Missouri
DEPARTMENT OF ELEMENTARY & SECONDARY
EDUCATION™

End-of-Course Assessments

Technical Report

2013–2014

English II
Algebra I
Biology
English I
Algebra II
Geometry
American History
Government

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Table of Contents

List of Abbreviations xiii
Executive Summary 1
E.1 Background 1
E.2 Administration 2
E.3 Student Performance 2
E.4 Evidence Supporting the Validity of Inferences from the MO EOC Assessment Scores .. 4
Chapter 1: Introduction 7
1.1 History of the MO EOC Assessments 7
1.2 Description of Missouri's Current Assessment System 10
1.3 Summary of the MO EOC Assessments 10
1.4 Testing, Reporting, and Accountability 11
1.5 MO EOC Organizational Support 12
1.6 Purpose of the Technical Report 14
Chapter 2: Test Development 15
2.1 Introduction 15
2.2 Design of the MO EOC Assessments 15
2.2.1 Spring 2008 Standalone Field Test 19
2.2.2 Fall 2008 Operational Administration 19
2.2.3 Spring 2009 Operational Administration 19
2.2.4 Spring 2009 Standalone English II WP Field Test 20
2.2.5 Spring 2009 Standalone Field Test 20
2.2.6 Fall 2009 Operational Administration 20
2.2.7 Spring 2010 Operational Administration 20
2.2.8 Summer 2010 Operational Administration 21
2.2.9 Fall 2010 Operational Administration 21
2.2.10 Spring 2011 Operational Administration 22
2.2.11 Released Forms 22
2.2.12 Summer 2011 through Spring 2014 Operational Administrations 22
2.3 Test Blueprints 22
2.4 Test Specifications 28
2.4.1 English II 28
2.4.2 Algebra I 32
2.4.3 Biology 36
2.4.4 English I 42
2.4.5 Algebra II 47
2.4.6 Geometry 50
2.4.7 Government 53
2.4.8 American History 56
2.5 Development of Test Items 61
2.5.1 Item Writing 62
2.5.2 Universal Design 63
2.5.3 Content and Bias Review Process 64
2.6 Test Form Assembly 66
2.6.1 Field-Test Selection and Administration 66
2.6.2 Statistical Item Review 67

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2.6.3 Operational Test Selection and Administration 68
2.7 Braille and Large Print Versions 69
2.8 Online Forms Construction 70
2.9 Quality Control for Test Construction 70
2.10 Summary 71
Chapter 3: Achievement-Level Setting 72
3.1 Introduction 72
3.2 Goal of the Standard Setting 72
3.3 Staff and Panelists 72
3.4 2008 Standard Setting 72
3.5 2009 Standard Setting 73
3.6 Development of Achievement-Level Descriptors (ALDs) 73
3.7 Overview of the Standard Setting Activities 73
3.7.1 Methodology and Data Considerations 73
3.7.2 Description of the Test Forms and Considerations 74
3.7.2.1 2008 Standard Setting 74
3.7.2.2 2009 Standard Setting 74
3.8 Specific Standard Setting Activities 75
3.8.1 General Process Overview 75
3.8.2 Panelists Take the Operational Assessments 75
3.8.3 Panelists Discuss and Fine-Tune the ALDs 75
3.8.4 Orientation to the Modified Angoff Procedures 76
3.8.5 Round 1 Judgments 77
3.8.6 Feedback and Discussion of Round 1 Judgments 78
3.8.7 Round 2 Judgments 78
3.8.8 Feedback and Discussion of Round 2 Judgments 79
3.8.9 Round 3 of Judgments, Meeting Evaluation, and Final Inspection of the ALDs 79
3.9 Session Results by Panel and Round 79
3.10 Results of Panelist Evaluations 82
Chapter 4: Item Analysis 83
4.1 Introduction 83
4.2 Analysis of Forms for Each End-of-Course Assessment 84
4.3 Speededness 112
4.4 Differential Item Functioning (DIF) 112
4.5 Summary 115
Chapter 5: Test Administration 116
5.1 Introduction 116
5.2 Students for Whom the MO EOC Assessments are Appropriate 116
5.2.1 Students with Individualized Education Programs (IEPs) 117
5.2.2 Students with Individual Accommodation Programs 117
5.2.3 English Language Learner (ELL) Students 117
5.3 Students for Whom a School or District is Accountable 117
5.4 Dissemination of Testing Materials and Information 117
5.5 District and Test Examiner Training 118
5.6 Test Security 118
5.6.1 Detection and Prevention of Testing Irregularities 119

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5.7 Test Administration 120
5.7.1 Test Organization 120
5.7.2 Test and Ancillary Materials 120
5.7.3 Preparing the Test Administration Site and the Students 121
5.7.4 Directions for Administration 122
5.8 Accommodations and Modifications 124
5.9 Materials Handling and Return 130
5.9.1 Questar's Secure Material Check-In Procedures 131
5.10 Summary 132
Chapter 6: Testing on Tablets 133
6.1 Introduction 133
6.2 Raw Score Descriptive Statistics by Device 133
6.3 Comparability Study Methodology 137
6.4 Comparability Study Results 138
6.4.1 Analysis of Items Outside of Control Line Boundaries 147
6.4.2 Comparison of Samples A and B Scoring Tables to Sample C Scoring Tables . 148
6.5 Comparability Analysis Summary 151
Chapter 7: Scoring 152
7.1 Introduction 152
7.2 Scoring Requiring Human Judgment 152
7.3 Scoring of the PE/WPs 152
7.3.1 Scorer Recruitment and Selection 152
7.3.2 Scorer Training and Qualification Procedures 153
7.4 Scorer Training 154
7.5 Qualification 154
7.5.1 Second Read Procedures 155
7.5.2 Scoring Monitoring and Recalibration Procedures 155
7.5.2.1 Read-Behinds 155
7.5.2.2 Calibration 155
7.5.2.3 Managing Scoring Quality (Scorer Exception Processing) 156
7.5.2.4 Validity 156
7.5.2.6 Validity as Review 158
7.5.2.7 Frequency Distribution 158
7.5.2.8 Retraining and Resetting Scores 158
7.5.2.9 Reporting and Data Analysis 158
7.5.3 Description of the Item Types and Score Points for each Content Area 158
7.5.3.1 Summer 2013 158
7.5.3.2 Fall 2013 159
7.5.3.3 Spring 2014 159
Chapter 8: Scaling and Equating 160
8.1 Introduction 160
8.2 Item Response Theory 160
8.3 Scaling and Equating 161
8.3.1 Scaling Transformations 161
8.3.2 Post-equating of English II 164
8.3.2.1 Equating Sample 164

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8.3.2.2 Equating Procedure ... 164
8.3.2.3 Equating Results ... 165
8.3.3 Pre-equating ... 165
8.3.4 Raw Score to Scale Score Conversions ... 168
Chapter 9: Reporting ... 195
9.1 Introduction ... 195
9.2 Individual Student Report (ISR) ... 196
9.3 Student Score Label ... 198
9.4 Missouri Comprehensive Data System Portal ... 198
9.4.1 Administrative Reports ... 203
Chapter 10: Summary Statistics ... 205
10.1 Introduction ... 205
10.2 Descriptive Statistics for Total Raw Score ... 205
10.3 Descriptive Statistics for Total Raw Score by Cluster ... 206
10.4 Descriptive Statistics for Scale Scores by Test Administration and Content Area ... 209
10.4.1 MO EOC Calendar of Major Events ... 218
10.5 Descriptive Statistics by Demographic Group ... 218
Chapter 11: Reliability ... 305
11.1 Introduction ... 305
11.2 Reliability and Measurement Error ... 305
11.2.1 Defining Reliability ... 305
11.2.2 Estimating Reliability ... 306
11.2.3 Sources of Measurement Error ... 306
11.3 Evidence of Raw-Score Internal Consistency ... 306
11.4 Conditional Standard Error Estimates for Scale Scores ... 332
11.5 Evidence Supporting Scorer Reliability ... 333
11.5.1 Inter-rater Reliabilities ... 333
11.6 Reliability of Classifications ... 335
Chapter 12: Validity ... 340
12.1 Introduction ... 340
12.2 Federal Authority for School Accountability ... 340
12.3 Purpose and Intended Uses of Test Scores ... 340
12.4 MO EOC Assessment Scores ... 341
12.5 Content-Related Evidence of Validity ... 342
12.5.1 Appropriateness of Content Definition ... 342
12.5.2 Adequacy of Content Representation ... 342
12.6 Validity Evidence Based on the Internal Structure of the MO EOC Assessments ... 343
12.7 Discriminant Validity Evidence for the MO EOC Assessments ... 346
12.8 Additional Validity Evidence for the MO EOC Assessments ... 348
12.9 Summary ... 349
References ... 350
Appendix A: Training PowerPoint Presentations ... 351
Appendix B: Accommodation Codes ... 384
Appendix C: MO EOC Paper/Pencil vs. Online Comparability Study ... 387

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List of Tables

Table E.1: Percentage of Students at Each Performance Level for 2013–2014 3
Table 1.1: 2013–2014 MO EOC Testing Windows..... 12
Table 1.2: Main Activities for Groups Involved in MO EOC Organizational Support..... 13
Table 2.1: Linking Design for the English II, Algebra I, and Biology Assessments..... 17
Table 2.2: Test Construction Blueprint for English II with WP 23
Table 2.3: Test Construction Blueprint for Algebra I with PE 24
Table 2.4: Test Construction Blueprint for Biology with PEs..... 25
Table 2.5: Test Construction Blueprint for English I 26
Table 2.6: Test Construction Blueprint for Algebra II 27
Table 2.7: Test Construction Blueprint for Geometry 27
Table 2.8: Test Construction Blueprint for Government 27
Table 2.9: Test Construction Blueprint for American History 27
Table 2.10: Target Point Distributions for the English II Operational Forms 30
Table 2.11: Actual Point Distributions for the Summer 2013 English II Operational Forms 32
Table 2.12: Actual Point Distributions for the Fall 2013 English II Operational Forms..... 32
Table 2.13: Actual Point Distributions for the Spring 2014 English II Operational Forms 32
Table 2.14: Target Point Distributions for the Algebra I Operational Forms..... 34
Table 2.15: Actual Point Distributions for the Summer 2013 Algebra I Operational Forms..... 36
Table 2.16: Actual Point Distributions for the Fall 2013 Algebra I Operational Forms 36
Table 2.17: Actual Point Distributions for the Spring 2014 Algebra I Operational Forms..... 36
Table 2.18: Target Point Distributions for the Biology I Operational Forms..... 38
Table 2.19: Actual Point Distributions for the Summer 2013 Biology Operational Forms 42
Table 2.20: Actual Point Distributions for the Fall 2013 Biology Operational Forms..... 42
Table 2.21: Actual Point Distributions for the Spring 2014 Biology Operational Forms 42
Table 2.22: Target Point Distributions for the English I Operational Forms 44
Table 2.23: Actual Point Distributions for the Summer 2013 English I Operational Form 46
Table 2.24: Actual Point Distributions for the Fall 2013 English I Operational Form 46
Table 2.25: Actual Point Distributions for the Spring 2014 English I Operational Form 46
Table 2.26: Target Point Distributions for the Algebra II Operational Forms 48
Table 2.27: Actual Point Distributions for the Summer 2013 Algebra II Operational Form 50
Table 2.28: Actual Point Distributions for the Fall 2013 Algebra II Operational Form 50
Table 2.29: Actual Point Distributions for the Spring 2014 Algebra II Operational Form 50
Table 2.30: Target Point Distributions for the Geometry Operational Forms 51
Table 2.31: Actual Point Distributions for the Summer 2013 Geometry Operational Form..... 53
Table 2.32: Actual Point Distributions for the Fall 2013 Geometry Operational Form 53
Table 2.33: Actual Point Distributions for the Spring 2014 Geometry Operational Form..... 53
Table 2.34: Target Point Distributions for the Government Operational Forms 54
Table 2.35: Actual Point Distributions for the Summer 2013 Government Operational Form.... 56
Table 2.36: Actual Point Distributions for the Fall 2013 Government Operational Form 56
Table 2.37: Actual Point Distributions for the Spring 2014 Government Operational Form..... 56
Table 2.38: Target Distributions for the Am. History Operational Forms 58
Table 2.39: Actual Point Distributions for the Summer 2013 Am. History Operational Form.... 61
Table 2.40: Actual Point Distributions for the Fall 2013 Am. History Operational Form 61

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Table 2.41: Actual Point Distributions for the Spring 2014 Am. History Operational Form..... 61
Table 2.42: 2007 Content/Bias Item Review Acceptance Rates 66
Table 2.43: 2008 Content/Bias Item Review Acceptance Rates 66
Table 2.44: Criteria for Flagged Items..... 68
Table 3.1: Median Recommended Cut Scores by Content Area and Round..... 81
Table 3.2: Median Recommended Cut Scores by Content Area and Round..... 81
Table 3.3: Projected Statewide Percentages of Students Scoring in the Various Achievement Levels on the MO EOC Assessments, 2008 82
Table 3.4: Projected Statewide Percentages of Students Scoring in the Various Achievement Levels on the MO EOC Assessments, 2009 82
Table 4.1: N-Count per Content Area for Each Administration..... 84
Table 4.2: Item Statistics for English II, Summer 2013 85
Table 4.3: Item Statistics for Algebra I, Summer 2013 86
Table 4.4: Item Statistics for Biology, Summer 2013 87
Table 4.5: Item Statistics for English I, Summer 2013..... 89
Table 4.6: Item Statistics for Algebra II, Summer 2013..... 90
Table 4.7: Item Statistics for Geometry, Summer 2013 91
Table 4.8: Item Statistics for Government, Summer 2013 92
Table 4.9: Item Statistics for Am. History, Summer 2013 93
Table 4.10: Item Statistics for English II, Fall 2013..... 94
Table 4.11: Item Statistics for Algebra I, Fall 2013 95
Table 4.12: Item Statistics for Biology, Fall 2013..... 96
Table 4.13: Item Statistics for English I, Fall 2013 98
Table 4.14: Item Statistics for Algebra II, Fall 2013 99
Table 4.15: Item Statistics for Geometry, Fall 2013..... 100
Table 4.16: Item Statistics for Government, Fall 2013..... 101
Table 4.17: Item Statistics for Am. History, Fall 2013..... 102
Table 4.18: Item Statistics for English II, Spring 2014 103
Table 4.19: Item Statistics for Algebra I, Spring 2014 104
Table 4.20: Item Statistics for Biology, Spring 2014 105
Table 4.21: Item Statistics for English I, Spring 2014..... 107
Table 4.22: Item Statistics for Algebra II, Spring 2014..... 108
Table 4.23: Item Statistics for Geometry, Spring 2014 109
Table 4.24: Item Statistics for Government, Spring 2014 110
Table 4.25: Item Statistics for Am. History, Spring 2014 111
Table 4.26: Frequency Distribution of DIF Categories for the Summer 2013 Operational Assessments 113
Table 4.27: Frequency Distribution of DIF Categories for the Fall 2013 Operational Assessments 114
Table 4.28: Frequency Distribution of DIF Categories for the Spring 2014 Operational Assessments 115
Table 5.1: Frequency and Percentage of Students Receiving Each Type of Allowable Accommodation on the Summer 2013 MO EOC Assessments..... 125

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Table 5.2: Frequency and Percentage of Students Receiving Each Type of Allowable Accommodation on the Fall 2013 MO EOC Assessments 127
Table 5.3: Frequency and Percentage of Students Receiving Each Type of Allowable Accommodation on the Spring 2014 MO EOC Assessments 129
Table 6.1: Raw and Scale Score Statistics for SR-only MO EOC Assessments—iPad vs. Online 134
Table 6.2: Raw and Scale Score Statistics for SR-only MO EOC Assessments—Chromebook vs. Online 134
Table 6.3: Raw and Scale Score Statistics for Mixed-Format MO EOC Assessments—iPad vs. Online 136
Table 6.4: Raw and Scale Score Statistics for Mixed-Format MO EOC Assessments—Chromebook vs. Online 136
Table 6.5: Correlation Coefficients for Item Parameters Estimated from Different Samples 146
Table 6.6: Items Outside the Control Lines 147
Table 7.1: Validity Statistics for Fall 2013 157
Table 7.2: Validity Statistics for Spring 2014 157
Table 8.1: Form: Scale Score Ranges for the MO EOC Assessment Achievement Levels 162
Table 8.2: Summary of Slopes and Intercepts of Theta to Scale Score Transformation Functions by Content Area 163
Table 8.3: Theta to Scale Score Transformation Function for English II from the *2008–2009 MO EOC Phase I Technical Report* (p.129) 165
Table 8.4: Raw Score to Scale Score Conversions for Summer 2013, English II 168
Table 8.5: Raw Score to Scale Score Conversions for Summer 2013, Algebra I 169
Table 8.6: Raw Score to Scale Score Conversions for Summer 2013, Biology 170
Table 8.7: Raw Score to Scale Score Conversions for Summer 2013, English I 172
Table 8.8: Raw Score to Scale Score Conversions for Summer 2013, Algebra II 173
Table 8.9: Raw Score to Scale Score Conversions for Summer 2013, Geometry 174
Table 8.10: Raw Score to Scale Score Conversions for Summer 2013, Government 175
Table 8.11: Raw Score to Scale Score Conversions for Summer 2013, Am. History 176
Table 8.12: Raw Score to Scale Score Conversions for Fall 2013, English II 177
Table 8.13: Raw Score to Scale Score Conversions for Fall 2013, Algebra I 178
Table 8.14: Raw Score to Scale Score Conversions for Fall 2013, Biology 179
Table 8.15: Raw Score to Scale Score Conversions for Fall 2013, English I 181
Table 8.16: Raw Score to Scale Score Conversions for Fall 2013, Algebra II 182
Table 8.17: Raw Score to Scale Score Conversions for Fall 2013, Geometry 183
Table 8.18: Raw Score to Scale Score Conversions for Fall 2013, Government 184
Table 8.19: Raw Score to Scale Score Conversions for Fall 2013, Am. History 185
Table 8.20: Raw Score to Scale Score Conversions for Spring 2014, English II 186
Table 8.21: Raw Score to Scale Score Conversions for Spring 2014, Algebra I 187
Table 8.22: Raw Score to Scale Score Conversions for Spring 2014, Biology 188
Table 8.23: Raw Score to Scale Score Conversions for Spring 2014, English I 190
Table 8.24: Raw Score to Scale Score Conversions for Spring 2014, Algebra II 191
Table 8.25: Raw Score to Scale Score Conversions for Spring 2014, Geometry 192
Table 8.26: Raw Score to Scale Score Conversions for Spring 2014, Government 193

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Table 8.27: Raw Score to Scale Score Conversions for Spring 2014, Am. History 194
Table 9.1: Reports Available on the MCDS Portal 203
Table 10.1: Descriptive Statistics for Total Raw Score 205
Table 10.2: Descriptive Statistics for Total Raw Score by Test Administration, Content Area, and Cluster—Summer 2013 206
Table 10.3: Descriptive Statistics for Total Raw Score by Test Administration, Content Area, and Cluster—Fall 2013 207
Table 10.4: Descriptive Statistics for Total Raw Score by Test Administration, Content Area, and Cluster—Spring 2014 208
Table 10.5: Scale Score Distributions for Each MO EOC Assessment 209
Table 10.6: Scale Score Cuts by Content Area 210
Table 10.7: Achievement-Level Distributions for Each MO EOC Assessment—Summer 2013 211
Table 10.8: Achievement-Level Distributions for Each MO EOC Assessment—Fall 2013 212
Table 10.9: Achievement-Level Distributions for Each MO EOC Assessment—Spring 2014 . 213
Table 10.10: Percentage of Students in Each Achievement Level by Test Administration and Content Area 214
Table 10.11: Percentage of Students in Each Achievement Level by Administration Year and Content Area 217
Table 10.12: Calendar of Major Events from 2008–2009 to 2013–2014 218
Table 10.13: Scale Score Distributions by Demographic Group—Gender, Summer 2013 219
Table 10.14: Scale Score Distributions by Demographic Group—Gender, Fall 2013 219
Table 10.15: Scale Score Distributions by Demographic Group—Gender, Spring 2014 220
Table 10.16: Scale Score Distributions by Demographic Group—Ethnicity, Summer 2013 221
Table 10.17: Scale Score Distribution by Demographic Group—Ethnicity, Fall 2013 223
Table 10.18: Scale Score Distribution by Demographic Group—Ethnicity, Spring 2014 225
Table 10.19: Scale Score Distribution by Demographic Group—Migrant Status, Summer 2013 227
Table 10.20: Scale Score Distribution by Demographic Group—Migrant Status, Fall 2013 227
Table 10.21: Scale Score Distribution by Demographic Group—Migrant Status, Spring 2014 228
Table 10.22: Scale Distributions by Demographic Group—Free and Reduced Lunch, Summer 2013 229
Table 10.23: Scale Distributions by Demographic Group—Free and Reduced Lunch, Fall 2013 229
Table 10.24: Scale Distributions by Demographic Group—Free and Reduced Lunch, Spring 2014 230
Table 10.25: Scale Score Distributions by Demographic Group—Limited English Proficient, Summer 2013 231
Table 10.26: Scale Score Distributions by Demographic Group—Limited English Proficient, Fall 2013 231
Table 10.27: Scale Score Distributions by Demographic Group—Limited English Proficient, Spring 2014 232
Table 10.28: Scale Score Distributions by Demographic Group—Title I, Summer 2013 233
Table 10.29: Scale Score Distributions by Demographic Group—Title I, Fall 2013 233
Table 10.30: Scale Score Distributions by Demographic Group—Title I, Spring 2014 234

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Table 10.31: Scale Score Distributions by Demographic Group—Students with IEPs, Summer 2013 235
Table 10.32: Scale Score Distributions by Demographic Group—Students with IEPs, Fall 2013 235
Table 10.33: Scale Score Distributions by Demographic Group—Students with IEPs, Spring 2014 236
Table 10.34: Scale Score Distributions by Demographic Group—Students with Accommodations, Summer 2013 237
Table 10.35: Scale Score Distributions by Demographic Group—Students with Accommodations, Fall 2013 237
Table 10.36: Scale Score Distributions by Demographic Group—Students with Accommodations, Spring 2014 238
Table 10.37: Achievement-Level Distributions—Gender, Summer 2013 239
Table 10.38: Achievement-Level Distributions—Gender, Fall 2013 241
Table 10.39: Achievement-Level Distributions—Gender, Spring 2014 243
Table 10.40: Achievement-Level Distribution—Ethnicity, Summer 2013 245
Table 10.41: Achievement-Level Distributions—Ethnicity, Fall 2013 253
Table 10.42: Achievement-Level Distributions—Ethnicity, Spring 2014 261
Table 10.43: Achievement-Level Distributions—Migrant, Summer 2013 269
Table 10.44: Achievement-Level Distributions—Migrant, Fall 2013 271
Table 10.45: Achievement-Level Distributions—Migrant, Spring 2014 273
Table 10.46: Achievement-Level Distributions—Free and Reduced Lunch, Summer 2013 275
Table 10.47: Achievement-Level Distributions—Free and Reduced Lunch, Fall 2013 277
Table 10.48: Achievement-Level Distributions—Free and Reduced Lunch, Spring 2014 279
Table 10.49: Achievement-Level Distributions—Limited English Proficient, Summer 2013 .. 281
Table 10.50: Achievement-Level Distributions—Limited English Proficient, Fall 2013 283
Table 10.51: Achievement-Level Distributions—Limited English Proficient, Spring 2014 285
Table 10.52: Achievement-Level Distributions—Title I, Summer 2013 287
Table 10.53: Achievement-Level Distributions—Title I, Fall 2013 289
Table 10.54: Achievement-Level Distributions—Title I, Spring 2014 291
Table 10.55: Achievement-Level Distributions—Individualized Education Program, Summer 2013 293
Table 10.56: Achievement-Level Distributions—Individualized Education Program, Fall 2013 295
Table 10.57: Achievement-Level Distributions—Individualized Education Program, Spring 2014 297
Table 10.58: Achievement-Level Distributions—Accommodations, Summer 2013 299
Table 10.59: Achievement-Level Distributions—Accommodations, Fall 2013 301
Table 10.60: Achievement-Level Distributions—Accommodations, Spring 2014 303
Table 11.1: Alpha Coefficients and Standard Errors of Measurement, English II, Summer 2013 308
Table 11.2: Alpha Coefficients and Standard Errors of Measurement, Algebra I, Summer 2013 309
Table 11.3: Alpha Coefficients and Standard Errors of Measurement, Biology, Summer 2013 310

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Table 11.4: Alpha Coefficients and Standard Errors of Measurement, English I, Summer 2013 311
Table 11.5: Alpha Coefficients and Standard Errors of Measurement, Algebra II, Summer 2013 312
Table 11.6: Alpha Coefficients and Standard Errors of Measurement, Geometry, Summer 2013 313
Table 11.7: Alpha Coefficients and Standard Errors of Measurement, Government, Summer 2013..... 314
Table 11.8: Alpha Coefficients and Standard Errors of Measurement, Am. History, Summer 2013..... 315
Table 11.9: Alpha Coefficients and Standard Errors of Measurement, English II, Fall 2013.... 316
Table 11.10: Alpha Coefficients and Standard Errors of Measurement, Algebra I, Fall 2013 .. 317
Table 11.11: Alpha Coefficients and Standard Errors of Measurement, Biology, Fall 2013..... 318
Table 11.12: Alpha Coefficients and Standard Errors of Measurement, English I, Fall 2013 ... 319
Table 11.13: Alpha Coefficients and Standard Errors of Measurement, Algebra II, Fall 2013 . 320
Table 11.14: Alpha Coefficients and Standard Errors of Measurement, Geometry, Fall 2013.. 321
Table 11.15: Alpha Coefficients and Standard Errors of Measurement, Government, Fall 2013 322
Table 11.16: Alpha Coefficients and Standard Errors of Measurement, Am. History, Fall 2013 323
Table 11.17: Alpha Coefficients and Standard Errors of Measurement, English II, Spring 2014 324
Table 11.18: Alpha Coefficients and Standard Errors of Measurement, Algebra I, Spring 2014 325
Table 11.19: Alpha Coefficients and Standard Errors of Measurement, Biology, Spring 2014 326
Table 11.20: Alpha Coefficients and Standard Errors of Measurement, English I, Spring 2014327
Table 11.21: Alpha Coefficients and Standard Errors of Measurement, Algebra II, Spring 2014 328
Table 11.22: Alpha Coefficients and Standard Errors of Measurement, Geometry, Spring 2014 329
Table 11.23: Alpha Coefficients and Standard Errors of Measurement, Government, Spring 2014 330
Table 11.24: Alpha Coefficients and Standard Errors of Measurement, Am. History, Spring 2014 331
Table 11.25: CSEMs at the Proficient Cut Score 332
Table 11.26: Inter-rater Reliability for Summer 2013 333
Table 11.27: Inter-rater Reliability for Fall 2013 334
Table 11.28: Inter-rater Reliability for Spring 2014 334
Table 11.29: Classification Consistency Coefficients 336
Table 11.30: Raw Agreement Consistency Coefficients 337
Table 11.31: Classification Consistency Coefficients (Two Classification Categories) 338
Table 11.32: Raw Agreement Consistency Coefficients (Two Classification Categories) 339
Table 12.1: Pearson Correlation Coefficients Between Domains and Clusters for English II ... 343
Table 12.2: Pearson Correlation Coefficients Between Domains and Clusters for Algebra I.... 344
Table 12.3: Pearson Correlation Coefficients Between Domains and Clusters for Biology 344

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Table 12.4: Pearson Correlation Coefficients Between Domains and Clusters for Algebra II .. 345
Table 12.5: Pearson Correlation Coefficients Between Domains and Clusters for Geometry ... 345
Table 12.6: Pearson Correlation Coefficients Between Domains and Clusters for Government 346
Table 12.7: Pearson Correlation Among Assessments with PEs, Spring 2014 347
Table 12.8: Pearson Correlation Coefficients Among Assessments with only SRs, Spring 2014 347
Table 12.9: Pearson Correlation Among All Assessments 348

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List of Figures

Figure 2.1: 2008–2009 Field-Test and Operational Assessment Design, English II 16
Figure 2.2: 2008–2009 Field-Test and Operational Assessment Design, Algebra I and Biology 16
Figure 2.3: Linking Design for Post Equating the MO EOC Assessments 17
Figure 2.4: Field Test and Operational Assessment Design, English I 18
Figure 2.5: Field Test and Operational Assessment Design, Algebra II, Geometry, Government, and American History 18
Figure 2.6: Field Test and Operational Assessment Design, Integrated Mathematics II and III.. 19
Figure 5.1: Examples of Type Styles Used to Differentiate between Spoken and Unspoken Instructions in the Test Administration Manual 122
Figure 5.2: Example Script from the Test Administration Manual for the Government EOC Assessment 123
Figure 6.1: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—English II 139
Figure 6.2: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—Algebra I 140
Figure 6.3: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—Biology 141
Figure 6.4: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—English I 142
Figure 6.5: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—Algebra II 143
Figure 6.6: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—Geometry 144
Figure 6.7: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—Government 145
Figure 6.8: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—American History 146
Figure 6.9: Amount (in logits) by which a Student Benefits from a Chromebook group-derived Conversion Table, by Raw Score 150
Figure 8.1: English II TCC 166
Figure 8.2: Algebra I TCC 166
Figure 8.3: Biology TCC 167
Figure 9.1: Individual Student Report (ISR) 197
Figure 9.2: Student Score Label 198

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List of Abbreviations

Below is a list of abbreviations that appear in this technical report.

ALD .....Achievement-Level Descriptor
ARC .....Assessment Resource Center
AYP .....Adequate Yearly Progress
CLE.....Course-Level Expectation
CMS.....Content Management System
CR .....Constructed-Response
CSEM .....Conditional Standard Error of Measurement
CTT.....Classical Test Theory
DESE .....Department of Elementary and Secondary Education
DIF.....Differential Item Functioning
DOK.....Depth of Knowledge
EFT .....Embedded Field Test
ELL .....English Language Learner
EOC .....End-of-Course
ESEA .....Elementary and Secondary Education Act
FRL .....Free and Reduced Lunch
GLE.....Grade-Level Expectation
GRF.....General Research File
IAP.....Individualized Accommodation Program
IDEA.....Individuals with Disabilities Education Act
IEP .....Individualized Education Program
IRR.....Inter-Rater Reliability
IRT .....Item Response Theory
ISR .....Individual Student Report
ITS .....Internet Testing Systems
LEP .....Limited English Proficient
LOSS.....Lowest Obtainable Scale Score
MAP.....Missouri Assessment Program
MCDS .....Missouri Comprehensive Data System
MH.....Mantel-Haenszel procedure
MOSIS .....Missouri Student Information System
NCLB.....No Child Left Behind
PE.....Performance Event
RS .....Raw Score
SD .....Standard Deviation
SE.....Standard Error
SEM .....Standard Error of Measurement
SR .....Selected-Response
TAC .....Technical Advisory Committee
TDS.....Test Development Specialist
WP .....Writing Prompt

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Executive Summary

This document provides a technical summary of the 2013–2014 administrations of the Missouri End-of-Course (MO EOC) Assessments in English II, Algebra I, Biology, English I, Algebra II, Geometry, Government, and American History. The criterion-referenced MO EOC Assessments are designed to assess students' knowledge of Missouri's Course-Level Expectations (CLEs) in these eight content areas. The 2013–2014 school year marked the sixth operational administration of the English II, Algebra I, and Biology Assessments and the fifth operational administration of the English I, Algebra II, Geometry, Government, and American History Assessments.

Most of the test forms used in 2013–2014 were intact forms previously administered in other testing administrations, and no items were developed or field tested. Existing raw score to scale score (RSS) conversion tables were used for these test forms. Post equating was conducted for English II for the Fall 2013 administration. The scheduled Fall 2013 general form of the English II Assessment was previously administered in Summer 2010, with only selected-response (SR) items. The writing prompt (WP) was added to the form for the Fall 2013 administration where the WP, with missing parameter estimations from field testing, was used operationally for the first time. In order to provide accurate scale scores and achievement level designations for students completing the English II Assessment in Fall 2013, post-equating was conducted using the operational data. For the Spring 2014 forms, PE/WPs were also added to the existing intact SR forms for English II, Algebra I, and Biology. Pre-equating was conducted to produce the RSS tables for these content areas.

In the past, technical reports consisted of two volumes: one for English II, Algebra I, and Biology and one for English I, Algebra II, Geometry, Government, and American History. Starting with the 2012–2013 edition, the technical report is streamlined to include all assessments in one volume. However, historical information from previous technical reports is still included to provide context in which technical procedures were developed and to assist with the understanding and interpretation of the 2013–2014 results. Previous technical reports can be found on the Missouri Department of Elementary and Secondary Education (DESE) website at http://dese.mo.gov/college-career-readiness/assessment/assessment-technical-support-materials.

E.1 Background

In 1993, the Missouri legislature passed the Outstanding Schools Act (Senate Bill 380), requiring the Missouri State Board of Education to adopt challenging academic performance standards that define the skills and competencies necessary for students to successfully advance through the public school system, prepare for post-secondary education and the workplace, and participate as citizens in a democratic society. The Missouri State Board of Education formally adopted the academic standards known as the Show-Me Standards in January 1996.

In addition to mandating the development of rigorous academic standards, the Outstanding Schools Act of 1993 required the development and implementation of a comprehensive assessment program to measure student proficiency in the knowledge, skills, and competencies identified in the standards. Therefore, upon adoption of the standards in 1996, Missouri developed the Missouri Assessment Program (MAP) that included grade-level assessments for elementary, middle, and high school students in core academic content areas.

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In January 2007, the Missouri State Board of Education approved a plan to replace the MAP for high school students with the MO EOC Assessments beginning with English II, Algebra I, and Biology in 2008–2009. The remaining MO EOC Assessments (English I, Algebra II, Geometry, Government, and American History) were added the following year. The MO EOC Assessments have been administered each summer, fall, and spring since the 2008–2009 school year for English II, Algebra I, and Biology (beginning with the Fall 2008 administration) and since the 2009–2010 school year for English I, Algebra II, Geometry, Government, and American History (beginning with the Fall 2009 administration).

E.2 Administration

Missouri's goal is for every student to be Proficient, as defined by the Missouri State Board of Education. Therefore, EOC testing is conducted as close as possible to the end of each course to allow school staff and students the greatest opportunity to achieve the goal of proficiency.

The scope of this technical report includes the Summer 2013, Fall 2013, and Spring 2014 administrations. Data analyses for the total assessed population, which includes students who have not yet reached the secondary level, are based on a combination of assessment results as well as demographic criteria required by Missouri's approved Elementary and Secondary Education Act (ESEA) Flexibility Waiver.

Individual student reports are distributed to school districts following each assessment administration window. Building-, district- and state-level reports are available following each spring administration. Scores are used during the accountability year in which the tests are administered. The accountability year begins with the summer administration preceding the academic year. Therefore, the score reports for the 2013–2014 assessment year contained information from the Summer 2013, Fall 2013, and Spring 2014 assessments.

E.3 Student Performance

The MO EOC Assessment score matches a student's performance to a defined achievement level. Achievement-level descriptors (ALDs) associated with each level provide details about the content expectations that students at that level meet or exceed. Missouri uses four achievement levels for the MO EOC Assessments: Below Basic, Basic, Proficient, and Advanced.

Table E.1 displays the percentage of students at each achievement level for the Summer 2013, Fall 2013, and Spring 2014 MO EOC Assessments, respectively.

Beginning with the 2012–2013 administration, Missouri began operating under the requirements of its approved ESEA Flexibility Waiver, which includes new high school EOC requirements beginning with the graduating class of 2017. This waiver, approved by the U.S. Department of Education in June 2012, gives Missouri flexibility from No Child Left Behind (NCLB) requirements and allows the state to use its own accountability system. In order to establish three years of trend data prior to the 2012–2013 test administrations, building- and district-level student performance data for English II, Algebra I, and Biology was recalculated for the 2010–2011 and 2011–2012 administration years to include the banked scores of all students who took those assessments prior to entering high school. Scores are no longer banked and are instead considered for accountability purposes at the time the student is assessed and in the building that

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provided the instruction.[1] It should be noted that the data for *all* tested students are used each year for purposes of item analysis and scaling and equating if they are performed. For this reason, the numbers and/or percentages of tested students reported in the MO EOC technical reports for the 2008–2009 through the 2011–2012 administrations do not match the numbers of students reported by DESE for accountability purposes in those years.

