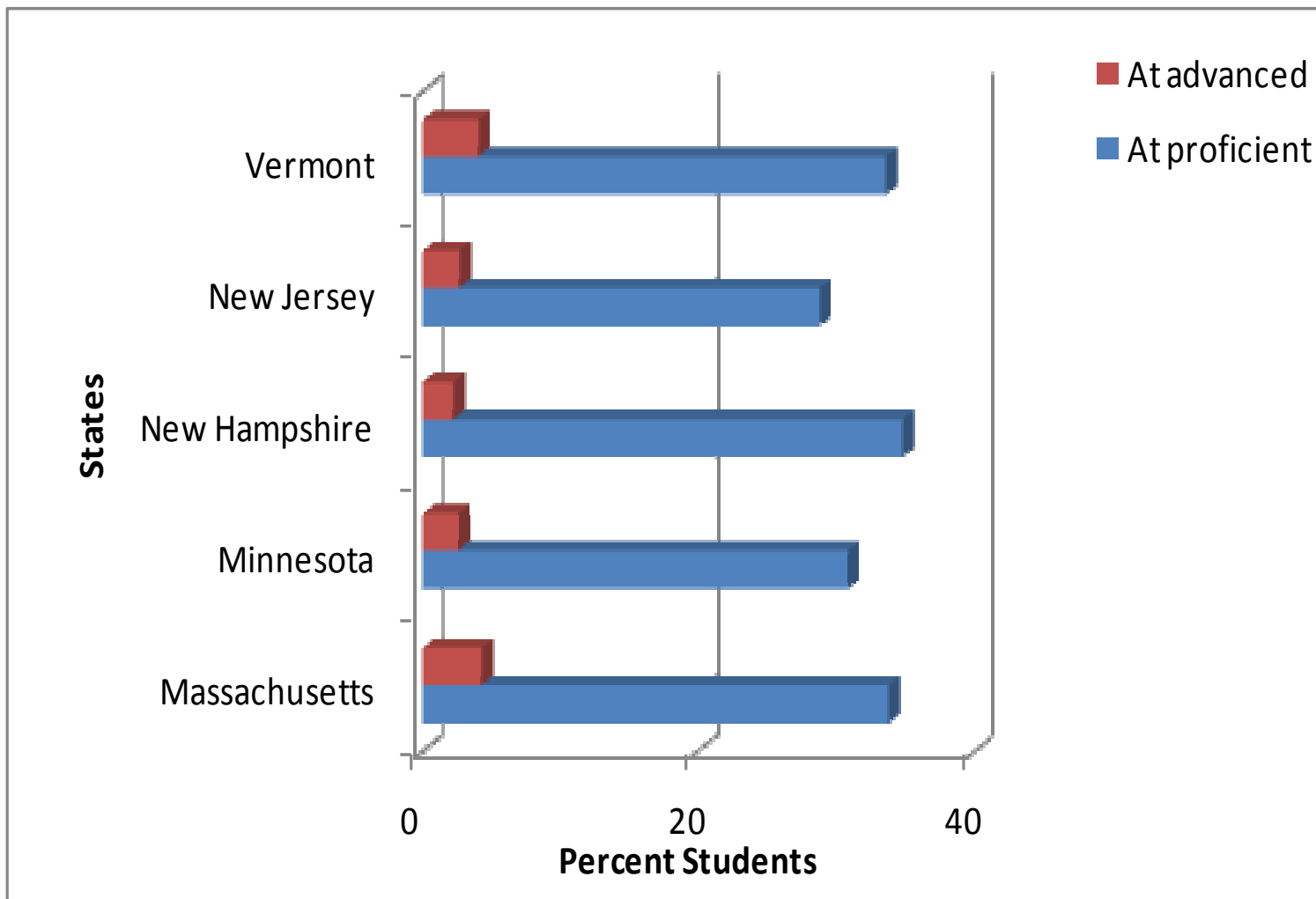
| Nation                | Mean |
|-----------------------|------|
| Hungary               | 536  |
| Italy                 | 535  |
| Kazakhstan            | 533  |
| Germany               | 528  |
| Australia             | 527  |
| Slovak Republic       | 526  |
| Austria               | 526  |
| Sweden                | 525  |
| Netherlands           | 523  |
| Slovenia              | 518  |
| Denmark               | 517  |
| Czech Republic        | 515  |
| Lithuania             | 514  |
| New Zealand           | 504  |
| Scotland              | 500  |
| Armenia               | 484  |
| Norway                | 477  |
| Ukraine               | 474  |
| Iran, Islamic Rep. of | 436  |
| Georgia               | 418  |
| Colombia              | 400  |
| El Salvador           | 390  |
| Algeria               | 354  |
| Kuwait                | 348  |
| Tunisia               | 318  |
| Morocco               | 297  |
| Qatar                 | 294  |
| Yemen                 | 197  |

|                                     |
|-------------------------------------|
| Significantly Higher than MN        |
| Not Significantly Different from MN |
| Significantly Lower than MN         |

# Grade 4 Science: 1995 & 2007

| <i>1995 Rescaled Scores</i>                |             | <i>2007 Scores</i>    |             |
|--|-------------|-----------------------|-------------|
| <b>Nation</b>                              | <b>Mean</b> | <b>Nation</b>         | <b>Mean</b> |
| Japan                                      | 553         | Singapore             | 587         |
| <b>Minnesota, US</b>                       | <b>553</b>  | Hong Kong SAR         | 554         |
| <b>United States</b>                       | <b>542</b>  | <b>Minnesota, US</b>  | <b>551</b>  |
| Austria                                    | 538         | Japan                 | 548         |
| Czech Republic                             | 532         | England               | 542         |
| Netherlands                                | 530         | Latvia                | 542         |
| England                                    | 528         | <b>United States</b>  | <b>539</b>  |
| Singapore                                  | 523         | Hungary               | 536         |
| Australia                                  | 521         | Australia             | 527         |
| Scotland                                   | 514         | Austria               | 526         |
| Hong Kong SAR                              | 508         | Netherlands           | 523         |
| Hungary                                    | 508         | Slovenia              | 518         |
| New Zealand                                | 505         | Czech Republic        | 515         |
| Norway                                     | 504         | New Zealand           | 504         |
| Latvia                                     | 486         | Scotland              | 500         |
| Slovenia                                   | 464         | Norway                | 477         |
| Iran, Islamic Rep. of                      | 380         | Iran, Islamic Rep. of | 436         |
|  |             |                       |             |
|  |             |                       |             |
|  |             |                       |             |
| <b>Significantly Higher than MN</b>        |             |                       |             |
| <b>Not Significantly Different from MN</b> |             |                       |             |
| <b>Significantly Lower than MN</b>         |             |                       |             |

# 2005 NAEP Grade 4 Science



# 2007 Grade 8 Science

| Nation                   | Mean       |
|--------------------------|------------|
| Singapore                | 567        |
| Chinese Taipei           | 561        |
| <b>Massachusetts, US</b> | <b>556</b> |
| Japan                    | 554        |
| Korea, Rep. of           | 553        |

| Nation               | Mean       |
|----------------------|------------|
| England              | 542        |
| Hungary              | 539        |
| Czech Republic       | 539        |
| <b>Minnesota, US</b> | <b>539</b> |
| Slovenia             | 538        |
| Hong Kong SAR        | 530        |
| Russian Federation   | 530        |

|                                     |
|-------------------------------------|
| Significantly Higher than MN        |
| Not Significantly Different from MN |
| Significantly Lower than MN         |

| Nation                 | Mean       |
|------------------------|------------|
| <b>United States</b>   | <b>520</b> |
| Lithuania              | 519        |
| Australia              | 515        |
| Sweden                 | 511        |
| Scotland               | 496        |
| Italy                  | 495        |
| Armenia                | 488        |
| Norway                 | 487        |
| Ukraine                | 485        |
| Jordan                 | 482        |
| Malaysia               | 471        |
| Thailand               | 471        |
| Serbia                 | 470        |
| Bulgaria               | 470        |
| Israel                 | 468        |
| Bahrain                | 467        |
| Bosnia and Herzegovina | 466        |
| Romania                | 462        |
| Iran, Islamic Rep. of  | 459        |
| Malta                  | 457        |
| Turkey                 | 454        |
| Syrian Arab Republic   | 452        |
| Cyprus                 | 452        |
| Tunisia                | 445        |

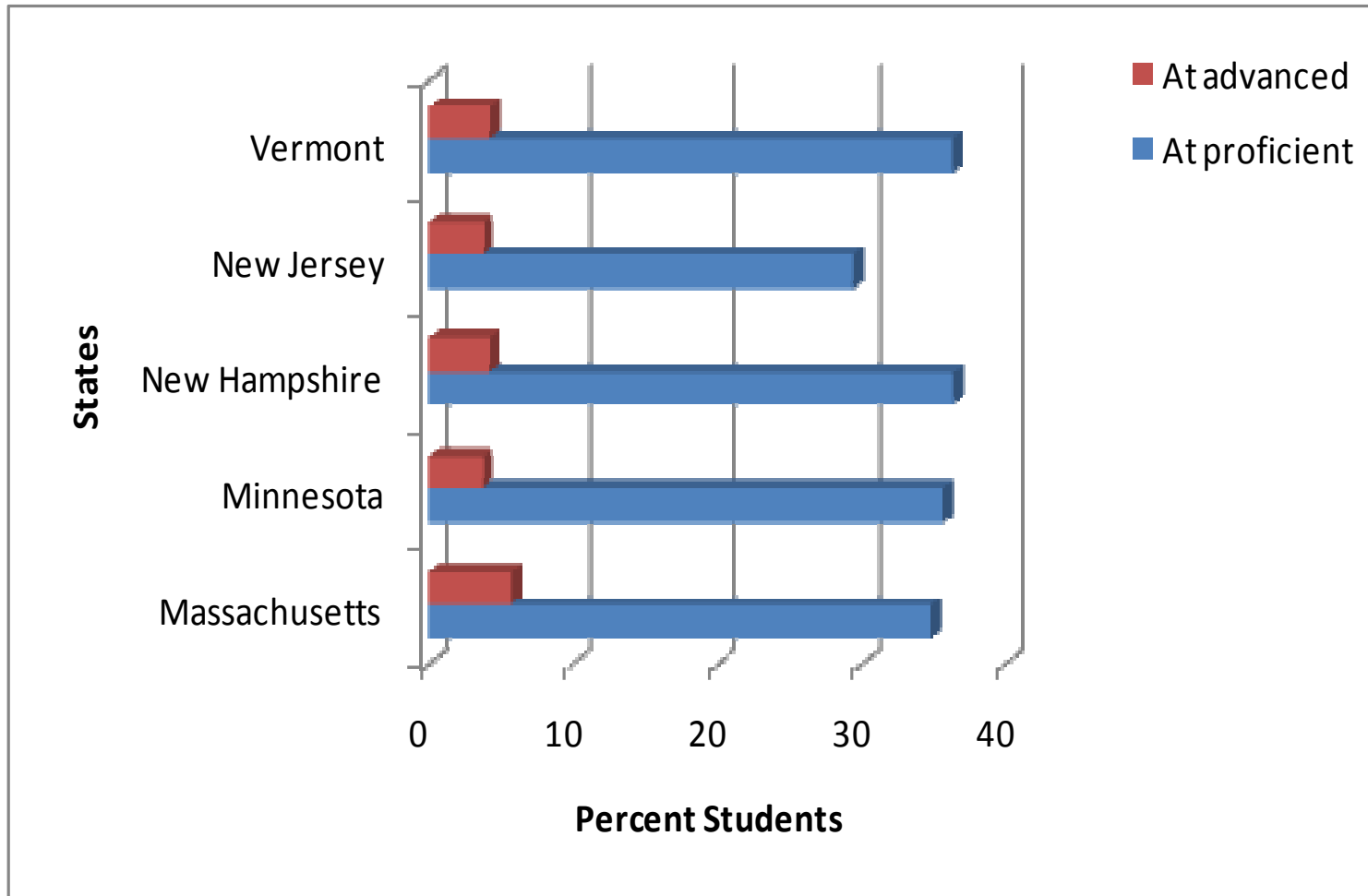
| Nation                  | Mean |
|-------------------------|------|
| Indonesia               | 427  |
| Oman                    | 423  |
| Georgia                 | 421  |
| Kuwait                  | 418  |
| Colombia                | 417  |
| Lebanon                 | 414  |
| Egypt                   | 408  |
| Algeria                 | 408  |
| Palestinian Nat'l Auth. | 404  |
| Saudi Arabia            | 403  |
| Morocco                 | 402  |
| El Salvador             | 387  |
| Botswana                | 355  |
| Qatar                   | 319  |
| Ghana                   | 303  |



# Grade 8 Science: 1995 & 2007

| <i>1995 Rescaled Scores</i>                |            | <i>2007 Scores</i>    |            |
|--|------------|-----------------------|------------|
| Nation                                     | Mean       | Nation                | Mean       |
| Singapore                                  | 580        | Singapore             | 567        |
| Czech Republic                             | 555        | Japan                 | 554        |
| Japan                                      | 554        | Korea, Rep. of        | 553        |
| Sweden                                     | 553        | England               | 542        |
| Korea, Rep. of                             | 546        | Czech Republic        | 539        |
| <b>Minnesota, US</b>                       | <b>544</b> | Hungary               | 539        |
| Hungary                                    | 537        | <b>Minnesota, US</b>  | <b>539</b> |
| England                                    | 533        | Slovenia              | 538        |
| Bulgaria                                   | 527        | Hong Kong SAR         | 530        |
| Russian Federation                         | 523        | Russian Federation    | 530        |
| Australia                                  | 514        | <b>United States</b>  | <b>520</b> |
| Norway                                     | 514        | Lithuania             | 519        |
| Slovenia                                   | 514        | Australia             | 515        |
| <b>United States</b>                       | <b>513</b> | Sweden                | 511        |
| Hong Kong SAR                              | 510        | Scotland              | 496        |
| Scotland                                   | 501        | Norway                | 487        |
| Romania                                    | 471        | Bulgaria              | 464        |
| Lithuania                                  | 464        | Romania               | 462        |
| Iran, Islamic Rep. of                      | 463        | Iran, Islamic Rep. of | 459        |
| Cyprus                                     | 452        | Cyprus                | 452        |
| Colombia                                   | 365        | Colombia              | 417        |
|  |            |                       |            |
|  |            |                       |            |
| <b>Significantly Higher than MN</b>        |            |                       |            |
| <b>Not Significantly Different from MN</b> |            |                       |            |
| <b>Significantly Lower than MN</b>         |            |                       |            |

# 2005 NAEP Grade 8 Science



# Grade 4 Science 1

| 1995             |           |                  |           |                       |           |                  |           |                  |           |                  |           |                        |           |
|------------------|-----------|------------------|-----------|-----------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------------|-----------|
| Earth Features   |           | Earth Processes  |           | Earth in the Universe |           | Plants & Animals |           | Organs & Tissues |           | Life Processes & |           | Life Cycles & Genetics |           |
| <b>Minnesota</b> | <b>67</b> | <b>Minnesota</b> | <b>70</b> | <b>Minnesota</b>      | <b>88</b> | <b>Minnesota</b> | <b>89</b> | <b>Minnesota</b> | <b>70</b> | Japan            | 75        | Czech Republic         | 73        |
| Japan            | 63        | Japan            | 62        | Czech Republic        | 75        | Japan            | 78        | Singapore        | 67        | Australia        | 70        | <b>Minnesota</b>       | <b>72</b> |
| <b>U.S.A.</b>    | <b>60</b> | <b>U.S.A.</b>    | <b>61</b> | Hong Kong             | 75        | Australia        | 72        | Australia        | 66        | Czech Republic   | 69        | Australia              | 71        |
| England          | 59        | Australia        | 56        | Hungary               | 75        | Czech Republic   | 72        | Czech Republic   | 65        | <b>Minnesota</b> | <b>69</b> | Japan                  | 71        |
| Czech Republic   | 58        | England          | 55        | Norway                | 75        | Singapore        | 70        | <b>U.S.A.</b>    | <b>65</b> | England          | 69        | <b>U.S.A.</b>          | <b>70</b> |
| Hungary          | 58        | Singapore        | 54        | Australia             | 72        | <b>U.S.A.</b>    | <b>70</b> | Hong Kong        | 65        | Singapore        | 69        | Norway                 | 68        |
| Norway           | 56        | Czech Republic   | 54        | England               | 71        | England          | 67        | Japan            | 63        | <b>U.S.A.</b>    | <b>68</b> | England                | 68        |
| Australia        | 56        | Hungary          | 53        | <b>U.S.A.</b>         | <b>70</b> | Hungary          | 66        | England          | 62        | Norway           | 67        | Hong Kong              | 68        |
| Hong Kong        | 54        | Hong Kong        | 51        | Japan                 | 69        | Hong Kong        | 65        | Hungary          | 61        | Hong Kong        | 66        | Hungary                | 67        |
| International Mn | 53        | International Mn | 50        | Singapore             | 69        | International Mn | 64        | Norway           | 61        | Hungary          | 64        | Singapore              | 67        |
| Singapore        | 53        | Norway           | 42        | International Mn      | 67        | Norway           | 60        | International Mn | 59        | International Mn | 64        | International Mn       | 64        |
|                  | 57        |                  | 54        |                       | 72        |                  | 69        |                  | 64        |                  | 69        |                        | 69        |

| 2007             |           |                  |           |                       |           |                  |           |                  |           |                  |           |                        |           |
|------------------|-----------|------------------|-----------|-----------------------|-----------|------------------|-----------|------------------|-----------|------------------|-----------|------------------------|-----------|
| Earth Features   |           | Earth Processes  |           | Earth in the Universe |           | Plants & Animals |           | Organs & Tissues |           | Life Processes & |           | Life Cycles & Genetics |           |
| <b>Minnesota</b> | <b>70</b> | Japan            | 70        | England               | 66        | Singapore        | 70        | Hungary          | 63        | Singapore        | 82        | Singapore              | 62        |
| Hong Kong        | 66        | <b>Minnesota</b> | <b>67</b> | Singapore             | 66        | <b>Minnesota</b> | <b>62</b> | Singapore        | 60        | Hong Kong        | 63        | Czech Republic         | 56        |
| <b>U.S.A.</b>    | <b>64</b> | England          | 65        | Hong Kong             | 63        | <b>U.S.A.</b>    | <b>61</b> | <b>Minnesota</b> | <b>60</b> | <b>U.S.A.</b>    | <b>58</b> | Hungary                | 56        |
| Singapore        | 64        | <b>U.S.A.</b>    | <b>65</b> | <b>Minnesota</b>      | <b>62</b> | England          | 60        | England          | 59        | England          | 56        | <b>Minnesota</b>       | <b>55</b> |
| England          | 63        | Hong Kong        | 64        | <b>U.S.A.</b>         | <b>61</b> | Hungary          | 60        | <b>U.S.A.</b>    | <b>58</b> | <b>Minnesota</b> | <b>55</b> | Australia              | 53        |
| Japan            | 63        | Australia        | 64        | Australia             | 60        | Hong Kong        | 59        | Hong Kong        | 58        | Japan            | 55        | Japan                  | 52        |
| Australia        | 60        | Hungary          | 60        | Hungary               | 56        | Australia        | 59        | Czech Republic   | 56        | Australia        | 48        | England                | 52        |
| Hungary          | 58        | Singapore        | 60        | Norway                | 55        | Czech Republic   | 57        | Australia        | 53        | Hungary          | 48        | <b>U.S.A.</b>          | <b>52</b> |
| Norway           | 54        | Czech Republic   | 60        | Japan                 | 54        | Japan            | 56        | Japan            | 53        | Czech Republic   | 47        | Hong Kong              | 49        |
| International Mn | 51        | International Mn | 51        | Czech Republic        | 53        | International Mn | 50        | Norway           | 50        | International Mn | 45        | International Mn       | 43        |
| Czech Republic   | 50        | Norway           | 51        | International Mn      | 50        | Norway           | 50        | International Mn | 49        | Norway           | 35        | Norway                 | 42        |
|                  | 60        |                  | 62        |                       | 59        |                  | 59        |                  | 57        |                  | 55        |                        | 53        |

# Grade 4 Science 2

| 1995                   |           |                  |           |                             |           |                             |           |                  |           |                                 |           |                      |           |
|------------------------|-----------|------------------|-----------|-----------------------------|-----------|-----------------------------|-----------|------------------|-----------|---------------------------------|-----------|----------------------|-----------|
| Human Biology & Health |           | Matter           |           | Energy & Physical Processes |           | Physical & Chemical Changes |           | Forces & Motion  |           | Environmental & Resource Issues |           | Scientific Processes |           |
| <b>Minnesota</b>       | <b>75</b> | Japan            | 75        | Japan                       | 70        | Japan                       | 72        | Japan            | 62        | <b>Minnesota</b>                | <b>79</b> | <b>Minnesota</b>     | <b>67</b> |
| Australia              | 70        | Singapore        | 67        | <b>Minnesota</b>            | <b>66</b> | <b>Minnesota</b>            | <b>69</b> | Czech Republic   | 62        | Japan                           | 72        | <b>U.S.A.</b>        | <b>63</b> |
| <b>U.S.A.</b>          | <b>69</b> | <b>Minnesota</b> | <b>66</b> | Australia                   | 63        | Hong Kong                   | 68        | Singapore        | 60        | Australia                       | 69        | Australia            | 59        |
| Norway                 | 68        | Australia        | 63        | England                     | 62        | Czech Republic              | 67        | <b>Minnesota</b> | <b>59</b> | <b>U.S.A.</b>                   | <b>68</b> | Singapore            | 54        |
| Singapore              | 68        | <b>U.S.A.</b>    | <b>61</b> | Czech Republic              | 61        | <b>U.S.A.</b>               | <b>65</b> | Norway           | 58        | Czech Republic                  | 63        | England              | 54        |
| England                | 67        | Czech Republic   | 61        | <b>U.S.A.</b>               | <b>61</b> | Singapore                   | 65        | Australia        | 55        | Hungary                         | 62        | Japan                | 53        |
| Hong Kong              | 67        | Hong Kong        | 60        | Singapore                   | 61        | Australia                   | 63        | Hungary          | 55        | England                         | 60        | Hong Kong            | 51        |
| Czech Republic         | 66        | Hungary          | 59        | Hong Kong                   | 59        | England                     | 61        | Hong Kong        | 54        | International Mn                | 58        | Czech Republic       | 51        |
| Japan                  | 66        | England          | 58        | Hungary                     | 57        | Hungary                     | 60        | <b>U.S.A.</b>    | <b>53</b> | Norway                          | 58        | Norway               | 48        |
| Hungary                | 65        | International Mn | 58        | International Mn            | 56        | International Mn            | 59        | International Mn | 51        | Singapore                       | 57        | International Mn     | 46        |
| International Mn       | 63        | Norway           | 56        | Norway                      | 53        | Norway                      | 58        | England          | 49        | Hong Kong                       | 54        | Hungary              | 40        |
|                        | 67        |                  | 62        |                             | 61        |                             | 64        |                  | 56        |                                 | 62        |                      | 53        |

| 2007                   |           |                  |           |                             |           |                             |           |                  |           |                                 |           |                      |           |
|------------------------|-----------|------------------|-----------|-----------------------------|-----------|-----------------------------|-----------|------------------|-----------|---------------------------------|-----------|----------------------|-----------|
| Human Biology & Health |           | Matter           |           | Energy & Physical Processes |           | Physical & Chemical Changes |           | Forces & Motion  |           | Environmental & Resource Issues |           | Scientific Processes |           |
| Japan                  | 65        | Singapore        | 72        | Singapore                   | 73        | Singapore                   | 69        | Hong Kong        | 71        | Singapore                       | 62        | Singapore            | 70        |
| Singapore              | 64        | Hong Kong        | 67        | Japan                       | 67        | Japan                       | 65        | Singapore        | 70        | <b>Minnesota</b>                | <b>63</b> | Hong Kong            | 70        |
| Hong Kong              | 61        | Japan            | 65        | Hong Kong                   | 61        | Hong Kong                   | 61        | <b>Minnesota</b> | <b>67</b> | Hong Kong                       | 61        | England              | 69        |
| Hungary                | 60        | <b>Minnesota</b> | <b>61</b> | <b>Minnesota</b>            | <b>58</b> | Hungary                     | 58        | Australia        | 62        | Japan                           | 59        | <b>Minnesota</b>     | <b>67</b> |
| <b>Minnesota</b>       | <b>57</b> | England          | 59        | England                     | 56        | <b>Minnesota</b>            | <b>57</b> | England          | 62        | Australia                       | 58        | <b>U.S.A.</b>        | <b>67</b> |
| England                | 57        | Hungary          | 59        | <b>U.S.A.</b>               | <b>55</b> | England                     | 57        | <b>U.S.A.</b>    | <b>61</b> | England                         | 58        | Australia            | 67        |
| <b>U.S.A.</b>          | <b>55</b> | <b>U.S.A.</b>    | <b>59</b> | Hungary                     | 54        | Czech Republic              | 55        | Japan            | 61        | <b>U.S.A.</b>                   | <b>57</b> | Japan                | 65        |
| Australia              | 54        | Czech Republic   | 58        | Australia                   | 53        | <b>U.S.A.</b>               | <b>55</b> | Hungary          | 58        | Hungary                         | 57        | Hungary              | 62        |
| Czech Republic         | 54        | Australia        | 55        | Czech Republic              | 50        | Australia                   | 51        | International Mn | 54        | Czech Republic                  | 51        | Czech Republic       | 57        |
| Norway                 | 51        | International Mn | 50        | International Mn            | 47        | International Mn            | 46        | Czech Republic   | 54        | International Mn                | 45        | International Mn     | 56        |
| International Mn       | 48        | Norway           | 48        | Norway                      | 42        | Norway                      | 40        | Norway           | 53        | Norway                          | 41        | Norway               | 54        |
|                        | 58        |                  | 60        |                             | 57        |                             | 57        |                  | 61        |                                 | 56        |                      | 64        |

# Comparing MN and the US: Grade 4 Science

| Topic                           | 1995 | 2007 |
|---------------------------------|------|------|
| Earth Features                  |      |      |
| Earth Processes                 |      |      |
| Earth in the Universe           |      |      |
| Plants & Animals                |      |      |
| Organs & Tissues                |      |      |
| Life Processes & Functions      |      |      |
| Life Cycles & Genetics          |      |      |
| Interactions of Living Things   |      |      |
| Human Biology and Health        |      |      |
| Matter                          |      |      |
| Energy and Physical Processes   |      |      |
| Physical & Chemical Changes     |      |      |
| Forces and Motion               |      |      |
| Environmental & Resource Issues |      |      |
| Scientific Processes            |      |      |

|  |       |
|--|-------|
|  | MN>US |
|  | MN=US |
|  | MN<US |

# MN Grade 4 Student Science Performance

|                                  | <b>1995</b>  | <b>2007</b>            |
|----------------------------------|--|------------------------|
| <b>≥ 75% Correct</b>             | <b>Earth Processes</b><br><b>Earth in the Universe</b><br><b>Plants &amp; Animals</b><br><b>Scientific Processes</b> |                        |
| <b>Between 50 to 74% Correct</b> | <b>10 of 14 Topics</b>   | <b>14 of 14 Topics</b> |
| <b>&lt; 50% Correct</b>          |  |                        |

The 1995 Scores have been adjusted to account for the differences in difficulty of the 1995 & 2007 tests.

# Grade 8 Science 1

| 1995               |           |                    |           |                       |           |  |           |                            |           |                        |           |  |  |
|--------------------|-----------|--------------------|-----------|-----------------------|-----------|--|-----------|----------------------------|-----------|------------------------|-----------|--|--|
| Earth Features     |           | Earth Processes    |           | Earth in the Universe |           | Diversity & Structure of Living Things |           | Life Processes & Functions |           | Life Cycles & Genetics |           |  |  |
| Czech Republic     | 67        | <b>Minnesota</b>   | <b>67</b> | <b>Minnesota</b>      | <b>74</b> | Japan                                  | 76        | Singapore                  | 72        | <b>Minnesota</b>       | <b>86</b> |  |  |
| Hungary            | 67        | England            | 67        | Sweden                | 71        | Singapore                              | 74        | Japan                      | 70        | Japan                  | 82        |  |  |
| Korea              | 65        | Singapore          | 67        | Norway                | 70        | Hong Kong                              | 73        | Korea                      | 68        | Korea                  | <b>81</b> |  |  |
| Singapore          | 65        | Norway             | 62        | Czech Republic        | 67        | Korea                                  | 72        | Czech Republic             | 64        | England                | 80        |  |  |
| <b>Minnesota</b>   | <b>64</b> | <b>U.S.A.</b>      | <b>61</b> | Japan                 | 67        | Czech Republic                         | 72        | Thailand                   | 63        | Israel                 | 79        |  |  |
| Sweden             | 61        | Russian Federation | 61        | Thailand              | 66        | <b>Minnesota</b>                       | <b>70</b> | <b>Minnesota</b>           | <b>63</b> | Sweden                 | 78        |  |  |
| Thailand           | 60        | Sweden             | 60        | Singapore             | 65        | Thailand                               | 69        | Hungary                    | 60        | Norway                 | 78        |  |  |
| Russian Federation | 59        | Korea              | 59        | Korea                 | 64        | Sweden                                 | 68        | Russian Federation         | 59        | Korea                  | 76        |  |  |
| Norway             | 59        | Japan              | 58        | <b>U.S.A.</b>         | <b>63</b> | Hungary                                | 67        | England                    | 59        | Russian Federation     | 76        |  |  |
| Japan              | 59        | Czech Republic     | 57        | Australia             | 63        | Australia                              | 67        | <b>U.S.A.</b>              | <b>58</b> | Japan                  | 75        |  |  |
| England            | 59        | Australia          | 57        | England               | 59        | Russian Federation                     | 66        | Australia                  | 57        | Hungary                | 74        |  |  |
| Australia          | 57        | Thailand           | 56        | Hungary               | 59        | England                                | 64        | Israel                     | 57        | Australia              | 73        |  |  |
| <b>U.S.A.</b>      | <b>57</b> | Israel             | 55        | International Mn      | 58        | <b>U.S.A.</b>                          | <b>64</b> | Hong Kong                  | 56        | International Mn       | 70        |  |  |
| Israel             | 56        | International Mn   | 54        | Hong Kong             | 58        | International Mn                       | 61        | Sweden                     | 55        | Singapore              | 69        |  |  |
| International Mn   | 55        | Hong Kong          | 52        | Israel                | 56        | Israel                                 | 60        | International Mn           | 55        | Thailand               | 67        |  |  |
| Hong Kong          | 54        | Hungary            | 51        | Russian Federation    | 57        | Norway                                 | 59        | Norway                     | 54        | Hong Kong              | 65        |  |  |
|                    | 60        |                    | 59        |                       | 63        |  | 68        |                            | 61        |                        | 75        |  |  |
| 2007               |           |                    |           |                       |           |  |           |                            |           |                        |           |  |  |
| <b>Minnesota</b>   | <b>61</b> | Czech Republic     | 60        | Czech Republic        | 61        | Singapore                              | 61        | Singapore                  | 68        | S. Korea               | 65        |  |  |
| Hungary            | 59        | Hong Kong          | 60        | S. Korea              | 60        | S. Korea                               | 60        | S. Korea                   | 63        | Japan                  | 60        |  |  |
| Czech Republic     | 59        | Japan              | 59        | <b>Minnesota</b>      | <b>60</b> | <b>Minnesota</b>                       | <b>59</b> | Japan                      | 62        | Hong Kong              | 60        |  |  |
| Japan              | 58        | <b>Minnesota</b>   | <b>58</b> | <b>U.S.A.</b>         | <b>58</b> | Japan                                  | 57        | Hong Kong                  | 59        | Singapore              | 57        |  |  |
| Russian Federation | 57        | Russian Federation | 57        | Sweden                | 57        | Hungary                                | 56        | England                    | 58        | Russian Federation     | 52        |  |  |
| S. Korea           | 57        | Singapore          | 56        | Norway                | 57        | Czech Republic                         | 56        | <b>Minnesota</b>           | <b>56</b> | Hungary                | 51        |  |  |
| Sweden             | 56        | <b>U.S.A.</b>      | <b>53</b> | Singapore             | 57        | England                                | 55        | Russian Federation         | 52        | <b>Minnesota</b>       | <b>49</b> |  |  |
| Norway             | 54        | Australia          | 52        | England               | 56        | <b>U.S.A.</b>                          | <b>54</b> | <b>U.S.A.</b>              | <b>52</b> | <b>U.S.A.</b>          | <b>47</b> |  |  |
| Singapore          | 53        | England            | 52        | Russian Federation    | 55        | Russian Federation                     | 53        | Czech Republic             | 47        | England                | 47        |  |  |
| <b>U.S.A.</b>      | <b>51</b> | Sweden             | 51        | Australia             | 53        | Hong Kong                              | 51        | Sweden                     | 47        | Czech Republic         | 46        |  |  |
| Australia          | 51        | Hungary            | 50        | Hong Kong             | 51        | Australia                              | 50        | Australia                  | 47        | Australia              | 44        |  |  |
| Hong Kong          | 50        | S. Korea           | 50        | Hungary               | 49        | Sweden                                 | 48        | Hungary                    | 43        | Sweden                 | 41        |  |  |
| England            | 50        | Norway             | 47        | Thailand              | 49        | Thailand                               | 44        | International Mn           | 43        | Israel                 | 39        |  |  |
| International Mn   | 38        | Thailand           | 46        | Japan                 | 48        | Norway                                 | 42        | Thailand                   | 41        | International Mn       | 38        |  |  |
| Israel             | 37        | International Mn   | 41        | International Mn      | 45        | International Mn                       | 41        | Norway                     | 38        | Norway                 | 38        |  |  |
| Thailand           | 34        | Israel             | 40        | Israel                | 38        | Israel                                 | 41        | Israel                     | 38        | Thailand               | 35        |  |  |
|                    | 52        |                    | 52        |                       | 54        |  | 52        |                            | 51        |                        | 49        |  |  |
| Earth Features     |           | Earth Processes    |           | Earth in the Universe |           | Diversity & Structure of Living Things |           | Life Processes & Functions |           | Life Cycles & Genetics |           |  |  |