Table E.1: Percentage of Students at Each Performance Level for 2013–2014

		Summer 2013		Fall 2013		Spring 2014	
Test Period	**Achievement Level**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**
English II	Below Basic	93	25.91	321	11.11	2,277	3.68
	Basic	114	31.75	947	32.79	12,776	20.66
	Proficient	124	34.54	1,255	43.46	28,611	46.27
	Advanced	28	7.80	365	12.64	18,172	29.39
	Total	359	100.00	2,888	100.00	61,836	100.00
Algebra I	Below Basic	195	21.76	818	15.08	6,242	9.88
	Basic	344	38.39	1,778	32.78	22,031	34.86
	Proficient	271	30.25	1,931	35.60	22,533	35.66
	Advanced	86	9.60	897	16.54	12,386	19.60
	Total	896	100.00	5,424	100.00	63,192	100.00
Biology	Below Basic	144	37.31	660	22.88	3,335	5.44
	Basic	145	37.56	951	32.96	15,994	26.10
	Proficient	82	21.24	863	29.91	29,006	47.34
	Advanced	15	3.89	411	14.25	12,940	21.12
	Total	386	100.00	2,885	100.00	61,275	100.00
English I	Below Basic	125	30.49	118	13.20	5,799	9.61
	Basic	173	42.20	322	36.02	18,185	30.12
	Proficient	83	20.24	295	33.00	23,014	38.12
	Advanced	29	7.07	159	17.79	13,369	22.15
	Total	410	100.00	894	100.00	60,367	100.00
Algebra II	Below Basic	22	23.16	27	6.57	1,995	7.72
	Basic	49	51.58	67	16.30	7,409	28.66
	Proficient	21	22.11	193	46.96	10,274	39.74
	Advanced	3	3.16	124	30.17	6,173	23.88
	Total	95	100.00	411	100.00	25,851	100.00
Geometry	Below Basic	87	39.01	108	11.66	3,812	10.67
	Basic	77	34.53	237	25.59	8,240	23.07
	Proficient	44	19.73	274	29.59	14,972	41.91
	Advanced	15	6.73	307	33.15	8,697	24.35
	Total	233	100.00	926	100.00	35,721	100.00
Government	Below Basic	101	11.58	1,982	12.98	4,181	9.31
	Basic	289	33.14	4,656	30.50	12,030	26.80
	Proficient	338	38.76	5,721	37.48	18,667	41.59
	Advanced	144	16.51	2,905	19.03	10,009	22.30
	Total	872	100.00	15,264	100.00	44,887	100.00
Am. History	Below Basic	106	40.93	459	27.99	12,485	24.93
	Basic	60	23.17	432	26.34	13,465	26.88
	Proficient	70	27.03	479	29.21	15,780	31.50
	Advanced	23	8.88	270	16.46	8,360	16.69
	Total	259	100.00	1,640	100.00	50,090	100.00

[1] Find more information regarding Missouri's ESEA Waiver at http://dese.mo.gov/quality-schools/esea-flexibility-waiver.

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E.4 Evidence Supporting the Validity of Inferences from the MO EOC Assessment Scores

The MO EOC Assessments are part of an integrated program of testing, accountability, and curricular and instructional support. This technical report provides extensive details about the development and operation of the MO EOC Assessments. While Chapter 12 of this report is devoted specifically to the documentation of validity evidence for the MO EOC Assessment scores, all information contained herein ultimately contributes to the argument for the validity of the scores for their intended purposes.

The following summarizes the information contained in this report.

Chapter 1: Introduction

Chapter 1 provides background information about the MO EOC Assessments, as well as MAP in general. It also provides information about the organizational support provided by each contractor and subcontractor for the MO EOC Assessment program. The chapter ends with a statement of purpose for this technical report.

Chapter 2: Test Development

Questar Assessment, Inc. (Questar) has not conducted item or test development for the MO EOC Assessments. Therefore, Chapter 2 mostly consists of historical data from Riverside Publishing, the previous contractor, and contains descriptions of each step in the development process for the MO EOC Assessments, including test design, test blueprints, test specifications and target point distributions, item writing, content and bias review procedures, test form assembly, and statistical item review. The evidence provided in this chapter is important to the content-related validity of the MO EOC Assessment scores. Additionally, this chapter covers principles of universal design and outlines the quality control processes employed throughout the test development process.

Chapter 3: Achievement-Level Setting

Chapter 3 consists of summarized historical information from the 2008 achievement-level setting for English II, Algebra I, and Biology and the 2009 achievement-level setting for English I, Algebra II, Geometry, Government, and American History. It details each step in the planning and execution of the 2008 and 2009 achievement-level setting events that resulted in the cut scores for each of the MO EOC achievement levels. While this chapter was included in the *2009–2010 MO EOC Phase I and Phase II Technical Reports*, it is summarized here since the results are relevant to the current test administrations. This chapter covers selection of panelists, development of the ALDs, and an overview of the methodology and considerations for the data available at the time of the achievement-level setting event.

Chapter 4: Item Analysis

Chapter 4 contains summary information, including item difficulty and discrimination indices, at the item level for each content area. The chapter also contains information on omit rates for the Summer 2013, Fall 2013, and Spring 2014 operational items.

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Chapter 5: Test Administration

Chapter 5 contains information about the administration of the MO EOC Assessments, beginning with a description of students for whom the assessments are appropriate. Details of the administration are then summarized. This summary includes a description of how the materials are distributed and how Test Examiners are trained, as well as information about the organization of the assessments, preparation of students to take the assessments, and directions for administration. The chapter also includes information about the accommodations allowed on the MO EOC Assessments and describes how materials are submitted for processing and scoring.

Chapter 6: Testing on Tablets

This chapter details the results of students using iPads and Chromebooks to take the MO EOC Assessments. Comparability analysis results for students taking the test on Chromebooks are also included.

Chapter 7: Scoring

Chapter 7 covers the scoring processes for both the selected-response (SR) and performance events/writing prompts (PE/WPs) on the MO EOC Assessments. It contains information on how Questar scored the MO EOC SR items and the PE/WPs, including the scoring training and qualification processes, scoring procedures, and monitoring for quality assurance.

Chapter 8: Scaling and Equating

Chapter 8 begins with an introduction to the item response theory (IRT) model used for scaling and equating the MO EOC Assessments. Next, steps are given for the scaling and equating procedures established for the MO EOC Assessments, which include the 2008 and 2009 standalone field-test items, the Spring 2009 operational forms (for establishing the base scale), and the Spring 2009 field-test items. Finally, the raw score to scale score conversion tables are presented for the Summer 2013, Fall 2013, and Spring 2014 operational forms.

Chapter 9: Reporting

Chapter 9 contains information about the reports Questar produced for the MO EOC Assessments, including the Individual Student Report (ISR) and Student Score Label. A brief description of the state's data portal and reporting system is also included.

Chapter 10: Summary Statistics

Chapter 10 provides descriptive statistics for raw scores and scale scores for the MO EOC Assessments. Raw score statistics are summarized by test administration, content area, and cluster. Scale score statistics are summarized for each content area and are also broken down by gender and ethnicity, as well as migrant, free and reduced lunch (FRL), limited English proficient (LEP), Title I, Individualized Education Program (IEP), and accommodation statuses.

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Chapter 11: Reliability

Chapter 11 begins by defining reliability and providing an overview of reliability estimation techniques. Raw-score internal consistency reliability coefficients are presented for all students and for each demographic group. Conditional standard errors of measurement (CSEMs) are presented at each scale score cut point. Finally, this chapter provides inter-rater reliability information for the Summer 2013, Fall 2013, and Spring 2014 administrations.

Chapter 12: Validity

After an introduction to the validity evidence for the MO EOC Assessments, Chapter 12 documents more specific evidence related to test content, the internal structure of the assessments, and other types of validity evidence proposed by the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 1999). The chapter summarizes and reiterates validity evidence presented in earlier chapters in addition to providing new information. It provides an argument supporting the validity of the MO EOC Assessments for measuring Missouri students' mastery of the CLEs, for identifying students' strengths and weaknesses, for serving as a basis for evaluating accountability plans, and for program evaluation.

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Chapter 1: Introduction

This technical report provides detailed information and statistical results for the Summer 2013, Fall 2013, and Spring 2014 administrations of the Missouri End-of-Course (MO EOC) Assessments in English II, Algebra I, Biology, English I, Algebra II, Geometry, Government, and American History. These criterion-referenced assessments are designed to assess students' knowledge of Missouri's Course-Level Expectations (CLEs)[2] in each of these content areas.

The 2013–2014 administration of the MO EOC Assessments marked the sixth operational year for English II, Algebra I, and Biology and the fifth operational year for English I, Algebra II, Geometry, Government, and American History. Previously used operational test forms were re-administered for the 2013–2014 year, and no new item or test development was conducted.

For the 2013–2014 administration, Summer 2013, Fall 2013, and Spring 2014 English II, Algebra I, and Biology Assessments contained both selected-response (SR) items and performance events/writing prompts (PE/WPs). The English I, Algebra II, Geometry, Government, and American History Assessments contained only SR items for each administration.

Past administrations have had two separate technical reports:

- One for the assessments first administered during the 2008–2009 school year, which were designated as Phase I Assessments
- One for the assessments first administered during the 2009–2010 school year, which were designated as Phase II Assessments

However, starting in 2012–2013 and continuing for subsequent administrations, there is only one technical report that contains information for all eight MO EOC Assessments. This chapter starts with the history of the MO EOC Assessments, followed by a description of the current assessments and the purpose of the technical report.

1.1 History of the MO EOC Assessments

In 1993, the Missouri legislature passed the Outstanding Schools Act (Senate Bill 380) requiring the Missouri State Board of Education to adopt challenging academic performance standards defining the skills and competencies necessary for students to successfully advance through the public school system, prepare for post-secondary education and the workplace, and participate as citizens in a democratic society. The Missouri State Board of Education formally adopted the academic standards known as the Show-Me Standards in January 1996.

[2] DESE expects teachers to adhere to Missouri's Course-Level Expectations (CLEs), which give students, teachers, and administrators a clear and standardized framework for learning and teaching the ideas, concepts, skills, and processes for each content area based on grade level. See the following link for the Missouri Learning Standards: http://dese.mo.gov/college-career-readiness/curriculum/missouri-learning-standards. For Biology, Government, and American History, these standards are the same as the CLEs. For English I, English II, Algebra I, Algebra II, and Geometry, the CLEs can be found under "Archived GLEs/CLEs."

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These 73 standards are organized around four broad goals that address application, communication, problem-solving, and responsible decision-making. Thirty-three process standards emphasize the importance of engaging students of all ages in hands-on, active learning and integrating practical, challenging learning across all content areas. An additional 40 content standards define the academic skills and knowledge that provide the foundation for student learning in six content areas: Communication Arts, Mathematics, Science, Social Studies, Fine Arts, and Health/Physical Education. Content standards serve as the vehicle through which students demonstrate proficiency in the broader process standards. The Show-Me Standards are available for review on the Missouri Department of Elementary and Secondary Education (DESE) website at http://dese.mo.gov/show-me-standards.

In 2001, DESE developed Grade-Level Expectations (GLEs) to assist districts in articulating the Show-Me Standards across grade levels and content areas. GLEs were developed for Mathematics, Communication Arts, Science, Social Studies, Physical Education, Health, Music, Visual Arts, and Theater. In 2008, the high school GLEs were clustered into CLEs to define content within typical high school courses of study in English, Mathematics, Social Studies, and Science. GLEs and CLEs are available for review on the DESE website at http://dese.mo.gov/college-career-readiness/curriculum/missouri-learning-standards.[3]

In addition to mandating the development of rigorous academic standards, the Outstanding Schools Act of 1993 also required the development and implementation of a comprehensive assessment program to measure student proficiency in the knowledge, skills, and competencies identified within the standards. Upon adoption of the standards in 1996, Missouri began developing the Missouri Assessment Program (MAP) in collaboration with contractor CTB/McGraw-Hill.

The Missouri State Board of Education adopted the purposes listed below to serve as guiding principles for developing the MAP:

- Improving students' acquisition of important knowledge, skills, and competencies
- Monitoring the performance of Missouri's educational system
- Empowering students and their families to improve their educational prospects
- Supporting the teaching and learning process

The first MAP assessments administered to students statewide were grade-span Mathematics assessments in grades 4, 8, and 10 in Spring 1998. A voluntary grade-span Communication Arts assessment for students in grades 3, 7, and 11 was also administered in Spring 1998 and became mandatory in Spring 1999. Required Science and Social Studies grade-span assessments (grades 3, 7, and 10, and grades 4, 8, and 11, respectively) were added to the program in subsequent years. A voluntary Health/Physical Education assessment was available in 2000 and was required until Spring 2002, and a Fine Arts assessment was field tested in 2001. Due to budget constraints, development of the Fine Arts assessment was suspended and the Health/Physical Education assessment was discontinued. Science and Social Studies grade-span assessments

[3] This link is to the Missouri Learning Standards. For Biology, Government, and American History, these standards are the same as the CLEs. For English I, English II, Algebra I, Algebra II, and Geometry, the CLEs can be found under "Archived GLEs/CLEs."

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returned to voluntary status in Spring 2003. Social Studies assessments were discontinued in Spring 2008 and required assessments in Science were implemented in grades 5, 8, and 11 to comply with No Child Left Behind (NCLB) requirements.

Through the Spring 2005 administration, the MAP statewide assessment program included grade-span assessments in the following grade levels and content areas:

- Mathematics at grades 4, 8, and 10
- Communication Arts at grades 3, 7, and 11
- Science at grades 3, 7, and 10 (required Spring 1998 through Spring 2002; returned to voluntary status in Spring 2003)
- Social Studies at grades 4, 8, and 11 (required Spring 1999 through Spring 2002; returned to voluntary status in Spring 2003)

All MAP assessments included three types of items: selected-response (SR), constructed-response (CR), and performance events (PEs). For all content areas, MAP assessments included SR items from the TerraNova® Survey Edition. CR items and PEs were custom-developed with significant input from Missouri educators.

During the initial MAP development and implementation period, DESE developed two to four equivalent forms for each content area and grade level assessment, using the first form for a voluntary testing cycle and administering the next form(s) in subsequent years. Early in the development phase, DESE tried out new items using separate field tests that usually occurred in the fall of the school year. As the program continued, each test form contained embedded field-test items. Small-scale pilots continued as well.

As each content area and grade level assessment was administered, DESE used the Bookmark method to set achievement levels, defining student performance through Spring 2005 as Advanced, Proficient, Nearing Proficiency, Progressing, or Step 1.

After nearly a decade of MAP administration, new federal and state legislation prompted change in the program. To comply with NCLB requirements, Missouri's assessment program needed to incorporate Mathematics and Communication Arts assessments at all elementary and middle school grade levels (grades 3–8) and at one high school grade level. As a result, new grade-level assessments were developed for both content areas. These assessments were administered for the first time in Spring 2006.

Additional NCLB requirements necessitated the addition of a mandatory Science assessment once in the elementary grade range, once in the middle school grade range, and once in the high school grade range beginning in Spring 2008. The voluntary Science assessment in grades 3, 7, and 10 became a requirement and was moved to grades 5, 8, and 11. The voluntary Social Studies MAP assessment was eliminated following the Spring 2007 administration. Missouri's assessment system changed further in 2008–2009 when high school content area MAP assessments were replaced by the MO EOC Assessments. In 2008–2009, the MO EOC Assessments included English II, Algebra I, and Biology. In 2009–2010, the EOC Assessments in English I, Algebra II, Geometry, Government, American History, Integrated Mathematics II,

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and Integrated Mathematics III were added to the program. However, following the 2009–2010 administration year, the Integrated Mathematics II and Integrated Mathematics III Assessments were discontinued due to extremely low enrollment.

1.2 Description of Missouri's Current Assessment System

The current MAP system includes the following assessment components for elementary and middle school:

- Grades 3–8 Communication Arts
- Grades 3–8 Mathematics
- Grades 5 and 8 Science

The MO EOC Assessments administered in 2013–2014 included the following:

- English II
- Algebra I
- Biology
- English I
- Algebra II
- Geometry
- Government
- American History

In addition, the statewide assessment program currently includes the Missouri Assessment Program–Alternate (MAP-A) for students with severe cognitive disabilities, WIDA ACCESS for English language learners (ELLs), and a Personal Finance assessment for high school students who do not enroll in a personal finance course or who are receiving personal finance credit for embedded coursework.

1.3 Summary of the MO EOC Assessments

The MO EOC Assessments were developed and first administered during the 2008–2009 school year for English II, Algebra I, and Biology. Other MO EOC Assessments were developed and first administered in the 2009–2010 school year for English I, Algebra II, Geometry, Government, and American History. The MO EOC Assessments were created to assess the CLEs and meet the needs of Missouri districts, schools, teachers, and students while also meeting state and federal requirements. The Missouri State Board of Education identified the following purposes for the MO EOC Assessments:

- Measuring and reflecting students' mastery toward post-secondary readiness
- Identifying students' strengths and weaknesses
- Communicating expectations for all students
- Serving as the basis for state and national accountability plans
- Evaluating programs

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CLEs outline the ideas, concepts, and skills that form the foundation for an assessed EOC content area, regardless of a student's grade level. Each MO EOC Assessment is tailored to each EOC content area and is designed to be administered when a student has completed the content defined for that course. Districts can offer EOC course content in any grade and in a variety of configurations. Although many districts offer EOC course content within a course bearing the same name, EOC course content can also be embedded within a course or across several courses. MO EOC Assessments are administered according to a "right test, right time" philosophy when students have completed the content within the CLEs.

An SR item (also known as a multiple-choice item) presents students with a question followed by four response options. PEs are open-ended items that require students to perform more complicated tasks. A PE measures depth of understanding and interpretative and analytical abilities in a format that allows for more than one approach to arrive at a correct response. The advantage of this type of item is that it provides insight into a student's ability to apply knowledge and understanding in real-life situations. The WP, a special type of PE that appears in the English II Assessment, is an open-ended item that requires students to demonstrate their writing proficiency. Beginning in Summer 2010, PE/WPs were suspended from the English II, Algebra I, and Biology Assessments due to budget constraints, but they were added back in beginning with the Fall 2012 administration.

In 2013–2014, the English II, Algebra I, and Biology contained both SR items and PE/WPs. English I, Algebra II, Geometry, Government, and American History contained only SR items. These tests are designed to be administered in approximately one testing period and are not strictly timed.

The 2013–2014 MO EOC Assessments were offered primarily in an online administration mode with Paper/Pencil, Braille, or Large Print forms available for students requiring accommodations.

1.4 Testing, Reporting, and Accountability

Evidence of students' progress in meeting the Show-Me Standards/CLEs is obtained from the MO EOC Assessments. These assessments provide the data that DESE uses to inform students, parents, the public, and the state legislature about students' performance to help make informed decisions about educational issues and to drive student services throughout the state.

The MO EOC Assessment reports provide useful information for determining the performance of students in a particular school and classroom. These reports help identify students who are below Proficient in a particular test area so that the school may determine a course of action that will meet the students' specific needs. Additionally, districts may use locally designed assessments aligned to the Show-Me Standards/CLEs to provide more detailed information for each student in specific test areas.

Testing for the MO EOC Assessments is conducted during three state-designated windows each year for Summer, Fall, and Spring. Table 1.1 displays the 2013–2014 MO EOC testing windows.

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Table 1.1: 2013–2014 MO EOC Testing Windows

Summer 2013	June 10, 2013 – August 30, 2013
Fall 2013	October 7, 2013 – January 24, 2014
Spring 2014	February 24, 2014 – June 6, 2014

Individual Student Reports (ISRs) and student raw scores are available to the district five business days after the close of their district content window. Timely availability of score reports allows teachers the option to consider MO EOC Assessment results in assigning course grades. ISRs are only available in an online format unless an order is placed by the district for paper reports. Multiple testing windows allow school districts the flexibility to schedule MO EOC testing as close as possible to the end of each course to provide students the greatest opportunity to demonstrate proficiency in the course content. In the 2008–2009 and 2009–2010 administration years, districts were required to administer the English II, Algebra I, and Biology Assessments to all students prior to graduation, unless students completed coursework prior to the operational administration of the assessments. In 2010–2011, Government was added to the list of required EOC Assessments. In 2012–2013 and 2013–2014, districts were required to administer the English II, Algebra I, Biology, English I, Government, and American History Assessments to all students prior to graduation.

Data for this technical report came from the Summer 2013, Fall 2013, and Spring 2014 operational administrations. Data analyses for the total assessed population, which includes students who have not yet reached the secondary level, are based on a combination of assessment results as well as DESE-provided demographic criteria required under Missouri's approved ESEA Flexibility Waiver.

Through the 2011–2012 administration year, Missouri reported English II, Algebra I, and Biology EOC scores in accordance with NCLB, which requires states to assess all students at least once in high school in Mathematics, English/Communication Arts, and Science. All students who took the MO EOC Assessments in English II, Algebra I, and/or Biology prior to entering high school were excluded from Missouri’s high school accountability data until they enrolled in high school. Their scores were “banked” until they actually reached high school, at which time they were rolled into the high school accountability data for that year. However, beginning with the 2012–2013 administration with the approved ESEA Flexibility Waiver, scores are no longer banked and are instead considered for accountability purposes at the time the student is assessed and in the building that provided the instruction.

1.5 MO EOC Organizational Support

DESE coordinates the development and implementation of the MO EOC Assessments. In addition to planning, scheduling, and directing all EOC activities, the staff is extensively involved in numerous test reviews, security, and quality assurance procedures. At the outset of the 2008 contract award, Riverside Publishing was the primary contractor working in partnership with Questar Assessment, Inc. (Questar), the Assessment Resource Center (ARC), Internet Testing Systems (ITS), Bookette, and others. Beginning with the Summer 2011 administration,

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DESE contracted operational activities with Questar. Table 1.2 outlines the main activities for each group involved with the 2013–2014 MO EOC administrations.

Table 1.2: Main Activities for Groups Involved in MO EOC Organizational Support

Group	Responsibilities
Questar Assessment, Inc. (Questar)	• Provide program management, including primary contact with DESE; coordinate all meetings; handle all administrative costs/activities; generate all program management reports and status reports • Create and update the Test Administration Manual, Software Installation Guides, and other ancillary materials • Conduct psychometric analyses, reporting, linking/equating studies, and associated tasks • Provide all needed prepress work for program materials through camera-ready art • Produce all materials, including online, Paper/Pencil, Braille, and Large Print versions of the test, as well as online testing tools and content area-specific tutorials • Account for secure test books received after testing • Provide a direct customer service line, including technical support and general support to the program and customer interactions • Store materials after testing • Participate in and present at Technical Advisory Committee (TAC) meetings • Score all SR items and the PE/WPs • Produce and distribute all score reports and the Guide for Interpreting Results • Complete the technical report for DESE • Provide online enrollment and pre-ID system for use by Missouri districts • Provide online testing interface and online test administration site • Package and distribute materials • Barcode test books with security IDs
Districts	• Distribute materials to the school buildings, track all secure materials, and promptly return all materials, including transcribed test forms, for scoring • Assist in the timely resolution of scoring alerts • Act as a liaison between Questar and buildings
School Buildings	• Administer tests, track all secure materials, and promptly return materials to districts for scoring
American Printing House for the Blind (APH)	• Print both Braille and Large Print versions

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1.6 Purpose of the Technical Report

The purpose of this technical report is to provide information about the technical characteristics of the 2013–2014 operational administration of the MO EOC Assessments. Because this report is technical in nature and the intended audience is psychometric and educational research experts, it is best understood with a working knowledge of measurement concepts such as reliability and validity and statistical concepts such as correlation and central tendency. For some chapters, the reader is presumed to have basic familiarity with advanced topics in measurement and statistics such as item response theory (IRT).

This technical report provides extensive detail about the operation of the MO EOC Assessments, as well as the history of their development. The empirical reliability of the assessments and validity of intended uses of the scores are reported explicitly in this document. Chapter 11 contains a discussion of reliability, and Chapter 12 summarizes the validity argument. The validity of score use and interpretation for any assessment stems from the statement of the test's purpose and the intended use of the scores; the steps taken in designing the test; and the processes of developing the content of the test, consulting with stakeholders, communicating about the test to users, scoring and reporting, and data analysis. The careful documentation of each of these steps is a necessary piece of a comprehensive, defensible validity argument for the intended uses of the assessment scores. In short, while a specific chapter is devoted to validity, other parts of this document provide evidence necessary to assess the validity of the MO EOC Assessment scores for their intended purposes.

In reading this technical report, it is critical to remember that the testing program does not exist in a vacuum; it is not just a test. It is one part of a complex network intended to help schools to improve student learning. The MO EOC Assessments are an integrated program of testing and accountability, as well as curricular and instructional support. The assessments can be evaluated properly only within their full context.

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Chapter 2: Test Development

2.1 Introduction

The English II, Algebra I, and Biology Assessments were first administered operationally during the 2008–2009 school year. The English I, Algebra II, Geometry, Government, American History, Integrated Mathematics II, and Integrated Mathematics III Assessments were first administered operationally during the 2009–2010 school year. (Integrated Mathematics II and Integrated Mathematics III were discontinued after the first administration year due to extremely low enrollment.) Although there was no item or test development for 2013–2014, information on the test design and development processes established for the testing program is essential for understanding the assessments and interpreting the results. Therefore, documentation of test development from previous technical reports has been carried over and constitutes the majority of the content of this chapter.

This chapter provides an overview of the development of the MO EOC Assessments, including the test specifications, item development, item review, and test form development. According to the *Standards for Educational and Psychological Testing* (AERA, APA, & NCME, 1999) (hereafter referred to as the Standards), "Important validity evidence can be obtained from an analysis of the relationship between a test's content and the construct it is intended to measure" (p. 11). Accordingly, the descriptions of the test development procedures included in this chapter provide validity evidence of the MO EOC Assessments.

2.2 Design of the MO EOC Assessments

Figure 2.1 details the design of the Spring 2008 standalone field test, the Fall 2008 operational administration, and the Spring 2009 operational administration with the embedded field test (EFT) for English II. Additionally, Figure 2.1 displays the design of the Spring 2009 standalone WP field test.

Figure 2.2 details the design of the Spring 2008 standalone field test, the Fall 2008 operational administration, and the Spring 2009 operational administration with the EFT for Algebra I and Biology.

Figure 2.3 details the design of the linking forms for the 2009–2010 administration year. The Fall 2009 operational administration was linked to both the Spring 2009 and Spring 2010 operational administrations. Additionally, the Spring 2010 administration was linked to the Summer 2010 administration. Besides being linked to the Spring 2010 administration, the Summer 2010 administration was also linked to the Spring 2009 administration.

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Figure 2.1: 2008–2009 Field-Test and Operational Assessment Design, English II

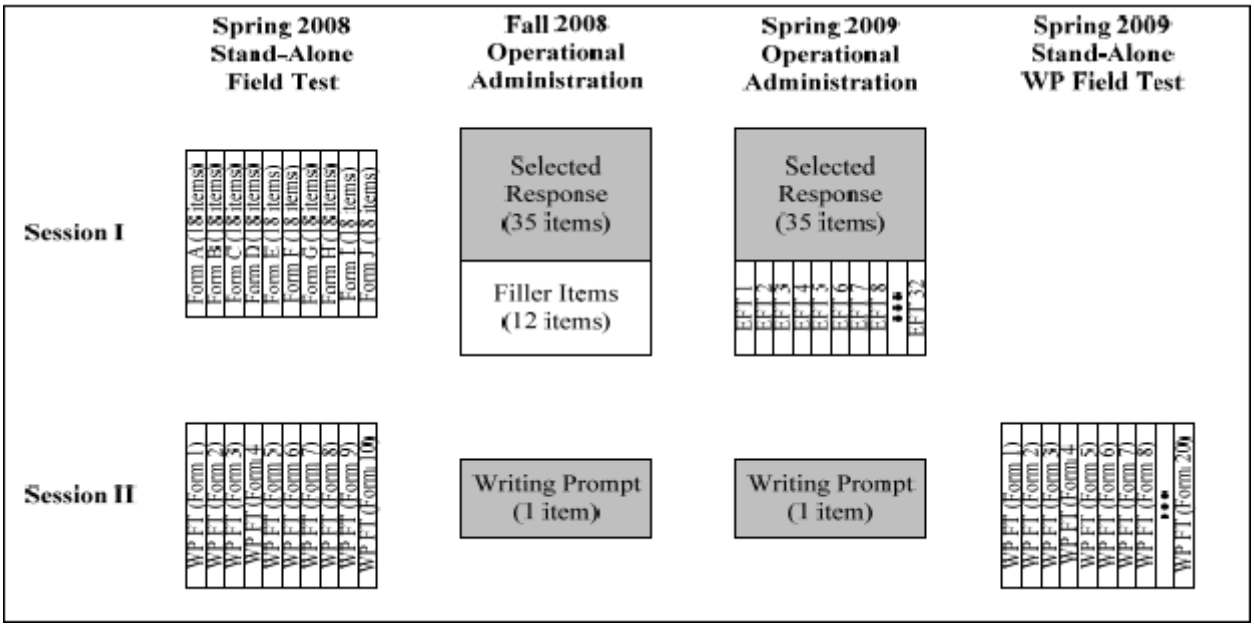

Figure 2.2: 2008–2009 Field-Test and Operational Assessment Design, Algebra I and Biology

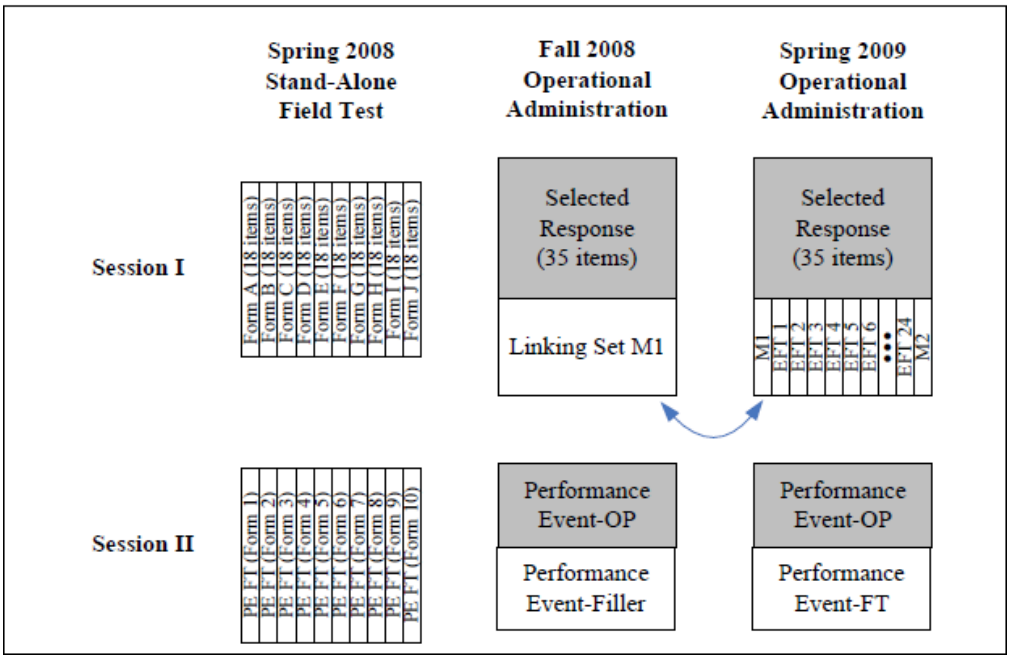

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Figure 2.3: Linking Design for Post Equating the MO EOC Assessments

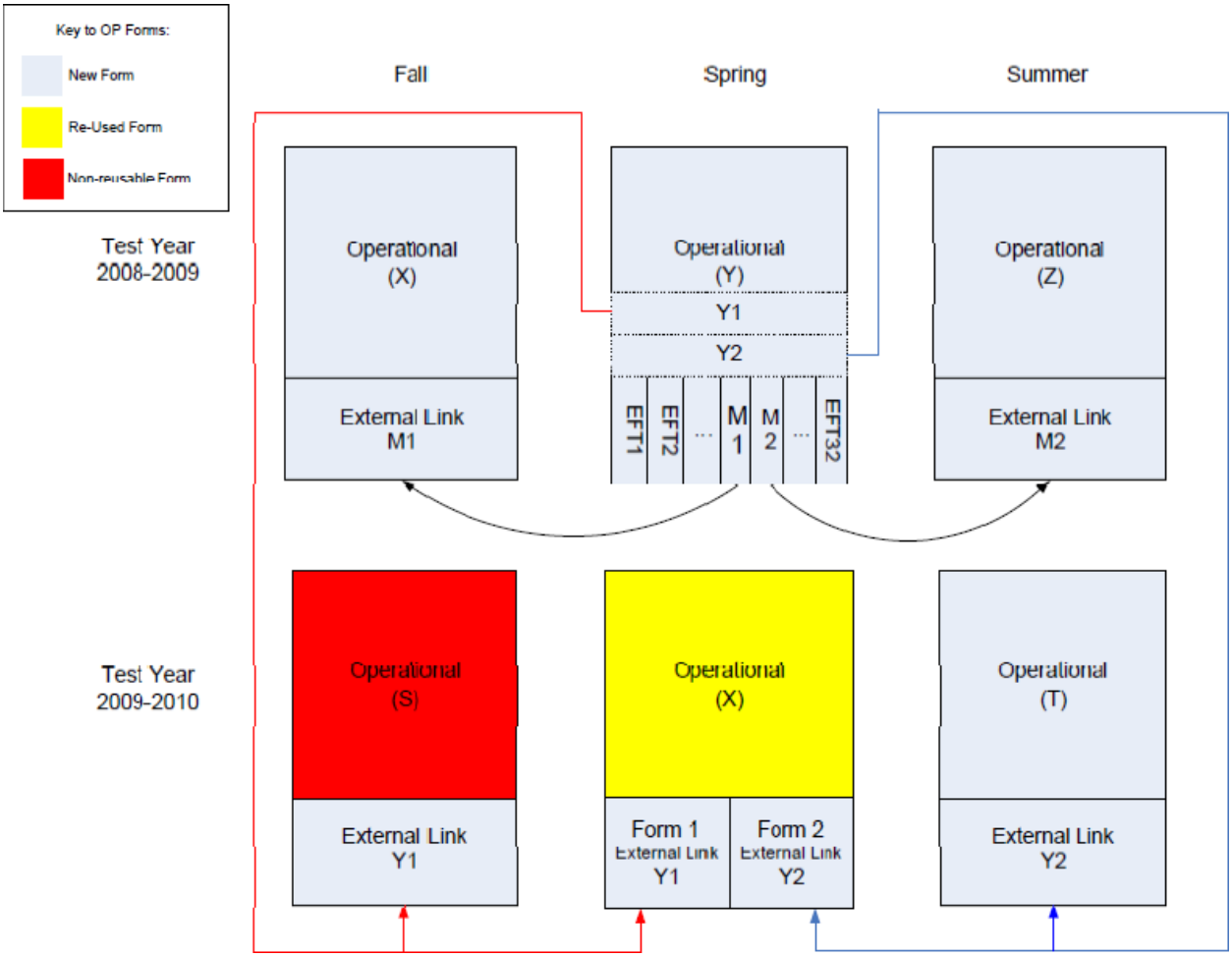

Table 2.1 lists the linking design for multiple operational administration years of the English II, Algebra I, and Biology Assessments.

Table 2.1: Linking Design for the English II, Algebra I, and Biology Assessments

Test Period	Assessment Form*	Linking Set(s)
Fall 2008	A	M1
Spring 2009	B	M1, M2, Y1, Y2
Summer 2009	C	M2
Fall 2009	D	Y1
Spring 2010	A	Y1, Y2
Summer 2010	E	Y2
Fall 2010	B	M1, M2
Spring 2011	F	M1, M2

*The correspondence between the forms presented in Figure 2.3 and Table 2.1 is X=A, Y=B, Z=C, S=D, and T=E.

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Figure 2.4 details the design of the Spring 2009 standalone field test, the Fall 2009 operational administration, and the Spring 2010 operational administration with the EFT for English I. Figure 2.5 details the design of the Spring 2009 standalone field test, the Fall 2009 operational administration, and the Spring 2010 operational administration with EFTs for Algebra II, Geometry, Government, and American History. Figure 2.6 details the design of the Spring 2009, Fall 2009, and Spring 2010 Integrated Mathematics II and III Assessments. It should be noted that DESE made the determination to discontinue these two assessments because of extremely low actual enrollments for the Fall 2009 assessments and low projections of the number of students who would enroll to take these assessments in Spring 2010. Therefore, information about the Integrated Mathematics II and Integrated Mathematics III Assessments is limited in this technical report.

Figure 2.4: Field Test and Operational Assessment Design, English I

Figure 2.5: Field Test and Operational Assessment Design, Algebra II, Geometry, Government, and American History

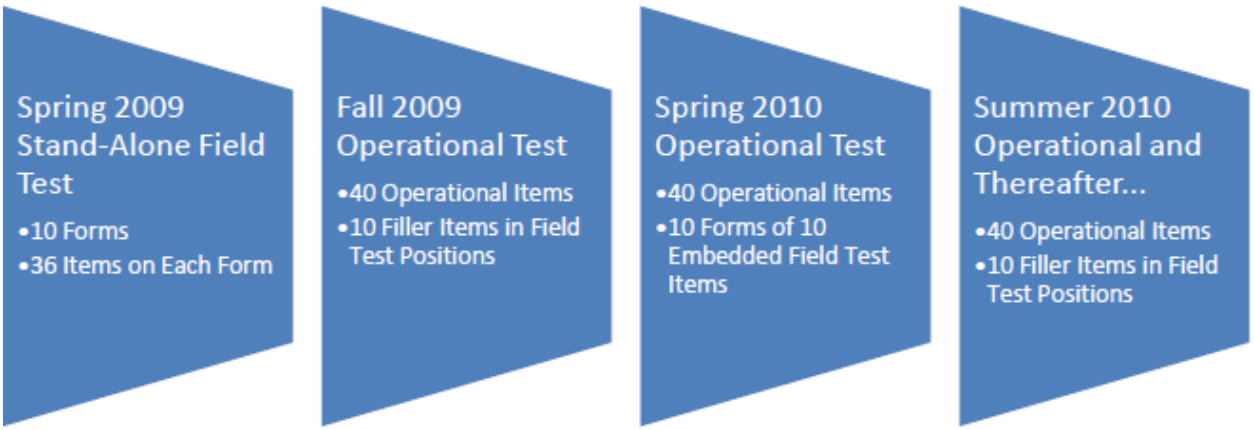

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Figure 2.6: Field Test and Operational Assessment Design, Integrated Mathematics II and III

2.2.1 Spring 2008 Standalone Field Test

The Spring 2008 standalone field test of the English II, Algebra I, and Biology Assessments provided item data to inform the 2008–2009 operational forms selection process. The Spring 2008 field test consisted of two sessions. For each assessment, Session I included 10 unique forms of SR items, with each form containing 19 items. Session II included 10 unique forms of PE/WPs. For English II, the PE forms in Session II each consisted of one 4-point WP. For Algebra I, each Session II form consisted of one 4-point PE. For Biology, each Session II form consisted of 10–12 CR items for a total of 20 points on each form. Forms within each session were spiraled at the student level across the state.

2.2.2 Fall 2008 Operational Administration

The Fall 2008 administration consisted of three operational assessments (English II, Algebra I, and Biology). English II consisted of one 35-item SR form and one WP. Algebra I and Biology each consisted of one 35-item SR form and one PE form. The Algebra I PE consisted of one 4-point item. The Biology PE consisted of 10 CR items, ranging from 1 to 4 points each for a total of 20 points.

In addition to the 35 scored items, each Fall 2008 Algebra I and Biology Session I test book contained a set of 12 linking items (designated as M1 in Figures 2.2 and 2.3). These linking items were used for the post-equating check of the pre-equating results following the Spring 2009 operational administration (indicated by an arrow in Figure 2.2). For the English II Assessment, the 12 additional SR items in Session I were filler (non-scored) items.

2.2.3 Spring 2009 Operational Administration

The Spring 2009 administration consisted of three operational assessments (English II, Algebra I, and Biology). For all three content areas, Session I consisted of 35 operational SR items. English II had 32 unique sets of 12 EFT items (labeled as EFT 1 through EFT 32 in Figure 2.1). Algebra I and Biology had 24 unique sets of 12 EFT items (labeled as EFT 1 through EFT 24 in Figure 2.2). Additionally, the sets of items used to link the Spring 2009 form to the Fall 2008 (M1) and Summer 2009 (M2) assessments for the post-equating check occupied two of the EFT slots on the Algebra I and Biology Assessments.

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Session II of the Spring 2009 English II Assessment contained one 4-point WP. Session II of the Algebra I Assessment contained one 4-point PE. Finally, Session II of the Biology Assessment contained 11 CR items, ranging from 1 to 4 points each, for a total of 20 points. Session II of the Algebra I and Biology Assessments also contained an EFT PE.

2.2.4 Spring 2009 Standalone English II WP Field Test

In Spring 2009, 20 English II WPs were administered statewide in a separate standalone field test. Each WP was administered on its own form.

2.2.5 Spring 2009 Standalone Field Test

The Spring 2009 standalone field test of the English I, Algebra II, Geometry, Government, and American History Assessments provided item data to inform the 2009–2010 operational forms selection process. The field test included 10 unique forms of 36 items each for Algebra II, Geometry, Government, and American History. The English I field test included 14 unique forms with 36 items on each form. Forms for each course were spiraled at the student level across the state.

2.2.6 Fall 2009 Operational Administration

The Fall 2009 administration consisted of 10 operational assessments (English II, Algebra I, Biology, English I, Algebra II, Geometry, Government, American History, Integrated Mathematics II, and Integrated Mathematics III). Session I for English II, Algebra I, and Biology consisted of 35 operational SR items. Each form also contained 12 linking items used to equate the Fall 2009 forms to the Spring 2009 forms as shown in Figure 2.3. Session II of the Fall 2009 English II Assessment contained one 4-point WP. Session II of the Algebra I Assessment contained one 4-point PE. Session II of the Biology Assessment contained 12 CR items, ranging from 1 to 4 points each, for a total of 20 points.

English I consisted of one 52-item SR form. Algebra II, Geometry, Government, American History, Integrated Mathematics II, and Integrated Mathematics III each consisted of one 50-item SR form. In addition to the 40 scored items, each Algebra II, Geometry, Government, American History, Integrated Mathematics II, and Integrated Mathematics III Assessment in the Fall 2009 administration contained a set of 10 EFT items. The English I Assessment contained 12 EFT items in addition to the 40 scored items.

2.2.7 Spring 2010 Operational Administration

The Spring 2010 administration consisted of 10 operational assessments (English II, Algebra I, Biology, English I, Algebra II, Geometry, Government, American History, Integrated Mathematics II, and Integrated Mathematics III). For English II, Algebra I, and Biology, the Fall 2008 operational form was re-used for the Spring 2010 operational SR assessment. The English II, Algebra I, and Biology Assessments each had two forms, which contained the same set of operational items but two unique sets of linking items. As shown in Figure 2.3, each course had

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two unique sets of linking items. Set Y1 linked the Spring 2010 Form A to the Fall 2009 and the Spring 2008 forms. Set Y2 linked the Spring 2010 Form B to the Spring 2008 and the Summer 2009 forms. Session II of the Spring 2010 English II Assessment contained one 4-point WP. Session II of the Algebra I Assessment contained one 4-point PE. Session II of the Biology Assessment contained 12 CR items, ranging from 1 to 4 points each, for a total of 20 points. Session II of the Algebra I and Biology Assessments also contained an EFT PE.

The forms for English I, Algebra II, Geometry, Government, American History, Integrated Mathematics II, and Integrated Mathematics II consisted of 40 operational SR items. English I had four unique sets of 12 EFT items. Algebra II, Geometry, Government, and American History had 10 unique sets of 10 field-test items. There was one form each of Integrated Mathematics II and Integrated Mathematics III with online administration only. As previously noted, because these assessments were discontinued by DESE, districts never accessed the online Integrated Mathematics II and Integrated Mathematics III Assessments in Spring 2010.

2.2.8 Summer 2010 Operational Administration

The Summer 2010 administration consisted of eight operational assessments (English II, Algebra I, Biology, English I, Algebra II, Geometry, Government, and American History). The English II, Algebra I, and Biology Assessments were newly developed test forms. For all three assessments, Session I consisted of 35 operational SR items. Each form also contained 12 linking items that were also administered on the Summer 2009 test form and the Spring 2010 test form as shown in Figure 2.3. Session II of the Fall 2009 English II Assessment contained one 4-point WP. Session II of the Algebra I assessment contained one 4-point PE. Finally, Session II of the Biology Assessment contained 12 CR items, ranging from 1 to 4 points each, for a total of 20 points. Session II of the Algebra I and Biology Assessments also contained an EFT PE. After the forms were created and printed, a decision was made to discontinue the use of PE/WPs on the MO EOC Assessments. Therefore, the student responses from this administration were not scored.

The English I, Algebra II, Geometry, Government, and American History Assessments had filler items in the EFT slots.

2.2.9 Fall 2010 Operational Administration

The Fall 2010 administration consisted of eight operational assessments (English II, Algebra I, Biology, English I, Algebra II, Geometry, Government, and American History). For English II, Algebra I, and Biology, the operational form was reused for the Spring 2009 operational SR assessment. The English II, Algebra I, and Biology Assessments each had two forms, which contained 12 linking items. As shown in Figure 2.3, each course had two unique sets of linking items. Set M1 linked the Fall 2010 form to the Fall 2008 and the Spring 2009 forms. Set M2 linked the Fall 2010 form to the Summer 2008 and the Spring 2009 forms.

English I consisted of one 52-item SR form. Algebra II, Geometry, Government, and American History each consisted of one 50-item SR form. Each Algebra II, Geometry, Government, and American History Assessment consisted of 40 operational items and 10 filler items in the EFT slots. The English I Assessment contained 12 filler items in the EFT slots in addition to 40 scored items.

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2.2.10 Spring 2011 Operational Administration

The Spring 2011 administration consisted of eight operational assessments (English II, Algebra I, Biology, English I, Algebra II, Geometry, Government, and American History). The English II, Algebra I, and Biology Assessments were newly created. For all three assessments, Session I consisted of 35 operational SR items. Each form also contained 12 linking items (sets M1 and M2) as shown in Figure 2.3. In addition to the linking items, additional items were field tested in the EFT positions. Each of the three content areas field tested an additional 12 forms' worth of new items.

English I consisted of one 52-item SR form. Algebra II, Geometry, Government, and American History each consisted of one 50-item SR form. Each Algebra II, Geometry, Government, and American History Assessment consisted of 40 operational items and 10 filler items in the EFT slots. The English I Assessment contained 12 filler items in the EFT slots in addition to 40 scored items.

2.2.11 Released Forms

In addition to the operational forms, DESE and contractor Riverside Publishing constructed "released" forms for each operational assessment. The English II, Algebra I, and Biology forms were posted on the DESE website in August 2008, and the English I, Algebra II, Geometry, Government, and American History forms were posted on the DESE website in August 2009. They were constructed to mirror the test content of the actual operational forms (minus the EFT items) to allow Missouri teachers, parents, and students the opportunity to review the new format and representative content of the MO EOC Assessments. Although these forms were constructed to parallel the operational forms, the items in these released forms were never used on an operational MO EOC Assessment.

2.2.12 Summer 2011 through Spring 2014 Operational Administrations

Beginning with Summer 2011, Questar was awarded the contract for administering the MO EOC Assessments. The assessments were administered according to an established form rotation schedule, and two forms of each of the operational assessments were used to create Braille and Large Print versions of the assessments. Depending on the form rotation schedule, the Braille and Large Print versions of the test may not have been the same form administered to the general student population.

2.3 Test Blueprints

Test blueprints specify the relative percentage of items in each high-level content strand. This document helps ensure that each strand is represented by the minimum number of points (8) for student score reports.

Riverside Publishing content experts worked with DESE to develop blueprints for each course before item writing began in Fall 2007. Blueprint development was guided by the Missouri Show-Me Standards.

Tables 2.2 through 2.9 outline the test construction blueprints for English II, Algebra I, Biology, English I, Algebra II, Geometry, Government, and American History, respectively.

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Table 2.2: Test Construction Blueprint for English II with WP

Big Idea	Target # of Points	Point Range*	Target % Total	Minimum Emphasis	Maximum Emphasis
Develop and apply skills and strategies to the reading process	12	10–14	31%	**26%**	**36%**
Develop and apply skills and strategies to comprehend, analyze, and evaluate fiction, poetry, and drama	9	8–11	23%	**23%**	**28%**
Develop and apply skills and strategies to comprehend, analyze, and evaluate nonfiction	9	8–11	23%	**23%**	**28%**
Writing • Apply a writing process in composing text • Compose well-developed text • Write effectively in various forms and types of writing	9	8–9	23%	**23%**	**23%**
Total	39		100%		

Note: Total score points for each content strand may vary depending on which passages are selected for a particular administration. The percentage of total score points from each content strand (emphasis) will fall within the blueprint range described above.

*The minimum number of points in each strand will be 8.

This blueprint was built under the following assumptions:

1. The operational test will be composed of two sessions. Session I will have 35 1-point SR items, and Session II will have one 4-point WP.
2. The reading passages will generally be balanced between nonfiction and fiction. A slight imbalance may occur if an odd number of passages appears on the operational test.
3. Content strand 1 has a larger percentage of total points because it can be assessed using both fiction and nonfiction passages.
4. The writing form/type will vary depending on the WP selected for a particular administration. WPs will be aligned to a primary CLE; however, multiple writing CLEs may be assessed to reflect the holistic rubric.

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Table 2.3: Test Construction Blueprint for Algebra I with PE

Content Strand	Target # of Points	Point Range	Target % Total	Minimum Emphasis	Maximum Emphasis
Number and Operations	8	7–9	21%	**19%**	**23%**
Algebraic Relationships	23	21–25	58%	**53%**	**63%**
Data and Probability	8	7–9	21%	**19%**	**23%**
Total	39		100%		

Note: Total score points for the operational tests may vary depending on which PE is selected for a particular administration. Regardless of the total score points on a particular operational test, the percentage of total score points from each content strand (emphasis) will fall within the blueprint range described above. Point ranges are determined using a 10 percent tolerance.

This blueprint was built under the following assumptions:

1. The operational test will be composed of two sessions. Session I will have 35 1-point SR items, and Session II will have one 4-point PE.
2. Each PE will be aligned to one CLE from the Algebraic Relationships strand.

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Table 2.4: Test Construction Blueprint for Biology with PEs

Content Strand	Target # of Points	Point Range	Target % Total	Minimum Emphasis	Maximum Emphasis
Characteristic and Interactions of Living Organisms	22	20–24	40%	**36%**	**44%**
Changes in Ecosystems and Interactions of Organisms with Their Environments	13	12–14	24%	**22%**	**27%**
Scientific Inquiry	20	20	36%	**36%**	**36%**
Total	55		100%		

Note: Total score points for the operational tests may vary depending on which PE prompts are selected for a particular administration. Regardless of the total score points on a particular operational test, the percentage of total score points from each content strand (emphasis) will fall within the blueprint range described above. Point ranges are determined using a 10 percent tolerance.

This blueprint was built under the following assumptions:

1. The operational test will be composed of two sessions. Session I will have 35 1-point SR items, and Session II will have one 20-point PE that is comprised of a main context and several prompts.
2. Prompts within PEs will be aligned to CLEs from the Scientific Inquiry strand only.

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Table 2.5: Test Construction Blueprint for English I

Big Idea	Target # of Points	Point Range*	Target % Total	Minimum Emphasis	Maximum Emphasis
Develop and apply skills and strategies to the reading process	15	13–17	38%	**33%**	**43%**
Develop and apply skills and strategies to comprehend, analyze, and evaluate fiction, poetry, and drama from a variety of cultures and times	12	10–14	30%	**25%**	**35%**
Develop and apply skills and strategies to comprehend, analyze, and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	13	11–15	32%	**28%**	**38%**
Total	40	40	100%		

Note: Total score points for each content strand may vary depending on which passages are selected for a particular administration. The percentage of total score points from each content strand (emphasis) will fall within the blueprint range described above.

*The minimum number of points in each strand will be 8.

This blueprint was built under the following assumptions:

1. The reading passages will generally be balanced between nonfiction and fiction. A slight imbalance may occur if an odd number of passages appears on the operational test.
2. Content strand 1 has a larger percentage of total points because it can be assessed using both fiction and nonfiction passages.

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Table 2.6: Test Construction Blueprint for Algebra II

Content Strand	Target # of Points	Point Range	Target % Total	Minimum Emphasis	Maximum Emphasis
Number and Operations	8	7–9	20%	**17.5%**	**22.5%**
Algebraic Relationships	22	20–24	55%	**50%**	**60%**
Data and Probability	10	9–11	25%	**22.5%**	**27.5%**
Total	40	40	100%		

Table 2.7: Test Construction Blueprint for Geometry

Content Strand	Target # of Points	Point Range	Target % Total	Minimum Emphasis	Maximum Emphasis
Algebraic Relationships	8	7–10	20%	**18%**	**25%**
Geometric Spatial	24	22–24	60%	**55%**	**60%**
Measurement	8	7–9	20%	**18%**	**23%**
Total	40	40	100%		

Table 2.8: Test Construction Blueprint for Government

Content Strand	Target # of Points	Point Range	Target % Total	Minimum Emphasis	Maximum Emphasis
Principles of Constitutional Democracy	20	18–22	50%	**45%**	**55%**
Principles and Processes of Governance Systems	20	18–22	50%	**45%**	**55%**
Total	40	40	100%		

Note: Point ranges are determined using a 10 percent tolerance.

Table 2.9: Test Construction Blueprint for American History

Content Strand	Target # of Points	Point Range	Target % Total	Minimum Emphasis	Maximum Emphasis
Government	8	7–9	20%	**18%**	**23%**
History	16	14–18	40%	**35%**	**45%**
Economics	8	7–9	20%	**18%**	**23%**
Geography	8	7–9	20%	**18%**	**23%**
Total	40	40	100%		

Note: Point ranges are determined using a 10 percent tolerance.

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2.4 Test Specifications

Standard 1.6[4] specifically addresses the appropriateness of test content and its relationship to a solid validity argument. Additionally, Standard 3.3[5] defines "test specifications" and provides examples of the type of information that should be included in a specification document. The test specifications describe the content and format of the test and delineate the ideal number of items and points assessed for each CLE. This section details the development and use of the test specification documents for the MO EOC Assessments.

Riverside Publishing content experts developed draft test specifications for English II, Algebra I, and Biology in 2007 and for English I, Algebra II, Geometry, Government, and American History in 2008. These draft test specifications were subsequently reviewed and approved by DESE. The specifications were finalized in Fall 2007 and Fall 2008, respectively, before the development of items for the field-test forms.

The test specification document served as the foundation for all item development. The material in the test specifications was designed for use by Riverside Publishing content experts and DESE to construct tests with the following characteristics:

- Aligned to Missouri CLEs
- Aligned to Norman Webb's depth of knowledge (DOK) cognitive levels
- Include both SR items and PE/WPs
- Include both standalone and passage-based items

Detailed descriptions of the test content measured in each MO EOC Assessment are presented in the following sections.

2.4.1 English II

The English II Assessment measures student achievement in reading and writing. Session I of the test contains commissioned passages that comprise both fiction and nonfiction and cover a wide range of genres, including poems, short stories, newspaper articles, historical fiction, functional texts, and webpages. The questions associated with each passage are in SR format. The English II Assessment has 35 SR items, as well as standalone SR items that assess grammar and language usage. Session II of the English II Assessment comprises a WP, which could cover one or more of the following genres: narrative, expository, persuasive, or informative. The WP is scored based on a holistic 4-point rubric.

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[4] **Standard 1.6:** When the validation rests in part on the appropriateness of test content, the procedures followed in specifying and generating test content should be described and justified in reference to the construct the test is intended to measure or the domain it is intended to represent. If the definition of the content sampled incorporates criteria such as importance, frequency, or criticality, these criteria should also be clearly explained and justified (p. 18).

[5] **Standard 3.3:** The test specifications should be documented, along with their rationale and the process by which they were developed. The test specifications should define the content of the test, the proposed number of items, the item formats, the desired psychometric properties of the items, and the item and section arrangement. They should also specify the amount of time for testing, directions to the test takers, procedures to be used for test administration and scoring, and other relevant information (p. 43).

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Table 2.10 contains targets for the CLE point distribution on the English II operational forms for Session I only. Some of the CLE point targets may not be met because the use of a passage or scenario is not conducive to items written to the CLE. Some Big Ideas are not represented in this chart because they are not assessed at this course level.

Tables 2.11, 2.12, and 2.13 contain actual point distributions for the Summer 2013, Fall 2013, and Spring 2014 operational forms, respectively.

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Table 2.10: Target Point Distributions for the English II Operational Forms

Reading Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range of Points per CLE on the Operational Test**
Develop and apply skills and strategies to the reading process	Vocabulary	Develop vocabulary through text, using a. roots and affixes b. context clues c. glossary, dictionary, and thesaurus	2	3–4
	Post Reading	Apply post-reading skills to comprehend, interpret, analyze, and evaluate text: a. draw conclusions b. paraphrase c. summarize	3	5–6
	Making Connections	Compare, contrast, analyze and evaluate connections: a. text to text (information and relationships in various fiction and nonfiction works)	3	1–2
Develop and apply skills and strategies to comprehend, analyze, and evaluate fiction, poetry and drama from a variety of cultures and times	Text Features	Analyze and evaluate the text features in grade-level text	3	2–3
	Literary Techniques	Identify and explain literary techniques, emphasizing a. understatement b. parallelism c. allusion d. analogy e. analyze and evaluate literary techniques previously introduced	3	2–3
	Literary Elements	Use details from text(s) to a. demonstrate comprehension skills previously introduced b. analyze character, plot, setting, point of view c. analyze the development of a theme across genres d. identify and analyze tone	3	4–5

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Table 2.10 (continued): Target Point Distributions for the English II Operational Forms

Reading Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range of Points per CLE on the Operational Test**
Develop and apply skills and strategies to comprehend, analyze, and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	Text Features	Explain, analyze, and evaluate the author's use of text features to clarify meaning	3	1–2
	Literary Techniques	Identify, explain, and analyze literary techniques in nonfiction, emphasizing a. understatement b. parallelism c. allusion d. analogy e. figurative language and sound devices previously introduced	3	2–3
	Text Structures	Use details from informational and persuasive text(s) to a. analyze and evaluate the organizational patterns b. identify and analyze faulty reasoning and unfounded inferences c. evaluate proposed solutions d. evaluate for accuracy and adequacy of evidence e. evaluate effect of tone on the overall meaning of work f. analyze and evaluate point of view g. analyze and evaluate author's viewpoint/perspective h. demonstrate comprehension skills previously introduced	3	3–4

Writing Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range of Points per CLE on the Operational Test**
Compose well-developed text	Conventions	In written text, apply a. conventions of capitalization b. conventions of punctuation c. standard usage	1	5

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Table 2.11: Actual Point Distributions for the Summer 2013 English II Operational Forms

	Blueprint Target				Actual			
	# Items		# Points		# Items		# Points	
Reporting Categories	**SR**	**WP**	**SR**	**WP**	**SR**	**WP**	**SR**	**WP**
Reading Process	12		12		11		11	
Reading (fiction)	9		9		10		11	
Reading (nonfiction)	9		9		9		8	
Writing	5	1	5	4	5	1	5	4
Total #Items/Points	**35**	**1**	**35**	**4**	**35**	**1**	**35**	**4**

Table 2.12: Actual Point Distributions for the Fall 2013 English II Operational Forms

	Blueprint Target				Actual			
	# Items		# Points		# Items		# Points	
Reporting Categories	**SR**	**WP**	**SR**	**WP**	**SR**	**WP**	**SR**	**WP**
Reading Process	12		12		10		10	
Reading (fiction)	9		9		11		11	
Reading (nonfiction)	9		9		9		9	
Writing	5	1	5	4	5	1	5	4
Total #Items/Points	**35**	**1**	**35**	**4**	**35**	**1**	**35**	**4**

Table 2.13: Actual Point Distributions for the Spring 2014 English II Operational Forms

	Blueprint Target				Actual			
	# Items		# Points		# Items		# Points	
Reporting Categories	**SR**	**WP**	**SR**	**WP**	**SR**	**WP**	**SR**	**WP**
Reading Process	12		12		10		10	
Reading (fiction)	9		9		9		9	
Reading (nonfiction)	9		9		11		11	
Writing	5	1	5	4	5	1	5	4
Total #Items/Points	**35**	**1**	**35**	**4**	**35**	**1**	**35**	**4**

2.4.2 Algebra I

The Algebra I Assessment measures a student's ability to solve problems by applying mathematical concepts. Three strands are assessed on the Algebra I Assessment:

- Numbers and Operations
- Algebraic Relationships
- Data and Probability

The 35 SR items in Session I are aligned to the strands listed above. Session II contains a PE aligned to the Algebraic Relationships strand. The PE is a mathematical scenario in which the

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student is required to respond to several CR items. The student may be asked to construct a graph and/or provide equations. On some items, the student is required to show his or her work for full credit. The PE is worth a total of 4 points and is scored on an item-specific rubric.

Table 2.14 contains targets for the CLE point distribution on the Algebra I operational forms. Some Big Ideas are not represented in this table because they are not assessed at this course level. Tables 2.15, 2.16, and 2.17 contain actual point distributions for the Summer 2013, Fall 2013, and Spring 2014 Algebra I operational forms, respectively.

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Table 2.14: Target Point Distributions for the Algebra I Operational Forms

Numbers and Operations Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range of Points per CLE on the Operational Test**
Understand numbers, ways of representing numbers, relationships among numbers, and number systems	Read, write, and compare numbers	Compare and order rational and irrational numbers, including finding their approximate locations on a number line	1	3–5
	Represent and use real numbers	Use real numbers and various models, drawing, etc. to solve problems	3	3–5
Algebraic Relationships Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range of Points per CLE on the Operational Test**
Understand patterns, relations, and functions	Create and analyze patterns	Generalize patterns using explicitly or recursively defined functions	2	1–2
	Classify objects and representations	Compare and contrast various forms of representations of patterns	3	1–2
	Identify and compare functions	Understand and compare the properties of linear and nonlinear functions	2	2–3
	Describe the effects of parameter changes	Describe the effects of parameter changes on linear, exponential growth/decay, and quadratic functions including intercepts	2	2–3
Represent and analyze mathematical situations and structures using algebraic symbols	Represent mathematical situations	Use symbolic algebra to represent and solve problems that involve linear and quadratic relationships, including equations and inequalities	3	2–3
	Describe and use mathematical manipulation	Describe and use algebraic manipulations, including factoring and rules of integer exponents, and apply properties of exponents, including order of operations, to simplify expressions	2	2–3
	Use equivalent forms	Use and solve equivalent forms of equations (linear, absolute value, and quadratic)	2	1–2
	Use systems	Use and solve systems of linear equations or inequalities with 2 variables	2	1–2

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Table 2.14 (continued): Target Point Distribution for the Algebra I Operational Forms

Algebraic Relationships Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range of Points per CLE on the Operational Test**
Use mathematical models to represent and understand quantitative relationships	Use mathematical models	Identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	2	3–4
Analyze change in various contexts	Analyze change	Analyze linear and quadratic functions by investigating rates of change, intercepts, and zeros	3	3–4
Data and Probability Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range of Points per CLE on the Operational Test**
Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them	Formulate questions	Formulate questions and collect data about a characteristic, which include sample spaces and distributions	3	1–2
	Represent and interpret data	Select and use appropriate graphical representation of data and, given one-variable quantitative data, display the distribution and describe its shape	3	2–3
Select and use appropriate statistical methods to analyze data	Describe and analyze data	Apply statistical measures of center to solve problems	2	2–3
	Represent data algebraically	Given a scatterplot, determine an equation for a line of best fit	2	1–2
Develop and evaluate inferences and predictions that are based on data	Develop and evaluate inferences	Make conjectures about possible relationships between 2 characteristics of a sample on the basis of scatterplots of the data	3	2–3

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Table 2.15: Actual Point Distributions for the Summer 2013 Algebra I Operational Forms

	Blueprint Target				Actual			
	# Items		# Points		# Items		# Points	
Reporting Categories	**SR**	**PE**	**SR**	**PE**	**SR**	**PE**	**SR**	**PE**
Number and Operation	8		8		8		8	
Algebraic Relationships	19	1	19	4	19	1	19	4
Data and Probability	8		8		8		8	
Total #Items/Points	35	1	35	4	35	1	35	4

Table 2.16: Actual Point Distributions for the Fall 2013 Algebra I Operational Forms

	Blueprint Target				Actual			
	# Items		# Points		# Items		# Points	
Reporting Categories	**SR**	**PE**	**SR**	**PE**	**SR**	**PE**	**SR**	**PE**
Number and Operation	8		8		9		9	
Algebraic Relationships	19	1	19	4	17	1	17	4
Data and Probability	8		8		9		9	
Total #Items/Points	35	1	35	4	35	1	35	4

Table 2.17: Actual Point Distributions for the Spring 2014 Algebra I Operational Forms

	Blueprint Target				Actual			
	# Items		# Points		# Items		# Points	
Reporting Categories	**SR**	**PE**	**SR**	**PE**	**SR**	**PE**	**SR**	**PE**
Number and Operation	8		8		8		8	
Algebraic Relationships	19	1	19	4	19	1	19	4
Data and Probability	8		8		8		8	
Total #Items/Points	35	1	35	4	35	1	35	4

2.4.3 Biology

The Biology Assessment measures student achievement in the following content and process strands:

- Characteristics and Interactions of Living Organisms
- Changes in Ecosystems and Interactions of Organisms with Their Environments
- Scientific Inquiry

The 35 SR items in Session I are aligned to the two strands listed above. Session II contains a PE aligned to the Scientific Inquiry strand, in which the student is required to respond to several CR items. The student may be asked to construct a data table, measure, and/or graph scientific results. Individual items within the PE may be worth 1, 2, 3, or 4 points and are scored on item-specific rubrics. The total point value of each operational PE is 20 points.

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Table 2.18 is used as a target for the CLE point distribution for the Biology operational forms. Some Big Ideas are not represented in this table because they are not assessed at this course level. Tables 2.19, 2.20, and 2.21 contain actual point distributions for the Summer 2013, Fall 2013, and Spring 2014 operational forms, respectively.

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Table 2.18: Target Point Distributions for the Biology I Operational Forms

Characteristics and Interactions of Living Organisms Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range of Points per CLE on the Operational Test**
There is a fundamental unity underlying the diversity of all living organisms	Organisms progress through life cycles unique to different types of organisms	Recognize cells both increase in number and differentiate, becoming specialized in structure and function, during and after embryonic development	1	1–2
	Cells are the fundamental units of structure and function of all living things	Describe the structure of cell parts (e.g., cell wall, cell membrane, cytoplasm, nucleus, chloroplast, mitochondrion, ribosome, vacuole) found in different types of cells (e.g., bacterial, plant, skin, nerve, blood, muscle) and the functions they perform (e.g., structural support, transport of materials, storage of genetic information, photosynthesis and respiration, synthesis of new molecules, waste disposal) that are necessary to the survival of the cell and organism	2	1–2
Living organisms carry out life processes in order to survive	The cell contains a set of structures called organelles that interact to carry out life processes through physical and chemical means	Explain physical and chemical interactions that occur between organelles (e.g., nucleus, cell membrane, chloroplast, mitochondrion, ribosome) as they carry out life processes	2	1–2
	Photosynthesis and cellular respiration are complementary processes necessary to the survival of most organisms on Earth	Explain the interrelationship between the processes of photosynthesis and cellular respiration (e.g., recycling of oxygen and carbon dioxide), comparing and contrasting photosynthesis and cellular respiration reactions (Do NOT assess intermediate reactions.)	2	1–2
		Determine what factors affect the processes of photosynthesis and cellular respiration (i.e., light intensity, availability of reactants, temperature)	2	1–2

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Table 2.18 (continued): Target Point Distributions for the Biology I Operational Forms

Characteristics and Interactions of Living Organisms Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range of Points per CLE on the Operational Test**
Living organisms carry out life processes in order to survive	Cellular activities and responses can maintain stability internally while external conditions are changing (homeostasis)	Explain the significance of the selectively permeable membrane to the transport of molecules	2	1–2
		Predict the movement of molecules across a selectively permeable membrane (i.e., diffusion, osmosis, active transport) needed for a cell to maintain homeostasis given concentration gradients and different sizes of molecules	2	1–2
		Explain how water is important to cells (e.g., is a buffer for body temperature, provides a soluble environment for chemical reactions, serves as a reactant in chemical reactions, provides hydration that maintains cell turgidity, maintains protein shape)	2	1–2
There is a genetic basis for the transfer of biological characteristics from one generation to the next through reproductive processes	All living organisms have genetic material (DNA) that carries hereditary information	Describe the chemical and structural properties of DNA (e.g., DNA is a large polymer formed from linked subunits of four kinds of nitrogen bases; genetic information is encoded in genes based on the sequence of subunits; each DNA molecule in a cell forms a single chromosome) (Assess the concepts; do NOT memorize the nitrogen base pairs.)	1	1–2
		Recognize the DNA codes for proteins, which are expressed as the heritable characteristics of an organism.	1	1–2
		Identify possible external causes (e.g., heat, radiation, certain chemicals) and effects of DNA mutations (e.g., altered proteins which may affect chemical reactions and structural development)	2	1–2

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Table 2.18 (continued): Target Point Distributions for the Biology I Operational Forms

Characteristics and Interactions of Living Organisms Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range of Points per CLE on the Operational Test**
There is a genetic basis for the transfer of biological characteristics from one generation to the next through reproductive processes	Chromosomes are components of cells that occur in pairs and carry hereditary information from one cell to daughter cells and from parent to offspring during reproduction	Recognize the chromosomes of daughter cells, formed through the processes of asexual reproduction and mitosis, the formation of somatic (body) cells in multicellular organisms, are identical to the chromosomes of the parent cell	1	1–2
		Recognize that during meiosis, the formation of sex cells, chromosomes are reduced to half the number present in the parent cell	1	1–2
		Explain how fertilization restores the diploid number of chromosomes	2	1–2
	There is heritable variation within every species of organism	Describe the advantages and disadvantages of asexual and sexual reproduction with regard to variation within a population	2	1–2
	The pattern of inheritance for many traits can be predicted by using the principles of Mendelian genetics	Predict the probability of the occurrence of specific traits, including sex-linked traits, in an offspring by using a monohybrid cross	2	1–2

Changes in Ecosystems and Interactions of Organisms with their Environments Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range of Points per CLE on the Operational Test**
Organisms are interdependent with one another and with their environment	All populations living together within a community interact with one another and with their environment in order to survive and maintain a balanced ecosystem	Explain the nature of interactions between organisms in predator/prey relationships and different symbiotic relationships (i.e., mutualism, commensalism, parasitism)	1	1–3
		Explain how cooperative (e.g., symbiotic) and competitive (e.g., predator/prey) relationships help maintain balance within an ecosystem	2	1–2

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Table 2.18 (continued): Target Point Distributions for the Biology I Operational Forms

Changes in Ecosystems and Interactions of Organisms with their Environments Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range of Points per CLE on the Operational Test**
Organisms are interdependent with one another and with their environment	Living organisms have the capacity to produce populations of infinite size, but environments and resources are finite	Identify and explain the limiting factors (biotic and abiotic) that may affect the carrying capacity of a population within an ecosystem	2	1–3
	The diversity of species within an ecosystem is affected by changes in the environment, which can be caused by other organisms or outside processes	Predict the impact (beneficial or harmful) a natural environmental event (e.g., forest fire, flood, volcanic eruption, avalanche) or human caused change (e.g., acid rain, global warming, pollution, deforestation, introduction of an exotic species) may have on the diversity of different species in an ecosystem	2	1–2
Matter and energy flow through the ecosystem	As energy flows through the ecosystem, all organisms capture a portion of that energy and transform it to a form they can use	Predict how the use and flow of energy will be altered due to changes in a food web	2	1–2
Genetic variation sorted by the natural selection process explains evidence of biological evolution	Reproduction is essential to the continuation of every species	Explain the importance of reproduction to the survival of a species (i.e., the failure of a species to reproduce will lead to extinction of that species)	1	1–2
	Natural selection is the process of sorting individuals based on their ability to survive and reproduce within their ecosystem	Identify examples of adaptations that may have resulted from variations favored by natural selection (e.g., long-necked giraffes, long-eared jack rabbits) and describe how that variation may have provided populations an advantage for survival	2	1–2
		Explain how environmental factors (e.g., habitat loss, climate change, pollution, introduction of non-native species) can be agents of natural selection	2	1–2

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Table 2.19: Actual Point Distributions for the Summer 2013 Biology Operational Forms

Reporting Categories	Blueprint Target				Actual			
	# Items		# Points		# Items		# Points	
	SR	PE	SR	PE	SR	PE	SR	PE
Characteristics and Interactions of Living Organisms Total	22		22		22		22	
Changes in Ecosystems and Interactions of Organisms with Their Environments Total	13		13		13		13	
Scientific Inquiry		10–16		20		10		20
Total #Items/Points	**35**	**10–16**	**35**	**20**	**35**	**10**	**35**	**20**

Table 2.20: Actual Point Distributions for the Fall 2013 Biology Operational Forms

Reporting Categories	Blueprint Target				Actual			
	# Items		# Points		# Items		# Points	
	SR	PE	SR	PE	SR	PE	SR	PE
Characteristics and Interactions of Living Organisms Total	22		22		22		22	
Changes in Ecosystems and Interactions of Organisms with Their Environments Total	13		13		13		13	
Scientific Inquiry		10		20		10		20
Total #Items/Points	**35**	**10**	**35**	**20**	**35**	**10**	**35**	**20**

Table 2.21: Actual Point Distributions for the Spring 2014 Biology Operational Forms

Reporting Categories	Blueprint Target				Actual			
	# Items		# Points		# Items		# Points	
	SR	PE	SR	PE	SR	PE	SR	PE
Characteristics and Interactions of Living Organisms Total	22		22		22		22	
Changes in Ecosystems and Interactions of Organisms with Their Environments Total	13		13		13		13	
Scientific Inquiry		10		20		10		20
Total #Items/Points	**35**	**10**	**35**	**20**	**35**	**10**	**35**	**20**

2.4.4 English I

The English I Assessment measures student achievement in reading. All administrations of the test contain commissioned passages that comprise both fiction and nonfiction and cover a wide range of genres, including poems, short stories, newspaper articles, historical fiction, functional

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texts, and webpages. The items associated with each passage are in SR format. The English I Assessment contains 40 SR items.

Table 2.22 contains targets for the CLE point distribution on the English I operational forms. Some of the CLE point targets may not be met because the use of a passage or scenario is not conducive to items written to the CLE. Some Big Ideas are not represented in this chart because they are not assessed at this course level.

Tables 2.23, 2.24, and 2.25 contain actual point distributions for the Summer 2013, Fall 2013, and Spring 2014 operational forms, respectively.