# Grade 8 Science 2

| 1995                          |           |                        |           |                                       |           |                     |           |                             |           |                    |           |
|-------------------------------|-----------|------------------------|-----------|---------------------------------------|-----------|---------------------|-----------|-----------------------------|-----------|--------------------|-----------|
| Interactions of Living Things |           | Human Biology & Health |           | Properties & Classification of Matter |           | Structure of Matter |           | Energy & Physical Processes |           | Physical Changes   |           |
| Korea                         | 69        | Singapore              | 74        | Japan                                 | 67        | Russian Federation  | 56        | Singapore                   | 71        | Japan              | 67        |
| Singapore                     | 66        | Czech Republic         | 72        | Singapore                             | 67        | Hungary             | 54        | Japan                       | 69        | Singapore          | 63        |
| <b>Minnesota</b>              | <b>65</b> | <b>Minnesota</b>       | <b>71</b> | Korea                                 | 65        | Czech Republic      | 54        | Korea                       | 67        | Czech Republic     | 63        |
| Japan                         | 65        | Japan                  | 69        | Czech Republic                        | 60        | Singapore           | 57        | England                     | 64        | Israel             | 61        |
| Thailand                      | 64        | Hungary                | 69        | Hungary                               | 57        | <b>Minnesota</b>    | <b>49</b> | <b>Minnesota</b>            | <b>63</b> | Sweden             | 61        |
| Hungary                       | 63        | England                | 68        | Sweden                                | 57        | <b>U.S.A.</b>       | <b>48</b> | Czech Republic              | 62        | Hungary            | 61        |
| Australia                     | 62        | Israel                 | 68        | Hong Kong                             | 56        | Israel              | 45        | Australia                   | 61        | Norway             | 60        |
| England                       | 62        | <b>U.S.A.</b>          | <b>67</b> | Norway                                | 55        | Sweden              | 43        | Hungary                     | 60        | England            | 59        |
| Norway                        | 60        | Thailand               | 67        | Australia                             | 55        | Korea               | 42        | Hong Kong                   | 60        | Korea              | 57        |
| Czech Republic                | 58        | Australia              | 66        | England                               | 55        | Japan               | 41        | Israel                      | 59        | Australia          | 57        |
| <b>U.S.A.</b>                 | <b>54</b> | Korea                  | 66        | Russian Federation                    | 54        | Hong Kong           | 58        | Russian Federation          | 58        | Russian Federation | 57        |
| Russian Federation            | 52        | Sweden                 | 64        | Israel                                | 53        | International Mn    | 40        | <b>U.S.A.</b>               | <b>57</b> | Thailand           | 53        |
| Sweden                        | 52        | Russian Federation     | 63        | <b>Minnesota</b>                      | <b>52</b> | Australia           | 39        | Norway                      | 57        | International Mn   | 53        |
| International Mn              | 51        | Norway                 | 63        | International Mn                      | 52        | England             | 38        | Sweden                      | 57        | <b>Minnesota</b>   | <b>50</b> |
| Israel                        | 50        | International Mn       | 61        | <b>U.S.A.</b>                         | <b>50</b> | Norway              | 32        | International Mn            | 56        | <b>U.S.A.</b>      | <b>49</b> |
| Hong Kong                     | 47        | Hong Kong              | 60        | Thailand                              | 47        | Thailand            | 31        | Thailand                    | 55        | Hong Kong          | 49        |
|                               | 59        |                        | 67        |                                       | 57        |                     | 44        |                             | 61        |                    | 58        |
| 2007                          |           |                        |           |                                       |           |                     |           |                             |           |                    |           |
| Singapore                     | 64        | <b>Minnesota</b>       | <b>70</b> | Singapore                             | 53        | Singapore           | 64        | Singapore                   | 63        | S. Korea           | 57        |
| S. Korea                      | 62        | S. Korea               | 69        | S. Korea                              | 53        | Czech Republic      | 60        | S. Korea                    | 59        | Singapore          | 55        |
| <b>Minnesota</b>              | <b>62</b> | Czech Republic         | 66        | Japan                                 | 50        | Russian Federation  | 60        | Japan                       | 58        | Japan              | 53        |
| Hungary                       | 60        | England                | 66        | Hungary                               | 50        | Hungary             | 57        | England                     | 54        | England            | 52        |
| Japan                         | 59        | Hungary                | 65        | Czech Republic                        | 49        | Japan               | 52        | Hungary                     | 54        | Russian Federation | 49        |
| England                       | 58        | Japan                  | 65        | Russian Federation                    | 48        | <b>U.S.A.</b>       | <b>49</b> | Czech Republic              | 52        | Hungary            | 49        |
| Czech Republic                | 57        | Singapore              | 64        | England                               | 47        | <b>Minnesota</b>    | <b>46</b> | Hong Kong                   | 51        | Czech Republic     | 47        |
| <b>U.S.A.</b>                 | <b>57</b> | Sweden                 | 63        | Hong Kong                             | 44        | Israel              | 44        | Russian Federation          | 49        | Hong Kong          | 45        |
| Hong Kong                     | 55        | <b>U.S.A.</b>          | <b>63</b> | <b>Minnesota</b>                      | <b>41</b> | Sweden              | 44        | Sweden                      | 45        | Sweden             | 44        |
| Australia                     | 55        | Hong Kong              | 63        | Sweden                                | 40        | International Mn    | 43        | Australia                   | 45        | <b>Minnesota</b>   | <b>43</b> |
| Russian Federation            | 55        | Russian Federation     | 62        | <b>U.S.A.</b>                         | <b>40</b> | England             | 42        | <b>Minnesota</b>            | <b>45</b> | Australia          | 42        |
| Sweden                        | 53        | Australia              | 62        | Australia                             | 39        | S. Korea            | 42        | <b>U.S.A.</b>               | <b>43</b> | <b>U.S.A.</b>      | <b>41</b> |
| Norway                        | 46        | Norway                 | 59        | Israel                                | 37        | Australia           | 35        | International Mn            | 40        | Norway             | 40        |
| Israel                        | 44        | Thailand               | 57        | International Mn                      | 35        | Thailand            | 35        | Norway                      | 39        | Israel             | 39        |
| Thailand                      | 43        | Israel                 | 54        | Norway                                | 34        | Norway              | 31        | Israel                      | 38        | International Mn   | 37        |
| International Mn              | 42        | International Mn       | 50        | Thailand                              | 33        | Hong Kong           | 29        | Thailand                    | 38        | Thailand           | 34        |
|                               | 55        |                        | 63        |                                       | 44        |                     | 46        |                             | 49        |                    | 46        |
| Interactions of Living Things |           | Human Biology & Health |           | Properties & Classification of Matter |           | Structure of Matter |           | Energy & Physical Processes |           | Physical Changes   |           |



# Grade 8 Science 3

| 1995               |           |                    |           |                                |           |                                 |           |                      |           |
|--------------------|-----------|--------------------|-----------|--------------------------------|-----------|---------------------------------|-----------|----------------------|-----------|
| Chemical Changes   |           | Forces & Motion    |           | Science, Technology, & Society |           | Environmental & Resource Issues |           | Scientific Processes |           |
| Singapore          | 74        | Czech Republic     | 78        | Korea                          | 74        | Singapore                       | 73        | Singapore            | 75        |
| Korea              | 66        | Japan              | 74        | Hungary                        | 73        | Thailand                        | 70        | Korea                | 64        |
| Hungary            | 65        | Singapore          | 73        | Sweden                         | 67        | <b>Minnesota</b>                | <b>68</b> | <b>Minnesota</b>     | <b>63</b> |
| <b>Minnesota</b>   | <b>65</b> | Korea              | 70        | Singapore                      | 66        | England                         | 67        | Czech Republic       | 61        |
| Czech Republic     | 64        | Hong Kong          | 69        | Japan                          | 60        | Australia                       | 65        | Australia            | 61        |
| England            | 64        | Hungary            | 69        | Thailand                       | 59        | Korea                           | 63        | Japan                | 60        |
| Japan              | 64        | England            | 68        | England                        | 57        | Japan                           | 62        | England              | 60        |
| Australia          | 62        | Sweden             | 68        | Hong Kong                      | 55        | <b>U.S.A.</b>                   | <b>60</b> | <b>U.S.A.</b>        | <b>59</b> |
| Russian Federation | 62        | Australia          | 67        | Norway                         | 52        | Czech Republic                  | 59        | Hungary              | 57        |
| <b>U.S.A.</b>      | <b>61</b> | Norway             | 67        | Czech Republic                 | 52        | Norway                          | 58        | Hong Kong            | 57        |
| Israel             | 61        | <b>Minnesota</b>   | <b>63</b> | <b>Minnesota</b>               | <b>52</b> | Hong Kong                       | 53        | Thailand             | 55        |
| Hong Kong          | 58        | Russian Federation | 62        | Australia                      | 52        | International Mn                | 53        | International Mn     | 53        |
| Sweden             | 57        | <b>U.S.A.</b>      | <b>61</b> | Israel                         | 51        | Sweden                          | 52        | Sweden               | 52        |
| International Mn   | 56        | International Mn   | 61        | International Mn               | 48        | Israel                          | 52        | Norway               | 52        |
| Norway             | 53        | Israel             | 55        | <b>U.S.A.</b>                  | <b>48</b> | Hungary                         | 49        | Israel               | 52        |
| Thailand           | 51        | Thailand           | 56        | Russian Federation             | 40        | Russian Federation              | 47        | Russian Federation   | 51        |
|                    | 62        |                    | 67        |                                | 58        |                                 | 59        |                      | 58        |
|                    |           |                    |           |                                |           |                                 |           |                      |           |
| 2007               |           |                    |           |                                |           |                                 |           |                      |           |
| England            | 55        | Czech Republic     | 49        | Singapore                      | 51        | Singapore                       | 55        | Japan                | 56        |
| Singapore          | 55        | Japan              | 49        | Japan                          | 50        | <b>Minnesota</b>                | <b>55</b> | Singapore            | 52        |
| Hong Kong          | 48        | S. Korea           | 48        | Czech Republic                 | 44        | England                         | 53        | S. Korea             | 50        |
| Japan              | 47        | Singapore          | 48        | Russian Federation             | 44        | Australia                       | 52        | <b>Minnesota</b>     | <b>48</b> |
| Australia          | 45        | England            | 45        | England                        | 41        | Hungary                         | 51        | England              | 46        |
| <b>Minnesota</b>   | <b>45</b> | Hungary            | 44        | Hong Kong                      | 39        | S. Korea                        | 51        | Czech Republic       | 45        |
| Russian Federation | 44        | <b>Minnesota</b>   | <b>43</b> | S. Korea                       | 39        | Hong Kong                       | 50        | Hong Kong            | 43        |
| Hungary            | 43        | Hong Kong          | 42        | <b>Minnesota</b>               | <b>38</b> | Russian Federation              | 49        | <b>U.S.A.</b>        | <b>43</b> |
| <b>U.S.A.</b>      | <b>43</b> | Russian Federation | 41        | <b>U.S.A.</b>                  | <b>37</b> | <b>U.S.A.</b>                   | <b>49</b> | Australia            | 42        |
| Czech Republic     | 39        | Sweden             | 41        | Australia                      | 36        | Czech Republic                  | 48        | Hungary              | 40        |
| S. Korea           | 37        | <b>U.S.A.</b>      | <b>40</b> | Hungary                        | 34        | Japan                           | 48        | Russian Federation   | 38        |
| Norway             | 35        | Australia          | 38        | Sweden                         | 26        | Sweden                          | 43        | Israel               | 34        |
| International Mn   | 34        | Norway             | 32        | International Mn               | 26        | Norway                          | 42        | Sweden               | 34        |
| Sweden             | 34        | Israel             | 32        | Thailand                       | 19        | Thailand                        | 40        | Thailand             | 29        |
| Thailand           | 31        | International Mn   | 31        | Norway                         | 17        | International Mn                | 38        | International Mn     | 29        |
| Israel             | 30        | Thailand           | 29        | Israel                         | 16        | Israel                          | 35        | Norway               | 28        |
|                    | 42        |                    | 41        |                                | 35        |                                 | 48        |                      | 41        |
|                    |           |                    |           |                                |           |                                 |           |                      |           |
| Chemical Changes   |           | Forces & Motion    |           | Science, Technology, & Society |           | Environmental & Resource Issues |           | Scientific Processes |           |

# Comparing MN and the US: Grade 8 Science

| Topic                                  | 1995 | 2007 |
|--|------|------|
| Earth Features                         |      |      |
| Earth Processes                        |      |      |
| Earth in the Universe                  |      |      |
| Diversity & Structure of Living Things |      |      |
| Life Processes & Functions             |      |      |
| Life Cycles & Genetics                 |      |      |
| Interactions of Living Things          |      |      |
| Human Biology and Health               |      |      |
| Properties & Classification of Matter  |      |      |
| Structure of Matter                    |      |      |
| Energy and Physical Processes          |      |      |
| Physical Changes                       |      |      |
| Chemical Changes                       |      |      |
| Forces and Motion                      |      |      |
| Science, Technology, & Society         |      |      |
| Environmental & Resource Issues        |      |      |
| Scientific Processes                   |      |      |