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Table 2.22: Target Point Distributions for the English I Operational Forms

Big Idea	Concept	CLE	DOK Limit	Range/CLE
Develop and apply skills and strategies to the reading process	Vocabulary	Develop vocabulary through text, using a. roots and affixes b. context clues c. glossary, dictionary, and thesaurus	2	4–6
	Post Reading	Apply post-reading skills to comprehend, interpret, analyze, and evaluate text: a. identify and explain the relationship between the main idea and supporting details d. draw conclusions e. paraphrase f. summarize	3	6–9
	Making Connections	Compare, contrast, analyze, and evaluate connections a. text to text (information and relationships in various fiction and nonfiction works)	3	2–3
Develop and apply skills and strategies to comprehend, analyze, and evaluate fiction, poetry, and drama from a variety of cultures and times	Text Features	Analyze and evaluate the text features in grade-level text	3	2–3
	Literary Techniques	Identify and, explain literary techniques, emphasizing a. irony b. imagery c. repeated sound, line, or phrase d. analyze literary techniques previously introduced	3	3–4
	Literary Elements	Use details from text(s) to a. demonstrate comprehension skills previously introduced b. analyze character, plot, setting, point of view c. analyze the development of a theme across genres d. evaluate the effect of author's style	3	4–7

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Table 2.22 (continued): Target Point Distributions for the English I Operational Forms

Big Idea	Concept	CLE	DOK Limit	Range/CLE
Develop and apply skills and strategies to comprehend, analyze, and evaluate nonfiction (such as biographies, newspapers, technical manuals) from a variety of cultures and times	Text Features	Explain, analyze and evaluate the author's use of text features to clarify meaning	3	2–3
	Literary Elements	Identify, explain, and analyze literary techniques in nonfiction, emphasizing a. irony b. imagery c. repeated sound, line, or phrase d. figurative language and sound devices previously introduced	3	3–4
	Text Structures	Use details from informational and persuasive text(s) to a. identify and explain the organizational patterns b. analyze and evaluate effectiveness of word choice c. analyze and evaluate for accuracy and adequacy of evidence d. analyze and evaluate point of view e. analyze and evaluate author's viewpoint/perspective f. evaluate proposed solutions g. demonstrate comprehension skills previously introduced	3	5–7

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Table 2.23: Actual Point Distributions for the Summer 2013 English I Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
Develop and apply skills and strategies to the reading process	13–17	14
Develop and apply skills and strategies to comprehend, analyze, and evaluate fiction, poetry, and drama	10–14	14
Develop and apply skills and strategies to comprehend, analyze, and evaluate nonfiction	11–15	12
Total #Items/Points	**40**	**40**

Table 2.24: Actual Point Distributions for the Fall 2013 English I Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
Develop and apply skills and strategies to the reading process	13–17	16
Develop and apply skills and strategies to comprehend, analyze, and evaluate fiction, poetry, and drama	10–14	12
Develop and apply skills and strategies to comprehend, analyze, and evaluate nonfiction	11–15	12
Total #Items/Points	**40**	**40**

Table 2.25: Actual Point Distributions for the Spring 2014 English I Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
Develop and apply skills and strategies to the reading process	13–17	17
Develop and apply skills and strategies to comprehend, analyze, and evaluate fiction, poetry, and drama	10–14	9
Develop and apply skills and strategies to comprehend, analyze, and evaluate nonfiction	11–15	14
Total #Items/Points	**40**	**40**

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2.4.5 Algebra II

The Algebra II Assessment measures a student's ability to solve problems by applying mathematical concepts. The three strands assessed on the Algebra II Assessment are as follows:

- Numbers and Operations
- Algebraic Relationships
- Data and Probability

The 40 SR items are aligned to the strands listed above. Table 2.26 contains targets for the CLE point distribution on the Algebra II operational forms. Some Big Ideas are not represented in this table because they are not assessed at this course level. Tables 2.27, 2.28, and 2.29 contain actual point distributions for the Summer 2013, Fall 2013, and Spring 2014 operational forms, respectively.

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Table 2.26: Target Point Distributions for the Algebra II Operational Forms

Numbers and Operations Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range/CLE**
Understand numbers, ways of representing numbers, relationships among numbers, and number systems	Read, write, and compare numbers	Compare and order rational and irrational numbers, including finding their approximate locations on a number line	1	3–4
	Represent and use real numbers	Use real numbers and various models, drawings, etc. to solve problems	3	4–5
Algebraic Relationships Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range/CLE**
Understand patterns, relations, and functions	Create and analyze patterns	Generalize patterns using explicitly or recursively defined functions	2	2–3
	Classify objects and representations	Compare and contrast various forms of representations of patterns	3	2–3
	Identify and compare functions	Compare properties of linear, exponential, logarithmic, and rational functions	2	2–3
	Describe the effects of parameter changes	Describe the effects of parameter changes on functions	2	2–3
Represent and analyze mathematical situations and structures using algebraic symbols	Represent mathematical situations	Use symbolic algebra to represent and solve problems that involve exponential, quadratic and logarithmic relationships	3	2–3
	Describe and use mathematical manipulation	Describe and use algebraic manipulations, inverse, or composition of functions	2	1–2
	Use equivalent forms	Use and solve equivalent forms of equations and inequalities	2	2–3
	Use systems	Use and solve systems of linear and quadratic equations or inequalities with two variables	3	2–3
Use mathematical models to represent and understand quantitative relationships	Use mathematical models	Identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	2	2–3
Analyze change in various contexts	Analyze change	Analyze exponential and logarithmic functions by investigating rates of change, intercepts, and asymptotes	3	3–4

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Table 2.26 (continued): Target Point Distributions for the Algebra II Operational Forms

Data and Probability Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range/CLE**
Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them	Represent and interpret data	Select and use appropriate graphical representation of data and, given one-variable quantitative data, describe its shape and calculate summary statistics	3	2–3
Select and use appropriate statistical methods to analyze data	Describe and analyze data	Apply statistical measures of center to solve problems	3	2–3
	Represent data algebraically	Given a scatterplot, determine the type of function which models the data	2	1–2
Understand and apply basic concepts of probability	Apply basic concepts of probability	Describe the concepts of sample space and probability distribution	2	1–2
	Use and describe compound events	Use and describe the concepts of conditional probability and independent events and how to compute the probability of a compound event	2	2–3

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Table 2.27: Actual Point Distributions for the Summer 2013 Algebra II Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
Numbers and Operations	7–9	9
Algebraic Relationships	20–30	22
Data and Probability	10–13	9
Total #Items/Points	**40**	**40**

Table 2.28: Actual Point Distributions for the Fall 2013 Algebra II Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
Numbers and Operations	7–9	8
Algebraic Relationships	20–30	22
Data and Probability	10–13	10
Total #Items/Points	**40**	**40**

Table 2.29: Actual Point Distributions for the Spring 2014 Algebra II Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
Numbers and Operations	7–9	8
Algebraic Relationships	20–30	22
Data and Probability	10–13	10
Total #Items/Points	**40**	**40**

2.4.6 Geometry

The Geometry Assessment measures a student's ability to solve problems by applying mathematical concepts. The three strands assessed on the Geometry Assessment are as follows:

- Algebraic Relationships
- Geometric and Spatial Relationships
- Measurement

The 40 SR items are aligned to the strands listed above. Table 2.30 contains targets for the CLE point distribution on the Geometry operational forms. Some Big Ideas are not represented in this table because they are not assessed at this course level. Tables 2.31, 2.32, and 2.33 contain actual point distributions for the Summer 2013, Fall 2013, and Spring 2014 operational forms, respectively.

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Table 2.30: Target Point Distributions for the Geometry Operational Forms

Algebraic Relationships Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range/CLE**
Understand patterns, relations, and functions	Create and analyze patterns	Generalize patterns using explicitly or recursively defined functions	2	1–2
	Classify objects and representations	Compare and contrast various forms of representations of patterns	3	1–2
	Identify and compare functions	Understand and compare the properties of linear and nonlinear functions	2	1–2
Represent and analyze mathematical situations and structures using algebraic symbols	Describe and use mathematical manipulation	Apply appropriate properties of exponents to simplify expressions and solve equations	2	1–2
Use mathematical models to represent and understand quantitative relationships	Use mathematical models	Identify quantitative relationships and determine the type(s) of functions that might model the situation to solve the problem	2	2–3
Analyze change in various contexts	Analyze change	Analyze linear and quadratic functions by investigating rates of change, intercepts, and zeros	3	2–3
Geometric and Spatial Relationships Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range/CLE**
Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships	Describe and use geometric relationships	Use inductive and deductive reasoning to establish the validity of geometric conjectures, prove theorems, and critique arguments made by others	3	6–7
Specify locations and describe spatial relationships using coordinate geometry and other representational systems	Use coordinate systems	Make conjectures and solve problems involving two-dimensional objects represented with Cartesian coordinates	3	6–7
Apply transformations and use symmetry to analyze mathematical situations	Use transformations on objects	Use and apply constructions and the coordinate plane to represent translations, reflections, rotations, and dilations of objects	2	3–4
	Use symmetry	Identify types of symmetries of two- and three-dimensional figures	2	3–4

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Table 2.30 (continued): Target Point Distributions for the Geometry Operational Forms

Geometric and Spatial Relationships Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range/CLE**
Use visualization, spatial reasoning, and geometric modeling to solve problems	Recognize and draw three-dimensional representations	Draw and use vertex-edge graphs or networks to find optimal solutions and draw representations of three-dimensional geometric objects from different perspectives	3	4–5
	Draw and use visual models	Draw or use visual models to represent and solve problems	3	
Measurement Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range/CLE**
Apply appropriate techniques, tools, and formulas to determine measurements	Use angle measurement	Solve problems of angle measure, including those involving triangles or other polygons and of parallel lines cut by a transversal	2	4–5
	Apply geometric measurements	Determine the surface area and volume of geometric figures, including cones, spheres, and cylinders	2	3–4
	Use relationships within a measurement system	Use unit analysis to solve problems	2	

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Table 2.31: Actual Point Distributions for the Summer 2013 Geometry Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
Algebraic Relationships	7–12	8
Geometric and Spatial Relationships	22–27	24
Measurement	7–9	8
Total #Items/Points	**40**	**40**

Table 2.32: Actual Point Distributions for the Fall 2013 Geometry Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
Algebraic Relationships	7–12	8
Geometric and Spatial Relationships	22–27	24
Measurement	7–9	8
Total #Items/Points	**40**	**40**

Table 2.33: Actual Point Distributions for the Spring 2014 Geometry Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
Algebraic Relationships	7–12	8
Geometric and Spatial Relationships	22–27	24
Measurement	7–9	8
Total #Items/Points	**40**	**40**

2.4.7 Government

The Government Assessment measures a student's ability to understand our history and participate in our civic life as citizens and consumers. The Government forms consist of 40 SR items that are aligned to the following strands:

- Principles of Constitutional Democracy
- Principles and Processes of Governance Systems

Table 2.34 contains targets for the CLE point distribution on the Government operational forms. Some Big Ideas are not represented in this table because they are not assessed at this course level. Tables 2.35, 2.36, and 2.37 contain actual point distributions for the Summer 2013, Fall 2013, and Spring 2014 operational forms, respectively.

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Table 2.34: Target Point Distributions for the Government Operational Forms

Principles of Constitutional Democracy Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range/CLE**
Knowledge of the principles expressed in documents shaping constitutional democracy in the United States	Principles of constitutional democracy in the United States	Apply the following principles of constitutional democracy to historical and contemporary issues: a. checks and balances b. separation of powers c. federalism d. representation e. popular sovereignty f. due process of law g. judicial review	3	2–4
		Determine the civic responsibilities of individual citizens	2	2–4
		Assess the changing roles of government: a. philosophy b. limits c. duties	2	2–4
		Describe the historical foundations of the U.S. governmental system as reflected in the following documents: a. Magna Carta b. Enlightenment writings of Hobbes, Locke, Rousseau, Montesquieu, and the Social Contract Theory c. Mayflower Compact d. Declaration of Independence e. Articles of Confederation	3	2–4
		Identify and give examples of democracies and republics	2	2–4
	Role of citizens and government in carrying out constitutional principles	Explain the relevance and connection of constitutional principles in the following documents: a. U.S. Constitution b. Federalist Papers c. Amendments to the Constitution, emphasizing the Bill of Rights d. Key Supreme Court decisions, *Marbury v. Madison*, *McCulloch v. Maryland*, *Miranda v. Arizona*, *Plessy v. Ferguson*, *Brown v. Topeka Board of Education*	3	2–4

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Table 2.34 (continued): Target Point Distributions for the Government Operational Forms

Principles and Processes of Governance Systems Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range/CLE**
Knowledge of principles and processes of governance systems	Principles and purposes of government	Describe the structure of government and the purposes of laws (with emphasis on the federal and state governments) in general	1	4–5
		Explain the importance of the following principles of government: a. limited government b. majority rule and minority rights c. constitution and civil rights d. checks and balances e. merits of the above principles	2	4–5
	Processes of governmental systems	Explain the processes pertaining to: a. selection of political leaders (with an emphasis on presidential and parliamentary systems) b. functions and styles of leadership (including authoritarian, democratic, and laissez-faire) c. governmental systems d. how laws and rules are made, enforced, changed, and interpreted	2	4–5
		Evaluate the roles and influence of political parties and interest groups	3	4–5

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Table 2.35: Actual Point Distributions for the Summer 2013 Government Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
Principles of Constitutional Democracy	18–22	20
Principles and Processes of Governance Systems	18–22	20
Total #Items/Points	**40**	**40**

Table 2.36: Actual Point Distributions for the Fall 2013 Government Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
Principles of Constitutional Democracy	18–22	20
Principles and Processes of Governance Systems	18–22	20
Total #Items/Points	**40**	**40**

Table 2.37: Actual Point Distributions for the Spring 2014 Government Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
Principles of Constitutional Democracy	18–22	20
Principles and Processes of Governance Systems	18–22	20
Total #Items/Points	**40**	**40**

2.4.8 American History

The American History Assessment measures a student's ability to understand U.S. history and participate in U.S. civic life as citizens and consumers. The American History forms consist of 40 SR items that are aligned to the Missouri, United States, and World History strand. Individual CLEs within that strand report out to the following categories:

- History
- Government
- Economics
- Geography

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Table 2.38 contains targets for the CLE point distribution on the American History operational forms. Some Big Ideas are not represented in this table because they are not assessed at this course level. Tables 2.39, 2.40, and 2.41 contain actual point distributions for the Summer 2013, Fall 2013, and Spring 2014 operational forms, respectively.

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Table 2.38: Target Distributions for the Am. History Operational Forms

Missouri, United States, and World History Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range/CLE**
Knowledge of continuity and change in the history of Missouri and the United States	Understand the migrations of people from many regions to North America	Describe the migrations of people from many regions of the world and the interactions of cultures and religious traditions that have contributed to America's history from Reconstruction to the present: a. motivations for immigration b. challenges to immigrants	3	3–4
	Political development in the United States	Analyze the evolution of American democracy, its ideas, institutions, and political processes from Reconstruction to the present, including: a. Reconstruction b. struggle for civil rights c. expanding role of government d. expanding participation in political processes	3	3–4
	Understanding economic concepts	Apply the following major economic concepts in the context of the historical period studied: a. natural resources, labor, and capital resources b. supply and demand (shortages and surpluses) c. business cycle d. government regulation and deregulation e. unemployment and full employment f. inflation and deflation g. savings and investment h. profit	3	2
	Principles and purposes of government	Explain the importance of the following principles of government since Reconstruction a. majority rule and minority rights b. constitution and civil rights c. checks and balances	2	4
	Processes of governmental systems	Analyze the roles and influence of political parties and interest groups since Reconstruction to the present	3	4

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Table 2.38 (continued): Target Point Distributions for the Am. History Operational Forms

Missouri, United States, and World History Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range/CLE**
Knowledge of continuity and change in the history of Missouri and the United States	Economic development in the United States	Describe the historical development of the American economy, including a. impact of geographic factors b. role of the frontier and agriculture c. impact of technological change and urbanization on land, resources, society, politics, and culture d. changing relationships between government and the economy	2	3–4
	Understanding the roles of people, business, and government in the economic system of the United States	Analyze the roles people, business, labor unions, and government play in the U.S. economy: a. how monopolies affect people's lives and how they are regulated b. how boycotts, strikes, and embargoes affect trade and people's options c. monetary policy (why the Federal Reserve System influences interest rates and money supply) d. fiscal policy (government taxation and spending)	3	2
	Understanding functions and effects of economic institutions	Survey the functions and effects of major economic institutions of the U.S. economy, such as corporations, labor unions, and financial institutions	2	2
	Understanding the roles of the government in the U.S. economy	Identify the roles of government in the U.S. economy (defining and protecting property rights, maintaining competition, promoting goals such as full employment, stable prices, growth, and justice)	2	2
	Understanding relationships within places	Distinguish major patterns and issues with regard to population distribution, demographics, settlements, migrations, and cultures in the United States.	2	4
	Understanding relationships between and among regions	List and explain criteria that give regions their identities in different periods of U.S. history. Explain how and why regions change.	2	4

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Table 2.38 (continued): Target Point Distributions for the Am. History Operational Forms

Missouri, United States, and World History Strand				
Big Idea	**Concept**	**CLE**	**DOK Limit**	**Range/CLE**
Knowledge of continuity and change in the history of Missouri and the United States	Foreign and domestic policy developments	Describe and evaluate the evolution of U.S. domestic and foreign policies from Reconstruction to the present, including a. isolationism b. immigration policy c. Manifest Destiny d. imperialism e. two world wars f. Cold War g. New Deal h. global interdependence	3	3–4
	Causes, comparisons, and results of major twentieth-century wars	Examine the wars of the twentieth century pertinent to U.S. history, including causes, comparisons, consequences, and peace efforts	2	3–4

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Table 2.39: Actual Point Distributions for the Summer 2013 Am. History Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
History	14–18	16
Government	7–9	8
Economics	7–9	8
Geography	7–9	8
Total #Items/Points	**40**	**40**

Table 2.40: Actual Point Distributions for the Fall 2013 Am. History Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
History	14–18	16
Government	7–9	8
Economics	7–9	8
Geography	7–9	8
Total #Items/Points	**40**	**40**

Table 2.41: Actual Point Distributions for the Spring 2014 Am. History Operational Form

Reporting Categories	Target #Items/Points (SR)	Actual #Items/Points (SR)
History	14–18	16
Government	7–9	8
Economics	7–9	8
Geography	7–9	8
Total #Items/Points	**40**	**40**

2.5 Development of Test Items

Content-related evidence of validity supporting test interpretation is presented in terms of how the MO EOC Assessments were assembled. Detailed information regarding both item-development procedures and content coverage is included in this section.

The forms for the Fall 2008 through the Spring 2014 administrations were constructed using items field tested in Spring 2008, Spring 2009, or Spring 2010. During the process of building the forms for the operational test administrations, statistical characteristics (i.e., p-values and point-biserial correlations) were monitored to ensure that the statistical properties of the forms were similar within each content area and across operational test forms for fall, spring, and summer.

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Riverside Publishing Test Development Specialists (TDSs) created a detailed item and passage development plan based on the blueprints for each content area. The plans included the number of items necessary for each assessed CLE, as well as an outline of the review process for developed items and passages. This process included internal Riverside Publishing reviews, DESE item review, and a content and bias review by Missouri educators.

2.5.1 Item Writing

Missouri educators, DESE staff members, Regional Instructional Facilitators (curriculum and assessment specialists housed in each of Missouri's nine Regional Professional Development Centers), and Riverside Publishing TDSs created all the test items, including the PEs. English II passages and WPs and English I passages were developed by item writers trained by Riverside Publishing, Riverside Publishing TDSs, and DESE staff. These passages were developed and refined prior to the item-writing workshops. Requirements to be an item writer included experience in classroom teaching and expert content knowledge.

In September 2007 and June 2008, Riverside Publishing conducted item-writing workshops to develop SR items for English II, Algebra I, and Biology as well as PEs for Algebra I and Biology. In January 2008, Riverside Publishing conducted item-writing workshops to develop SR items for Algebra II, Geometry, Government, and American History. These workshops were conducted at the Assessment Resource Center (ARC) in Columbia, MO. Participants in the workshops included Missouri educators, DESE staff, Regional Instructional Facilitators, and Riverside Publishing TDSs. The workshops were held over a five-day period and were conducted with 15–20 teacher participants per content area. Teacher participants were selected by DESE to represent school districts throughout Missouri. The content developed at the workshops was based on the Missouri Show-Me Standards and CLEs.

The English II participants wrote SR items associated with the passages that had been developed prior to the item-writing workshops. The Algebra I and Biology participants wrote SR items and PEs along with rubrics. Biology PEs consist of a science investigation scenario and several associated CR items and were written based on an existing Science PE development template that specified the types of tasks and numbers of items that compose a PE.

In March 2008, Riverside Publishing conducted item-writing workshops to develop SR items for English I. English I participants wrote SR items associated with the passages that had been developed prior to the item-writing workshops.

During the item-writing workshops, Riverside Publishing TDSs conducted training sessions with the item writers and provided instructions on avoiding bias and stereotyping of groups and individuals based on gender, race, ethnicity, religion, age, language, socioeconomic group, and disability. Riverside Publishing TDSs also trained item writers to write items that adhere to the principles of universal design, making the items accessible to the widest range of students. For example, items and passages were written using clear and concise language, and all art, graphs, and tables were labeled and were not overly crowded with extraneous information. Instruction was also provided on developing items at particular cognitive levels based on Norman Webb’s depth of knowledge (DOK) levels.

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Riverside Publishing TDSs trained item writers to enter content into the company's electronic Content Management System (CMS). During training, each item writer wrote several items and received feedback on them. Participants also received feedback through the CMS as Riverside Publishing TDSs responded to teachers' items as they were submitted. As items were produced, they were continuously reviewed, revised, edited, and evaluated by Riverside Publishing TDSs and DESE staff. Item writers who generated high-quality work on or ahead of schedule were given additional assignments.

As items were written, they were tracked according to the item development plan. Riverside Publishing kept careful records to maintain a workflow that generated items in assessment strands and CLEs as required by the test blueprint. All items and passages went through several rounds of internal reviews, including content and editorial reviews. Riverside Publishing TDSs reviewed each item with respect to alignment, clarity, and correspondence with item specifications.

2.5.2 Universal Design

Riverside Publishing TDSs were experienced in employing the principles of universal design in item development so that all students have equal access to the assessments. Riverside Publishing included these principles when training Missouri teachers to write the test items.

According to the NCEO Synthesis Report 44 (Thompson, Johnstone, & Thurlow, 2002) universally designed assessments have seven elements:

1. Inclusive assessment population
2. Precisely defined constructs
3. Accessible, nonbiased items
4. Amenable to accommodations
5. Simple, clear, and intuitive instructions and procedures
6. Maximum readability and comprehensibility
7. Maximum legibility

All items for the MO EOC Assessments were developed with these elements in mind. Riverside Publishing ensured the development of MO EOC items in accordance with these principles in the following manner:

- Items were developed to include a wide array of contexts and cultures. These item types may make students feel more included, increase motivation, and avoid bias.

- The test and item specifications served as a model for precisely defining the constructs that the tests would measure. These specifications indicated to the item writer, content reviewer, and TDS exactly what was to be measured. The item could assess a particular part of a standard or a combination of elements within a standard. The reviews served as a method for eliminating items that included assessment of knowledge outside the standard. For example, a Mathematics item should have nonmathematical vocabulary below grade level, otherwise the item might also be assessing reading ability, introducing construct-irrelevant variance.

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- The review of items, which included Missouri teachers from diverse ethnic and geographic backgrounds, served to ensure that all items were accessible to as many students as possible.

- Riverside Publishing staff members trained Missouri teachers to create clear and simple instructions so that students would have a clear understanding of the task needed to answer an item. Teacher review committees had an opportunity to review the instructions to ensure that they were appropriate for the grade levels and content areas. To ensure the appropriateness of the level of the vocabulary, Children's Writer's Word Book and EDL Core Vocabulary were employed by test developers and item review committees.

- Finally, items with text, art, tables, maps, and diagrams were constructed with maximum legibility.

2.5.3 Content and Bias Review Process

Standard 3.6[6] addresses the importance of item review by an examination of the item statistics and the use of expert panels of judges. This section details the steps taken to ensure that the items chosen for the operational forms of the MO EOC Assessments were of high technical quality and were free from bias. Content and bias reviews were conducted in November 2007 and July 2008 in Columbia, MO. The content review committees included DESE staff, Missouri educators from around the state, Regional Instructional Facilitators, and Riverside Publishing staff.

The content and bias review committees reviewed SR items and PE/WPs using the following criteria:

- Overall quality and syntactical clarity
- Content coverage and content appropriateness
- Alignment to the specified CLE
- Appropriate contexts
- One clearly correct answer and plausible distractors for SR items
- Freedom from bias or any racial, socioeconomic, gender, or other sensitivity issues

The bias review committee was held separately from the content review committee and focused on reviewing items on the last criterion above. Suggestions from the bias review committee were then shared with the content review committee for their review and a determination on how to incorporate the edits.

Before reviewing the items, a group training session was held with all committee members. Riverside Publishing presented a PowerPoint that described the MO EOC program, the test

[6] **Standard 3.6:** The type of items, response formats, scoring procedures, and test administration procedures should be selected based on the purposes of the test, the domain to be measured, and the intended test takers. To the extent possible, test content should be chosen to ensure that intended inferences from test scores are equally valid for members of different groups of test takers. The test review process should include empirical analyses and, when appropriate, the use of expert judges to review items and response formats. The qualifications, relevant experiences, and demographic characteristics of expert judges should also be documented (p. 44).

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development process, and the content and bias review procedures. After the large-group session, the committee members went to their respective break-out rooms to discuss the week's activities in more detail. The committee members were provided with copies of the CLEs and item specifications for the courses for the items they were to review. Each Riverside Publishing content facilitator reviewed these documents with the committee and answered any questions. The committee members were given the following checklists that could be referenced throughout the review process:

For SR items:

- ☐ Does the item assess the assigned CLE?
- ☐ Is the item clear, concise, and complete?
- ☐ Does the item contain accurate and sufficient content information?
- ☐ Is the item grade-level appropriate, and are the vocabulary and syntax appropriate for the students at the intended grade? (Reference the EDL Core Vocabularies.)
- ☐ Is the item fair to all students and free of bias and sensitivity issues?
- ☐ Does the item have correct punctuation, and is it grammatically correct?
- ☐ Is the item free from spelling and typographical errors?
- ☐ Is clueing avoided within an item stem and options, as well as among items?
- ☐ Does the item stand alone? (The answer to one item should not be dependent on the content of another item.)
- ☐ Are the equations, tables, charts, graphs, and other art clear, accurate, and necessary?
- ☐ Does the item have only one correct answer?
- ☐ Does the item have unique, plausible distractors containing common errors students would make?
- ☐ Are all the options parallel in form and arranged in logical order?
- ☐ Do all distractors contain clear rationale statements? (Mathematics and Science only)
- ☐ Is the item free from absolutes ("none of the above," "all of the above") as options and free from the use of negatives ("not," "none," "except") in the stem?
- ☐ Does the item avoid repeating words from the stem in the options?
- ☐ Does the item pose a single problem (although the solution may require more than one step)?

For PE/WPs:

- ☐ Does the item assess the assigned CLE?
- ☐ Does the item clearly specify how the student should respond?
- ☐ Does the item allow for a variety of acceptable responses for the student to get full credit?
- ☐ Is the item grade-level appropriate, and are the vocabulary and syntax appropriate for the students at the intended grade? (Reference the EDL Core Vocabularies.)
- ☐ Is the item rich enough to elicit an appropriate range of responses covering all possible score points?
- ☐ Is the item fair to all students and free of bias and sensitivity issues?
- ☐ Does the rubric clearly define an acceptable answer or answers at each score point level?

Missouri educators participated in the review process for each content area. The committee members read and reviewed each item. Discussions were held about whether the items met the

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criteria listed above. The committees then rejected or revised any items they deemed unsatisfactory. If there was disagreement about how to proceed with an item, the Riverside Publishing facilitator polled the group and followed the direction of the majority. Between approximately 95% and 98% of the items were accepted (as–is or with edits) by the content and bias committees. Tables 2.42 and 2.43 show the number of items reviewed in 2007 and 2008, respectively. The accepted items in Table 2.42 were placed in a pool of items from which the 2008 standalone field-test forms were built. The accepted items in Table 2.43 were placed on EFT forms in the 2009 operational administrations.

To further preserve validity, all item review sessions were held in secure meeting rooms, and all materials were confidential. Committee members were required to sign confidentiality agreements so that the integrity of the test content was not compromised. Although educators were encouraged to share information with their colleagues about the process of the item review, they were made fully aware of the expectation that any information about specific items and passages was to remain secure and confidential.

Table 2.42: 2007 Content/Bias Item Review Acceptance Rates

Test Period	Total Number of Items Presented for Review	Number of Items Accepted (as-is or with edits)	Acceptance Rate (items accepted as-is or with edits)
English II	404	398	99%
Algebra I	239	233	97%
Biology	402	365	91%

Table 2.43: 2008 Content/Bias Item Review Acceptance Rates

Test Period	Total Number of Items Presented for Review	Number of Items Accepted (as-is or with edits)	Acceptance Rate (items accepted as-is or with edits)
English II	298	298	100%
Algebra I	288	288	100%
Biology	164	161	98%
English I	669	669	100%
Algebra II	490	488	99.5%
Geometry	488	471	97%
Government	492	474	96%
Am. History	494	470	95%

2.6 Test Form Assembly

2.6.1 Field-Test Selection and Administration

The items accepted at the content/bias review were used to build the standalone field-test forms administered in Spring 2008 and Spring 2009. Field-test items were selected so that each form met the established operational blueprint requirements for content coverage as closely as possible. For any standalone field-test form that deviated slightly from the blueprint, another

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field-test form made up for that difference so that the entire pool of field-tested items met the blueprint requirements.

The MO EOC Spring 2008 field test consisted of 10 SR forms per course, 10 English II WPs, 10 Algebra I PE forms, and 10 Biology PE forms. All field-test forms were reviewed and approved by DESE.

The MO EOC Spring 2009 field test consisted of 10 SR forms of 36 items each for Algebra II, Geometry, Government, and American History. English I field tested 14 unique forms with 36 items on each form. All field-test forms were reviewed and approved by DESE. Both standalone field tests were census tests of all students enrolled in courses corresponding to the MO EOC Assessments. The forms for each course were spiraled at the student level across the state.

2.6.2 Statistical Item Review

After completion of the 2008 field-test item scoring and again after completion of the 2009 field-test item scoring, Riverside Publishing TDSs and psychometricians reviewed the statistical characteristics of the items. Riverside Publishing used classical item statistics, including n-counts, p-values, percentage choosing each response option, point-biserial correlations, and differential item functioning (DIF) analysis for the SR items. Additionally, the Rasch model was used for distractor analysis for the SR items and for DIF analysis for the PE/WPs.

During the data review, Riverside Publishing Research and Test Development staff and DESE staff reviewed student performance on the Spring 2008 field-test items for English II, Algebra I, and Biology and on the Spring 2009 field-test items for English I, Algebra II, Geometry, Government, and American History. Items were carefully reviewed with respect to their statistical characteristics. Item reviewers from DESE and Riverside Publishing were provided with the following information:

- Form
- Position
- Item as it appeared in the printed books
- Item alignment to the Missouri Show-Me Standards
- The p-value of the correct answer and percentage of students who selected each distractor (for SR items only)
- Mean and SD of item score (for PE/WPs only)
- Point-biserial correlation of correct response and point-biserial for each distractor (for SR items only)
- Total number of students who attempted to answer each question
- DIF using the Mantel-Haenszel (MH) (1959) procedure and the Educational Testing Service (ETS) classification (for SR items only)

Riverside Publishing and DESE staff reviewed items that were flagged because of statistics that fell outside the parameters determined by the Riverside Publishing Research staff. Table 2.44 contains the guidelines that were used for data review.

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Table 2.44: Criteria for Flagged Items

Item Flagging Criteria	Indicates
If p-value of keyed response < 0.35	Difficult item
If p-value of keyed response > 0.95	Easy item
If p-value of keyed response <p-value of distractor	Possible miskey
If p-value of distractor > 0.35	Possible second correct option
If point-biserial of keyed response < 0.20	Poorly discriminating item
If point-biserial of a distractor is > 0.00	Possible second correct option
If ETS classification is B or C (from DIF analysis)	Possible bias in item

Each flagged item was reviewed, and then Riverside Publishing and DESE decided whether the item should be accepted or rejected. The review included items flagged with moderate to severe DIF (an ETS classification of B or C). A flagged item was accepted if the review team determined that the item was strong and tested students on content they were expected to know. Accepted items were then made available in the pool of items that could be used to create the operational forms. Items the review team felt were biased or inappropriate for the MO EOC Assessments were rejected. Rejected items were removed from the item pool, making them invalid for the MO EOC Assessments. Of the 690 total items reviewed for English II, Algebra I, and Biology, 91% were accepted. Of the 2,233 total items reviewed for English I, Algebra II, Geometry, Government, and American History, 93% were accepted.

2.6.3 Operational Test Selection and Administration

Riverside Publishing TDSs selected operational items for test forms for use in each administration cycle. Using IRT item difficulty values, six equivalent operational forms and one released form were selected for each content area. The operational forms are administered in the summer, fall, and spring of each administration cycle according to a prescribed form rotation schedule.

The operational forms construction process was based on content requirements and statistical criteria. The steps associated with assembling the test forms included the following:

1. Determine form design. Each form includes item positions for operational items, field-test items, and/or linking items. Embedded field testing was discontinued in 2010–2011 due to budget constraints, and from 2010–2011 forward, field-test positions were occupied by field-test items that had been previously administered and scored.

2. Select items that meet content specifications. Each form was constructed based on the test specifications for that content area. The test specifications delineate the item distribution across assessment strands. They also outline the test length, type of items, and number of points to be assessed at each CLE.

3. Evaluate statistical specifications and select items to meet these specifications. Spreadsheets (form matrices) are used to ensure that the test forms meet statistical specifications. These matrices contain the following statistics: average p-values, point-

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biserial correlations, and DIF statistics. Riverside Publishing psychometricians conducted a review of the test forms to ensure equivalence of test difficulty across forms.

4. Review and approve test forms. Once the content and statistical specifications were met for each content area, the forms were reviewed and approved by DESE. The forms were then released for production and additional content and editorial reviews.[7]

2.7 Braille and Large Print Versions

Beyond employing the principles of universal design, all operational assessments were offered in Braille and Large Print versions for visually impaired students taking the MO EOC Assessments. To accommodate these students, two operational Paper/Pencil versions of each assessment were converted into Braille and Large Print as follows:

- English II, Algebra I, and Biology: Fall 2008 and Spring 2009
- English I, Algebra II, Geometry, Government, and American History: Fall 2009 and Spring 2013

Once the Braille and Large Print forms were created for each assessment, reviews were held with educators from Missouri who had specialized training in working with visually impaired students.

A Large Print form review for English II, Algebra I, and Biology was held in Jefferson City, MO, at the DESE offices on Sept. 29, 2008. A Braille review was held in St. Louis, MO, at the Missouri School for the Blind on Oct. 10, 2008. Braille and Large Print reviews for English I, Algebra II, Geometry, Government, and American History were held on Sept. 17 and 18, 2009, and on March 26, 2013.

The teachers consulted the Large Print and Braille Style Guide, which was also used during form composition, and relied on their own expertise to determine whether changes to directions, passages, or items were needed, or whether items should be omitted. Riverside Publishing Braille vendor (Region IV) also reviewed the forms and made recommendations based on how items, passages, and directions would be transcribed to Braille.

Riverside Publishing and DESE reviewed the recommendations from all of these sources. It was determined that no items had to be omitted to accommodate Large Print students. For the Braille version of the form, one item from English II, one item from English I, and three items from Geometry were removed because the content of the item prohibited transcription to Braille. Students taking the Braille form were given credit for these items. The EFT items were eliminated from both versions of these forms due to the irregular testing conditions and the small sample sizes for these groups. For English II, Algebra I, and Biology, the two Braille and Large Print test versions were alternated in each administration cycle through the Spring 2014 administration. For English I, Algebra II, Geometry, Government, and American History, the first Braille and Large Print test versions to be selected were used for each operational administration since 2009–2010. The second form was used in Fall 2013 and Spring 2014.

[7] Rasch values were not available for all items when the 2008–2009 operational forms were built.

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2.8 Online Forms Construction

All items were field tested in Paper/Pencil format, and all test forms were originally developed for administration in either Paper/Pencil or online format. All items were written so that they could be presented in an online delivery system without any alterations. In 2008–2009 and 2009–2010, school districts could select either a Paper/Pencil administration or online administration for all EOC Assessments. In 2010–2011, Missouri began moving toward a full implementation of online administration of all MO EOC Assessments. English I, Algebra II, Geometry, Government, and American History were available only for online administration, whereas English II, Algebra I, and Biology continued to be available in both online and Paper/Pencil. To assist in a smooth transition to online administration of all MO EOC Assessments without interruption of data trends, Riverside Publishing completed an online comparability study of the MO EOC Assessments (see Appendix C for the full report). Based on the results of the study, the MO Technical Advisory Committee (TAC) reached a consensus that the move from paper/pencil to online administration would not affect student performance.

Beginning in 2011–2012, Questar was tasked with moving all MO EOC Assessments to an online delivery platform (with the exception of the Paper/Pencil, Braille, and Large Print test forms for students needing such accommodations). More information on the current online test administration can be found in Chapter 5.

2.9 Quality Control for Test Construction

Checklists and quality control procedures accompanied each stage of form development. Following is a list of some quality control procedures used during the assembly of the MO EOC Assessment forms:

- Construct forms based on all content requirements noted in the test blueprint and test specifications.
- Verify correct number of items per standard or reporting category based on test blueprint.
- Review items to ensure a wide sampling of the knowledge and skills being measured.
- Ensure that all items have been through the appropriate review procedures and are approved for use by DESE.
- Check for a variety of item topics, equal distribution of males and females, ethnicities, etc.
- Verify appropriate portions of items with and without artwork.
- Check for clueing across all items on each form.
- Verify equal or nearly equal distribution of answer choices for SR items.
- Ensure that the test meets the required statistical specifications (i.e., that as many items as possible have p-values between .35 and .90 and as many items as possible have point-biserial correlations above .20).
- Consider any statistical flags or problems.
- Check statistics to ensure that the collection of items on a given form yields an overall difficulty that falls within the specified range.
- Verify that items have not been released to the public.
- Verify correct answer key for each item.
- Perform content review of form (senior staff).
- Perform statistical review of form (psychometrician/statistician).
- Send form to DESE for review and approval.

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2.10 Summary

The MO EOC Assessments provide an indication of student progress toward achieving the knowledge and skills identified in the Missouri Show-Me Standards. Just as the Show-Me Standards guided the item development and selection process, the consideration of content played an equally important role in form development. Form development required a balance of both content coverage and item difficulty. As items were selected for inclusion on particular forms, every effort was made to balance the content coverage to ensure the items aligned to the Missouri Show-Me Standards and CLEs being assessed while simultaneously considering the overall difficulty of the forms.

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Chapter 3: Achievement-Level Setting

3.1 Introduction

Achievement-level setting (or standard setting) workshops for the MO EOC Assessments were conducted in 2008 and 2009. The 2008 standard setting applied to English II, Algebra I, and Biology, and the 2009 standard setting applied to English I, Algebra II, Geometry, Government, and American History. This chapter provides an overview of the standard setting process. For more detailed information, see Chapter 3 of the *2009–2010 MO EOC Phase I and Phase II Technical Reports* at http://dese.mo.gov/college-career-readiness/assessment/assessment-technical-support-materials.

One purpose of assessment is to establish clear guidelines for educational decision making. By assigning meaning to test scores, standard setting allows policymakers, administrators, teachers, parents, and students to make statements about the level of proficiency of individual students and groups of students. Important information from the 2008 and 2009 standard setting events is provided since the cut scores established at those standard settings were applied to the 2013–2014 test scores.

3.2 Goal of the Standard Setting

The main goal of the standard setting event was to establish three cut scores for each test in the MO EOC Assessments:

1. The cut score that differentiates Below Basic performance from Basic performance
2. The cut score that differentiates Basic performance from Proficient performance
3. The cut score that differentiates Proficient performance from Advanced performance

The determination of three cut scores yields four achievement levels for each assessment.

3.3 Staff and Panelists

Staff from Questar, then a subcontractor to Riverside Publishing, planned and facilitated the standard setting workshops with consultation with Riverside Publishing's MO EOC Assessment team in 2008 and 2009. In addition to the staff from Questar, two Riverside Publishing psychometricians attended the 2008 standard setting and three Riverside Publishing psychometricians attended the 2009 standard setting. Their function was to enter panelist data, produce tables and reports, and oversee data quality control as well as observe activities in each of the groups. A Riverside Publishing program manager was present for the entire workshop to assist DESE staff and the panelists with logistical issues. Content area specialists from Riverside Publishing's Content Development group were present in the panel rooms to serve as resources for content-related questions. Finally, DESE curriculum staff attended the standard setting workshops to serve as content resources to the appropriate panels.

3.4 2008 Standard Setting

Forty-six panelists participated in the 2008 standard setting workshop: 14 in English II, 15 in Algebra I, and 17 in Biology. One to three members of each panel had participated in an earlier

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standard setting workshop for other Missouri assessments. Most panelists had not been members of any of the committees for MO EOC development activities. More than half of each panel was comprised of active classroom teachers in the relevant content area; several other panel members were other professional educators such as administrators and curriculum coordinators. One or two members of each panel were business professionals with expertise in the relevant field.

3.5 2009 Standard Setting

Seventy-three panelists participated in the 2009 standard setting workshop. Three members of the English I panel and two members of the Geometry panel had participated in an earlier standard setting workshop for other Missouri assessments. A small portion (approximately 10%) of the panelists had worked on some phase of standards development or assessment development at the state level. The remaining panelists were involved in leadership activities in their individual districts as they implemented the MO EOC Assessments and aligned curriculum to the CLEs. More than half of each panel was comprised of active classroom teachers in the relevant content area. Several other panelists were nonteacher professional educators, such as administrators and curriculum coordinators.

3.6 Development of Achievement-Level Descriptors (ALDs)

The MO EOC Assessments utilize the same achievement level labels used for previous high school MAP assessments: Advanced, Proficient, Basic, and Below Basic. For each of these levels, the achievement-level descriptor (ALD) describes the specific knowledge and skills that a student at that level is able to demonstrate. As suggested by Missouri's Technical Advisory Committee (TAC), DESE conducted sessions devoted to developing draft ALDs prior to the standard setting workshop.

At the standard setting workshop, panelists devoted a significant portion of time fine-tuning the draft ALDs for each assessment. The facilitators provided the panelists with draft copies of the appropriate ALDs, copies of the MO EOC Assessment blueprint, and the appropriate CLEs. Using these materials as references and drawing on the expertise of the panelists, Questar facilitators led each panel in an extended discussion and exercise to refine and elaborate on each of the ALDs. Once this activity was complete, the panels relied on the resulting ALDs as a reference during the actual standard setting activities. The panelists were also allowed to make appropriate, though generally minor, revisions and refinements to the ALDs during and after standard setting.

3.7 Overview of the Standard Setting Activities

3.7.1 Methodology and Data Considerations

The specific methodology used for the standard setting event was a modified Angoff procedure, as recommended by the state's TAC. The Angoff procedure and its modifications are well-recognized and heavily researched methods for establishing student performance standards for tests such as the MO EOC Assessments.

Consistent with the methods used for prior MAP standard setting events, the modified Angoff method allowed three distinct rounds of panelist judgments. Between the first and second rounds,

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Riverside Publishing provided the panelists with item-difficulty data for their consideration. Because operational data were not available in November for English II, Algebra I, and Biology, the item data for the 2008 standard setting were derived from the 2008 field test. Panelists were appropriately cautioned about the limitations of such data. Similarly, because operational data were not available in November for English I, Algebra II, Geometry, Government, and American History, the item data for the 2009 standard setting were derived from the Spring 2009 field test. Panelists were appropriately cautioned about the limitations of such data.

Before the last round of judgments, Riverside Publishing staff provided the panelists with statewide impact data for the assessment. These data were intended to serve as an anchor for the panelists' recommendations. Again, because actual performance data were not available, the data were based on projected statewide score distributions generated from the field tests.

Despite the limitations of the field-test data, panelists were provided with tentative data, both to mirror procedures used for establishing standards for previous Missouri assessments and to provide panelists with an "external reality check" on their evolving recommendations. Missouri TAC discussions confirmed the appropriateness of the use of these projected statewide impact data.

In addition to the caveats about item level and impact data, panel facilitators clearly communicated to the panelists that the results of their standard setting activities would be purely advisory to DESE, which would then consider the recommendations and present them to the Missouri State Board of Education for approval.

3.7.2 Description of the Test Forms and Considerations

3.7.2.1 2008 Standard Setting

DESE used the MO EOC Spring 2009 operational forms for the standard setting event. These forms were selected from the several available operational forms because they would be the most widely used in the 2008–2009 test administration year.

The English II, Algebra I, and Biology Assessments were comprised of SR items and a PE/WP. Each English II and Algebra I form included a single PE/WP worth 4 points. On the Biology Assessment, the PE consisted of 11 CR items, each worth between 0 and 4 points (for a total of 20 points).

3.7.2.2 2009 Standard Setting

The English I, Algebra II, Geometry, Government, and American History Assessments were composed of only SR items. DESE used the MO EOC Spring 2010 operational forms for the standard setting event. These forms were selected from the several available operational forms because they would be the most widely used in the 2009–2010 test administration year. Although the final printed test books were not available yet at the time of the event, Riverside Publishing staff presented the panelists with prototypes that contained all the test items in the same order and with the same "look and feel" as the final printed test books.

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3.8 Specific Standard Setting Activities

The following sections provide details about the processes Questar and Riverside Publishing followed during the course of the standard setting workshops.

3.8.1 General Process Overview

The first 90 minutes of the three-day session served as an introduction and overview to the general standard setting processes. First, DESE briefly outlined the session purpose and intended outcomes. Next, Questar led a brief general overview titled "What Is Standard Setting?" to ensure a common understanding of the fundamental elements of the process. Questar included a brief overview of the general process of establishing student performance standards, ground rules for panelist activities, and some key elements for the panelists to focus on when attempting to set standards. Questar also advised the panelists that their work was advisory to DESE. This introduction was a high-level overview of the standard setting process, whereas individual facilitators provided more detail about each step in the process after the panels broke into content-specific groups.

Finally, Questar provided a general overview of the ALDs and their importance to the standard setting process. Because the panels would be reviewing, editing, and expanding on draft versions of the ALDs provided by the state, it was important for panelists to understand the critical role of the ALDs in the standard setting process. Following this activity, panelists divided into content-specific panel break-out rooms where all remaining work for the sessions took place.

3.8.2 Panelists Take the Operational Assessments

After reconvening in the content-area panels, panelists introduced themselves and signed DESE-provided confidentiality forms. Facilitators also introduced themselves and reiterated the high-level standard setting processes that Questar had discussed during the opening session. Facilitators then allowed the panelists time to take and score the appropriate operational assessment. For this activity, panelists had access to the test administration procedures, the actual test content, and all relevant scoring materials. Field-test items included in these forms were removed from the test books seen by the panelists. Because these were "live" materials, facilitators stressed the confidentiality of all of the items.

The primary purpose of this activity was to familiarize panelists with the actual, complete assessment content prior to beginning the standard setting judgments. Following this review of the tests, each panel reacted to the assessment content: difficulty, sources of challenge, scoring issues, and general and specific reactions. This exercise provided the panelists, especially those not familiar with the MO EOC Assessments, with a context concerning the definition of Proficient as conveyed by the assessments.

3.8.3 Panelists Discuss and Fine-Tune the ALDs

At the standard setting workshop, panelists devoted a significant portion of time to fine-tuning the draft ALDs for each assessment. The facilitators provided the panelists with draft copies of the appropriate ALDs, copies of the MO EOC Assessment blueprint, and the appropriate CLEs. Using these materials as references and drawing on the expertise of the panelists, the Questar facilitators led each panel in an extended discussion and exercise to refine and elaborate each of the ALDs. Once this activity was complete, the panels relied on the resulting ALDs as a

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reference during the actual standard setting. In addition, the panelists were allowed to make appropriate, though generally minor, revisions and refinements to the ALDs during and after standard setting.

All panels began this activity with a review of the draft ALDs for the particular content area. Separate panels of Missouri educators had developed these draft ALDs during DESE-led sessions several weeks earlier. The ALD review activity was highly interactive, with panelists suggesting changes and other refinements—both substantive and editorial—to the draft ALDs. The ultimate task was to operationalize specific student outcomes indicating performance at the Advanced, Proficient, Basic, and Below Basic levels in the content area. Panel suggestions were discussed until consensus was reached and were then recorded on the draft ALDs, a copy of which was given to each panelist or placed on chart paper displayed around the room. Panelists could later refer to these pages, along with the original drafts, during the actual judgment activities. The thoroughness of the ALD refinement activities and the extent to which the panelists, individually and as a group, internalized the ALDs significantly affected the soundness of the subsequent standard setting activities.

At the conclusion of the standard setting sessions, DESE collected the panelist recommendations for ALD revisions for consideration in the wording of the final ALDs. See the *2009–2010 MO EOC Phase I and Phase II Technical Reports* for copies of both the draft and final ALDs for the 2008 and 2009 standard setting workshops, respectively.

3.8.4 Orientation to the Modified Angoff Procedures

After completion of the ALD activity, facilitators oriented the panels to the specific tasks involved with the modified Angoff standard setting process. The modified Angoff process required panelists to read and make judgments about each successive item in the test book using the following procedures. When reading an item, panelists were to consider the item's importance in the context of the underlying CLE, the task(s) required of the student, and the item's difficulty. They were to decide what percentage of minimally Proficient students should be able to answer the item correctly. Panelists were then to decide what percentage of minimally Advanced students would answer the item correctly. Finally, they were to decide what percentage of minimally Basic students would answer the item correctly. (While the MO EOC Assessments contain four levels of student performance, cuts are made at only three locations on the score distribution.) The panelists were instructed to consider their judgments in this order—Proficient, Advanced, and Basic—as it anchors the item judgments on the most important cut, Proficient. In addition, once panelists made their judgment for the Proficient students, they had a clearer, more defined range of values to consider for the other two cuts.

For the PE/WPs, panelists were to consider the average item score of minimally Proficient, minimally Advanced, and minimally Basic students. In other words, judgments for the PE/WPs were made as whole-point values (i.e., 1, 2, 3, etc.) rather than as percentages of students answering correctly.

The facilitators included the following important points in their presentations:

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- Panelists should focus on the threshold of performance in each category.
- Panelists should review and recall what each performance descriptor means.
- Panelists should focus on MO EOC students statewide, not just in the school or district in which they work.

Finally, the facilitators explained that the panelists' judgments should be made independently and anonymously and that security of the testing materials should be maintained at all times.

The second day of the standard setting workshop began with an overview of the previous day's activities and outcomes, after which panelists took a five-item SR qualifying test concerning the standard setting procedures they were about to use. This qualifying test was used to ensure that all panelists understood the importance of the ALDs and selected elements of the modified Angoff procedure before beginning the process of making item judgments.

Before moving on to the Round 1 judgments, facilitators asked the panelists to complete and sign a form indicating that they understood the information they had received and discussed and that they felt prepared to make their Round 1 judgments. All panelists so indicated.

3.8.5 Round 1 Judgments

Round 1 judgments were completed anonymously (via judge identification numbers known only to the individual panelist and Riverside Publishing staff) and independently. Panelists indicated their judgments on specially designed scannable rating sheets developed for each content area. These rating sheets contained three fields for each test item: one for Basic, one for Proficient, and one for Advanced. For the SR items, each field contained a set of bubbles corresponding to the percentage of students expected to choose the correct answer. As panelists made their judgments for each item, facilitators instructed them to "bubble in" one value for each achievement level. In other words, for Item 1, the panelist entered a number corresponding to the percentage of students expected to choose a correct answer at the minimally Basic level, a number for the minimally Proficient level, and a number for the minimally Advanced level. Panelists were constrained to choosing multiples of 5 (i.e., 5%, 10%, 15%, etc.) as they appeared on the Rating Forms. Panelists then followed this same procedure for all the remaining SR items. For the PE/WPs, each field contained bubbles corresponding to the various point values possible for the item. Panelists made a judgment about how many points a borderline student at each achievement level would score on that item (i.e., how many points a Basic student would score, how many points a Proficient student would score, and how many points an Advanced student would score).

Most panelists completed their first round of judgments within 60 minutes; however, there was no time limit for this activity, and some panelists required 90 minutes to complete their judgments. This is not unusual for the first round of judgments in a modified Angoff workshop; often some panelists are still struggling to understand the task at this point, thus requiring more time to make their judgments. After panelists completed their judgments, they turned in their rating sheets and were excused.

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3.8.6 Feedback and Discussion of Round 1 Judgments

In-between Round 1 and Round 2, the Riverside Publishing psychometricians prepared reports of the Round 1 judgment results. The next session began with an overview of these reports. The first report was a table displaying all three raw score cuts as determined individually by each panelist's judgments. This table also contained the entire panel's average, median, highest, and lowest raw-score cuts, as well as the standard deviation of all the panelists' judgments for each of the three raw-score cuts. The second report contained a frequency display of all three cut scores (Basic, Proficient, and Advanced) recommended by each panelist. This bar graph displayed all the panelists' judgments on a single graph so that areas of dispersion or overlap in the raw cut scores would be apparent. These reports were anonymous; ID numbers, rather than names, were used to identify individual panelists.

Facilitators reviewed these reports with the panelists to ensure that everyone understood how to interpret the information contained in them. Using the Round 1 results, facilitators then led an extended discussion of the Round 1 judgments that focused primarily on the panelists' judgments of individual items. Facilitators actively engaged all the panelists in the discussion to gauge whether they had indicated the item percentage values that they intended, that the reasoning processes they followed in making their judgments were consistent with good practice, and that the panelists clearly understood the mechanics of making item judgments. Throughout these discussions, facilitators focused on the key elements of the standard setting process: establishing the threshold of each cut, projecting the cuts for a statewide population of these students, and focusing on the particular course and performance level of the target populations.

Much like a jury deliberation, this discussion also allowed the panelists to hear their peers' comments and rationales for their judgments. This phase took around one to two hours depending on the session; facilitators permitted discussion to continue until they perceived that all panelists were prepared to make their second round of judgments.

Next, facilitators distributed statewide item difficulty data derived from the 2008 field test. For the SR items, the derived item difficulties were item p-values. For the PE/WPs, the item difficulties were average item scores. Facilitators advised the panelists that caution should be taken in interpreting the item difficulty data since the data were collected during a standalone field test (and student motivation may not have been the same as it would be on an operational assessment). Facilitators also explained that these data were relevant, but not critical, to the process of setting standards.

3.8.7 Round 2 Judgments

During Round 2, panelists again made judgments independently about the percentage of students at the threshold of each achievement level that would answer each item correctly. Panelists could maintain their Round 1 judgments or revise them as they deemed appropriate. Before beginning Round 2, panelists were once more reminded of the key elements of the process and were asked to focus specifically on the ALDs for their assessment. Again, there was no time limit, although this round required significantly less time than did Round 1 because the panelists more clearly understood the judgment process. They were also increasingly familiar with the specific items for which they were making the judgments, and many panelists had begun to formulate some or all of their Round 2 item judgments during the discussion of the Round 1 results.

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After panelists completed their Round 2 judgments and recorded their recommendations on their rating sheets, they submitted the forms and were excused. After all rating sheets were collected, Riverside Publishing psychometricians prepared the reports of the Round 2 judgments.

3.8.8 Feedback and Discussion of Round 2 Judgments

When the panels reconvened, facilitators presented the results of the Round 2 judgments. The reports showing the Round 2 results were used to guide another discussion of specific items. The presentation and discussion at this stage were similar to, although more focused than, those following Round 1.

Following this discussion, facilitators provided panelists with estimated statewide impact data (i.e., the percentage of students statewide whose performance would likely be labeled Below Basic, Basic, Proficient, or Advanced if the panels' Round 2 judgments were adopted). The panels' median Round 2 judgments were used to determine cut scores for this report. Again, facilitators advised the panelists that the impact data were relevant to, but not essential for, setting performance standards. (This cautionary information was especially important in the case of MO EOC Assessments, as the data were not grounded in an operational administration of the assessments.)

When facilitators were comfortable that all panelists were prepared to make their final recommendations, they proceeded to Round 3.

3.8.9 Round 3 of Judgments, Meeting Evaluation, and Final Inspection of the ALDs

For Round 3, the panelists' judgments consisted of one recommended cut score for each achievement level; panelists were not required to make item-level judgments. Panelists were given unlimited time to complete their Round 3 (final) recommendations, although most completed their judgments within 20 minutes. All panelists clearly understood that only the Round 3 judgments counted as their recommendations and that the three rounds were not combined in any way to form the proposed cuts.

After completing their final round of judgments, panelists completed a written evaluation of the process that covered the panelists' opinions of the adequacy of the training provided and their comfort with and confidence in their judgments on a round-by-round basis. The form also contained spaces for the panelists to write other comments concerning the workshop. See the *2009–2010 MO EOC Phase I and Phase II Technical Reports* for a copy of this evaluation form.

After facilitators collected the evaluations, they allowed the panels time for a final review of the ALDs to discuss and, if necessary, fine-tune or revise the ALDs. Finally, panelists were thanked for their participation and dismissed.

3.9 Session Results by Panel and Round

See the *2009–2010 MO EOC Phase I and Phase II Technical Reports* for the feedback reports by round. Selected data from these graphs and tables are summarized below for ease of cross-round and cross-content-area comparison.

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The standard setting literature typically considers the median recommendation to be the best indicator of a panel's judgment, as the median would not be impacted by the judgments of a few outlying panelists. In the case of the MO EOC standard setting, all median and mean cut scores are within a single rounded raw-score point for all content areas. Therefore, the choice of a measure of central tendency for these particular panels would not markedly affect the resulting cut scores.

Table 3.1 contains the median recommended cut scores for all rounds for English II, Algebra I, and Biology, and Table 3.2 contains the median recommended cut scores for all rounds for English I, Algebra II, Geometry, Government, and American History.

Table 3.1 indicates that the panels did not markedly change their typical recommended cut scores across the three rounds of judgments. This is not to say that individual panelists made the same recommendations across rounds. In fact, across the nine sets of judgments between rounds during the 2008 standard setting (three content areas with three cut scores each), the mean change in median raw cut scores was −0.5 between Rounds 1 and 2, −1.0 between Rounds 2 and 3, and −1.5 between Rounds 1 and 3. (The median raw-score change between any pair of rounds was 0.) Though the mean changes were minimal from round to round, individual panelists changed their round-to-round recommendations by as much as 17 raw-score points. Across all panels, the mean absolute value of raw cut score changes made was 1.5 between Rounds 1 and 2, 1.9 between Rounds 2 and 3, and 2.6 between Rounds 1 and 3.

Similarly, Table 3.2 indicates that the panels did not markedly change their typical recommended cut scores across the three rounds of judgments. However, across the 15 sets of judgments between rounds (five content areas with three cut scores each), the average difference in the number of raw score points between cut scores was 0.67 between Rounds 1 and 2, 0.40 between Rounds 2 and 3, and 0.93 between Rounds 1 and 3. (The median raw-score change between any pair of rounds was 0.)

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Table 3.1: Median Recommended Cut Scores by Content Area and Round

Cut*	Content Area								
	English II			Algebra I			Biology		
	B	P	A	B	P	A	B	P	A
Round 1	16.5	24.5	32	13	23	32	20	35	48
Round 2	16.5	25.5	33	13	23	31	19	34	46
Round 3 / Final	15.5	24	33	13	22	31	18	32	45
# Points Possible	**39**			**39**			**55**		

* B = Basic; P = Proficient; A = Advanced

Table 3.2: Median Recommended Cut Scores by Content Area and Round

Cut*	Content Area														
	English I			Algebra II			Geometry			Government			Am. History		
	B	P	A	B	P	A	B	P	A	B	P	A	B	P	A
Round 1	18	26	32	14	23	33	17	27	33	15	25	33	18	26	32
Round 2	18	26	33	14	24	33	17	24	32	15	26	34	19	25	32
Round 3 / Final	16	25	33	16	24	33	17	24	32	15	25	34	19	25	32
# Points Possible	**40**			**40**			**40**			**40**			**40**		

* B = Basic; P = Proficient; A = Advanced

As is typically the case with standard setting activities conducted over multiple rounds, the standard deviations of panelists' recommendations got smaller across rounds, indicating both an increasing level of panelist understanding of the process and increasing interpanel agreement based on group discussions between rounds of judgments. While panelists came closer to their peers in judging the most appropriate cut scores, even in Round 3—not unexpectedly—there was still a fair amount of spread in the recommended scores. That variability is especially notable in the Biology Assessment; however, this assessment is significantly longer than the others, which may partially account for the larger Round 3 variability.

Standard errors of the median judgments (SEJs) were computed for all cut scores across all panels. In no case did the Round 3 standard error reach a whole raw-score unit. Most were lower than half of a raw-score point. This indicates that the final median judgments were stable.

Table 3.3 summarizes the projected statewide percentages of students whose EOC scores would fall in each of the four achievement levels for English II, Algebra I, and Biology. Similarly, Table 3.4 summarizes the projected statewide percentages of students whose EOC scores would fall in each of the four achievement levels for English I, Algebra II, Geometry, Government, and American History.

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Table 3.3: Projected Statewide Percentages of Students Scoring in the Various Achievement Levels on the MO EOC Assessments, 2008

Assessment	Achievement Level*			
	Below Basic	Basic	Proficient	Advanced
English II	15%	31%	39%	16%
Algebra I	18%	38%	33%	11%
Biology	12%	39%	39%	10%

*Percentages may not sum to 100% due to rounding.

Table 3.4: Projected Statewide Percentages of Students Scoring in the Various Achievement Levels on the MO EOC Assessments, 2009

Content Area	Achievement Level			
	Below Basic	Basic	Proficient	Advanced
English I	9%	34%	37%	20%
Algebra II	14%	45%	33%	8%
Geometry	18%	30%	38%	14%
Government	12%	44%	34%	10%
Am. History	23%	32%	30%	15%

3.10 Results of Panelist Evaluations

See the *2009–2010 MO EOC Phase I and Phase II Technical Reports* for the data collected from panelists on the evaluation form. Overall, these data indicate that the panelists understood what was expected of them and were comfortable with the process and the resulting cut scores.

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Chapter 4: Item Analysis

4.1 Introduction

Item analyses were conducted for the MO EOC Assessments in English II, Algebra I, Biology, English I, Algebra II, Geometry, Government, and American History for 2013–2014. This chapter presents the summary information, which includes mean item scores and discrimination indices, at the item level for each content area.

The item summary statistics presented in this section (i.e., p-values, point-biserial correlations, and omit rates) are based on the operational administrations that included responses from 3,500 students for Summer 2013, 30,319 students for Fall 2013, and 403,071 students for Spring 2014 across the eight content areas. Differential item functioning (DIF) analyses were conducted for each content area for the Summer 2013, Fall 2013, and Spring 2014 administrations.

For SR items, item difficulty is the proportion of students who gave correct responses to the item (also referred to as p-value), and the discrimination index is the point-biserial correlation between the item score and the total score based on the remaining items (also referred to as corrected point-biserial correlation).

The total score for English II, Algebra I, and Biology included both SR items and PE/WPs. For the PE/WPs, the mean score is the average of the scores students who responded to these items achieved on a scale of 0 to 4 for English II and Algebra I and on a scale of 0 to 20 for Biology. The discrimination index is the correlation between the item score and the total score based on the remaining items (also referred to as corrected point-biserial correlation).

Table 4.1 lists the number of examinees by content area for each administration that were used in the analyses.

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Table 4.1: N-Count per Content Area for Each Administration

Test Period	Content Area	N-Count
Summer 2013	English II	359
	Algebra I	896
	Biology	386
	English I	410
	Algebra II	95
	Geometry	223
	Government	872
	Am. History	259
	Total	**3,500**
Fall 2013	English II	2,886
	Algebra I	5,420
	Biology	2,884
	English I	894
	Algebra II	410
	Geometry	925
	Government	15,260
	Am. History	1,640
	Total	**30,319**
Spring 2014	English II	61,813
	Algebra I	63,167
	Biology	61,253
	English I	60,343
	Algebra II	25,848
	Geometry	35,707
	Government	44,869
	Am. History	50,071
	Total	**403,071**

4.2 Analysis of Forms for Each End-of-Course Assessment

Tables 4.2 through 4.25 summarize item difficulty, discrimination, and omit rates for the items that composed each assessment for the Summer 2013, Fall 2013, and Spring 2014 operational administrations (items in field-test slots are not included in the tables). For SR items, the p-value is the proportion of students who answered the item correctly. For the PE/WPs, the mean value is the average student score on that item. The item discrimination, or corrected point-biserial correlation, is the correlation between students' item scores and their total scores on the remaining test items. Both item difficulty and item discrimination are expressed in the raw score metric.

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When building a test form for the MO EOC Assessment, care is taken to refrain from choosing items with p-values less than 0.30 or greater than 0.95, or with negative point biserials. When p-values and point biserials are out of range, the answer keys are checked to verify that they are correct.

Table 4.2: Item Statistics for English II, Summer 2013

N-Count: 359

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.51	0.48	0
2	0.58	0.41	0
3	0.67	0.54	0
4	0.55	0.52	0
5	0.70	0.49	0
6	0.35	0.16	0
7	0.69	0.53	0
8	0.51	0.59	0
9	0.39	0.37	0
10	0.57	0.46	0
11	0.53	0.61	0
12	0.43	0.45	0
24	0.39	0.31	0
25	0.38	0.39	0
26	0.64	0.59	0
27	0.29	0.39	0
28	0.57	0.44	0
29	0.40	0.36	0
30	0.25	0.32	0
31	0.65	0.57	0
32	0.51	0.57	0
33	0.35	0.48	0
34	0.48	0.42	0
35	0.71	0.64	0
36	0.70	0.58	0
37	0.45	0.51	0
38	0.42	0.44	0
39	0.62	0.61	0
40	0.47	0.49	0
41	0.54	0.54	0
43	0.67	0.51	0
44	0.43	0.32	0
45	0.66	0.51	0
46	0.70	0.42	0
47	0.58	0.41	0
PE*	2.31	0.68	0

*The English II PE is worth a total of 4 raw score points.

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Table 4.3: Item Statistics for Algebra I, Summer 2013

N-Count: 896

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.82	0.45	0
2	0.72	0.34	0
3	0.65	0.53	0
4	0.62	0.44	0
5	0.62	0.53	0
10	0.75	0.45	0
11	0.62	0.39	0
12	0.62	0.47	0
13	0.55	0.40	0
14	0.28	0.26	0
15	0.53	0.46	0
16	0.60	0.50	0
17	0.73	0.50	0
18	0.66	0.52	0
19	0.53	0.60	0
20	0.45	0.31	0
21	0.43	0.43	0
26	0.55	0.49	0
27	0.49	0.49	0
28	0.57	0.41	0
29	0.46	0.44	0
30	0.50	0.37	0
31	0.46	0.46	0
32	0.35	0.37	0
33	0.36	0.38	0
34	0.44	0.48	0
35	0.54	0.46	0
36	0.32	0.40	0
37	0.48	0.48	0
38	0.35	0.29	0
43	0.22	0.24	0
44	0.49	0.40	0
45	0.37	0.25	0
46	0.13	0.06	0
47	0.31	0.32	0
PE*	1.77	0.71	0

*The Algebra I PE is worth a total of 4 raw score points.

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Table 4.4: Item Statistics for Biology, Summer 2013

N-Count: 386

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.68	0.51	0
2	0.58	0.48	0
3	0.75	0.31	0
4	0.49	0.29	0
5	0.56	0.46	0
10	0.45	0.40	0
11	0.55	0.51	0
12	0.40	0.33	0
13	0.48	0.44	0
14	0.38	0.35	0
15	0.41	0.13	0
16	0.54	0.50	0
17	0.73	0.57	0
18	0.45	0.50	0
19	0.32	0.40	0
20	0.23	0.19	0
21	0.44	0.32	0
26	0.52	0.53	0
27	0.52	0.49	0
28	0.32	0.47	0
29	0.31	0.22	0
30	0.26	0.26	0
31	0.33	0.32	0
32	0.35	0.40	0
33	0.46	0.38	0
34	0.38	0.44	0
35	0.49	0.41	0
36	0.48	0.44	0
37	0.37	0.33	0
38	0.49	0.46	0
43	0.47	0.33	0
44	0.45	0.36	0
45	0.25	0.22	0
46	0.45	0.37	0
47	0.57	0.50	0
PE1*	0.47	0.47	0
PE2	0.60	0.49	0
PE3	0.56	0.50	0
PE4	1.54	0.70	0
PE5	0.75	0.61	0

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PE6	0.87	0.54	0
PE7	0.83	0.64	0
PE8	0.43	0.47	0
PE9	0.38	0.62	0
PE10	0.50	0.57	0
PE11	0.44	0.50	0

*PE1 = 1 pt.	PE4 = 3 pts.	PE7 = 2 pts.	PE10 = 3 pts.
PE2 = 1 pt.	PE5 = 2 pts.	PE8 = 1 pt.	PE11 = 2 pts.
PE3 = 1 pt.	PE6 = 3 pts.	PE9 = 2 pts.	

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Table 4.5: Item Statistics for English I, Summer 2013

N-Count: 410

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.51	0.34	0
2	0.39	0.50	0
3	0.47	0.40	0
4	0.61	0.40	0
5	0.53	0.25	0
6	0.30	0.20	0
7	0.45	0.38	0
8	0.51	0.52	0
9	0.78	0.36	0
10	0.52	0.36	0
11	0.46	0.31	0
12	0.71	0.45	0
13	0.49	0.26	0
14	0.52	0.45	0
15	0.47	0.28	0
16	0.63	0.41	0
29	0.33	0.23	0
30	0.45	0.38	0
31	0.47	0.17	0
32	0.72	0.43	0
33	0.29	0.21	0
34	0.46	0.21	0
35	0.66	0.44	0
36	0.49	0.44	0
37	0.53	0.39	0
38	0.54	0.49	0
39	0.33	0.38	0
40	0.49	0.46	0
41	0.40	0.39	0
42	0.46	0.30	0
43	0.54	0.52	0
44	0.44	0.38	0
45	0.53	0.45	0
46	0.73	0.45	0
47	0.49	0.33	0
48	0.69	0.44	0
49	0.29	0.13	0
50	0.46	0.41	0
51	0.35	0.23	0
52	0.50	0.33	0

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Table 4.6: Item Statistics for Algebra II, Summer 2013

N-Count: 95

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.28	0.45	0
2	0.80	0.31	0
3	0.63	0.40	0
4	0.39	0.13	0
5	0.31	0.17	0
6	0.69	0.52	0
7	0.47	0.46	0
8	0.34	0.16	0
9	0.37	0.23	0
10	0.49	0.40	0
16	0.31	0.03	0
17	0.52	0.40	0
18	0.27	0.38	0
19	0.45	0.50	0
20	0.61	0.32	0
21	0.41	0.31	0
22	0.45	0.54	0
23	0.59	0.33	0
24	0.48	0.46	0
25	0.52	0.21	0
26	0.57	0.06	0
27	0.67	0.31	0
28	0.29	0.18	0
29	0.36	0.36	0
30	0.34	0.28	0
31	0.38	0.26	0
32	0.40	0.42	0
33	0.23	0.35	0
34	0.44	0.45	0
35	0.32	0.07	0
41	0.69	0.44	0
42	0.47	0.35	0
43	0.52	0.25	0
44	0.43	0.57	0
45	0.66	0.50	0
46	0.72	0.19	0
47	0.58	0.39	0
48	0.41	0.36	0
49	0.43	0.11	0
50	0.48	0.31	0

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Table 4.7: Item Statistics for Geometry, Summer 2013

N-Count: 223

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.66	0.41	0
2	0.52	0.56	0
3	0.59	0.55	0
4	0.51	0.56	0
5	0.54	0.58	0
6	0.73	0.40	0
7	0.64	0.33	0
8	0.53	0.52	0
9	0.62	0.48	0
10	0.28	0.27	0
16	0.33	0.32	0
17	0.61	0.41	0
18	0.51	0.44	0
19	0.55	0.56	0
20	0.57	0.47	0
21	0.56	0.29	0
22	0.77	0.33	0
23	0.76	0.38	0
24	0.55	0.39	0
25	0.69	0.41	0
26	0.46	0.40	0
27	0.59	0.33	0
28	0.37	0.49	0
29	0.43	0.42	0
30	0.30	0.07	0
31	0.49	0.21	0
32	0.27	0.32	0
33	0.21	0.33	0
34	0.52	0.40	0
35	0.28	0.41	0
41	0.44	0.32	0
42	0.33	0.30	0
43	0.53	0.25	0
44	0.32	0.34	0
45	0.33	0.39	0
46	0.39	0.22	0
47	0.38	0.19	0
48	0.13	0.21	0
49	0.32	0.26	0
50	0.41	0.39	0

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Table 4.8: Item Statistics for Government, Summer 2013

N-Count: 872

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.83	0.49	0
2	0.87	0.39	0
3	0.72	0.48	0
4	0.82	0.40	0
5	0.64	0.33	0
6	0.75	0.28	0
7	0.63	0.50	0
8	0.82	0.41	0
9	0.75	0.48	0
10	0.59	0.38	0
16	0.30	0.34	0
17	0.63	0.28	0
18	0.34	0.29	0
19	0.50	0.25	0
20	0.31	0.38	0
21	0.65	0.29	0
22	0.42	0.31	0
23	0.36	0.23	0
24	0.50	0.40	0
25	0.43	0.48	0
26	0.28	0.29	0
27	0.68	0.47	0
28	0.73	0.47	0
29	0.54	0.43	0
30	0.61	0.48	0
31	0.46	0.45	0
32	0.54	0.33	0
33	0.60	0.53	0
34	0.58	0.55	0
35	0.39	0.38	0
41	0.76	0.49	0
42	0.81	0.53	0
43	0.69	0.54	0
44	0.79	0.47	0
45	0.59	0.56	0
46	0.79	0.45	0
47	0.74	0.45	0
48	0.60	0.47	0
49	0.66	0.56	0
50	0.73	0.43	0

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Table 4.9: Item Statistics for Am. History, Summer 2013

N-Count: 259

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.46	0.38	0
2	0.74	0.12	0
3	0.70	0.37	0
4	0.71	0.36	0
5	0.57	0.43	0
6	0.71	0.40	0
7	0.78	0.46	0
8	0.66	0.24	0
9	0.73	0.47	0
10	0.80	0.41	0
16	0.42	0.42	0
17	0.57	0.44	0
18	0.47	0.44	0
19	0.30	0.15	0
20	0.38	0.09	0
21	0.60	0.35	0
22	0.46	0.39	0
23	0.49	0.52	0
24	0.29	0.29	0
25	0.25	0.13	0
26	0.41	0.18	0
27	0.15	0.08	0
28	0.33	0.21	0
29	0.51	0.39	0
30	0.47	0.44	0
31	0.61	0.24	0
32	0.31	0.28	0
33	0.37	0.49	0
34	0.21	0.22	0
35	0.44	0.30	0
41	0.52	0.48	0
42	0.55	0.52	0
43	0.31	0.17	0
44	0.61	0.43	0
45	0.58	0.51	0
46	0.62	0.37	0
47	0.55	0.50	0
48	0.48	0.43	0
49	0.49	0.39	0
50	0.79	0.40	0

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Table 4.10: Item Statistics for English II, Fall 2013

N-Count: 2,886

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.70	0.40	0
2	0.52	0.42	0
3	0.73	0.47	0
4	0.61	0.38	0
5	0.47	0.23	0
6	0.81	0.46	0
7	0.76	0.48	0
8	0.67	0.45	0
9	0.55	0.23	0
10	0.54	0.59	0
11	0.52	0.48	0
12	0.66	0.52	0
24	0.71	0.56	0
25	0.49	0.36	0
26	0.63	0.49	0
27	0.37	0.25	0
28	0.64	0.45	0
29	0.56	0.49	0
30	0.35	0.25	0
31	0.47	0.41	0
32	0.64	0.35	0
33	0.55	0.47	0
34	0.54	0.45	0
35	0.42	0.34	0
36	0.63	0.49	0
37	0.40	0.44	0
38	0.50	0.54	0
39	0.50	0.42	0
40	0.66	0.61	0
41	0.64	0.62	0
43	0.80	0.25	0
44	0.55	0.39	0
45	0.73	0.48	0
46	0.67	0.35	0
47	0.75	0.45	0
PE*	2.51	0.70	0

*The English II PE is worth a total of 4 raw score points.