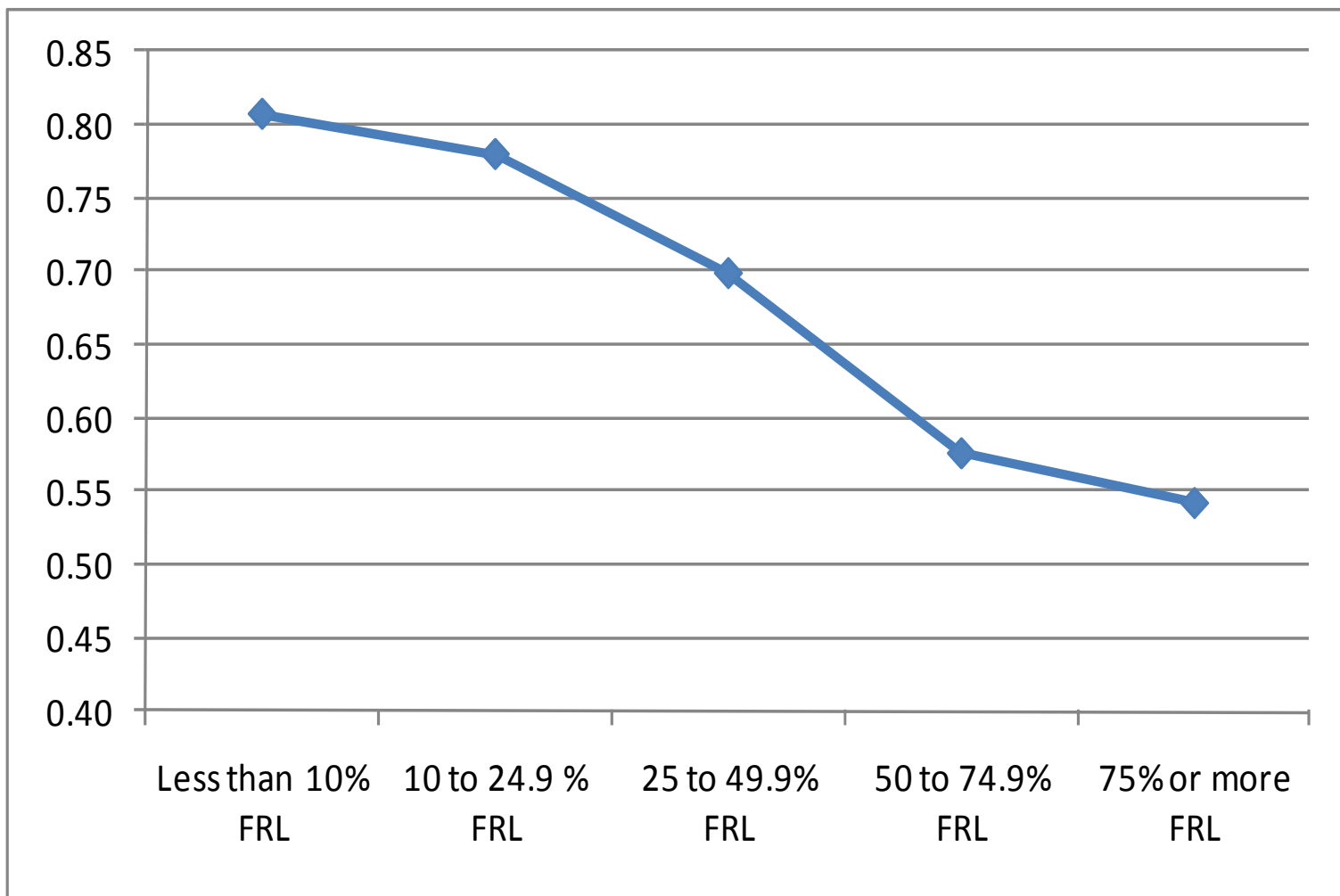
|  |       |
|--|-------|
|  | MN>US |
|  | MN=US |
|  | MN<US |

# MN Grade 8 Student Science Performance

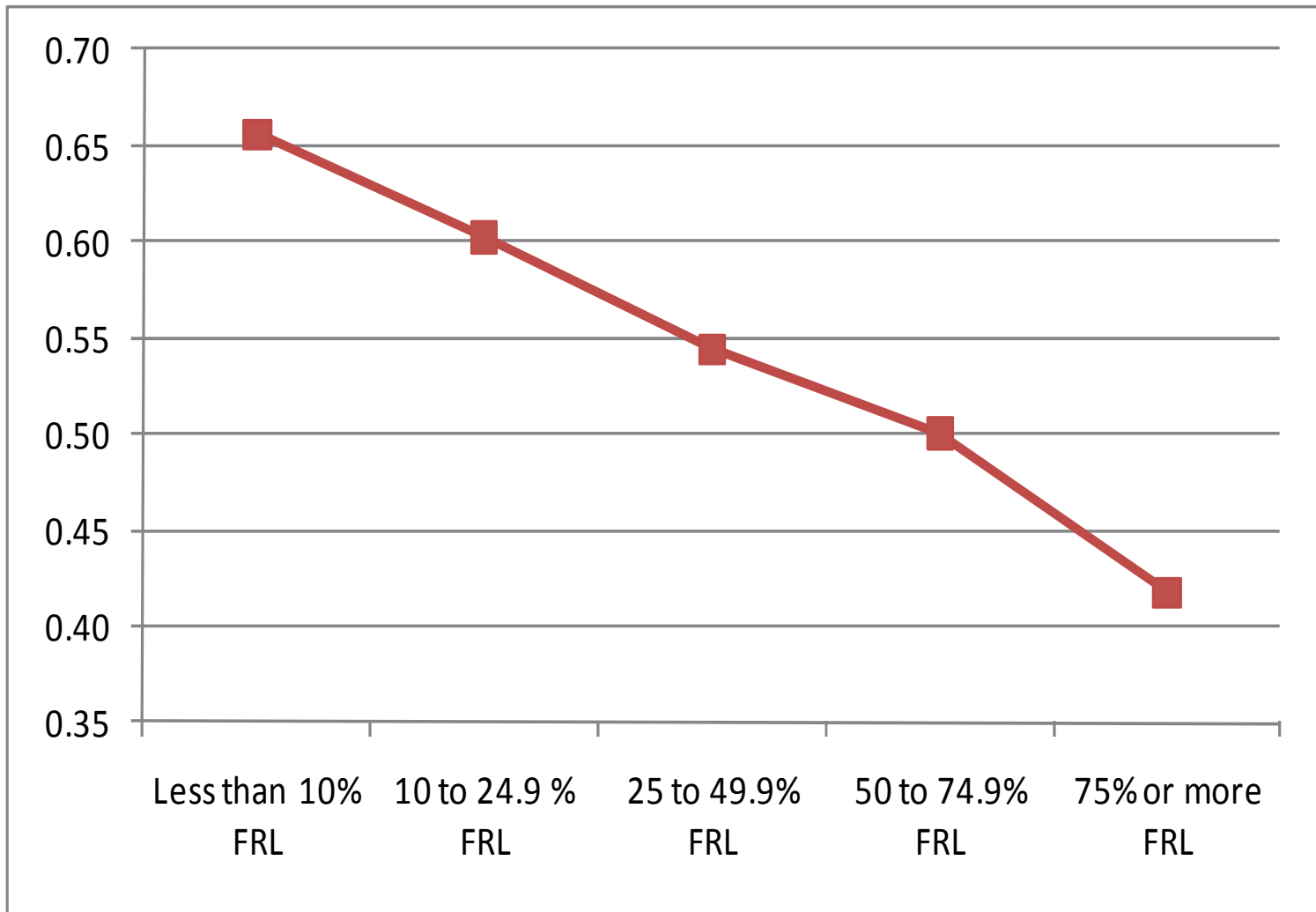
|                                  | 1995   | 2007  |
|----------------------------------|--|---|
| <b>&gt; 75% Correct</b>          |  |   |
| <b>Between 50 to 74% Correct</b> | <b>11 of 17 Topics</b>   | <b>8 of 17 Topics</b>   |
| <b>&lt; 50% Correct</b>          | <b>Properties &amp; Classification of Matter</b><br><b>Physical Changes</b><br><b>Chemical Changes</b><br><b>Forces and Motion</b><br><b>Science, Technology, &amp; Society</b><br><b>Scientific Processes</b> |   |
|                                  |  | <b>Life Cycles &amp; Genetics</b><br><b>Structure of Matter</b><br><b>Energy and Physical Processes</b> |

The 1995 Scores have been adjusted to account for the differences in difficulty of the 1995 & 2007 tests.

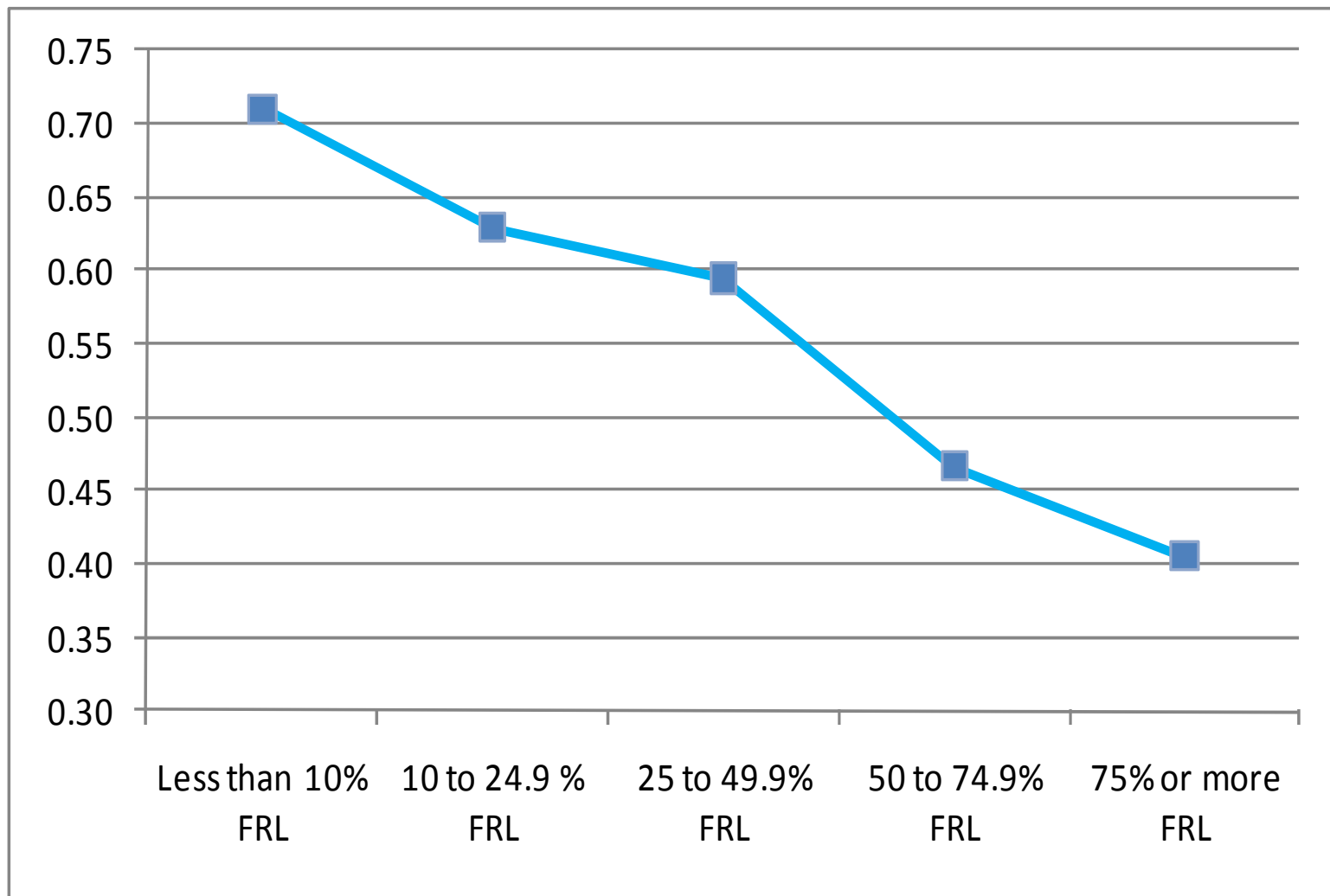
# Grade 4 Earth Features: Average Percent Correct by SES



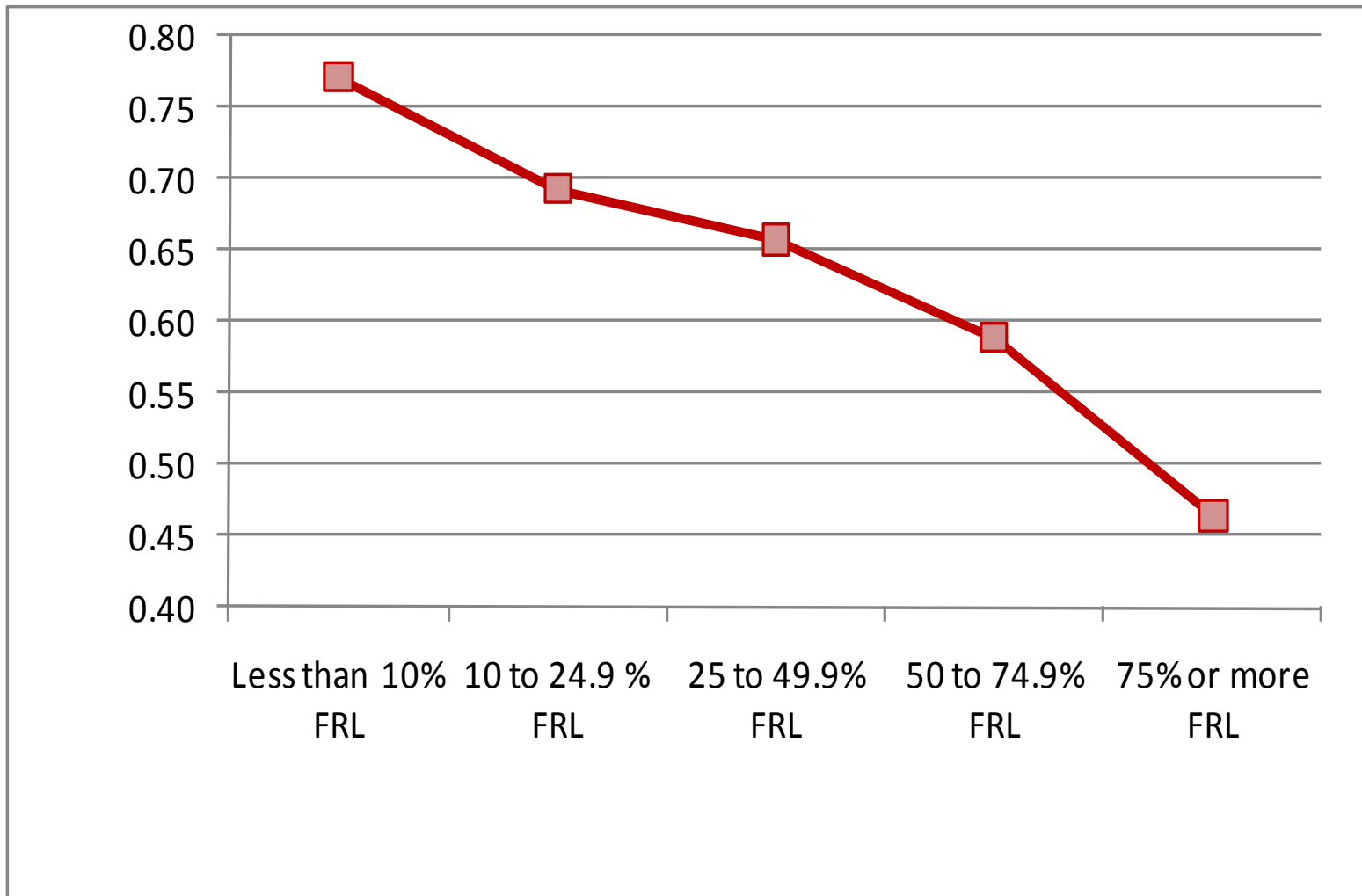
# Grade 4 Life Cycles and Genetics: Average Percent Correct by SES



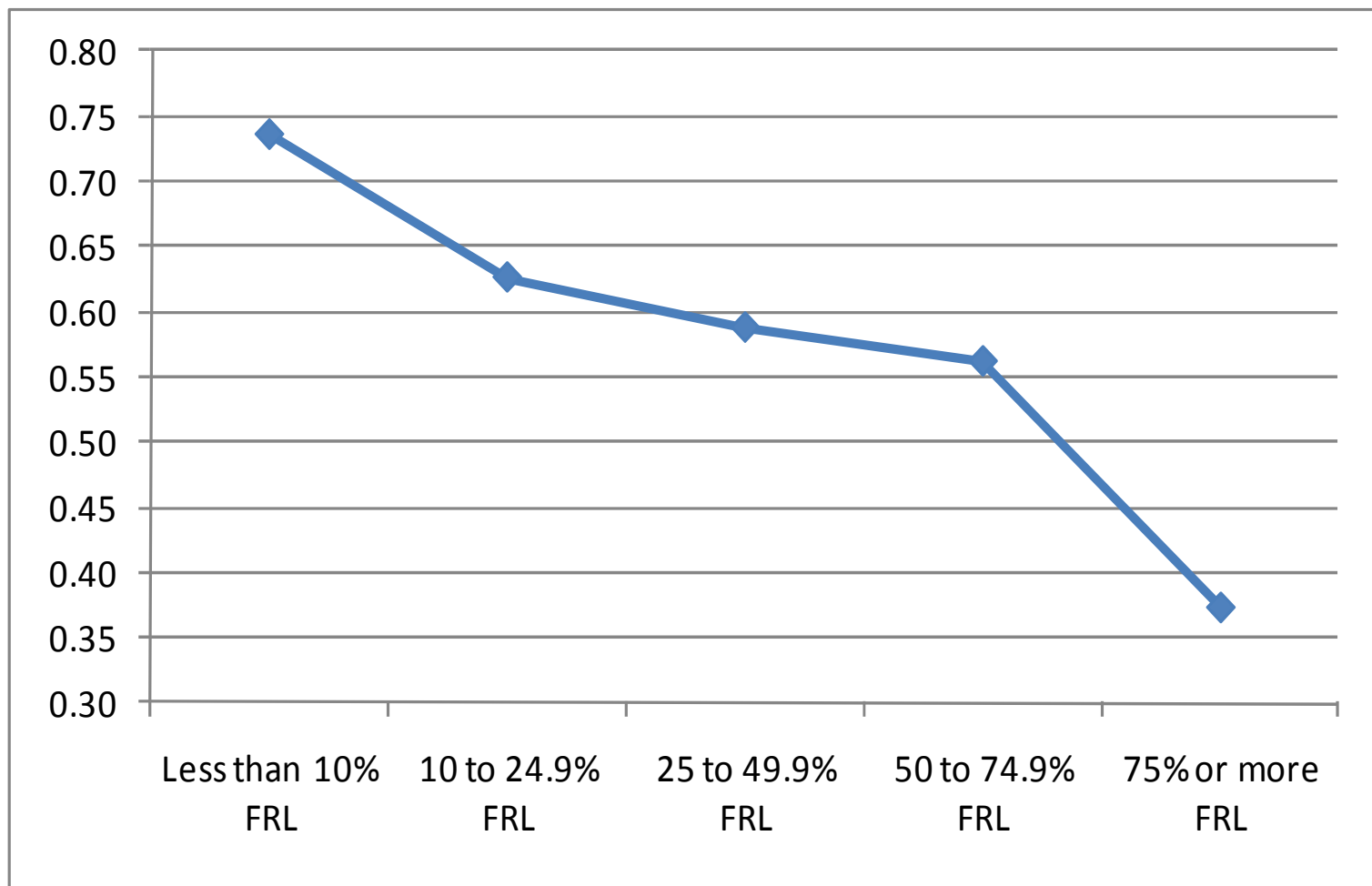
# Grade 4 Physical and Chemical Changes: Average Percent Correct by SES



# Grade 4 Environmental and Resource Issues: Average Percent Correct by SES

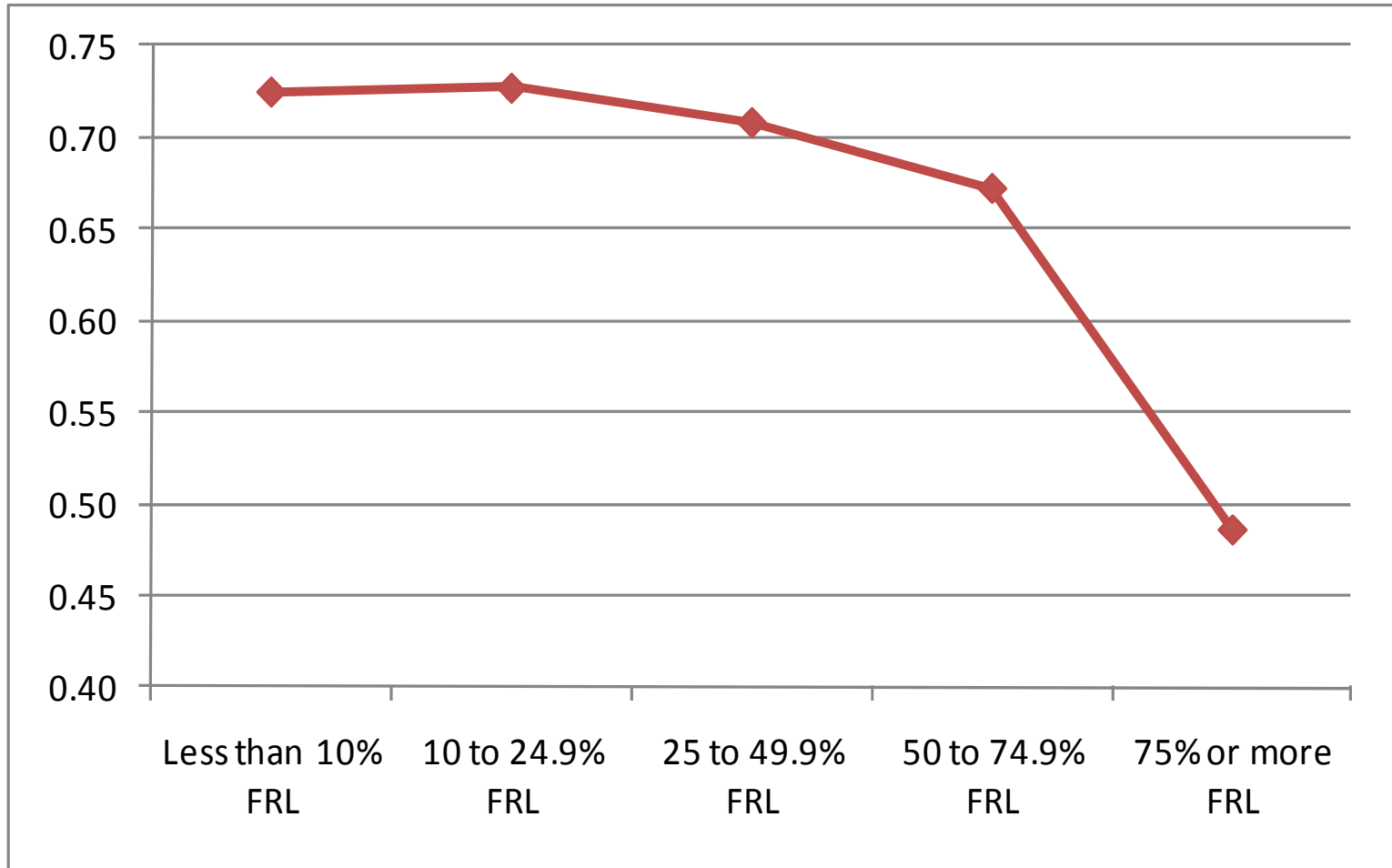


# Grade 8 Earth in the Universe: Average Percent Correct by SES

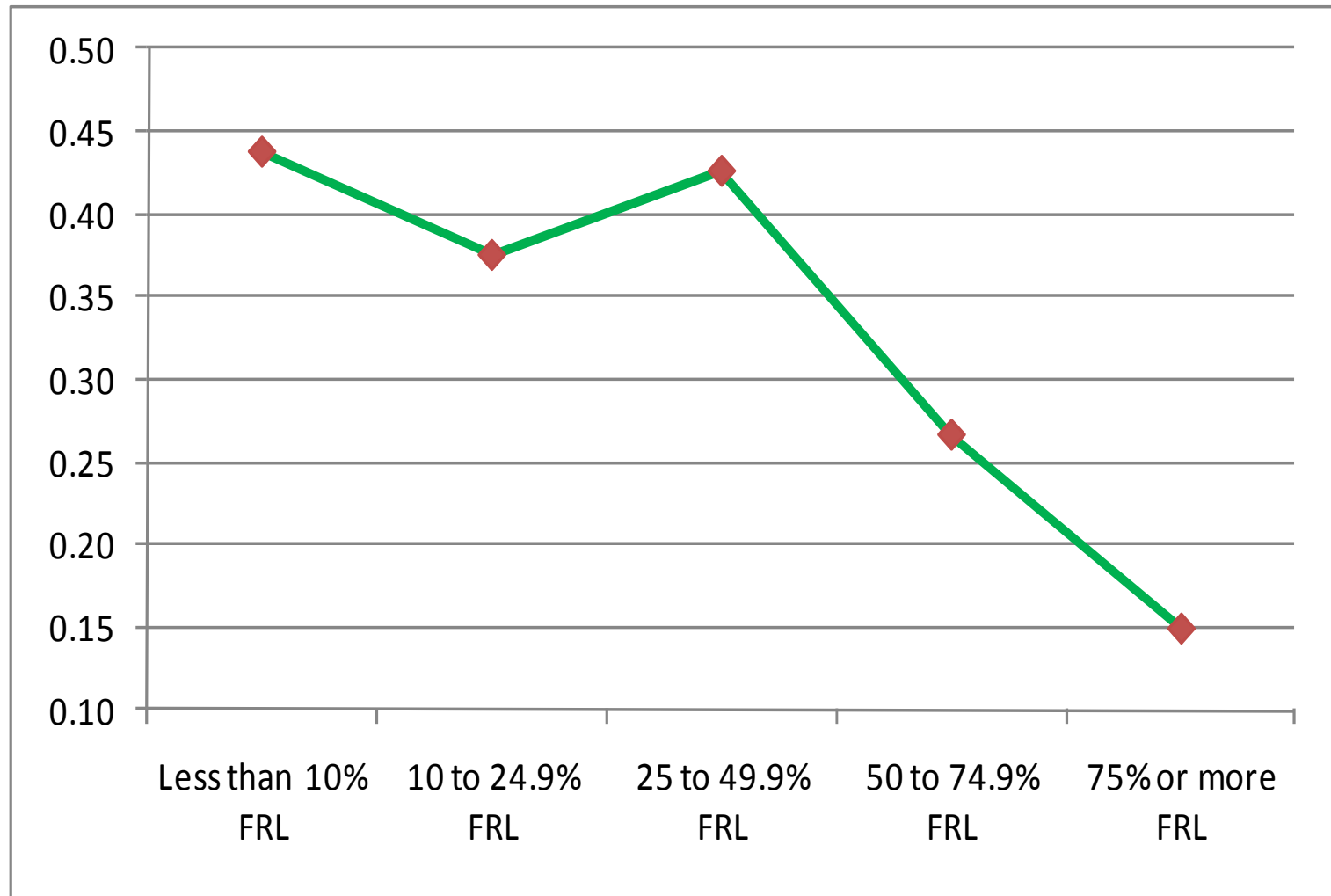




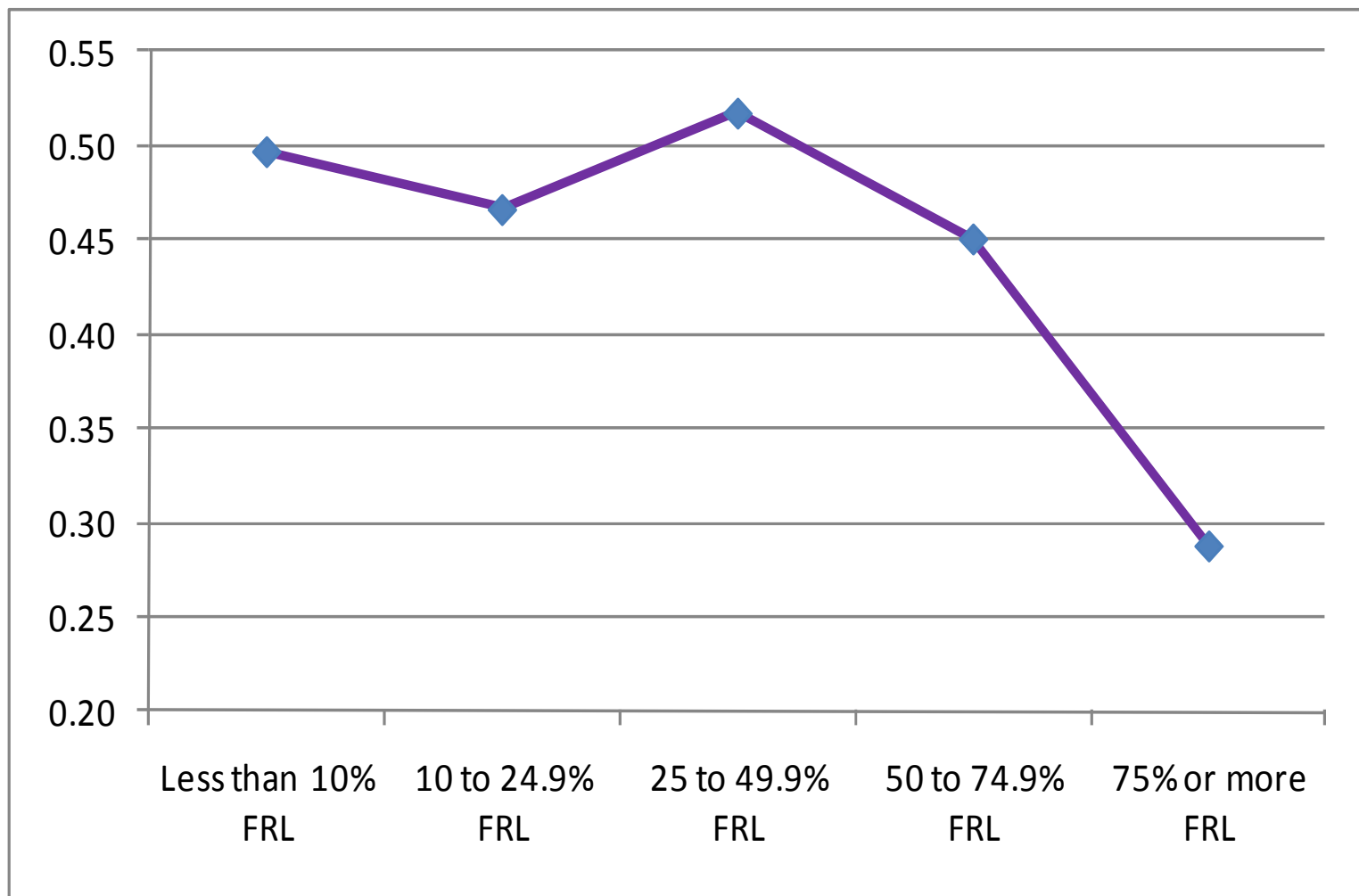
# Grade 8 Human Biology and Health: Average Percent Correct by SES