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Table 4.11: Item Statistics for Algebra I, Fall 2013

N-Count: 5,420

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.52	0.32	0
2	0.81	0.46	0
3	0.85	0.44	0
4	0.76	0.52	0
5	0.43	0.34	0
10	0.76	0.46	0
11	0.59	0.42	0
12	0.82	0.33	0
13	0.47	0.29	0
14	0.55	0.42	0
15	0.87	0.46	0
16	0.70	0.44	0
17	0.41	0.54	0
18	0.43	0.50	0
19	0.39	0.32	0
20	0.75	0.46	0
21	0.43	0.27	0
26	0.72	0.52	0
27	0.35	0.39	0
28	0.54	0.47	0
29	0.44	0.38	0
30	0.43	0.43	0
31	0.67	0.52	0
32	0.39	0.23	0
33	0.53	0.39	0
34	0.40	0.48	0
35	0.27	0.35	0
36	0.50	0.48	0
37	0.19	0.37	0
38	0.67	0.47	0
43	0.67	0.47	0
44	0.75	0.49	0
45	0.73	0.45	0
46	0.51	0.55	0
47	0.66	0.49	0
PE*	1.19	0.74	0

*The Algebra I PE is worth a total of 4 raw score points.

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Table 4.12: Item Statistics for Biology, Fall 2013

N-Count: 2,884

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.74	0.46	0
2	0.70	0.48	0
3	0.87	0.25	0
4	0.53	0.37	0
5	0.70	0.47	0
10	0.62	0.44	0
11	0.64	0.46	0
12	0.50	0.36	0
13	0.59	0.53	0
14	0.47	0.44	0
15	0.53	0.28	0
16	0.68	0.47	0
17	0.85	0.48	0
18	0.59	0.57	0
19	0.41	0.51	0
20	0.29	0.25	0
21	0.48	0.28	0
26	0.65	0.54	0
27	0.59	0.47	0
28	0.36	0.61	0
29	0.45	0.39	0
30	0.34	0.30	0
31	0.41	0.40	0
32	0.50	0.51	0
33	0.54	0.48	0
34	0.51	0.51	0
35	0.61	0.43	0
36	0.59	0.52	0
37	0.46	0.40	0
38	0.62	0.50	0
43	0.60	0.35	0
44	0.53	0.41	0
45	0.39	0.40	0
46	0.55	0.46	0
47	0.72	0.55	0
PE1*	0.57	0.41	0
PE2	0.70	0.49	0
PE3	0.67	0.51	0
PE4	2.19	0.80	0
PE5	0.91	0.65	0

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PE6	1.04	0.56	0
PE7	1.02	0.66	0
PE8	0.56	0.59	0
PE9	0.54	0.61	0
PE10	0.82	0.65	0
PE11	0.63	0.62	0

*PE1 = 1 pt.	PE4 = 4 pts.	PE7 = 2 pts.	PE10 = 3 pts.
PE2 = 1 pt.	PE5 = 2 pts.	PE8 = 1 pt.	PE11 = 2 pts.
PE3 = 1 pt.	PE6 = 2 pts.	PE9 = 1 pt.	

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Table 4.13: Item Statistics for English I, Fall 2013

N-Count: 894

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.87	0.35	0
2	0.55	0.52	0
3	0.71	0.40	0
4	0.71	0.38	0
5	0.46	0.47	0
6	0.79	0.47	0
7	0.62	0.29	0
8	0.71	0.28	0
9	0.51	0.36	0
10	0.70	0.39	0
11	0.78	0.49	0
12	0.63	0.46	0
13	0.61	0.43	0
14	0.57	0.44	0
15	0.66	0.44	0
16	0.64	0.48	0
29	0.87	0.45	0
30	0.60	0.52	0
31	0.33	0.36	0
32	0.65	0.60	0
33	0.54	0.40	0
34	0.34	0.18	0
35	0.72	0.46	0
36	0.74	0.38	0
37	0.60	0.33	0
38	0.62	0.46	0
39	0.47	0.39	0
40	0.59	0.42	0
41	0.31	0.22	0
42	0.47	0.44	0
43	0.51	0.33	0
44	0.69	0.46	0
45	0.55	0.48	0
46	0.64	0.49	0
47	0.48	0.38	0
48	0.45	0.41	0
49	0.35	0.32	0
50	0.54	0.36	0
51	0.63	0.50	0
52	0.45	0.35	0

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Table 4.14: Item Statistics for Algebra II, Fall 2013

N-Count: 410

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.94	0.36	0
2	0.67	0.31	0
3	0.86	0.51	0
4	0.58	0.48	0
5	0.83	0.45	0
6	0.73	0.38	0
7	0.81	0.40	0
8	0.45	0.41	0
9	0.54	0.32	0
10	0.38	0.32	0
16	0.88	0.40	0
17	0.56	0.40	0
18	0.79	0.37	0
19	0.82	0.40	0
20	0.70	0.36	0
21	0.63	0.46	0
22	0.82	0.22	0
23	0.45	0.39	0
24	0.69	0.51	0
25	0.60	0.54	0
26	0.47	0.36	0
27	0.69	0.55	0
28	0.77	0.39	0
29	0.59	0.24	0
30	0.61	0.44	0
31	0.74	0.48	0
32	0.73	0.40	0
33	0.73	0.27	0
34	0.48	0.43	0
35	0.73	0.37	0
41	0.75	0.45	0
42	0.79	0.35	0
43	0.69	0.43	0
44	0.64	0.47	0
45	0.85	0.39	0
46	0.68	0.53	0
47	0.55	0.46	0
48	0.53	0.34	0
49	0.50	0.40	0
50	0.43	0.16	0

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Table 4.15: Item Statistics for Geometry, Fall 2013

N-Count: 925

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.78	0.29	0
2	0.88	0.40	0
3	0.88	0.48	0
4	0.82	0.42	0
5	0.66	0.48	0
6	0.83	0.16	0
7	0.66	0.48	0
8	0.52	0.49	0
9	0.85	0.42	0
10	0.65	0.51	0
16	0.70	0.50	0
17	0.75	0.35	0
18	0.58	0.43	0
19	0.82	0.35	0
20	0.75	0.57	0
21	0.66	0.49	0
22	0.85	0.47	0
23	0.82	0.36	0
24	0.70	0.37	0
25	0.71	0.41	0
26	0.58	0.48	0
27	0.66	0.42	0
28	0.66	0.52	0
29	0.70	0.43	0
30	0.66	0.41	0
31	0.71	0.50	0
32	0.41	0.41	0
33	0.61	0.52	0
34	0.59	0.47	0
35	0.56	0.48	0
41	0.53	0.46	0
42	0.54	0.46	0
43	0.61	0.31	0
44	0.46	0.54	0
45	0.66	0.55	0
46	0.48	0.57	0
47	0.80	0.37	0
48	0.57	0.53	0
49	0.51	0.41	0
50	0.50	0.40	0

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Table 4.16: Item Statistics for Government, Fall 2013

N-Count: 15,260

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.77	0.27	0
2	0.77	0.45	0
3	0.74	0.22	0
4	0.81	0.43	0
5	0.74	0.48	0
6	0.56	0.47	0
7	0.56	0.38	0
8	0.57	0.40	0
9	0.72	0.54	0
10	0.43	0.36	0
16	0.68	0.28	0
17	0.46	0.44	0
18	0.72	0.46	0
19	0.66	0.49	0
20	0.59	0.32	0
21	0.73	0.59	0
22	0.44	0.44	0
23	0.71	0.38	0
24	0.59	0.47	0
25	0.66	0.50	0
26	0.64	0.41	0
27	0.49	0.41	0
28	0.58	0.37	0
29	0.56	0.47	0
30	0.63	0.39	0
31	0.54	0.57	0
32	0.54	0.42	0
33	0.66	0.41	0
34	0.60	0.55	0
35	0.64	0.54	0
41	0.56	0.39	0
42	0.76	0.53	0
43	0.66	0.44	0
44	0.66	0.43	0
45	0.73	0.53	0
46	0.67	0.49	0
47	0.44	0.47	0
48	0.57	0.48	0
49	0.75	0.42	0
50	0.67	0.40	0

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Table 4.17: Item Statistics for Am. History, Fall 2013

N-Count: 1,640

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.82	0.43	0
2	0.57	0.45	0
3	0.80	0.43	0
4	0.51	0.55	0
5	0.56	0.26	0
6	0.79	0.44	0
7	0.70	0.44	0
8	0.53	0.48	0
9	0.33	0.31	0
10	0.73	0.38	0
16	0.58	0.35	0
17	0.78	0.44	0
18	0.56	0.39	0
19	0.66	0.42	0
20	0.39	0.44	0
21	0.64	0.44	0
22	0.50	0.47	0
23	0.39	0.24	0
24	0.47	0.34	0
25	0.60	0.41	0
26	0.50	0.34	0
27	0.45	0.20	0
28	0.52	0.51	0
29	0.67	0.38	0
30	0.40	0.42	0
31	0.25	0.32	0
32	0.41	0.36	0
33	0.47	0.41	0
34	0.57	0.39	0
35	0.63	0.40	0
41	0.57	0.47	0
42	0.73	0.38	0
43	0.57	0.16	0
44	0.57	0.42	0
45	0.41	0.32	0
46	0.61	0.40	0
47	0.69	0.43	0
48	0.55	0.33	0
49	0.44	0.40	0
50	0.63	0.43	0

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Table 4.18: Item Statistics for English II, Spring 2014

N-Count: 61,813

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.74	0.41	0
2	0.91	0.41	0
3	0.72	0.43	0
4	0.87	0.35	0
5	0.87	0.36	0
6	0.64	0.37	0
7	0.78	0.48	0
8	0.68	0.39	0
9	0.71	0.35	0
10	0.67	0.53	0
11	0.78	0.38	0
12	0.87	0.52	0
24	0.84	0.46	0
25	0.73	0.42	0
26	0.61	0.27	0
27	0.76	0.53	0
28	0.59	0.42	0
29	0.44	0.39	0
30	0.64	0.46	0
31	0.71	0.51	0
32	0.68	0.46	0
33	0.65	0.42	0
34	0.75	0.29	0
35	0.71	0.46	0
36	0.64	0.23	0
37	0.62	0.51	0
38	0.71	0.45	0
39	0.80	0.37	0
40	0.63	0.45	0
41	0.59	0.47	0
43	0.90	0.35	0
44	0.61	0.41	0
45	0.63	0.30	0
46	0.55	0.40	0
47	0.82	0.52	0
PE*	3.01	0.60	0

*The English II PE is worth a total of 4 raw score points.

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Table 4.19: Item Statistics for Algebra I, Spring 2014

N-Count: 63,167

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.48	0.31	0
2	0.74	0.46	0
3	0.52	0.57	0
4	0.73	0.44	0
5	0.46	0.53	0
10	0.61	0.42	0
11	0.67	0.57	0
12	0.83	0.38	0
13	0.71	0.46	0
14	0.66	0.47	0
15	0.52	0.12	0
16	0.15	0.26	0
17	0.39	0.33	0
18	0.79	0.52	0
19	0.71	0.46	0
20	0.83	0.33	0
21	0.66	0.42	0
26	0.60	0.47	0
27	0.52	0.44	0
28	0.65	0.45	0
29	0.26	0.32	0
30	0.66	0.42	0
31	0.66	0.51	0
32	0.26	0.41	0
33	0.88	0.37	0
34	0.80	0.44	0
35	0.50	0.50	0
36	0.73	0.58	0
37	0.80	0.37	0
38	0.44	0.46	0
43	0.70	0.38	0
44	0.88	0.19	0
45	0.33	0.37	0
46	0.66	0.44	0
47	0.63	0.35	0
PE*	1.81	0.75	0

*The Algebra I PE is worth a total of 4 raw score points.

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Table 4.20: Item Statistics for Biology, Spring 2014

N-Count: 61,253

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.86	0.45	0
2	0.69	0.35	0
3	0.86	0.31	0
4	0.82	0.38	0
5	0.74	0.33	0
10	0.72	0.42	0
11	0.41	0.36	0
12	0.66	0.24	0
13	0.73	0.45	0
14	0.43	0.32	0
15	0.62	0.49	0
16	0.81	0.38	0
17	0.55	0.47	0
18	0.90	0.47	0
19	0.66	0.34	0
20	0.63	0.37	0
21	0.27	0.32	0
26	0.78	0.52	0
27	0.89	0.49	0
28	0.72	0.49	0
29	0.58	0.42	0
30	0.85	0.41	0
31	0.76	0.28	0
32	0.58	0.24	0
33	0.54	0.27	0
34	0.47	0.22	0
35	0.50	0.38	0
36	0.70	0.46	0
37	0.87	0.46	0
38	0.71	0.33	0
43	0.70	0.43	0
44	0.53	0.47	0
45	0.68	0.36	0
46	0.55	0.40	0
47	0.62	0.32	0
PE1*	0.80	0.48	0
PE2	0.79	0.47	0
PE3	0.81	0.37	0
PE4	0.55	0.38	0
PE5	1.22	0.52	0

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PE6	2.23	0.65	0
PE7	0.86	0.36	0
PE8	0.61	0.47	0
PE9	0.89	0.44	0
PE10	0.93	0.43	0
PE11	0.70	0.46	0
PE12	0.83	0.41	0
PE13	0.63	0.46	0

*PE1 = 1 pt.	PE4 = 1 pt.	PE7 = 1 pt.	PE10 = 2 pts.
PE2 = 1 pt.	PE5 = 3 pts.	PE8 = 1 pt.	PE11 = 1 pt.
PE3 = 1 pt.	PE6 = 4 pts.	PE9 = 1 pt.	PE12 = 2 pts.
			PE13 = 1 pt.

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Table 4.21: Item Statistics for English I, Spring 2014

N-Count: 60,343

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.73	0.34	0
2	0.61	0.46	0
3	0.88	0.42	0
4	0.48	0.32	0
5	0.64	0.50	0
6	0.48	0.37	0
7	0.62	0.34	0
8	0.85	0.38	0
9	0.83	0.34	0
10	0.75	0.30	0
11	0.61	0.43	0
12	0.79	0.48	0
13	0.84	0.41	0
14	0.66	0.43	0
15	0.90	0.34	0
16	0.43	0.34	0
29	0.41	0.30	0
30	0.64	0.45	0
31	0.57	0.44	0
32	0.77	0.45	0
33	0.61	0.32	0
34	0.58	0.50	0
35	0.87	0.47	0
36	0.69	0.54	0
37	0.65	0.49	0
38	0.60	0.48	0
39	0.67	0.47	0
40	0.64	0.42	0
41	0.41	0.28	0
42	0.57	0.42	0
43	0.44	0.37	0
44	0.49	0.27	0
45	0.31	0.43	0
46	0.68	0.46	0
47	0.70	0.39	0
48	0.79	0.46	0
49	0.43	0.42	0
50	0.47	0.29	0
51	0.39	0.36	0
52	0.59	0.46	0

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Table 4.22: Item Statistics for Algebra II, Spring 2014

N-Count: 25,848

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.70	0.43	0
2	0.79	0.44	0
3	0.77	0.43	0
4	0.35	0.40	0
5	0.63	0.48	0
6	0.67	0.39	0
7	0.66	0.43	0
8	0.35	0.41	0
9	0.61	0.52	0
10	0.48	0.38	0
16	0.59	0.31	0
17	0.49	0.49	0
18	0.53	0.44	0
19	0.88	0.35	0
20	0.68	0.42	0
21	0.68	0.51	0
22	0.84	0.32	0
23	0.58	0.48	0
24	0.59	0.46	0
25	0.70	0.48	0
26	0.71	0.48	0
27	0.75	0.35	0
28	0.67	0.33	0
29	0.68	0.43	0
30	0.52	0.42	0
31	0.39	0.27	0
32	0.73	0.42	0
33	0.50	0.29	0
34	0.75	0.36	0
35	0.73	0.41	0
41	0.84	0.36	0
42	0.65	0.42	0
43	0.81	0.29	0
44	0.61	0.42	0
45	0.70	0.45	0
46	0.50	0.40	0
47	0.65	0.43	0
48	0.45	0.35	0
49	0.53	0.54	0
50	0.48	0.48	0

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Table 4.23: Item Statistics for Geometry, Spring 2014

N-Count: 35,707

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.72	0.32	0
2	0.91	0.27	0
3	0.56	0.46	0
4	0.72	0.43	0
5	0.79	0.33	0
6	0.74	0.38	0
7	0.78	0.27	0
8	0.60	0.37	0
9	0.79	0.39	0
10	0.64	0.52	0
16	0.49	0.42	0
17	0.83	0.43	0
18	0.69	0.42	0
19	0.43	0.33	0
20	0.56	0.31	0
21	0.57	0.43	0
22	0.80	0.51	0
23	0.77	0.36	0
24	0.64	0.47	0
25	0.83	0.39	0
26	0.56	0.36	0
27	0.73	0.52	0
28	0.68	0.50	0
29	0.69	0.40	0
30	0.76	0.42	0
31	0.67	0.46	0
32	0.44	0.47	0
33	0.72	0.32	0
34	0.74	0.40	0
35	0.50	0.54	0
41	0.59	0.37	0
42	0.40	0.28	0
43	0.48	0.28	0
44	0.52	0.34	0
45	0.43	0.55	0
46	0.54	0.48	0
47	0.53	0.41	0
48	0.58	0.40	0
49	0.53	0.35	0
50	0.65	0.40	0

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Table 4.24: Item Statistics for Government, Spring 2014

N-Count: 44,869

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.71	0.42	0
2	0.57	0.10	0
3	0.41	0.32	0
4	0.88	0.48	0
5	0.57	0.38	0
6	0.89	0.37	0
7	0.81	0.37	0
8	0.70	0.38	0
9	0.75	0.45	0
10	0.79	0.54	0
16	0.49	0.43	0
17	0.39	0.30	0
18	0.71	0.30	0
19	0.76	0.49	0
20	0.83	0.28	0
21	0.70	0.47	0
22	0.67	0.46	0
23	0.52	0.40	0
24	0.56	0.39	0
25	0.66	0.48	0
26	0.70	0.54	0
27	0.71	0.47	0
28	0.57	0.21	0
29	0.77	0.51	0
30	0.78	0.50	0
31	0.79	0.49	0
32	0.67	0.49	0
33	0.63	0.47	0
34	0.71	0.51	0
35	0.77	0.31	0
41	0.63	0.46	0
42	0.61	0.37	0
43	0.85	0.46	0
44	0.50	0.40	0
45	0.79	0.39	0
46	0.61	0.47	0
47	0.41	0.33	0
48	0.76	0.51	0
49	0.61	0.51	0
50	0.59	0.54	0

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Table 4.25: Item Statistics for Am. History, Spring 2014

N-Count: 50,071

Item #	P-Value/Mean	Corrected Point-Biserial Correlation	Omit Rate (%)
1	0.83	0.39	0
2	0.87	0.25	0
3	0.62	0.40	0
4	0.67	0.46	0
5	0.76	0.41	0
6	0.70	0.37	0
7	0.69	0.38	0
8	0.56	0.26	0
9	0.67	0.44	0
10	0.67	0.39	0
16	0.48	0.32	0
17	0.66	0.53	0
18	0.48	0.39	0
19	0.32	0.30	0
20	0.60	0.33	0
21	0.60	0.46	0
22	0.80	0.44	0
23	0.27	0.21	0
24	0.46	0.35	0
25	0.55	0.26	0
26	0.34	0.40	0
27	0.37	0.36	0
28	0.36	0.27	0
29	0.55	0.48	0
30	0.45	0.40	0
31	0.75	0.42	0
32	0.43	0.37	0
33	0.47	0.35	0
34	0.47	0.33	0
35	0.49	0.30	0
41	0.44	0.49	0
42	0.60	0.43	0
43	0.51	0.47	0
44	0.82	0.38	0
45	0.37	0.35	0
46	0.67	0.50	0
47	0.73	0.51	0
48	0.79	0.47	0
49	0.43	0.23	0
50	0.68	0.47	0

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4.3 Speededness

The consequence of time limits on examinees' scores is called speededness. A test is speeded if examinees taking it score lower than they would have had the test not been timed. Most speededness statistics are based on the number of items that were not attempted by students. For the purpose of this analysis, if a student did not attempt the last item on any of the separately timed subsections of the test, it was assumed that the student might not have reached the item because he or she ran out of time.

The MO EOC Assessments were not designed to be speeded tests. Rather, they were intended to be "power tests"; that is, students are expected to have ample time to finish all items and prompts.

Item omit rates, especially for items appearing later in a test, are a gauge of potential test speededness. The "Omit Rate" column in Tables 4.2 through 4.25 shows the percentage of students who omitted each SR item for each MO EOC Assessment. It is clear from the tables that the omit rates are negligible or zero for the majority of items.

4.4 Differential Item Functioning (DIF)

Differential item functioning (DIF) occurs when an item has difficulty measures that vary substantially across subgroups of examinees with comparable ability. DIF was examined using the Mantel-Haenszel (MH) (1959) procedure for SR items and WINSTEPS for the PE/WPs. The Mantel-Haenszel method is a nonparametric approach to DIF. In the MH procedure, total raw scores are held constant while an odds ratio is estimated. In practice, the odds ratio is generally converted to the delta metric, and the Educational Testing Service (ETS) categorization is applied to flag the significance of DIF effects (Dorans & Holland, 1992).

With the groups matched on raw score, the comparable examinees can be placed in j 2 × 2 tables of group by item response, where j equals the number of levels of the matching variable. For these analyses, if j equals each observed score category of the k-item tests, with $j = 0, 1, 2, \ldots, k$, then one 2 × 2 table for a given item with score category j can be represented as the following:

	Correct	Incorrect	Total
Reference	y_j	x_j	m_j
Focal	y'_j	x'_j	m'_j
Total	n_j	n'_j	N_j

The Delta MH test statistic and variance have the following form:

$$DeltaMH = 2.35 \ln \frac{\left[\sum_{j=0}^{K} \frac{\left(y_j x'_j - y'_j x_j \right)}{N_j} \right]}{\sum_{j=0}^{K} \frac{y'_j x_j}{N_j}},$$

where y_j, x_j, y'_j, and x'_j are the frequency counts of cells of the 2 × 2 tables, and N_j is the total n for the cells.

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The critical values of the ETS categorizations are 1.00 and 1.50 on the delta scale for categories A (negligible DIF), B (slight to moderate DIF), and C (moderate to severe DIF). Specifically, if the absolute value of delta is smaller than 1.00, the item is categorized as A. If the absolute value of delta is larger than or equal to 1.50, the item is classified as C. Otherwise items are categorized as B. In both the A and C categories, statistical significance is set at the 5% level for a single item.

Results of the DIF analyses for the items contained in the Summer 2013, Fall 2013, and Spring 2014 operational administrations are summarized in Tables 4.26, 4.27, and 4.28, respectively. In these analyses, male and white students were used as the reference group, and female, black, and Hispanic students were considered the focal group.

Table 4.26: Frequency Distribution of DIF Categories for the Summer 2013 Operational Assessments

Test	Group****	N-Count***	SR Items*					PE/WPs*				
			A**	B**	B–**	C**	C–**	A**	B**	B–**	C**	C–**
Summer 2013												
English II	M/F	220/139	--	--	--	--	--	--	--	--	--	--
	W/B	187/128	--	--	--	--	--	--	--	--	--	--
	W/H	187/35	--	--	--	--	--	--	--	--	--	--
Algebra I	M/F	536/360	31	1	2	1	0	1	0	0	0	0
	W/B	505/306	34	0	1	0	0	1	0	0	0	0
	W/H	505/39	--	--	--	--	--	--	--	--	--	--
Biology	M/F	200/186	--	--	--	--	--	--	--	--	--	--
	W/B	216/135	--	--	--	--	--	--	--	--	--	--
	W/H	216/23	--	--	--	--	--	--	--	--	--	--
English I	M/F	242/168	--	--	--	--	--					
	W/B	223/146	--	--	--	--	--					
	W/H	223/23	--	--	--	--	--					
Algebra II	M/F	61/34	--	--	--	--	--					
	W/B	30/56	--	--	--	--	--					
	W/H	30/5	--	--	--	--	--					
Geometry	M/F	115/108	--	--	--	--	--					
	W/B	93/106	--	--	--	--	--					
	W/H	93/12	--	--	--	--	--					
Government	M/F	439/433	35	3	1	0	1					
	W/B	596/152	--	--	--	--	--					
	W/H	596/68	--	--	--	--	--					
Am. History	M/F	132/127	--	--	--	--	--					
	W/B	154/82	--	--	--	--	--					
	W/H	154/13	--	--	--	--	--					

Note: Classifications with a negative sign ("–") favor the reference group, while classifications with no sign favor the focal group.

*The Mantel-Haenszel procedure is applied for the SR items.
**DIF categories: A, negligible; B, slight to moderate; and C, moderate to severe.
***DIF was not performed when the focal group n-count was less than 200.
****DIF contrast groups: M/F, male versus female; W/B, white versus black; and W/H, white versus Hispanic.

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Table 4.27: Frequency Distribution of DIF Categories for the Fall 2013 Operational Assessments

Test	Group****	N-Count***	SR Items*					PE/WPs*				
			A**	B**	B–**	C**	C–**	A**	B**	B–**	C**	C–**
Fall 2013												
English II	M/F	1,584/1,304	34	0	1	0	0	1	0	0	0	0
	W/B	1,517/1,087	34	0	0	0	1	1	0	0	0	0
	W/H	1,517/138	--	--	--	--	--	--	--	--	--	--
Algebra I	M/F	2,755/2,669	33	1	0	0	1	1	0	0	0	0
	W/B	3,856/1,126	33	1	1	0	0	1	0	0	0	0
	W/H	3,856/227	33	1	1	0	0	1	0	0	0	0
Biology	M/F	1,579/1,306	33	1	1	0	0	11	0	0	0	0
	W/B	1,848/766	35	0	0	0	0	11	0	0	0	0
	W/H	1,848/123	--	--	--	--	--	--	--	--	--	--
English I	M/F	459/435	32	4	4	0	0					
	W/B	591/180	--	--	--	--	--					
	W/H	591/84	--	--	--	--	--					
Algebra II	M/F	194/217	38	0	0	1	1					
	W/B	298/50	--	--	--	--	--					
	W/H	298/30	--	--	--	--	--					
Geometry	M/F	483/443	34	2	3	0	1					
	W/B	689/114	--	--	--	--	--					
	W/H	689/69	--	--	--	--	--					
Government	M/F	7,651/7,613	40	0	0	0	0					
	W/B	10,963/2,889	40	0	0	0	0					
	W/H	10,963/674	39	0	1	0	0					
Am. History	M/F	823/817	35	1	3	0	1					
	W/B	1,276/207	35	2	1	0	2					
	W/H	1,276/91	--	--	--	--	--					

Note: Classifications with a negative sign ("–") favor the reference group, while classifications with no sign favor the focal group.

*The Mantel-Haenszel procedure is applied for the SR items and WINSTEPS for the PE/WPs.
**DIF categories: A, negligible; B, slight to moderate; and C, moderate to severe.
***DIF was not performed when the focal group n-count was less than 200.
****DIF contrast groups: M/F, male versus female; W/B, white versus black; and W/H, white versus Hispanic.

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Table 4.28: Frequency Distribution of DIF Categories for the Spring 2014 Operational Assessments

Test	Group***	N-Count	SR Items*					PE/WPs*				
			A**	B**	B–**	C**	C–**	A**	B**	B–**	C**	C–**
Spring 2014												
English II	M/F	31,171/30,665	40	0	0	0	0	1	0	0	0	0
	W/B	47,667/8,841	40	0	0	0	0	1	0	0	0	0
	W/H	47,667/2,631	40	0	0	0	0	1	0	0	0	0
Algebra I	M/F	31,768/31,424	33	1	1	0	0	1	0	0	0	0
	W/B	48,136/9,362	34	0	1	0	0	1	0	0	0	0
	W/H	48,136/2,942	34	0	1	0	0	1	0	0	0	0
Biology	M/F	30,907/30,368	34	0	1	0	0	13	0	0	0	0
	W/B	46,955/9,025	35	0	0	0	0	11	0	2	0	0
	W/H	46,955/2,611	34	0	1	0	0	13	0	0	0	0
English I	M/F	30,227/30,140	39	0	0	1	0					
	W/B	46,807/8,206	38	1	1	0	0					
	W/H	46,807/2,695	40	0	0	0	0					
Algebra II	M/F	12,091/13,760	36	0	4	0	0					
	W/B	21,468/2,309	39	0	1	0	0					
	W/H	21,468/974	40	0	0	0	0					
Geometry	M/F	17,388/18,333	39	0	1	0	0					
	W/B	28,844/3,675	40	0	0	0	0					
	W/H	28,844/1,479	40	0	0	0	0					
Government	M/F	22,708/22,179	40	0	0	0	0					
	W/B	35,105/6,105	39	0	1	0	0					
	W/H	35,105/1,828	40	0	0	0	0					
Am. History	M/F	25,388/24,702	37	1	2	0	0					
	W/B	39,099/6,768	39	0	1	0	0					
	W/H	39,099/2,073	39	1	0	0	0					

Note: Classifications with a negative sign ("–") favor the reference group, while classifications with no sign favor the focal group.

*The Mantel-Haenszel procedure is applied for the SR items and WINSTEPS for the PE/WPs.
**DIF categories: A, negligible; B, slight to moderate; and C, moderate to severe.
***DIF contrast groups: M/F, male versus female; W/B, white versus black; and W/H, white versus Hispanic.

4.5 Summary

The item analyses provided in this chapter show that the MO EOC Assessments have sound psychometric properties. For example, p-values show that MO EOC Assessment items measure achievement across a broad range of difficulty. In addition, item discrimination values show that most items are appropriately correlated with the total test score and thus contribute to distinguishing between lower-performing and higher-performing students. In addition, very few students omitted items during testing. The low percentage of students omitting SR items provides evidence that the test is a power test of the students' skills and not a speeded test. Finally, DIF statistics based on data from the 2013–2014 operational administrations show the items to be generally free from statistical bias.

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Chapter 5: Test Administration

5.1 Introduction

This chapter contains information about DESE and Questar processes that ensure the standardized administration of the MO EOC Assessments. The Standards (AERA, APA, & NCME, 1999) state, "For tests designed to assess the examinee's knowledge, skills, or abilities, standardization helps to ensure that all examinees have the same opportunity to demonstrate their competencies" (p. 61). In other words, careful attention to the details of information dissemination, Test Examiner training, accommodations and modifications, and test security help ensure that students taking the MO EOC Assessments in different locations and under different circumstances have comparable opportunities for success.

The EOC Test Administration Manual contains detailed information about the testing guidelines, materials handling, and standardized administration instructions for the MO EOC Assessments. While this manual is not included here, much of the information contained in this chapter can be found in it.

Questar uses its online assessment platform to manage and deliver the MO EOC Online Assessments. This platform has two components:

- Student Test Delivery – The online testing student client is a small-footprint, secure browser application that is downloaded to the students' workstations to allow uninterrupted testing and failsafe protection of student responses in the event of a connection loss.
- Administration and Reporting System – The online testing system administration system is a web application that allows districts, schools, and teachers/proctors to manage their students and assessments.

For the MO EOC Assessments, the 2011–2012 administration year was the first in which districts were required to use an online delivery format unless a Paper/Pencil, Braille, or Large Print version was required for a student as indicated in the student's Individualized Education Program (IEP) and marked as an accommodation on the online test administration site. The Test Administration Manual contains information specific to the registration for and administration of the MO EOC Assessments. This process was continued for the 2013–2014 administration year.

5.2 Students for Whom the MO EOC Assessments are Appropriate

The responsibility and authority for testing students in the MO EOC Assessments at the appropriate time in the course of instruction belongs to the local district. The MO EOC Assessments are based on CLEs rather than on GLEs. Therefore, when the content of the CLEs is covered in the local school district's curriculum, the test may be administered regardless of student grade level or course name.

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5.2.1 Students with Individualized Education Programs (IEPs)

A student with disabilities, as classified under the Individuals with Disabilities Education Act (IDEA), has an IEP that, in part, governs whether a particular assessment is appropriate for the student. In the case of the MO EOC Assessments, decisions about whether a student with a disability will participate in the assessments are made by the student's IEP team and are documented in the IEP. All students must take required EOC Assessments. If, however, a student's disability qualifies him or her to take the MAP-Alternate Assessment (MAP-A) for students with severe cognitive disabilities, that student will not participate in the MO EOC Assessments.

5.2.2 Students with Individual Accommodation Programs

Students with Individual Accommodation Programs (IAPs) are considered disabled under Section 504 of the 1973 Rehabilitation Act. These students are not served under IDEA and are not documented with a particular designation for the MO EOC Assessment. However, professionals who are knowledgeable about a student's disability and educational needs should make accommodation decisions for the student as they would for a student with an IEP.

5.2.3 English Language Learner (ELL) Students

Students who have been in the United States for 12 cumulative months or less since school age at the time of test administration may be exempted by the local school district from taking the English I and English II Assessments. The students must, however, participate in other required MO EOC Assessments, although their scores do not count for school accountability purposes.

5.3 Students for Whom a School or District is Accountable

For accountability purposes, Missouri must include the results for any student who is eligible to take the MO EOC Assessments and has been enrolled at least one full academic year in a school (for school accountability) or district (for district accountability) without transferring out of the building or district for a significant period of time and re-enrolling. A full academic year is defined as the last Wednesday in September through the MO EOC Assessment administration. A significant period of time is considered "one more than half of the eligible days between the last Wednesday in September and the test administration." DESE obtains enrollment information from the Missouri Student Information System (MOSIS) data that are reported by school districts. This rule applies to the building and district summary levels independently. For example, a student who is coded as "In building less than a year," but was in the district a full academic year is excluded from the building totals but is included in the district totals.

5.4 Dissemination of Testing Materials and Information

All test administration information, including the Test Administration Manual and training webinars, were posted to the online test administration site for District Test Coordinators, School Test Coordinators, Examiners, and Information Technology Coordinators. One week prior to the start of the testing window, Questar distributed all password information for the online system by e-mail to district and school level users participating in the current EOC administration. Districts had the opportunity to order the Braille and Large Print editions of the assessment from Questar. The District Test Coordinator downloaded and printed the accommodated Paper/Pencil test edition through the online administration site, as needed for students in the district. The District

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Test Coordinator was responsible for inventorying all Paper/Pencil materials, as well as disseminating the online test information to the test administrators. The District Test Coordinator was also responsible for answering all district questions about test procedures and the online assessment platform. If the District Test Coordinator needed assistance with a question, he/she could contact Questar's Missouri Customer Service through the designated phone number and/or e-mail address.

5.5 District and Test Examiner Training

Both Questar and DESE were responsible for training the district staff on EOC test administration. DESE provided two standardized training webinars, scripts, and PowerPoint presentations on the Test Administration Manual, state procedures, and general testing issues. One training session was provided for Test Coordinators and the other was provided for Test Examiners. These training resources were available both on the DESE website and on the online test administration site. Appendix A contains the two PowerPoint presentations.

Questar provided training on the online assessment platform. Questar training contained propriety information and was only available on the test administration site. All Test Coordinators and Test Examiners were to view these standardized trainings prior to test administration. The District Test Coordinator was allowed to provide supplemental training on local issues, (e.g., schedules). Both DESE and Questar were available to answer any questions the districts may have about the MO EOC Assessment administration.

5.6 Test Security

The MO EOC Assessment test books (Paper/Pencil, Large Print, and Braille) and online assessments were secure. Test Coordinators were instructed to keep the materials in a locked room or cabinet at all times when not in use. No testing materials may be photocopied, duplicated, scanned, or made accessible to personnel who were not responsible for testing. Additionally, written or oral discussion of specific MO EOC Assessment items breaches the security and integrity of the test. In accordance with the Standards, the Test Administration Manual contained explicit instructions about test security for Test Coordinators and Test Examiners.[8]

Standardized training was required for all District and School Test Coordinators, Examiners, translators, proctors, and any district staff who had responsibilities in testing. Each test book shipped to the district or downloaded and printed by the district contained secure barcode information for tracking purposes. Questar used this information to ensure that districts used the materials assigned to them for testing and returning all of their secure materials after the completion of testing. The Paper/Pencil forms included a bar code on each page of the document. Upon return to Questar, the barcode information on each test was verified. Questar then followed up with the appropriate district(s) regarding any missing materials to ensure return or destruction (if materials were contaminated).

[8] **Standard 5.7:** Test users have the responsibility of protecting the security of test materials at all times (p. 64).

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When the tests were delivered online, Test Examiners did not have access to the student screens for the online assessment, only to the test administrator features. Students had unique, secure logins to access the MO EOC Assessments they were registered for, and these logins were disabled after the student had tested. For tests with multiple sessions (those including a PE/WP), the students also had a Session Access code given to them by the teacher at the start of the session to ensure that students accessed the correct session of the test. Test items, as well as student responses, were encrypted during transmission to and from student computers.

5.6.1 Detection and Prevention of Testing Irregularities

To protect the validity and fairness of scores on the MO EOC assessments, DESE has implemented measures to prevent and detect cheating. Possible cheating violations on the MO EOC Assessments include the following:

- Copying and reviewing MO EOC Assessment items with students
- Cueing students during testing either verbally or with written materials on the classroom walls
- Cueing students nonverbally, such as tapping or nodding the head
- Using a calculator on an EOC Assessment that does not allow calculator use, unless specified by the student's IEP
- Using a calculator that contains stored equations or connects to the Internet
- Splitting sessions into two parts
- Ignoring the standardized directions in the test books
- Paraphrasing parts of the assessment to students
- Changing or completing (or allowing other school personnel to change or complete) student answers
- Allowing accommodations that are not written in the Individualized Education Program (IEP)
- Allowing accommodations for students who do not have an IEP
- Allowing students to use dictionaries on parts of the MO EOC Assessment other than the WP
- Defining terms on the test
- Allowing students to access cell phones or other electronic devices during testing

To detect cheating, DESE has implemented the following steps for the MO EOC Assessments:

1. School officials, parents, and other interested parties call or email DESE to report a testing concern or allegation.
2. A narrative of the conversation, if reported orally, is written and read back to the individual reporting the concern.
3. The superintendent of the district in which the allegation is made is then contacted and read the narrative or email.
4. A letter is sent to confirm the conversation and to ask the superintendent to investigate the claim.
5. An MO EOC Assessment Quality Assurance Concern District Response Report is sent for the superintendent to use for replying to the allegation.