# Grade 8 Science, Technology and Society: Average Percent Correct by SES



# Grade 8 Earth in the Universe: Average Percent Correct by SES



# Instructional Content Constructs

## ❖ **Curricular Coherence**

- **Curricular Structure**

## ❖ **Curricular Focus**

- **Exposure Time (OTL)**

## ❖ **Curricular Rigor**

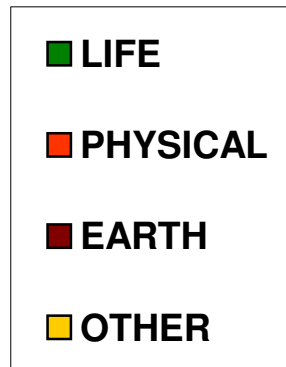
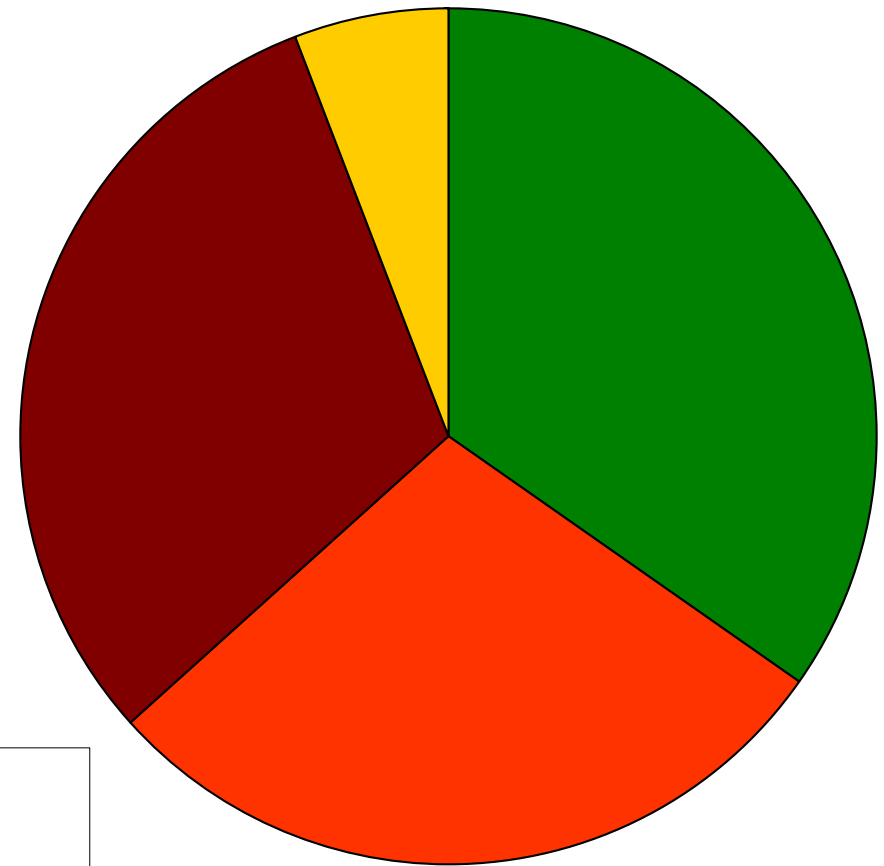
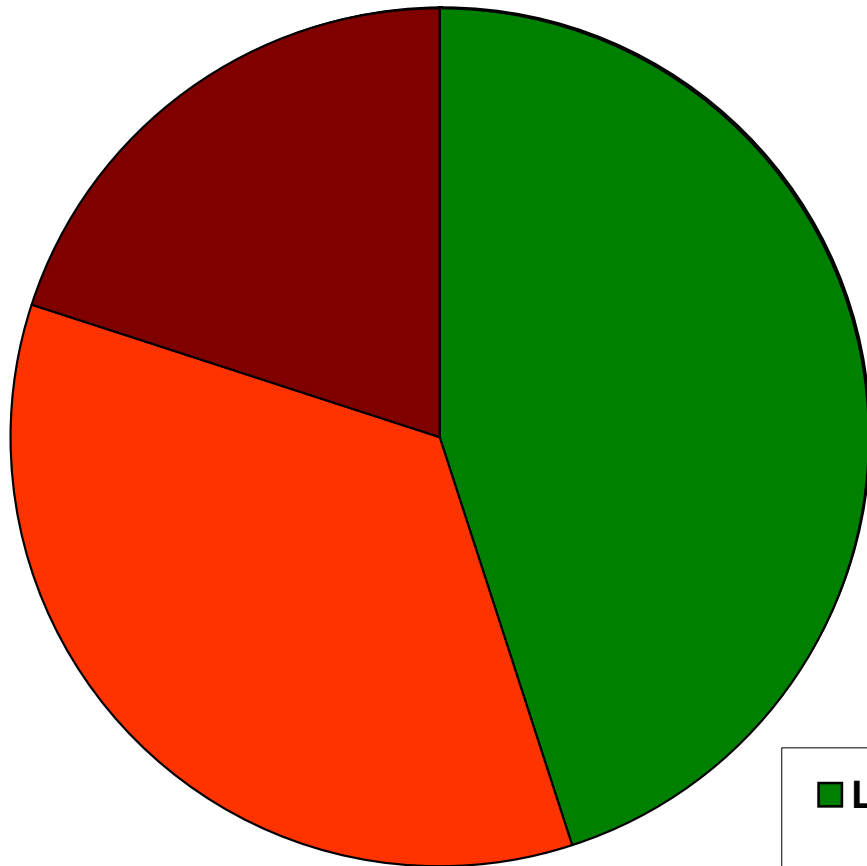
- **Level of Cognitive Complexity**



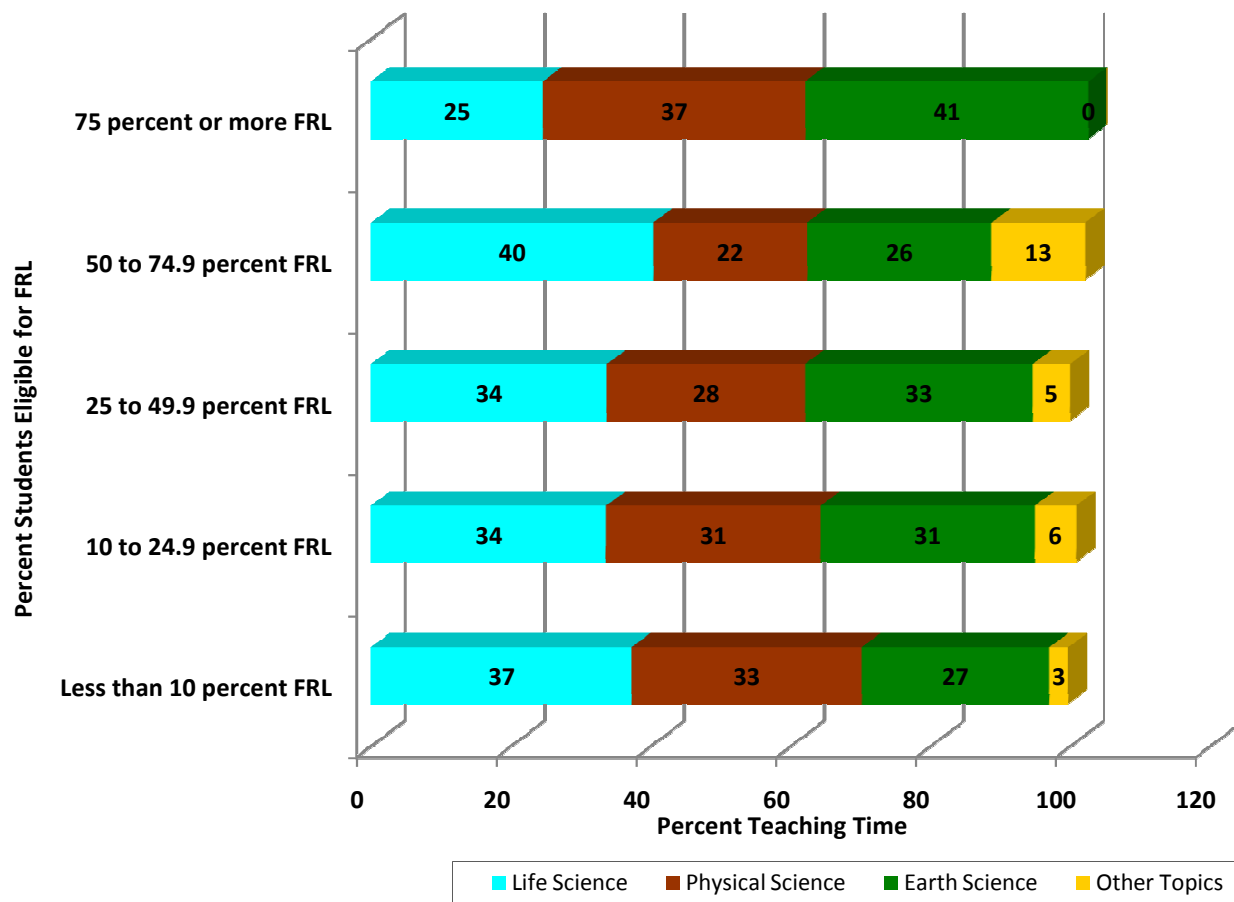
# Grade 4 Science Mean Teaching Emphasis

2007 TIMSS TEST EMPHASIS

2007

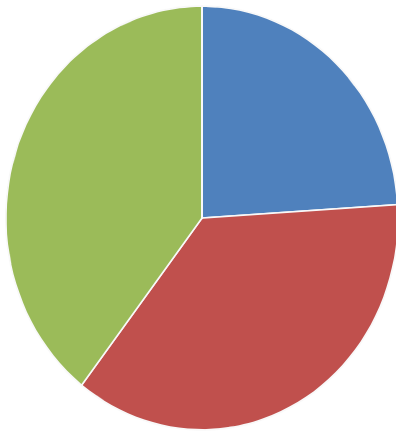


# Grade 4 Teachers' Reported Percent Teaching Time on Science Topics by School SES

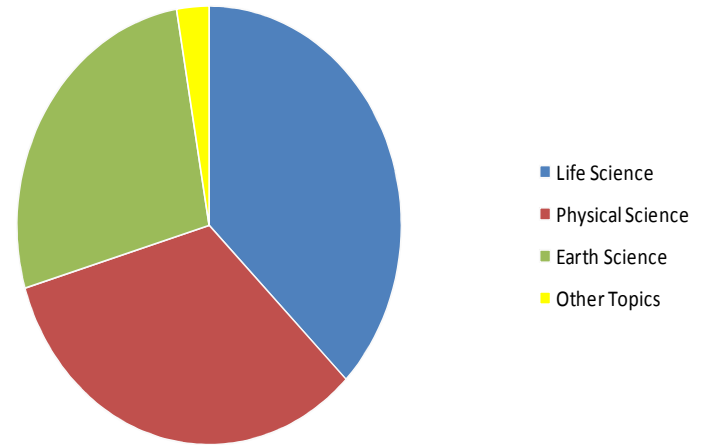


# Grade 4 Teachers' Reported Percent Teaching Time on Science Topics by School SES

Grade 4 Lowest SES Schools



Grade 4: Highest SES Schools

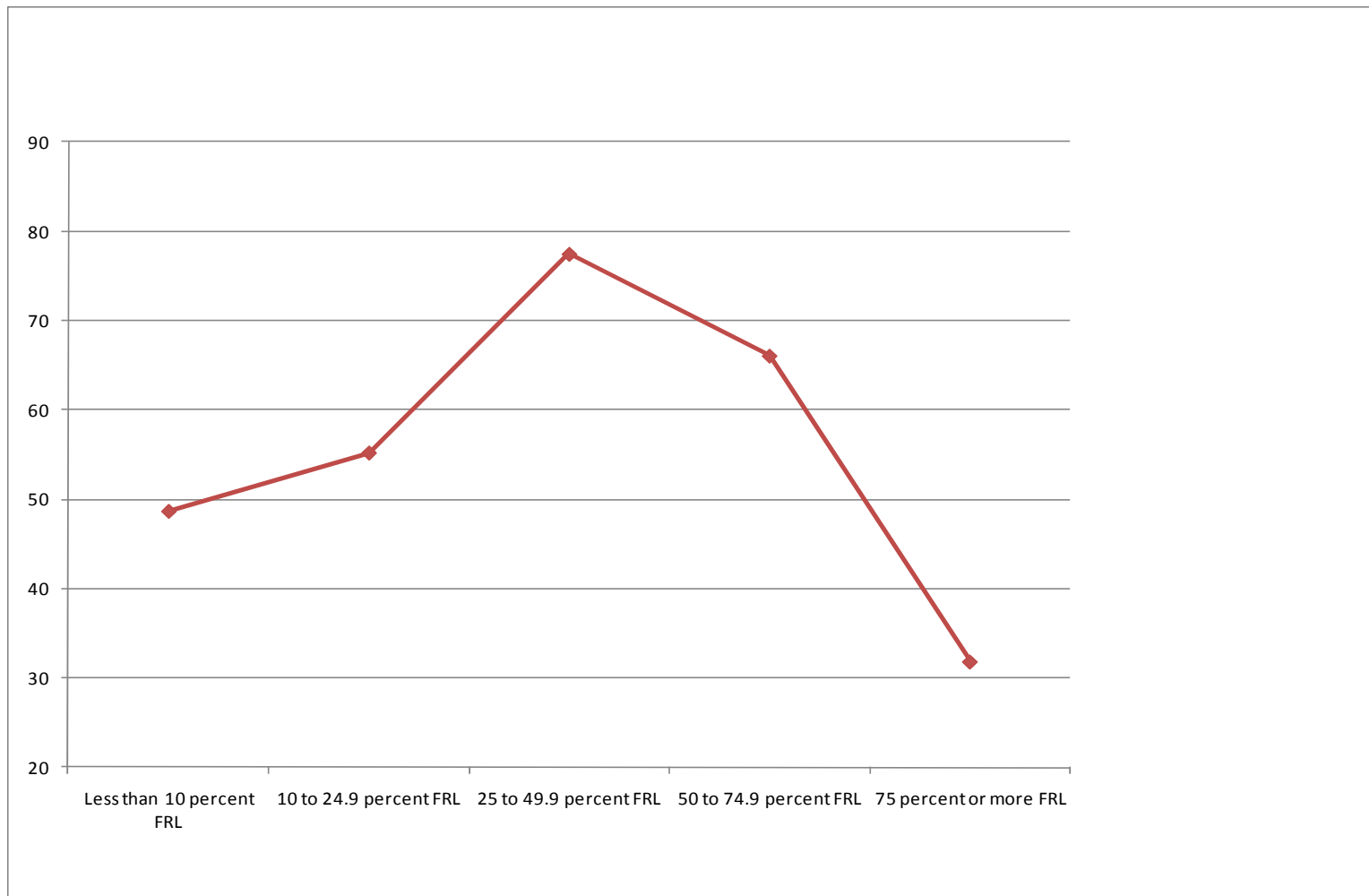




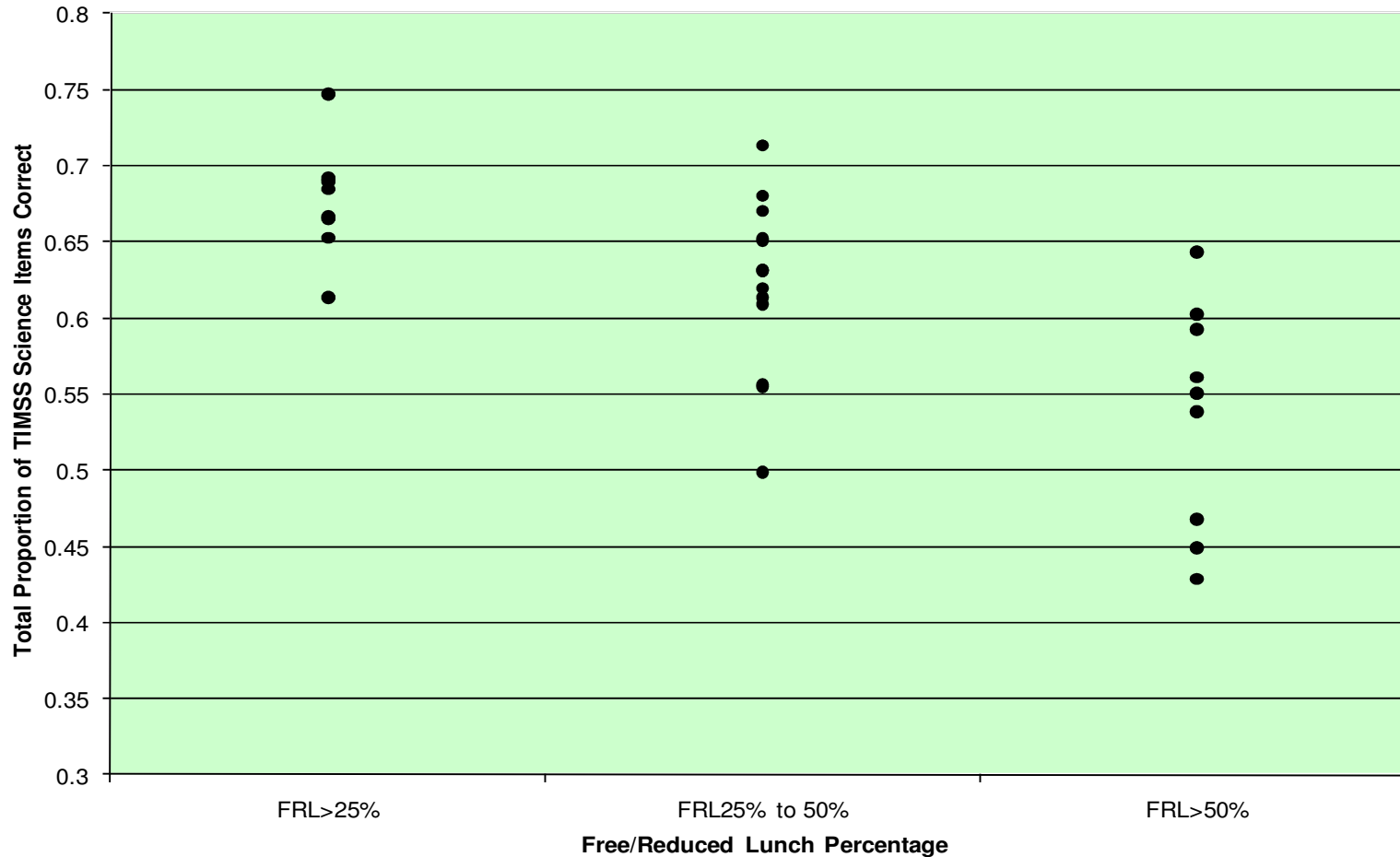
# Mean Percent of Grade 4 Science Teaching Time

| <i>Topic</i>  | <i>Highest SES</i> | <i>Lowest SES</i> | <i>Difference</i> |
|---------------|--------------------|-------------------|-------------------|
| Life Science  | 37                 | 25                | <b>4+ Weeks</b>   |
| Earth Science | 27                 | 41                | <b>5 Weeks</b>    |