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DESE also implemented a self-monitoring process whereby District Test Coordinators completed a Quality Assurance (QA) self-monitoring form.[9] This QA process was issued to District Test Coordinators in an administrative memo.[10] The form was designed to be used by District Test Coordinators as part of their regular supervision process throughout the assessment window, and it allowed districts to monitor and strengthen their administration of the MO EOC Assessments. The questions on the form were designed to focus attention and help districts examine important areas of assessment training, administration, and test security.

District Test Coordinators were asked to complete one MO EOC quality assurance form for one EOC classroom. Regarding cheating prevention, the form asked District Test Coordinators to "Explain the district's test security plan" and answer the question, "What preventative measures are taken to curb cheating within the computer lab?" District Test Coordinators were urged to report testing irregularities or concerns immediately to the Assessment Section at assessment@dese.mo.gov or (573) 751-3545. DESE also performed onsite spot checks of quality assurance procedures during the Spring testing window.

When testing irregularities were reported, DESE was able to request that Questar perform statistical analyses to detect and flag unusual response patterns. DESE then worked with districts to establish procedures for follow-up decisions appropriate to the situation.

5.7 Test Administration

5.7.1 Test Organization

Students took the MO EOC Assessments in one or two sessions depending on the content area. The MO EOC Assessments for Summer 2013, Fall 2013, and Spring 2014 for English II, Algebra I, and Biology contained SR items and a PE/WP. English I, Algebra II, Geometry, Government, and American History contained only SR items. All assessments were administered online unless the student's IEP specified a Braille/Large Print or Paper/Pencil administration. Each SR item consisted of a stem followed by four response options, and the student clicked an answer choice. The tests were not timed. Students were encouraged to complete an online practice test of the online assessment platform prior to testing. This practice test included instructions on how to use the tools in the system and practice questions for the students.

5.7.2 Test and Ancillary Materials

District Test Coordinators or School Test Coordinators were responsible for providing all MO EOC Assessment materials to Test Examiners. The materials provided by Questar and/or DESE included the following:

- *Test Administration Manual* (electronic copy)
- Large Print, and/or Braille test materials
- Return kit materials for accommodated test materials
- Accommodated Paper/Pencil test booklet (printed from the online assessment platform by the school district)

[9] View the QA form online at http://dese.mo.gov/sites/default/files/asmt-eoc-self-qa-2014.pdf.
[10] View the memo online at http://dese.mo.gov/sites/default/files/am/documents/CCR-14-001.pdf.

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Students taking an accommodated version of the MO EOC Assessments needed the following additional materials, which were not provided by Questar or DESE:

- No. 2 pencils
- Scratch paper

For the online assessment, each student needed a computer with a monitor, mouse, and keyboard, or a tablet device. Adequate space should have been left between workstations. Students could use scratch, grid, or draft paper and a writing utensil while taking the online assessment. The Test Examiner needed the following:

- A computer for logging on to the test administrator interface
- A writing board and utensil

Additionally, students taking either the Paper/Pencil or online version were allowed to use a calculator for the Algebra I, Algebra II, and Geometry Assessments. (This was not required.)

Calculators could not contain stored equations or functions at the time of the EOC Mathematics Assessments. Test Examiners were responsible for ensuring and verifying that calculators with the ability to store functions and equations (e.g., a graphing or a scientific calculator) had the memory cleared before and after each Mathematics Assessment.

Calculators could not have internet connectivity or be able to connect to anyone inside or outside the classroom during testing. Students could not use a calculator on a laptop or other portable computer, pocket organizer, cell phone, device with a typewriter-style keyboard, electronic writing pad, or pen-input device unless a particular assistive device was required for a student and was specified on his or her IEP.

5.7.3 Preparing the Test Administration Site and the Students

Before students began the assessment using the online system, a representative of the district or school was responsible for the following tasks:

- Read the entire *Test Administration Manual*
- Review the DESE and Questar trainings regarding the EOCs
- Run a workstation readiness test on each workstation used for testing
- Ensure that the online test delivery system is downloaded to each workstation for test delivery
- Provide an upload to DESE (precode file) of all students that will be testing for the current administration of the EOCs (the precode file is a data file containing one record per student and each student is assigned a unique MOSIS ID. The purpose of the data file is to identify students, Examiners, and content areas for testing.)
- Input identification information for students who were not included in the precode file
- Specify district testing windows within the Missouri statewide test administration window

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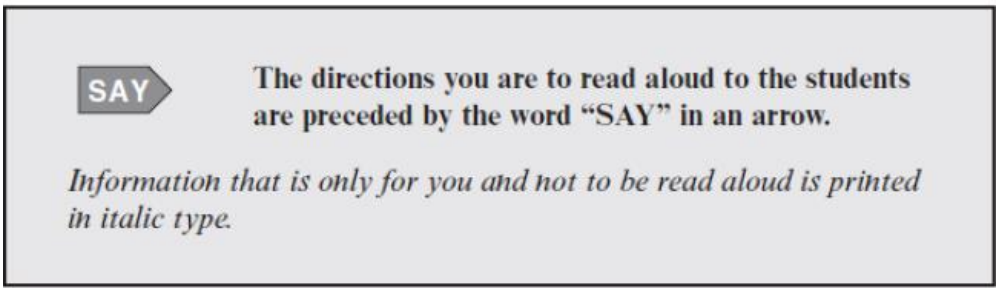
Additionally, the Test Examiner was responsible for setting and verifying class information and setting students' testing status codes and/or accommodations information in the online system.

Students were NOT allowed to use electronic devices such as cellular phones, digital cameras, gaming devices, or scanners during the testing session. However, students could use calculators during the Algebra I, Algebra II, and Geometry test sessions. (See section 5.7.2 for more information regarding calculator usage and restrictions.)

5.7.4 Directions for Administration

In accordance with Standard 5.1,[11] specific standardized directions for administration were printed in the Test Administration Manual. Directions to be read aloud to the students were printed in bold type and had a callout arrow in the margin for clarity. Information for the teacher that should not be read aloud was in italic type. Figure 5.1 provides an example of the type styles used in the Test Administration Manual to differentiate between spoken and unspoken instructions. Figure 5.2 provides an example of a script from the Government EOC Assessment.

Figure 5.1: Examples of Type Styles Used to Differentiate between Spoken and Unspoken Instructions in the Test Administration Manual



[11] **Standard 5.1:** Test administrators should follow carefully the standardized procedures for administration and scoring specified by the test developer, unless the situation or a test taker's disability dictates that an exception should be made (p. 63).

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Figure 5.2: Example Script from the Test Administration Manual for the Government EOC Assessment

Directions for Administering the Government Assessment Online

SAY **For the questions in this test, you will select an answer from a list of given choices. Remember to check that the circle that goes with the answer you chose is filled in after you click it. Your score on these questions will depend on how well you follow directions and show your understanding of Government. Click the Help button for instructions on how to use the system tools.**

There are several important things to remember:

1. **Read each question carefully and think about the answer. Then choose the one answer that you think is best.**
2. **If you do not know the answer to a question, mark it for review, skip it, and go on. You may return to it later.**
3. **When you finish the test, you may check your work.**

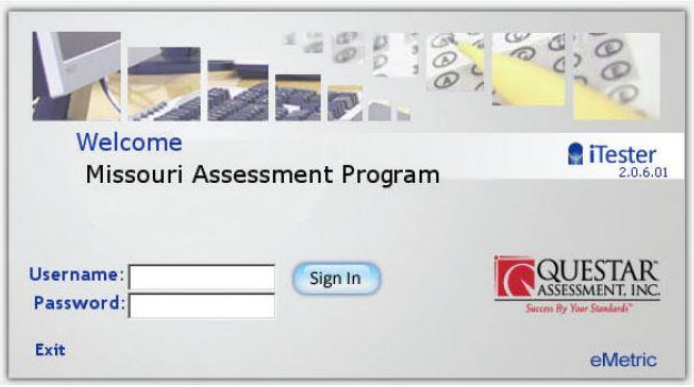
SAY **On your desktop, locate the icon titled "iTester_MOEOC."**

Double-click this icon and the program will launch. Once the program has opened, you will see the login page for iTester Student.

Do not enter anything until you have been instructed to do so.

Can everyone see the login page?

An example of the login page is below. Please be sure all students are on this page before proceeding with instructions.



Assist students as needed. The next step is to walk the students through logging into iTester Student. The username for all students is their MOSIS ID. For each content area tested, the student will receive a unique password.

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5.8 Accommodations and Modifications

A student's IEP team had the responsibility and authority to determine individual accommodations to support and ensure his or her participation in the MO EOC Assessments. Students who were English language learners (ELLs) were also able to receive allowable accommodations to support and ensure participation in the MO EOC Assessments. Allowable accommodations were intended to assist the student by reducing the effects of his or her disability without reducing performance expectations. Allowable accommodations for the MO EOC Assessments included, but were not limited to, the following:

- A student may receive a modified version of the testing materials, such as the Braille, Large Print, or Paper/Pencil edition.
- A teacher may present the test content to a student in a nonstandard way, such as by reading it aloud in English or in the student's native language, paraphrasing it, or using sign language. For the English I and English II Assessments, this will result in the lowest obtainable scale score (LOSS).
- A student may be allowed additional time to complete one or more sessions of the assessment.
- A student may use an assistive communicative device.
- A student may be tested individually or in a small group.
- A student may be allowed to use a computer, another word-processing device, or a teacher scribe to record his or her responses.
- A student may use other assistive materials such as a bilingual dictionary.

Modifications are alterations in the test that change construct-related requirements. The resulting information may not be equal to the information that might be obtained without modifications. The following modifications for the MO EOC Assessments were able to be provided:

- Oral reading of the assessment, including paraphrasing questions
- Oral reading in native language
- Use of a bilingual dictionary for the English I or English II Assessment

In accordance with Standard 5.2,[12] Test Examiners indicated an accommodation, when allowed by a student's IEP and used for the MO EOC Assessment, by checking the appropriate box(es) for the student in the online test administration site.

Tables 5.1, 5.2, and 5.3 contain information about the percentage of students who received each type of allowable accommodation for each MO EOC Assessment for Summer 2013, Fall 2013, and Spring 2014, respectively. The most prevalent type of accommodation across all MO EOC Assessments and administrations was testing in a small group. See Appendix B for the list of accommodation codes from the Test Administration Manual.

[12] **Standard 5.2:** Modifications or disruptions of standardized test administration procedures or scoring should be documented (p. 63).

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Table 5.1: Frequency and Percentage of Students Receiving Each Type of Allowable Accommodation on the Summer 2013 MO EOC Assessments

Accommodation	English II		Algebra I		Biology	
	Freq.	%	Freq.	%	Freq.	%
Braille	--	--	--	--	--	--
Large Print	--	--	--	--	--	--
Oral Reading	--	--	--	--	--	--
Oral Reading—Blind/Partial Sight	--	--	--	--	--	--
Signing of Assessment	--	--	--	--	--	--
Paraphrasing	--	--	--	--	--	--
Other Administrations	--	--	--	--	--	--
Oral Reading in Native Language	--	--	--	--	--	--
Extended Time	--	--	--	--	--	--
Administered Using More Than Allotted Periods	--	--	--	--	--	--
Other Timing	--	--	--	--	--	--
Use of Scribe	--	--	--	--	--	--
Use of Calculator, Math Tables, etc.	--	--	--	--	--	--
Using Bilingual Dictionary	--	--	--	--	--	--
Other Response	--	--	--	--	--	--
Testing Individually	--	--	--	--	--	--
Testing in Small Group	--	--	--	--	--	--
Other Setting	--	--	--	--	--	--

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Table 5.1 (cont.): Frequency and Percentage of Students Receiving Each Type of Allowable Accommodation on the Summer 2013 MO EOC Assessments

Accommodation	English I		Algebra II		Geometry		Government		Am. History	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Braille	--	--	--	--	--	--	--	--	--	--
Large Print	--	--	--	--	--	--	--	--	--	--
Oral Reading	--	--	--	--	--	--	--	--	--	--
Oral Reading—Blind/Partial Sight	--	--	--	--	--	--	--	--	--	--
Signing of Assessment	--	--	--	--	--	--	--	--	--	--
Paraphrasing	--	--	--	--	--	--	--	--	--	--
Other Administrations	--	--	--	--	--	--	--	--	--	--
Oral Reading in Native Language	--	--	--	--	--	--	--	--	--	--
Extended Time	--	--	--	--	--	--	--	--	--	--
Administered Using More Than Allotted Periods	--	--	--	--	--	--	--	--	--	--
Other Timing	--	--	--	--	--	--	--	--	--	--
Use of Scribe	--	--	--	--	--	--	--	--	--	--
Use of Calculator, Math Tables, etc.	--	--	--	--	--	--	--	--	--	--
Using Bilingual Dictionary	--	--	--	--	--	--	--	--	--	--
Other Response	--	--	--	--	--	--	--	--	--	--
Testing Individually	--	--	--	--	--	--	--	--	--	--
Testing in Small Group	--	--	--	--	--	--	--	--	--	--
Other Setting	--	--	--	--	--	--	--	--	--	--

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Table 5.2: Frequency and Percentage of Students Receiving Each Type of Allowable Accommodation on the Fall 2013 MO EOC Assessments

Accommodation	English II		Algebra I		Biology	
	Freq.	%	Freq.	%	Freq.	%
Braille	--	--	1	0.02	--	--
Large Print	2	0.07	3	0.06	1	0.04
Oral Reading	--	--	103	1.90	69	2.39
Oral Reading—Blind/Partial Sight	--	--	--	--	--	--
Signing of Assessment	--	--	--	--	--	--
Paraphrasing	--	--	--	--	--	--
Other Administrations	1	0.04	1	0.02	1	0.04
Oral Reading in Native Language	--	--	7	0.13	3	0.10
Extended Time	--	--	--	--	--	--
Administered Using More Than Allotted Periods	17	0.59	22	0.41	24	0.83
Other Timing	15	0.52	14	0.26	5	0.17
Use of Scribe	1	0.04	2	0.04	2	0.07
Use of Calculator, Math Tables, etc.	2	0.07	--	--	12	0.42
Using Bilingual Dictionary	--	--	--	--	--	--
Other Response	--	--	--	--	--	--
Testing Individually	13	0.45	17	0.31	11	0.38
Testing in Small Group	99	3.43	206	3.80	127	4.40
Other Setting	2	0.07	6	0.11	1	0.04

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Table 5.2 (cont.): Frequency and Percentage of Students Receiving Each Type of Allowable Accommodation on the Fall 2013 MO EOC Assessments

Accommodation	English I		Algebra II		Geometry		Government		Am. History	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Braille	--	--	1	0.24	--	--	1	0.01	--	--
Large Print	--	--	--	--	1	0.24	3	0.02	--	--
Oral Reading	--	--	1	0.24	8	0.86	429	2.81	52	3.17
Oral Reading—Blind/Partial Sight	--	--	--	--	--	--	--	--	--	--
Signing of Assessment	--	--	--	--	--	--	2	0.01	1	0.06
Paraphrasing	--	--	--	--	--	--	2	0.01	--	--
Other Administrations	--	--	1	0.24	--	--	--	--	--	--
Oral Reading in Native Language	--	--	--	--	--	--	14	0.09	--	--
Extended Time	--	--	--	--	--	--	--	--	--	--
Administered Using More Than Allotted Periods	11	1.23	--	--	--	--	123	0.81	5	0.31
Other Timing	2	0.22	--	--	1	0.11	99	0.65	3	0.18
Use of Scribe	2	0.22	1	0.24	--	--	8	0.05	2	0.12
Use of Calculator, Math Tables, etc.	1	0.11	--	--	--	--	12	0.08	--	--
Using Bilingual Dictionary	--	--	--	--	--	--	2	0.01	--	--
Other Response	--	--	--	--	--	--	5	0.03	--	--
Testing Individually	4	0.45	1	0.24	3	0.32	76	0.50	7	0.43
Testing in Small Group	44	4.92	2	0.49	12	1.30	611	4.00	70	4.27
Other Setting	--	--	--	--	--	--	22	0.14	--	--

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Table 5.3: Frequency and Percentage of Students Receiving Each Type of Allowable Accommodation on the Spring 2014 MO EOC Assessments

Accommodation	English II		Algebra I		Biology	
	Freq.	%	Freq.	%	Freq.	%
Braille	7	0.01	5	0.01	6	0.01
Large Print	16	0.03	20	0.03	16	0.03
Oral Reading	24	0.04	1,962	3.11	2,279	3.72
Oral Reading—Blind/Partial Sight	--	--	--	--	--	--
Signing of Assessment	--	--	26	0.04	19	0.03
Paraphrasing	--	--	--	--	1	0.00
Other Administrations	54	0.09	47	0.07	49	0.08
Oral Reading in Native Language	1	0.00	45	0.07	62	0.10
Extended Time	--	--	--	--	--	--
Administered Using More Than Allotted Periods	1,119	1.81	1,095	1.73	1,119	1.83
Other Timing	438	0.71	370	0.59	428	0.70
Use of Scribe	59	0.10	54	0.09	55	0.09
Use of Calculator, Math Tables, etc.	90	0.15	--	--	474	0.77
Using Bilingual Dictionary	--	--	5	0.01	11	0.02
Other Response	12	0.02	14	0.02	11	0.02
Testing Individually	307	0.50	308	0.49	323	0.53
Testing in Small Group	3,455	5.59	3,555	5.63	3,575	5.83
Other Setting	102	0.17	114	0.18	122	0.20

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Table 5.3 (cont.): Frequency and Percentage of Students Receiving Each Type of Allowable Accommodation on the Spring 2014 MO EOC Assessments

Accommodation	English I		Algebra II		Geometry		Government		Am. History	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Braille	2	0.00	1	0.00	2	0.01	2	0.00	6	0.01
Large Print	22	0.04	2	0.01	12	0.03	16	0.04	13	0.03
Oral Reading	22	0.04	139	0.54	418	1.17	1,648	3.67	1,621	3.24
Oral Reading—Blind/Partial Sight	3	0.01	--	--	2	0.01	--	--	--	--
Signing of Assessment	--	--	--	--	--	--	17	0.04	12	0.02
Paraphrasing	1	0.00	--	--	--	--	--	--	1	0.00
Other Administrations	61	0.10	5	0.02	--	--	47	0.11	7	0.01
Oral Reading in Native Language	--	--	2	0.01	--	--	43	0.10	23	0.05
Extended Time	--	--	--	--	--	--	--	--	--	--
Administered Using More Than Allotted Periods	938	1.55	92	0.36	294	0.82	867	1.93	843	1.68
Other Timing	373	0.62	60	0.23	137	0.38	362	0.81	254	0.51
Use of Scribe	57	0.09	2	0.01	8	0.02	25	0.06	32	0.06
Use of Calculator, Math Tables, etc.	101	0.17	--	--	--	--	117	0.26	93	0.19
Using Bilingual Dictionary	--	--	--	--	2	0.01	9	0.02	6	0.01
Other Response	9	0.02	2	0.01	1	0.00	6	0.01	10	0.02
Testing Individually	277	0.46	29	0.11	49	0.14	183	0.41	194	0.39
Testing in Small Group	3,150	5.22	300	1.16	999	2.80	2,600	5.79	2,450	4.89
Other Setting	98	0.16	32	0.12	43	0.12	83	0.19	105	0.21

5.9 Materials Handling and Return

The Test Administration Manual contained detailed instructions for how schools and districts should collect and package the Paper/Pencil, Braille, and/or Large Print testing materials at the end of the test administration. For Test Examiners, these activities included, but were not limited to, the following:

- Collecting test books from the students using the accommodated editions
- Returning all used and unused test books to the School Test Coordinator
- Collecting all scratch paper used during testing
- Properly handling all contaminated test books (i.e., books having contact with bodily fluids such as blood or with any potentially hazardous material)

For School Test Coordinators, these activities included, but were not limited to, the following:

- Collecting testing materials from the Test Examiners
- Returning all test books (scorable and nonscorable) to the District Test Coordinator
- Destroying all unused answer sheets and other nonsecure testing materials

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After receiving the scorable and nonscorable test books from the School Test Coordinators, District Test Coordinators completed the following steps:

- Verify 100% return of test books
- Complete the Test Book Accountability Form and fax it to Questar

For the online system, the student needed to click the Submit button once he or she had finished testing to submit the test for scoring. No additional information was needed from the Test Examiner after the student had completed the test. All demographic information was edited or added by the test administrator before the student started the assessment.

5.9.1 Questar's Secure Material Check-In Procedures

Questar adhered to strict quality assurance procedures in order to ensure that all accommodated version test booklets were returned and accounted for. The check-in procedures included multiple steps to ensure that no test booklets were overlooked. All staff members received thorough and specific training before they participated in the check-in of test booklets.

Upon receipt of accommodated test booklets from the school districts, boxes were kept in a secure location and remained sealed until check-in. If a box had to be opened for any reason, it was immediately resealed.

Two teams checked in the secure materials. The first team prepared the test booklets for scanning. One district box was opened at a time, and secure test booklets were separated from ancillary materials and stacked on carts to be checked in. This process was repeated for all boxes for a district to ensure that all materials returned to Questar at the same time were checked in at the same time. Once the first team filled the cart(s) with all the secure materials from a district, the cart(s) was passed to a second team.

The second team checked in each test booklet by scanning the secure barcode into Questar's database. Operators worked in teams of two at computers equipped with barcode scanners. Operator 1 counted and scanned enough secure documents to fill a storage box. The operator verified that the database collected the same number of barcodes. If there was a discrepancy, an immediate reconciliation took place. Each ID number (barcode number) had a check digit that ensured that all numbers were correctly read by the scanner and that no ID number was miskeyed when manually entered. If a barcode was damaged or not readable, the operator manually entered the barcode number into the system. After this process was complete, the box of secure materials was handed to Operator 2 and scanned a second time. The database verified that the same barcode numbers were read during the scanning of the box or an immediate reconciliation took place. After verification, the secure materials were placed in a Questar box for storage. The scanning system provided audible and onscreen cues to alert operators of scanning discrepancies.

Further validity checks were done before each box was sealed to ensure that there were no ID barcode scanning discrepancies and that all ID numbers were correct. The validity checks also ensured that the ID numbers and the quantity in each box matched what was entered into the database. Finally, each box was placed on a pallet and stored.

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Post check-in procedures were also performed prior to notifying the districts of missing secure materials. For any district that was missing a secure material, an individual box-by-box hand search was conducted in an attempt to locate the secure material(s). If an unaccounted secure material was found, the material was then coded into the database by a Questar supervisor and Questar's Program Management team was notified. If unaccounted-for material(s) were not found during the box-by-box hand search, the material(s) was considered missing and the district was notified via the Secure Missing Material Report process. This was also communicated to DESE, who would then follow up with discretion.

5.10 Summary

The distribution, administration, and collection of the MO EOC Assessments was carefully communicated and executed in the detailed Test Administration Manual. All standards related to test security, administration, and accommodations were adhered to throughout the process. The most important steps and procedures have been covered in this chapter. Readers interested in further detail should consult the Test Administration Manual for the MO EOC Assessments.

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Chapter 6: Testing on Tablets

6.1 Introduction

Tablets (e.g., iPads and Androids) and Chromebooks were allowed for the MO EOC testing for the SR items starting with the Summer 2013 administration and for both SR items and PE/WPs starting in Fall 2013. Because of the small number of students who tested in Summer 2013 and Fall 2013, very few students used these devices (and none used an Android). However, use of iPads and Chromebooks grew in the Spring 2014 administration, even though no student tested on the Android. This chapter examines the comparability of scores of students who tested on these devices and those who tested on the standard computers (desktops or laptops) using the Spring 2014 data.

Comparability could not be assessed directly because students were not randomly assigned to administration conditions, nor were all students familiar with all devices. Nevertheless, because of the relatively large numbers of students taking the tests on Chromebooks, it was possible to investigate the extent to which the MO EOC Assessments functioned the same for students taking the test on Chromebooks as for those taking it on standard computers.

A comparability study was conducted using matched groups of students randomly sampled from each device-specific administration condition. Too few students took the MO EOC Assessments on iPads for a matching group to be created for the tablet test takers, which could then be reliably calibrated; this is a critical element of the comparability analysis. The number of students taking an MO EOC Assessment on an iPad ranged from 56 to 642, depending on the content area. Thus, the comparability study described in this chapter is limited to the Chromebook and standard modes of administration.

The two research questions for the comparability analysis were:

1. Do item statistics differ for students with identical observed score distributions but sampled from different device administration conditions?
2. To what extent would the scoring tables vary if estimated from groups with identical observed score distributions but sampled from different device administration conditions?

The answers to these questions address (albeit indirectly) the comparability of scores obtained from testing on different devices. Because all analyses are based on assumptions that cannot be verified (such as the equitability of the total raw score across device), caution is warranted in results interpretations. In particular, it is not possible based on the analyses conducted to draw conclusions about the causes of observed differences between groups of students taking a test on a given device.

6.2 Raw Score Descriptive Statistics by Device

A number of different factors could give rise to score differences between groups taking tests on different devices. These include SES-related differences in the base achievement levels of students in schools with access to certain devices, relevant curricular or instructional factors associated with access to devices, and a legitimate device effect that may aid or hamper performance on the MO EOC Assessment. It is not possible to test these hypotheses by comparing overall statistics, as the relationship between device selection and ability is not

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known. All comparisons made in this section are limited to the observed data. No causal inferences regarding the effect of testing on a particular device are warranted.

Table 6.1 shows raw and scale score statistics for all of the students taking the SR-only MO EOC Assessments on a standard computer and on an iPad in Spring 2014. With the exception of Geometry (with only 56 cases), the raw and scale score means of students taking an MO EOC Assessment on an iPad were lower than for those taking the test on a standard computer. There was no discernable pattern in the standard deviations across device groups.

Table 6.1: Raw and Scale Score Statistics for SR-only MO EOC Assessments—iPad vs. Online

			Raw Score				Scale Score			
Device*	**Content Area**	**N-count**	**Mean**	**SD**	**Min.**	**Max.**	**Mean**	**SD**	**Min.**	**Max.**
iPad	English I	642	23.80	7.37	0	39	200.72	21.80	100	250
Online	English I	56,510	25.07	7.36	0	40	204.58	22.13	100	250
iPad	Algebra II	237	25.11	8.03	7	40	207.71	21.58	160	250
Online	Algebra II	24,712	25.22	7.64	4	40	207.75	20.51	147	250
iPad	Geometry	56	29.38	6.11	15	40	218.43	19.54	179	250
Online	Geometry	34,462	25.59	7.41	0	40	207.09	21.71	100	250
iPad	Government	341	22.57	8.10	5	39	194.74	20.38	148	250
Online	Government	42,479	26.81	7.52	0	40	205.62	20.53	100	250
iPad	Am. History	222	22.58	6.70	8	39	196.59	22.29	146	250
Online	Am. History	47,697	22.95	7.17	0	40	198.07	24.38	100	250

*Online counts exclude students who tested on iPads or Chromebooks, or who used an accommodated test form.

Table 6.2 shows analogous results for students taking the MO EOC Assessments on Chromebooks in Spring 2014. Here, the trend is reversed. In general, raw and scale score means were higher for students taking the MO EOC Assessments on Chromebooks. The exception is Algebra II, which, like Geometry in the case of iPads, also has the lowest count of students in the new device group. Again, with the exception of Algebra II, score distributions for Chromebooks show less spread than their standard computer counterparts.

Table 6.2: Raw and Scale Score Statistics for SR-only MO EOC Assessments—Chromebook vs. Online

			Raw Score				Scale Score			
Device*	**Content Area**	**N-count**	**Mean**	**SD**	**Min.**	**Max.**	**Mean**	**SD**	**Min.**	**Max.**
Chromebook	English I	3,105	25.92	7.06	0	40	207.10	21.43	100	250
Online	English I	56,510	25.07	7.36	0	40	204.58	22.13	100	250
Chromebook	Algebra II	881	24.77	8.24	3	40	206.85	22.26	140	250
Online	Algebra II	24,712	25.22	7.64	4	40	207.75	20.51	147	250
Chromebook	Geometry	1,168	26.01	7.19	6	40	208.22	21.06	150	250
Online	Geometry	34,462	25.59	7.41	0	40	207.09	21.71	100	250
Chromebook	Government	1,950	28.18	6.88	6	40	209.10	19.36	152	250
Online	Government	42,479	26.81	7.52	0	40	205.62	20.53	100	250
Chromebook	Am. History	2,108	24.15	6.72	7	40	202.01	22.91	142	250
Online	Am. History	47,697	22.95	7.17	0	40	198.07	24.38	100	250

*Online counts exclude students who tested on iPads or Chromebooks, or who used an accommodated test form.

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English II, Algebra I, and Biology have PE/WPs. Table 6.3 and Table 6.4 display the raw score statistics of the previous tables, but this time disaggregated for the SR and PE/WP sections. The scale score statistics are also shown.

With the exception of English II, the iPad scale score means were lower on the mixed-format MO EOC Assessments. Very few Algebra I and Biology cases had scale scores available, so these means could be less stable. SR means for students taking the English II MO EOC Assessment on iPads were notably higher than their counterparts taking the English II MO EOC Assessment on standard computers, while students taking the Biology MO EOC Assessment scored notably lower on their PE/WP sections.

On both of the sections and overall, students who took the MO EOC Assessment on Chromebooks scored consistently higher than those taking them on standard computers. The Chromebook group's scores were also less varied, both overall and by section.

Once again, it is not possible to draw inferences regarding a device effect or even differences in EOC-related ability from these comparisons, as the relationship between ability and choice of device is not controlled for.

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Table 6.3: Raw and Scale Score Statistics for Mixed-Format MO EOC Assessments—iPad vs. Online

		Raw Score (SR)					Raw Score (PE/WP)					Scale Score				
Device*	Content Area	N-Count	Mean	SD	Min.	Max.	N-Count	Mean	SD	Min.	Max.	N-Count	Mean	SD	Min.	Max.
iPad	English II	273	27.01	4.99	10	35	143	3.05	0.62	1	4	141	213.11	15.81	176	250
Online	English II	58,978	24.82	6.36	0	35	58,841	3.01	0.73	0	4	58,617	211.05	17.72	108	250
iPad	Algebra I	321	19.40	5.39	7	33	66	1.00	0.99	0	4	64	193.31	16.48	158	236
Online	Algebra I	60,290	21.40	6.64	0	35	60,610	1.80	1.30	0	4	60,012	202.93	21.30	100	250
iPad	Biology	323	23.91	5.82	9	35	29	8.31	3.93	0	15	29	193.21	15.06	166	225
Online	Biology	58,719	23.42	6.21	0	35	59,072	11.89	4.15	0	20	58,566	207.23	18.62	100	250

*Online counts exclude students who tested on iPads or Chromebooks, or who used an accommodated test form..

Table 6.4: Raw and Scale Score Statistics for Mixed-Format MO EOC Assessments—Chromebook vs. Online

		Raw Score (SR)					Raw Score (PE/WP)					Scale Score				
Device*	Content Area	N-Count	Mean	SD	Min.	Max.	N-Count	Mean	SD	Min.	Max.	N-Count	Mean	SD	Min.	Max.
Chromebook	English II	2,424	26.20	5.57	0	35	2,522	3.22	0.63	0	4	2,350	215.15	16.24	152	250
Online	English II	58,978	24.82	6.36	0	35	58,841	3.01	0.73	0	4	58,617	211.05	17.72	108	250
Chromebook	Algebra I	2,436	22.62	6.47	1	35	2,227	2.07	1.30	0	4	2,107	207.76	21.08	114	250
Online	Algebra I	60,290	21.40	6.64	0	35	60,610	1.80	1.30	0	4	60,012	202.93	21.30	100	250
Chromebook	Biology	2,078	24.05	5.71	5	35	1,897	12.09	3.79	0	20	1,887	208.66	16.81	146	250
Online	Biology	58,719	23.42	6.21	0	35	59,072	11.89	4.15	0	20	58,566	207.23	18.62	100	250

*Online counts exclude students who tested on iPads or Chromebooks, or who used an accommodated test form.

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6.3 Comparability Study Methodology

The comparability study conducted on the Spring 2014 EOC test forms was based on the possibility of constructing distinct groups of students matched on ability regarding the tested content area. As there is no direct measure of ability independent of device of administration, a proxy was required and total raw score was used. For the MO EOC Assessments composed of a mixture of SRs and PE/WPs, the matching was done so that the raw scores on each of these sections were also matched.

For each MO EOC Assessment, two matching groups were constructed by sampling without replacement separately from the group of students taking the test on a standard computer to match the distribution of the group of students taking the test on a Chromebook. The two samples are referred to as reference samples "A" and "B." The Chromebook group is referred to as group "C."

The sampling was done so that the raw score distributions of A, B, and C for a given MO EOC Assessment were identical and the total number of students in each sample was the same. For example, at the raw score of 10 for Algebra II, 14 students tested with Chromebooks. Then 14 students were randomly selected from the desktop/laptop group without replacement for Sample A and Sample B, respectively. This selection resulted in a score distribution that matched the score distribution of the Chromebook test takers. For tests with SR items and PE/WPs, the reference samples matched the Chromebook test takers in all combinations of SR and PE/WP raw scores.

Next, each sample was calibrated with the WINSTEPS program using the program specifications for the MO EOC program. These calibrations produced three sets of items parameters for each Spring 2014 EOC test form: one for reference group A, one for reference group B, and a third for Chromebook group C. The calibrations also produced raw score-to-logit conversions, which are precursors to the raw-to-scale conversion tables against which students are scored. With the exception of special business rules for conversions near cut points, the raw-to-scale conversions are linear transformations of the raw-to-logit conversions. (These linear transformations are those required to convert the logit metrics to scores on the MO EOC scales.)

These two sets of outputs (item parameters and raw-to-logit conversions) were then reviewed for two sets of analyses: one at the item level and the other at the test level. The rationale for both sets of analyses was that statistics derived from an A vs. B comparison would show the variability expected from randomly equivalent samples. Statistics derived from an A vs. C or a B vs. C comparison, on the other hand, would show whether, and the extent to which, the Chromebook group is systematically different from that obtained from students taking the test on a standard computer, regardless of matching total score distributions.

These analyses have four important limitations.

1. The approach assumes that total score does not depend on mode of administration (i.e., that it is an adequate proxy for ability as measured by the EOC constructs).
2. Particularly for the item-level analyses, differences in item parameters do not necessarily imply non-comparability at the score level. Different sets of item parameters could result in approximately equivalent test conversion tables.

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3. It is not possible to attribute differences in the parameters to mode of administration. The differences could be due to other factors associated with student assignment to or selection of administration mode, such as curricular factors.
4. Particularly for the test-level analyses, it is not possible to attribute differences in the raw-to-logit functions specifically to mode of administration. As with differences in parameters, the differences in raw-to-logit functions could be due to other factors associated with student assignment to or selection of administration mode.

6.4 Comparability Study Results

Chromebook group-derived IRT *b* (difficulty) parameter scatterplots (A vs. C and B vs. C) were generated and compared to a reference scatterplot (A vs. B) for each MO EOC Assessment. To generate upper and lower control lines, a degree-2 polynomial was fit with two sets of points. Higher degree polynomials did not noticeably improve fit. The first set of points was one pooled standard error above the average of the two derived parameters for a given item, and the second was one pooled SE below (Bond & Fox, 2007). The two parameters and their individual standard errors were from the A and B calibrations for the reference scatterplot, and from either A and C or B and C for the two comparison scatterplots.

As will be shown later, the correlation coefficient between any two sets of parameters is very high, regardless of sample. Scatterplots show that items have stable difficulty estimates across Samples A and B and that some items, which fall outside of the control lines, demonstrate differential difficulty estimates across the Chrombook sample and either or both of Samples A and B. These items are identified on the scatterplotsfor each content area. No item consistently strayed far from the control lines.