# Grade 4 MN Teachers' Yearly Total Science Instructional Time by SES

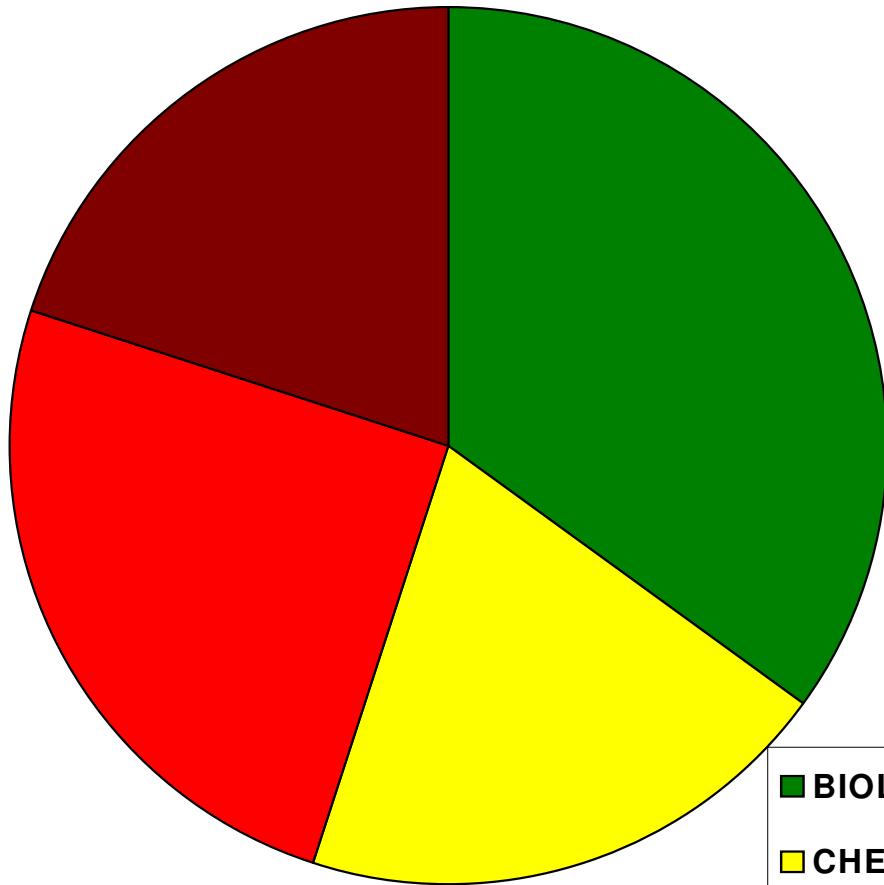


# MN Students Overall Percent Correct on TIMSS 2007 Science Fourth Grade Test by Percentage of FRL Students in School

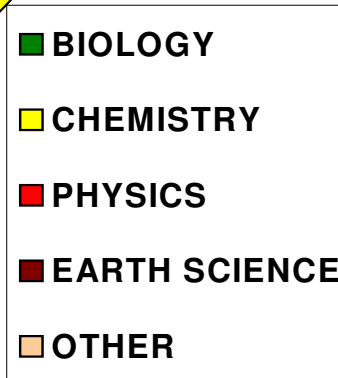
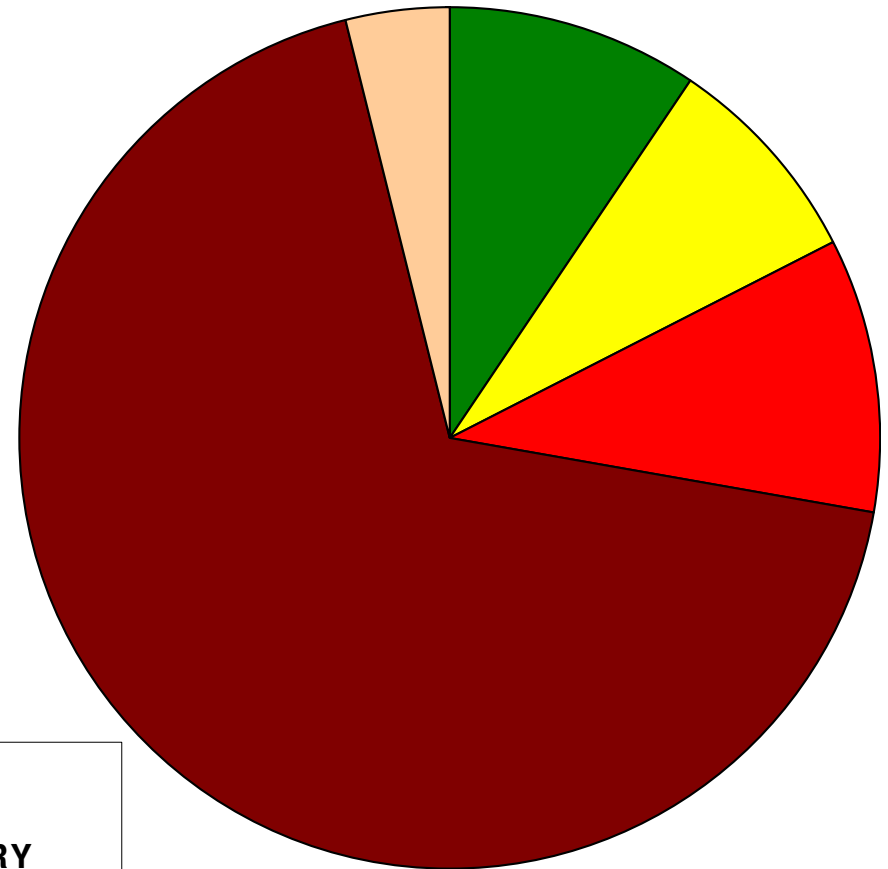


# Grade 8 Science Mean Teaching Emphasis

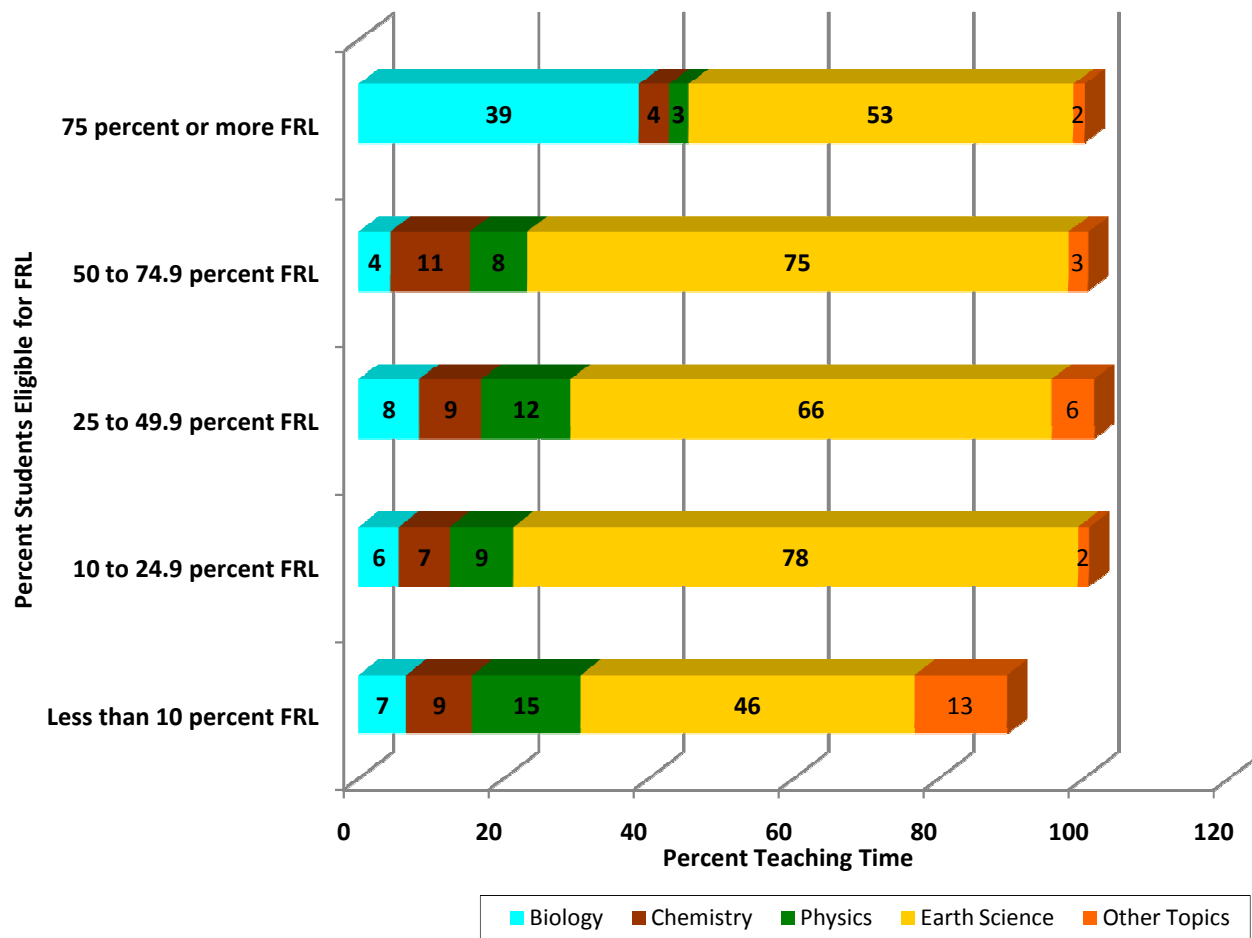
2007 TIMSS TEST EMPHASIS



2007

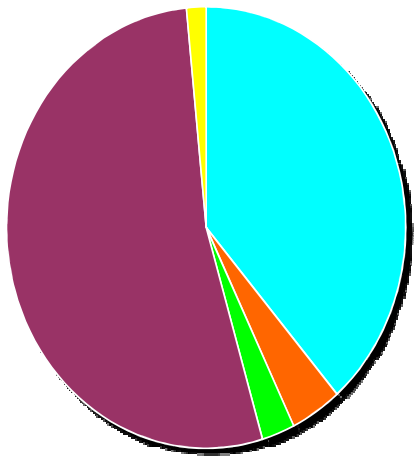


# Grade 8 Teachers' Reported Percent Teaching Time on Science Topics by School SES

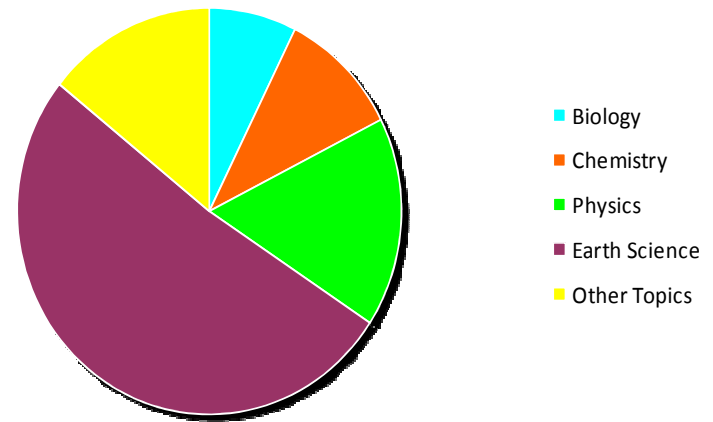


# Grade 8 Teachers' Reported Percent Teaching Time on Science Topics by School SES

Grade 8 Lowest SES Schools



Grade 8 Highest SES Schools

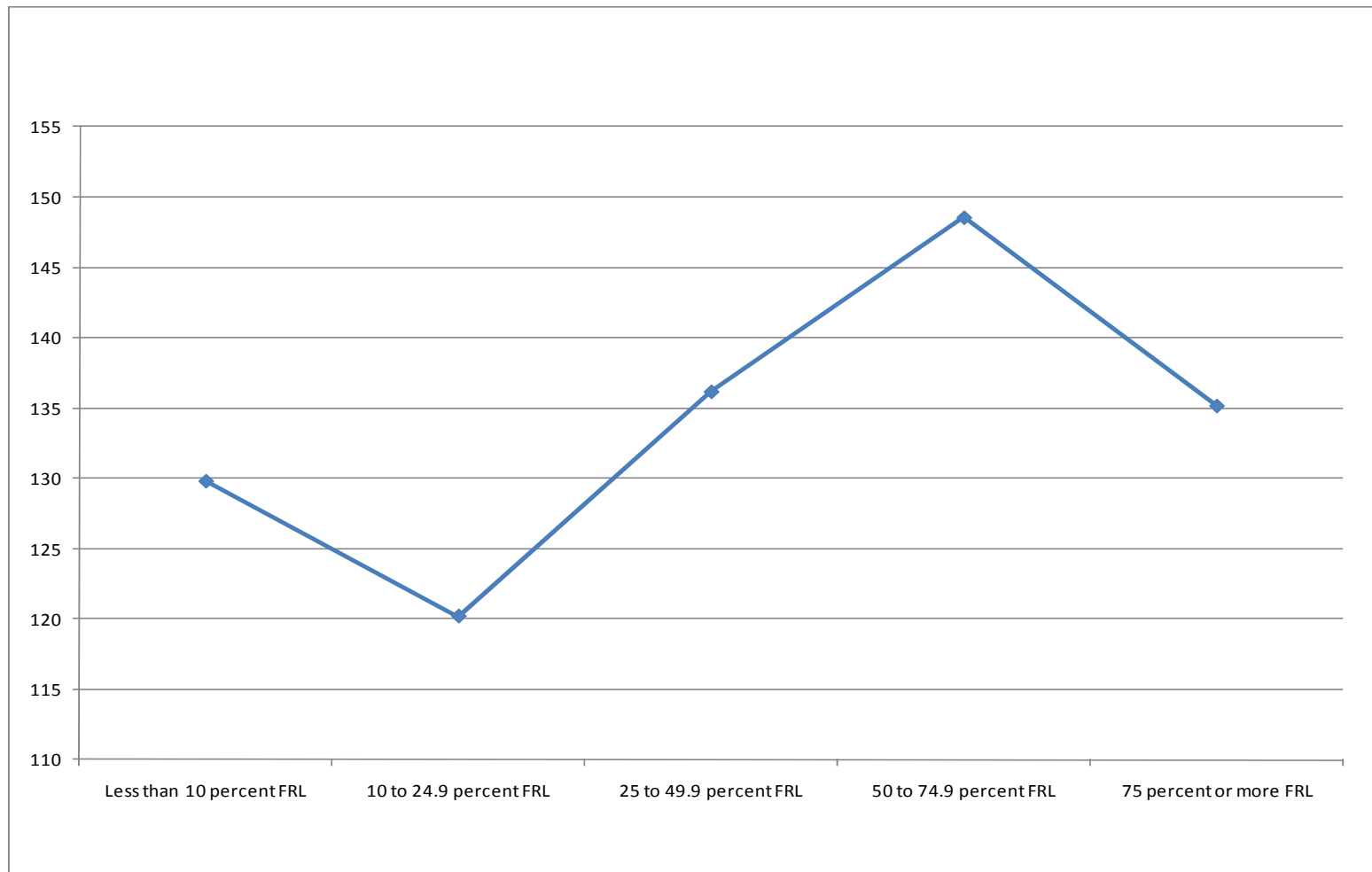


- Biology
- Chemistry
- Physics
- Earth Science
- Other Topics

# Mean Percent of Grade 8 Science Teaching Time

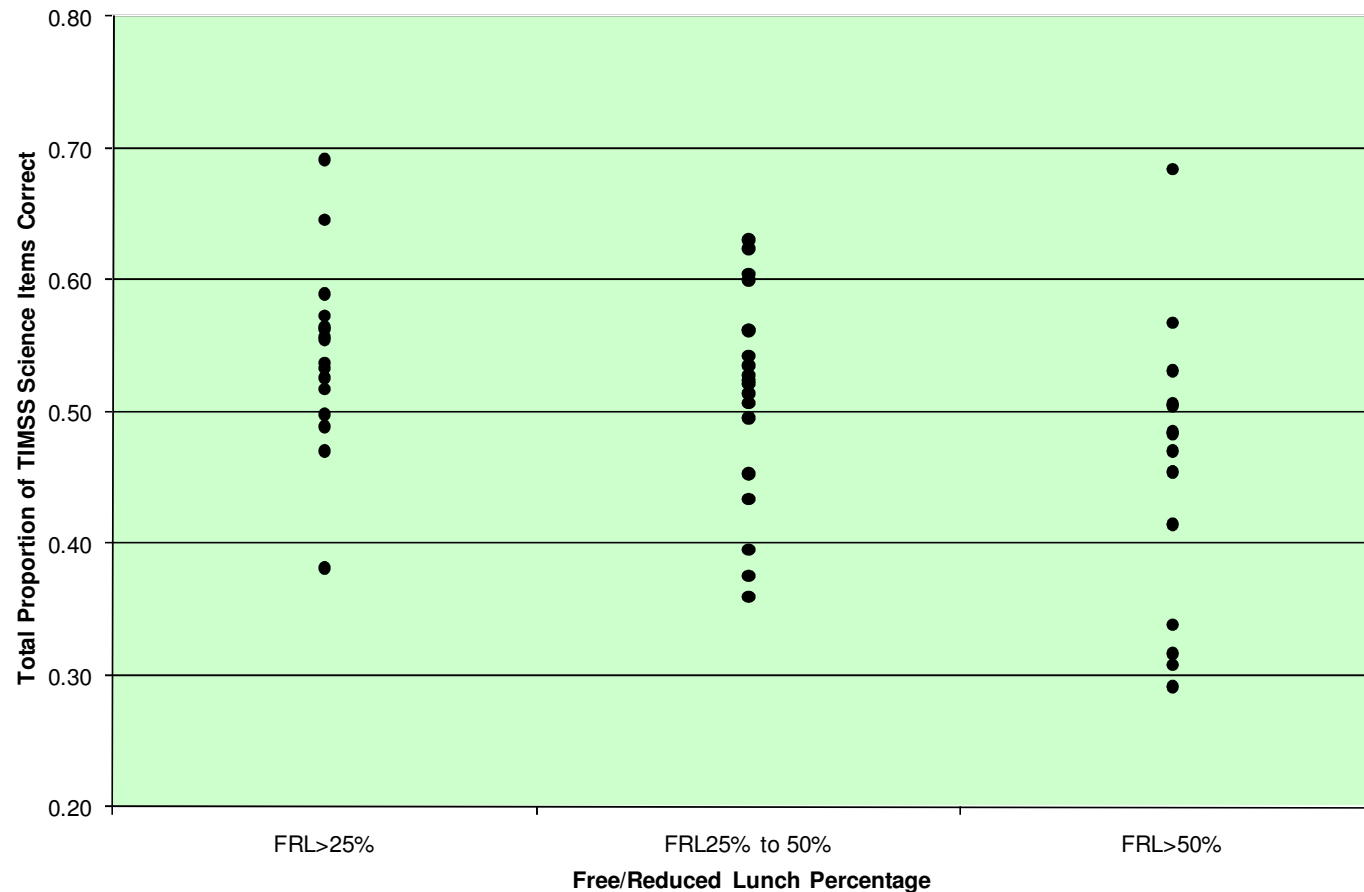
| <i>Topic</i>  | <i>Highest SES</i> | <i>Lowest SES</i> | <i>Difference</i> |
|---------------|--------------------|-------------------|-------------------|
| Biology       | 7                  | 39                | <b>11+ Weeks</b>  |
| Earth Science | 46                 | 53                | <b>2+ Weeks</b>   |
| Physics       | 15                 | 3                 | <b>2+ Weeks</b>   |
| Other Topics  | 13                 | 2                 | <b>4 Weeks</b>    |

# Grade 8 MN Teachers' Yearly Total Science Instructional Time by SES

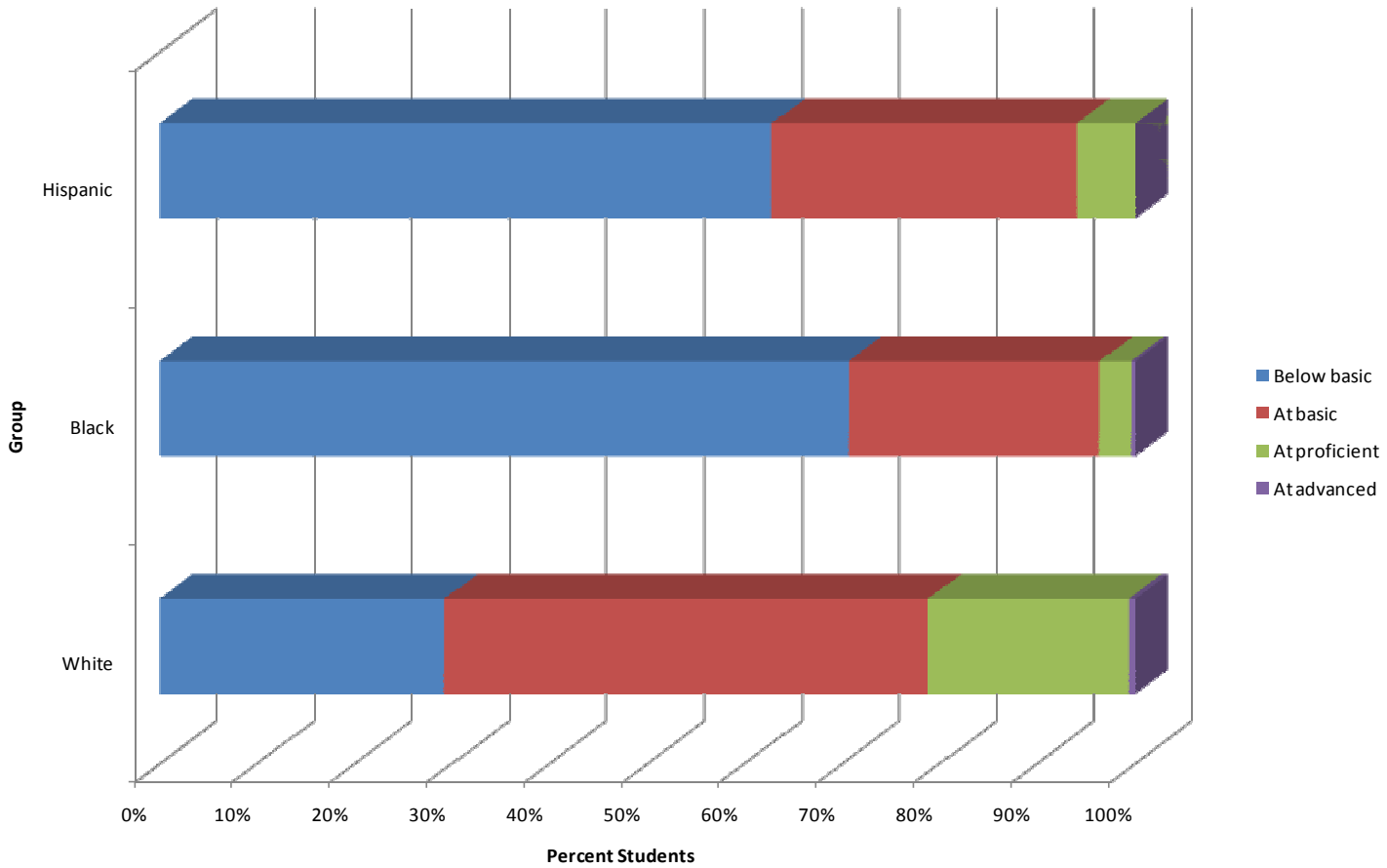




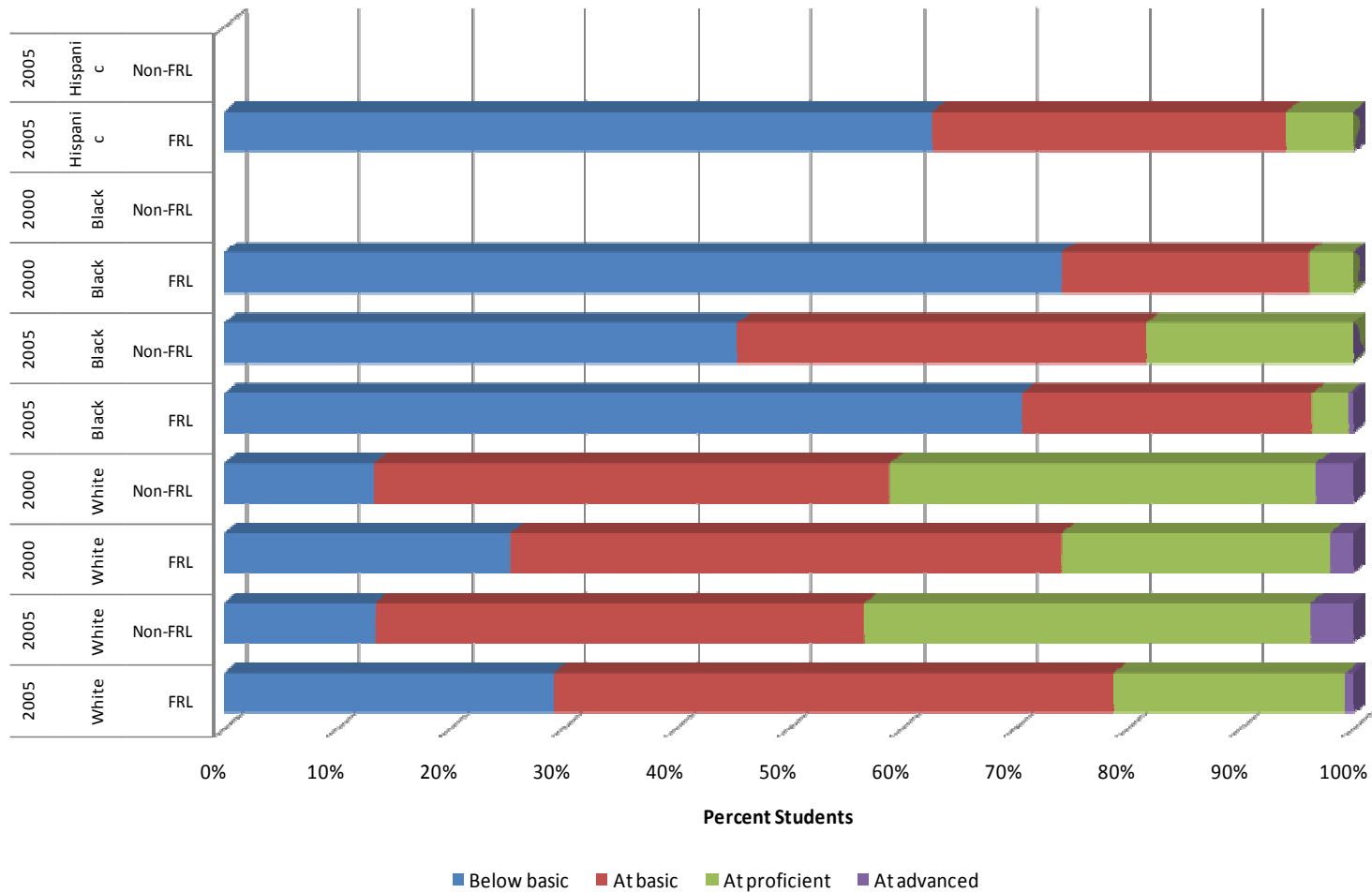
# MN Students Overall Percent Correct on TIMSS 2007 Science Eighth Grade Test by Percentage of FRL Students in School



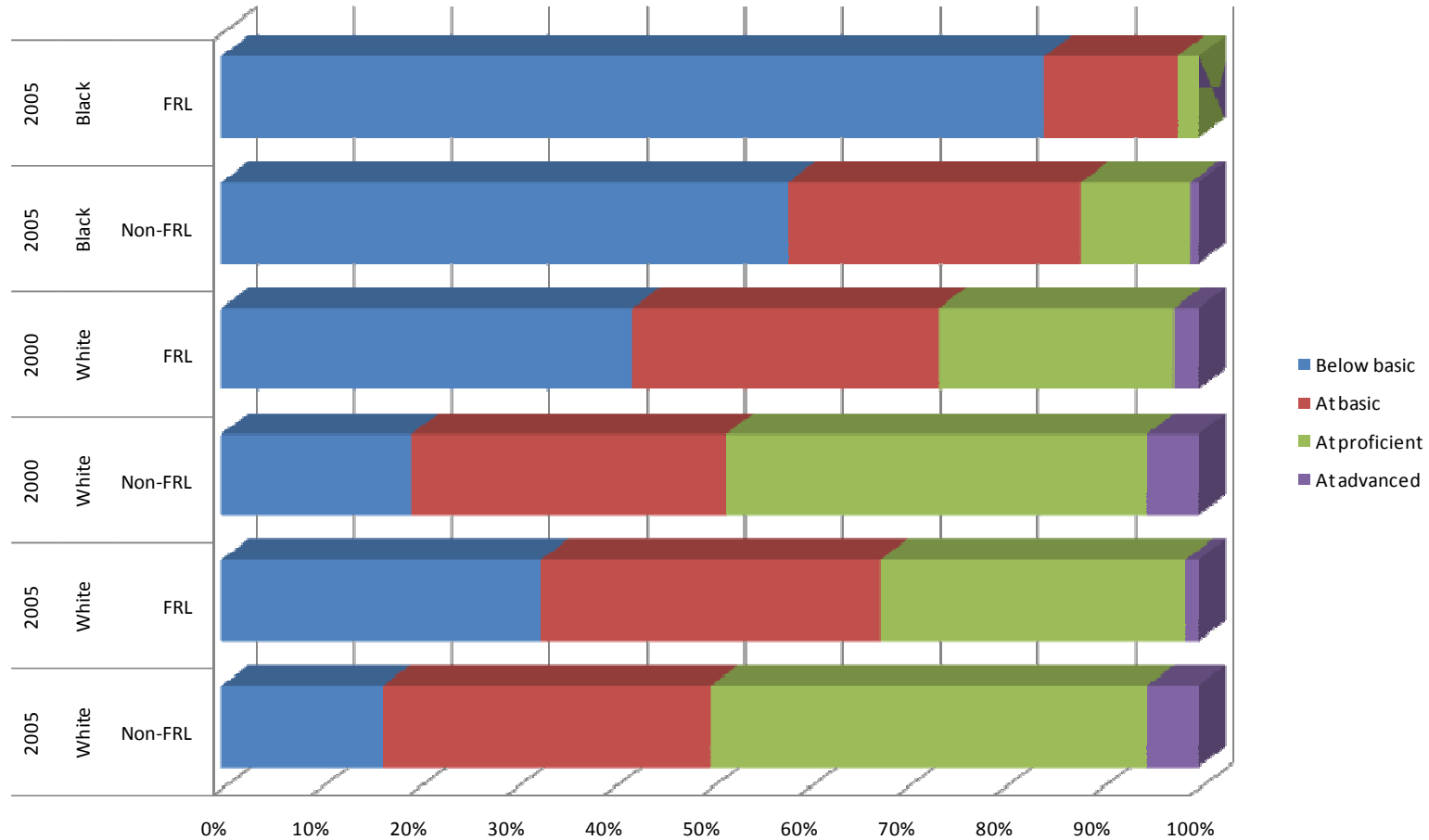
### MN Grade 4 Students Eligible for School Lunch Program: NAEP 2005 Science Proficiency Levels by Ethnicity



## MN Grade 4 Students: NAEP 2005 and 2000 Science Proficiency Levels by Ethnicity and School Lunch Eligibility



## MN Grade 8 Students: NAEP 2005 and 2000 Science Proficiency Levels by Ethnicity and School Lunch Eligibility



## MN Grade 4 Students: NAEP 2009, 2007 and 2005 Math Proficiency Levels by Ethnicity and School Lunch Eligibility