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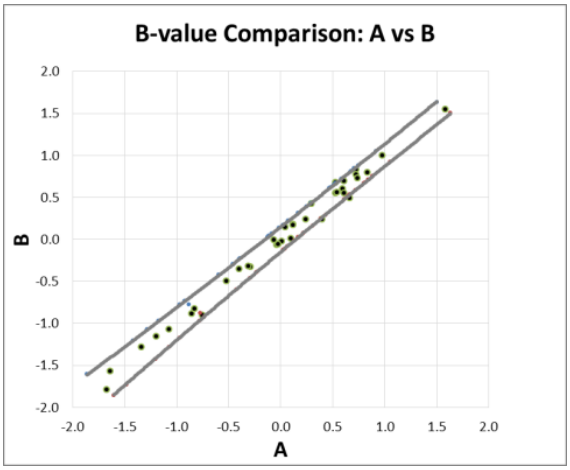
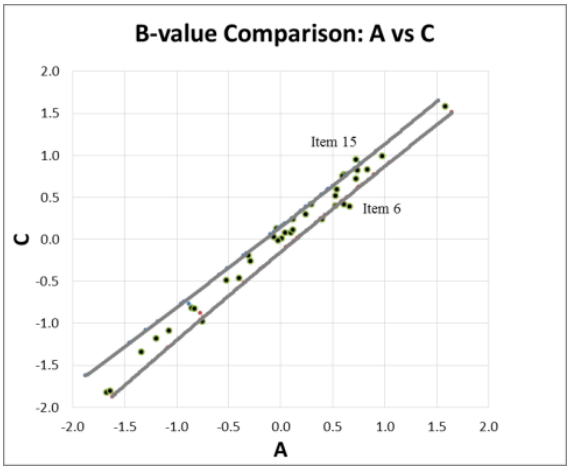
Figure 6.1: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—English II



English II: Reference



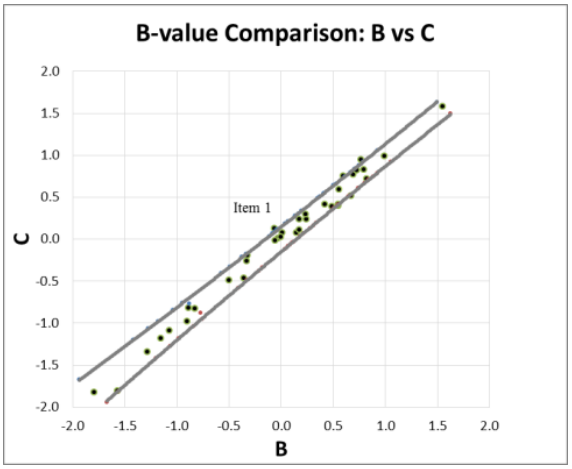


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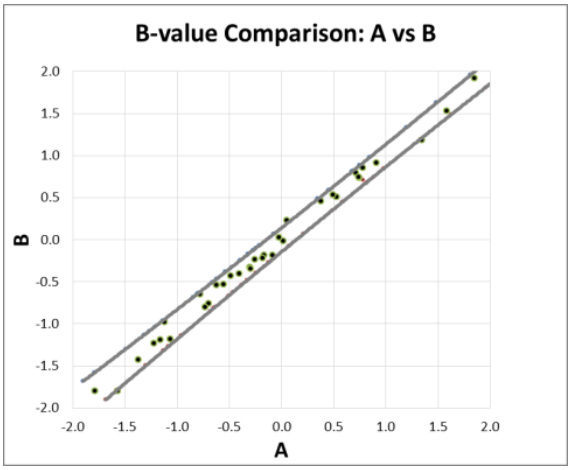
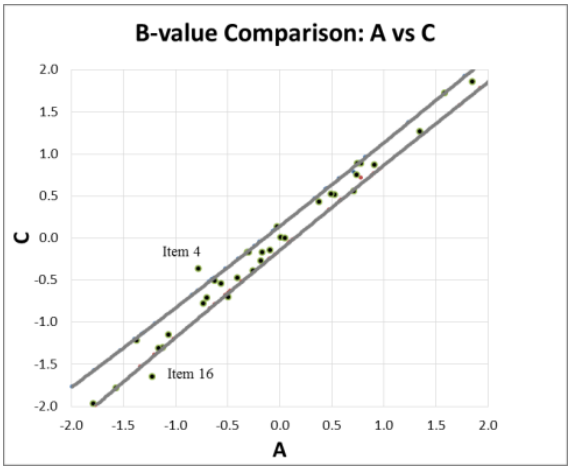
Figure 6.2: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—Algebra I



Algebra I: Reference



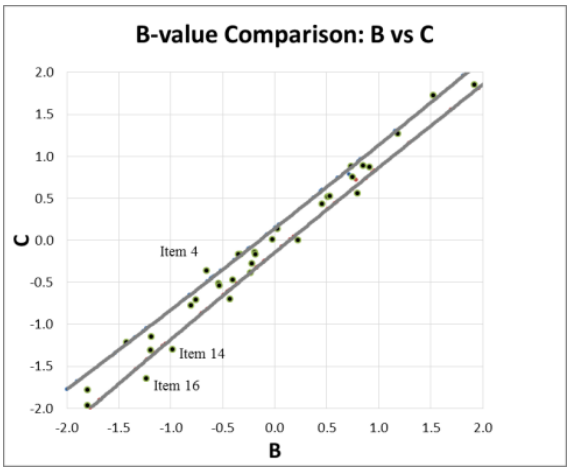


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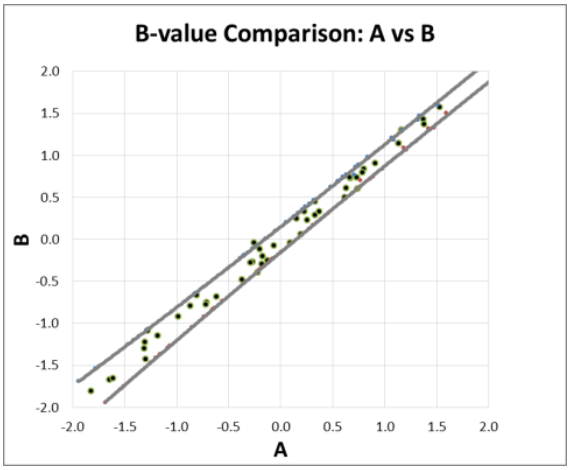
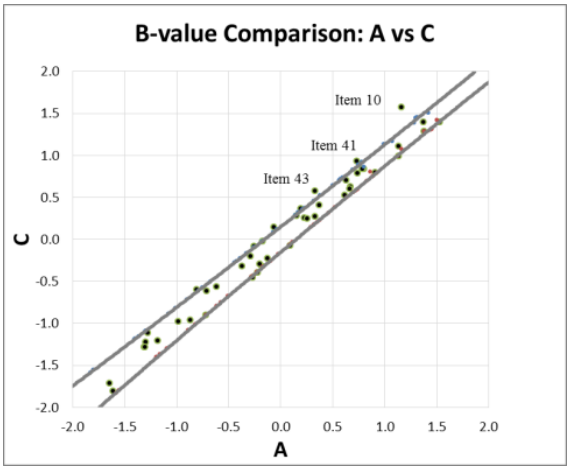
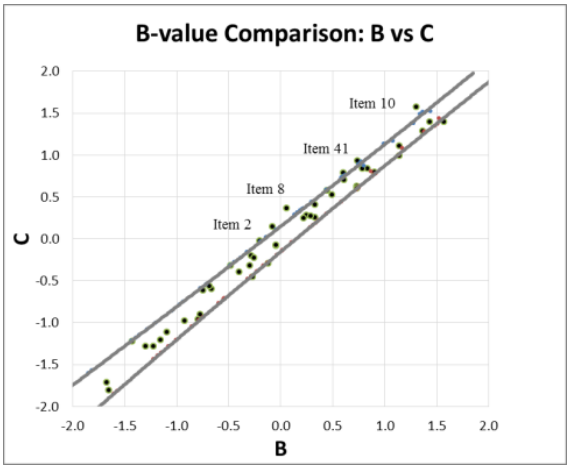
Figure 6.3: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—Biology







Biology: Reference

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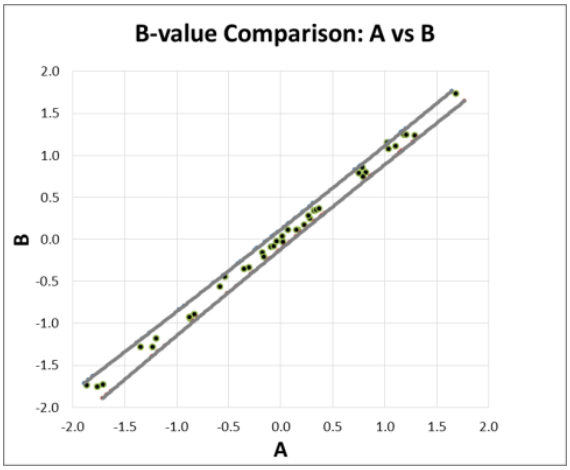
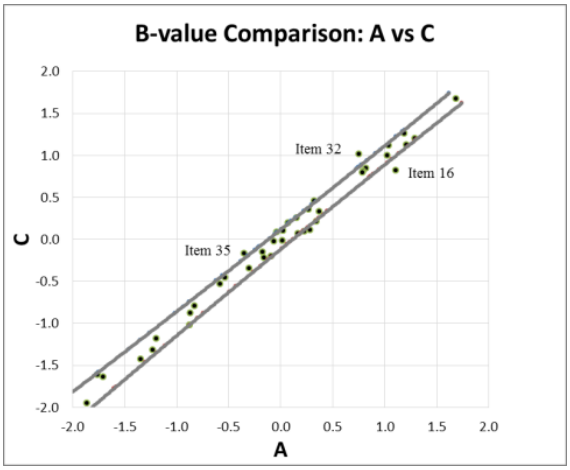
Figure 6.4: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—English I



English I: Reference



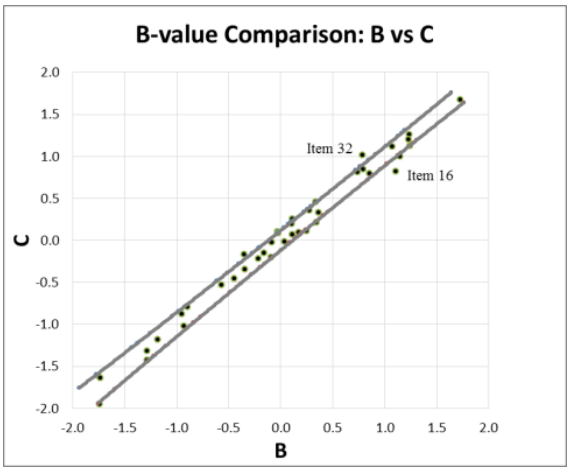


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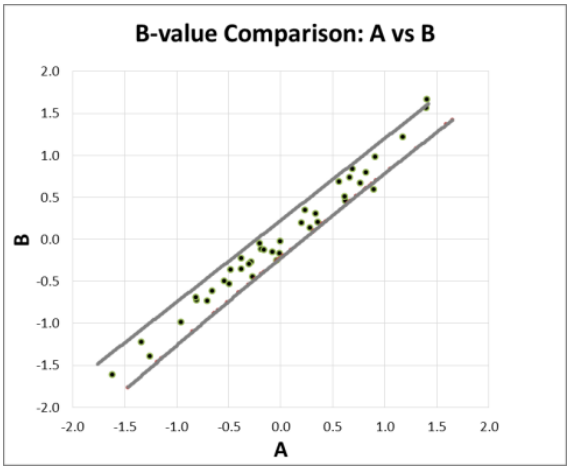
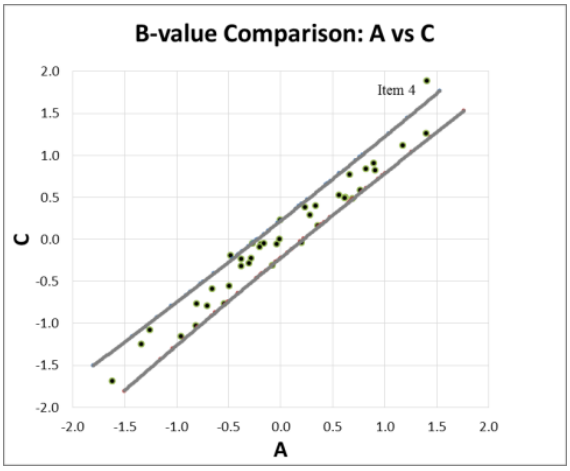
Figure 6.5: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—Algebra II



Algebra II: Reference



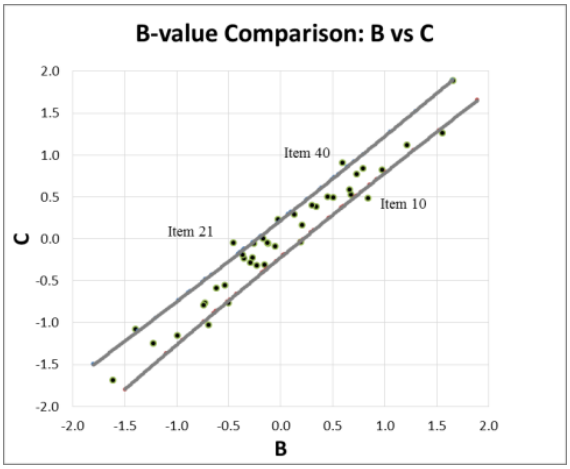


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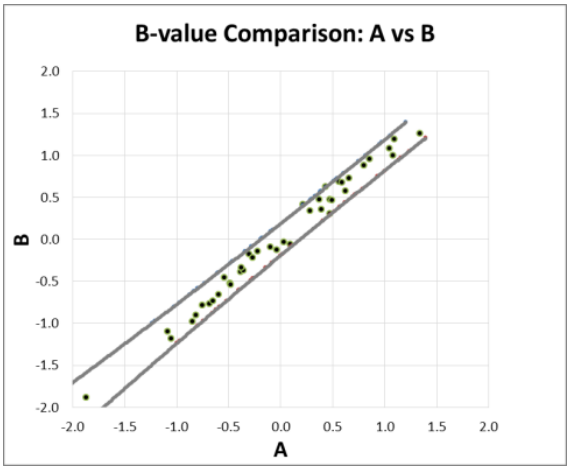
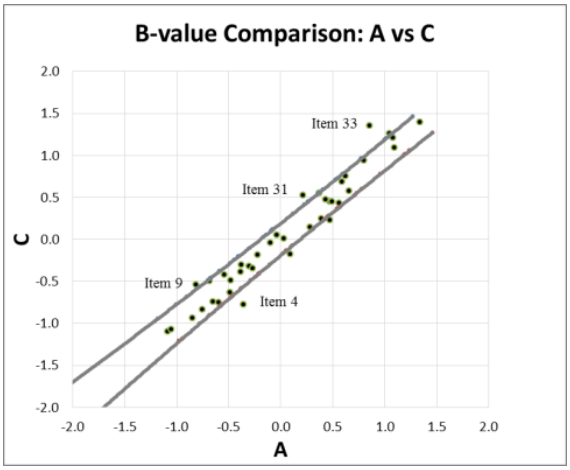
Figure 6.6: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—Geometry



Geometry: Reference



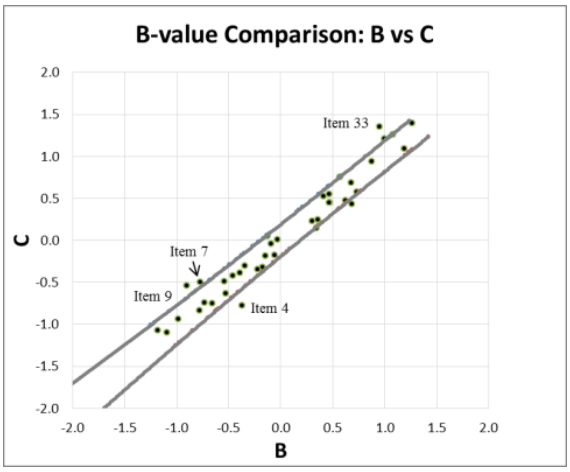


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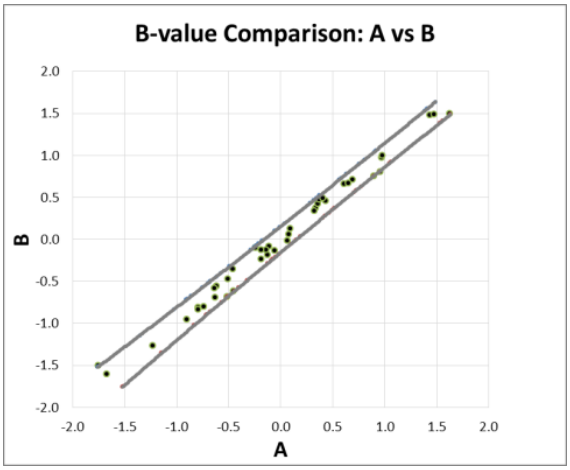
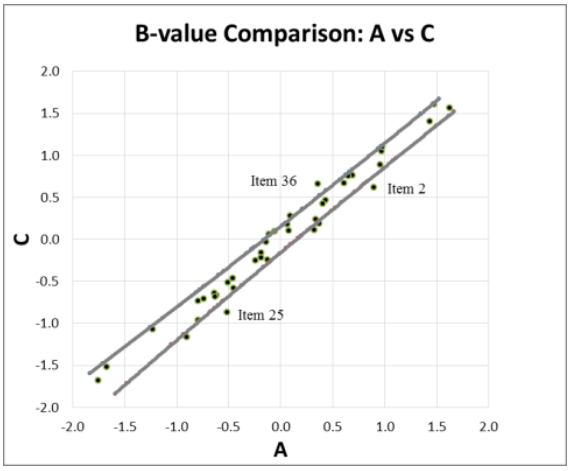
Figure 6.7: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—Government



Government: Reference



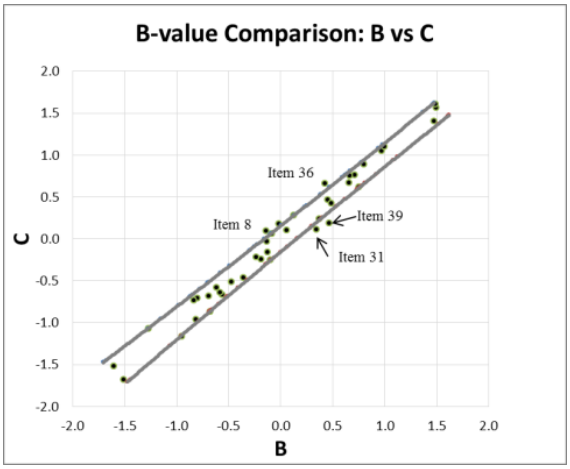


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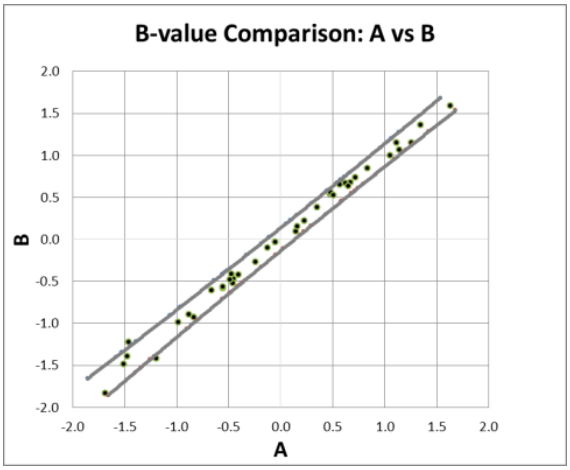
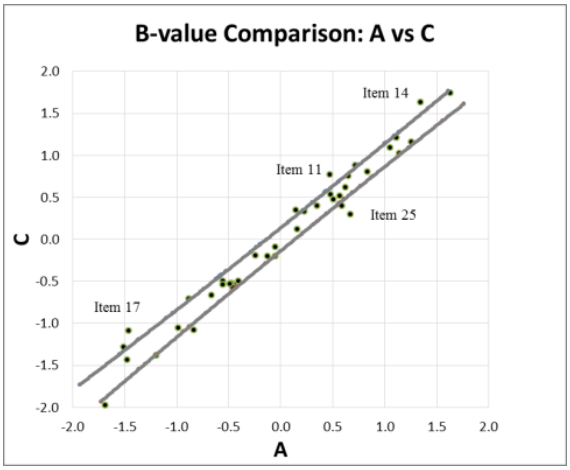
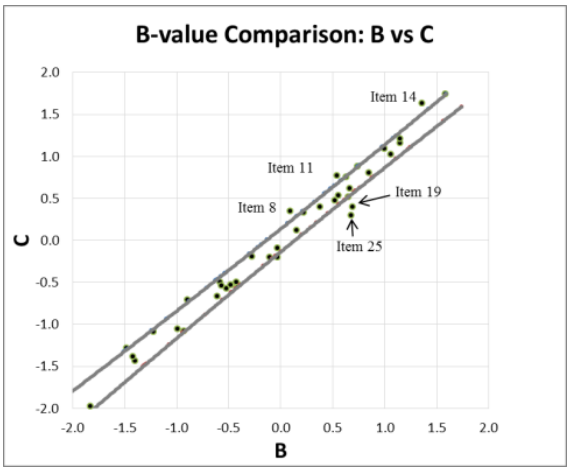
Figure 6.8: Scatterplots of Item Parameters from the A, B, and C Samples, with Control Lines—American History



American History: Reference





The correlation coefficients computed for all of the set pairs were very high, ranging from 0.9721 to 0.9985, as shown in Table 6.5. All correlations involving group C are lower than the correlation between the two reference sets for that content area.

Table 6.5: Correlation Coefficients for Item Parameters Estimated from Different Samples

	Correlation between parameters		
Content Area	**A and B**	**A and C**	**B and C**
English II	.9952	.9905	.9932
Algebra I	.9972	.9913	.9905
Biology	.9955	.9886	.9900
English I	.9985	.9926	.9923
Algebra II	.9867	.9769	.9721
Geometry	.9932	.9780	.9776
Government	.9943	.9854	.9868
Am. History	.9963	.9845	.9878

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It is not surprising that the correlations between A and B were higher than those for the other pairs. However, the correlations between A and C and between B and C were also very strong.

6.4.1 Analysis of Items Outside of Control Line Boundaries

To find out more about the items that fell outside of the control lines as identified in Figures 6.1 through 6.8, Questar conducted an analysis of the content of these items to determine if there is anything about the content or format of the items that might explain why students using the Chromebooks might perform differently than students using standard computers. Table 6.6 provides information about item type and the number of instances each item was found easier or harder on Chromebooks as compared to standard computers.

Table 6.6: Items Outside the Control Lines

Form	Position	Item Type	# of instances where the item is harder on Chromebooks than on standard computers	# of instances where the item is easier on Chromebooks than on standard computers
English II	1	SR	1	0
	6	SR	0	1
	15	SR	1	0
Algebra I	4	SR	2	0
	14	SR	0	1
	16	SR	0	2
Biology	2	SR	1	0
	8	SR	1	0
	10	SR	2	0
	41	PE	2	0
	43	PE	1	0
English I	16	SR	0	2
	32	SR	2	0
	35	SR	1	0
Algebra II	4	SR	1	0
	10	SR	0	1
	21	SR	1	0
	40	SR	1	0
Geometry	4*	SR	0	2
	7*	SR	1	0
	9*	SR	2	0
	31	SR	1	0
	33	SR	2	0
Government	2	SR	0	1
	8	SR	1	0
	25	SR	0	1
	31	SR	0	1
	36	SR	2	0
	39	SR	0	1

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Form	Position	Item Type	# of instances where the item is harder on Chromebooks than on standard computers	# of instances where the item is easier on Chromebooks than on standard computers
Am. History	8	SR	1	0
	11	SR	2	0
	14	SR	2	0
	17	SR	1	0
	19	SR	0	1
	25	SR	0	2

*required scrolling

As can be seen in this table, most of the items were selected-response items and appeared in the first section of the test. Two of the items, one graphing and one measurement, were part of a PE. Most of the items were only slightly outside of the boundaries.

The item in position 4 on the Algebra I form required computing the mean for 17 numbers, which, for some students, would be time-consuming and leave room for arithmetical errors. Selected-response items in positions 4, 7, and 9 on the Geometry form may have been presented differently among the various devices due to difference in space available for display. Items in positions 4 and 7 required scrolling to see all of the choices. Item 9 required scrolling to see the entire stimulus.

The graphing item appearing in the PE portion of the Biology Assessment is particularly challenging to complete on a tablet due to the difficulty in plotting points and placing textboxes with precision, as well as the relatively large amount of scrolling required.

6.4.2 Comparison of Samples A and B Scoring Tables to Sample C Scoring Tables

To investigate practical significance further, scoring tables derived from samples A and B were compared to those derived from group C. These tables are generated from WINSTEPS and are simply the sums of a test's item characteristic curves. The logit conversions for each raw score point generated from samples A and B were averaged to obtain a pooled estimate of the score point conversion for the reference administration condition. These were compared to the conversions per the scoring table derived from the Chromebook group by computing:

$$d(RS) = \theta_C(RS) - \frac{\theta_A(RS) + \theta_B(RS)}{2}.$$

where $d(RS)$ is the t amount by which the Chromebook-derived conversion is higher (or lower) than the reference conversion, as a function of raw score, and each $\theta_X(RS)$ is the logit value for a given raw score *RS* and group *X*, with *X* being A, B, or C. $d(RS)$ represents the advantage (or disadvantage, if negative) to using a Chromebook-group-derived conversion in scoring, as opposed to a standard computer-sample-derived conversion. The differences are expected to be zero but could fluctuate due to sampling error.

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These amounts are displayed in Figure 6.9. A difference of one logit is approximately a standard deviation, which translates to between about 16 points (for English II) and 27 points (for American History) on the EOC scale score metrics. Thus, a difference of 0.1 logit is between 2 and 3 points, and a difference on the order of 0.01 logit is practically negligible.

For example, $d(RS)$ for a raw score of 30 on Algebra I is about +0.025 logit. The logit to scale score conversion for Algebra I has a slope of approximately 20 points, so the +0.025 logit for Algebra I is 0.5 scale score point. This is the amount by which a student at a raw score of 30 is estimated to be advantaged by a Chromebook-based conversion table.

Uniformly across the MO EOC Assessments, the differences are quite small and mostly negligible. In terms of sign, with the exception of Biology, high-performing students appear to benefit most from a Chromebook-sample-derived table, but the amount by which they are favored is either in the negligible range or (for Algebra I) not more than 2 scale score points, and only for the highest raw scores. Also with the exception of English I, low-performing students would appear to be disadvantaged by a Chromebook-sample-derived table, but the amount of that disadvantage is in the negligible range.

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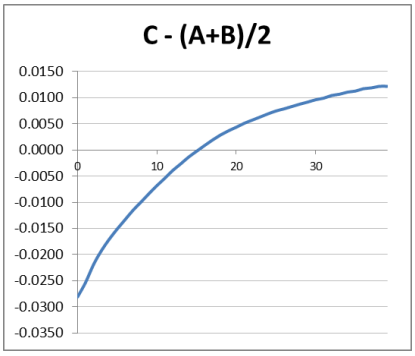
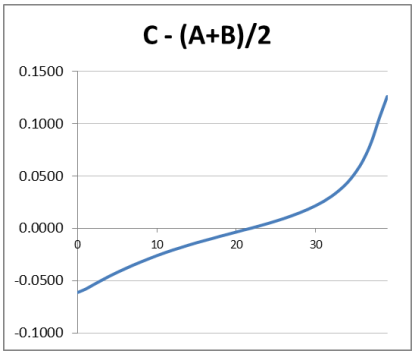
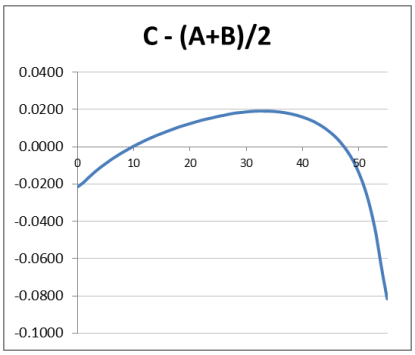
Figure 6.9: Amount (in logits) by which a Student Benefits from a Chromebook group-derived Conversion Table, by Raw Score



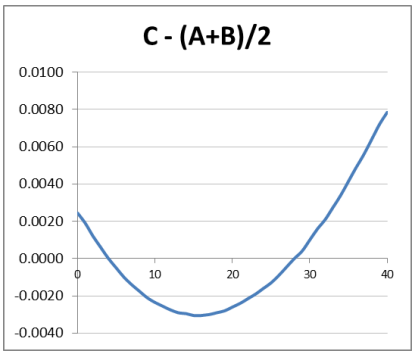
English II



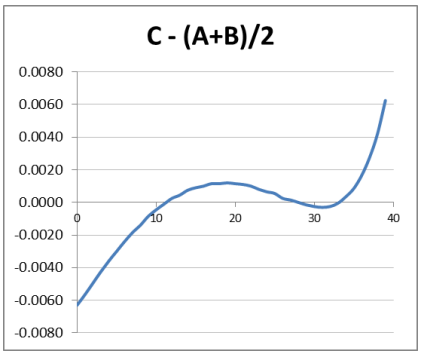
Algebra I



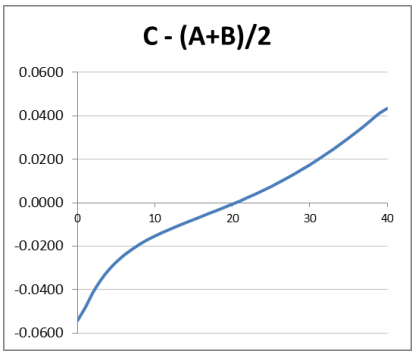
Biology



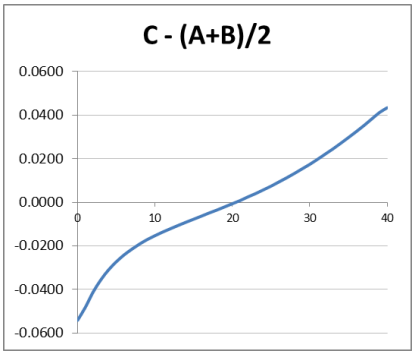
English I



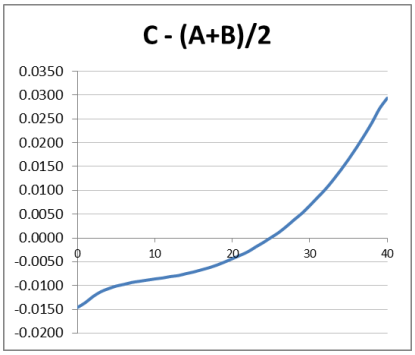
Algebra II



Geometry



Geometry



American History

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6.5 Comparability Analysis Summary

During the Spring 2014 MO EOC administration, students were permitted to take their exams on iPads and Chromebooks, in addition to the standard online and paper and pencil configurations. Since students were not randomly assigned to device condition, it was not possible to estimate a device effect on student scores.

Raw and scale score distributions reveal a tendency toward higher scores on Chromebooks and lower scores on iPads, but no conclusion about a device effect can be drawn from these. Samples matched on total scores were created from Chromebook test takers and standard computer test takers. Two sets of analyses were conducted: one at the item level and another at the test level. Both sets of analyses, limited by design, show differences in item and test parameters estimated from Chromebook versus standard online samples, but the differences have very small or negligible practical significance.

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Chapter 7: Scoring

7.1 Introduction

The MO EOC Assessment forms were processed and scored by Questar. SR items were automatically scored against a fixed key immediately after a test is submitted by the student. Each test form is tested entering 100% correct responses and 100% incorrect responses through both desktop and tablet clients, and each test score is validated as part of a comprehensive end-to-end process culminating in final reports.

The PE/WPs were scored by Questar's qualified scorers. This chapter outlines the processes used to implement scoring materials for the PE/WPs, receive and scan student responses, hire and train scorers, score the PE/WPs, and maintain control of the quality of the scoring processes.

7.2 Scoring Requiring Human Judgment

Standard 5.9[13] relates specifically to item scoring that requires human judgment. The Standards suggest specific procedures that should be followed to ensure that handscoring of open-ended items is consistent and fair. The following sections outline the processes that were established and followed for handscoring of the PE/WPs in the MO EOC Assessments.

7.3 Scoring of the PE/WPs

Questar handscored the English II Assessments, which contained a WP, and the Algebra I and Biology Assessments, which contained PEs. The PE/WPs required students to respond with extended written answers to questions on given topics or to a series of questions regarding specific events.

The following sections outline Questar's processes for scoring of the PE/WPs in the MO EOC Assessments for 2013–2014, which was consistent for all three administrations (Summer 2013, Fall 2013, and Spring 2014). The PE/WPs were scored by human raters. Information regarding inter-rater reliability (IRR) for PE/WPs is included in Chapter 11.

7.3.1 Scorer Recruitment and Selection

Scoring quality starts with the recruitment process and extends through screening and placement (assigning scorers to prompts based on their skills and experience), training, qualification, and scoring. Questar accessed a large pool of educated candidates to professionally evaluate assessment prompts.

Questar carefully selected scorers according to their strengths and background. All scorers had, at a minimum, a four-year college degree. The following steps show an overview of key processes:

[13] **Standard 5.9:** When test scoring involves human judgment, scoring rubrics should specify criteria for scoring. Adherence to established scoring criteria should be monitored and checked regularly. Monitoring procedures should be documented (pp. 64–65).

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1. Process Timeline and Recruitment Tool: Questar used a web-based application to collect data on scorer education, prior scoring experience, and other key information to screen candidates currently in the database system.

2. Initial Screening: Candidate data was analyzed and prospective scorers prioritized.

3. Interviews: For new hires, each applicant provided proof of degree and responded to an item in the content area they would be scoring. Upon qualifying, the candidate was interviewed by experienced Questar scoring personnel before employment was offered.

4. Offer: Questar contacted prospective scorers detailing project requirements, timelines, and quality standards.

5. Final Documentation and Project Placement: Scorers signed confidentiality agreements agreeing to keep all information and student responses confidential. Only scorers who successfully completed training and qualifying were allowed to evaluate student responses.

7.3.2 Scorer Training and Qualification Procedures

Questar content specialists reviewed training materials provided by DESE. Questar scoring staff communicated with DESE during this process regarding item questions or clarifications.

Training materials included the following:

- Anchor Sets: The anchor set is the primary reference for scorers as they internalize the rubric during training. All scorers had access to the anchor set while scoring and were directed to refer to it regularly.

- Practice Sets: Practice sets were used to help trainees develop experience in independently applying the scoring guide or rubric to student responses. The practice sets provided guidance and practice for trainees in defining the line between score points, as well as applying the scoring criteria to a wider range of types of responses.

- Qualification Sets: All qualifying sets were used to confirm that scorer trainees had grasped the scoring criteria and were able to accurately assign the range of scores to student responses. Scorer trainees had to demonstrate acceptable performance on these sets by meeting a predetermined standard for accuracy to qualify to score MAP EOC performance events and writing prompts. Questar's digital scoring system programmatically enforced qualification rules.

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7.4 Scorer Training

Scorers went through online training and qualifying prior to scoring, including reviewing scoring guidelines and procedures. This training provided scorers with a clear understanding of the training materials and scoring protocols of the MAP EOC. Scorers were expected to read and review annotations of the training materials with focused direction given by scoring directors or content specialists. The following are the steps used during the training of the items:

- Scoring for Questar: This gave a brief overview of what scoring is, the tools provided to help the scorers, and the individuals who would support the scorers during the project.

- Questar Scoring System: Scorers were trained on the internal scoring system.

- Scoring the Missouri Project: Specifics were provided regarding the Missouri Project. DESE and Questar worked collaboratively so the scorers understood the project.

- Scoring the Item: This training process walked the scorers through the anchor papers, practice and qualification papers. The scorers proceeded through the qualification process and, upon qualifying, they continued on to operational scoring.

- Additional Training: Before operational scoring could begin, information on how to handle unscorable student responses as well as alert responses was provided.

Scoring started for the scorer once all of the steps were successfully completed.

7.5 Qualification

If applicants did not successfully complete the training and qualifying requirements, they were not allowed to score any MAP EOC student responses. Furthermore, qualified scorers were dismissed if their scoring performance did not meet defined standards. Below are the qualification standards that must have been met in order to score the Missouri Project:

- 4-point items
  - (0–4, 1–4)
  - 2 sets of 10 papers
  - 80% perfect agreement on one of two sets
  - Scorers saw both sets. If they passed the first, the second was a review.
- 3-point items
  - (0–3)
  - 2 sets of 10 papers
  - 85% perfect agreement on one of two sets
  - Scorers saw both sets. If they passed the first, the second was a review.
- 2-point items
  - (0–2)
  - 2 sets of 10 papers
  - 95% perfect agreement on one of two sets
  - Scorers saw both sets. If they passed the first, the second was a review.

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- 1-point items
    - (0–1)
    - 2 sets of 10 papers
    - 100% perfect agreement on one of two sets
    - Scorers saw both sets. If they passed the first, the second was a review.

7.5.1 Second Read Procedures

Inter-Rater Reliability (IRR) is the agreement between the first and second scores assigned to student responses. IRR measurements include exact, adjacent, and nonadjacent agreement. Guidelines for IRR are determined in accordance with customer requirements and Questar scoring standards for exact and adjacent agreement. Questar scoring staff used IRR statistics as one factor in determining the needs for continuing training and intervention on individual levels.

Questar's scoring system included comprehensive inter-rater reliability reports that allowed scoring directors to monitor both individual and group performance. After the first score was applied, the system automatically sent the 10th document to a different scorer for a second read. Reader one provided the score of record, and the second read was for inter-rater reliability purposes only. IRR estimates are provided in Table 11.26 in Chapter 11.

7.5.2 Scoring Monitoring and Recalibration Procedures

7.5.2.1 Read-Behinds

The process of reading behind scorers (hereafter referred to as a read-behind) was a major responsibility of Questar's content staff and a primary tool for guarding against scorer drift. Questar's scoring system's integrated read-behind tool allowed Questar staff to review the scores assigned to individual student responses by any given scorer.

Questar's content staff could perform a search for the following:

- Responses scored by a particular scorer
- Responses receiving a particular score point
- Responses with scores that agree with, are adjacent to, or are non-adjacent to each other
- Combinations of these features

Content staff reviewed responses to confirm that the scores were correctly assigned and to give customized feedback and remediation to individual scorers.

7.5.2.2 Calibration

Content staff used calibration sets as needed to reinforce scoring standards, introduce scoring decisions, or correct scoring issues and trends. The primary goal of calibration was to continue training and to reinforce the scoring standards. Calibration sets may be "on the line" between score points or might contain unusual examples that are challenging to score and therefore useful for reinforcing the scoring rubric. Online calibration sets could be given to entire groups, a subset of scorers, or individual scorers, as needed, to score independently. These annotated sample responses promoted accuracy by exploring project-specific issues, score boundaries, or types of responses that were particularly challenging to score consistently. After scoring an online calibration set, scorers could ask questions and seek clarification of the score point or annotation.

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7.5.2.3 Managing Scoring Quality (Scorer Exception Processing)

Content staff, often along with a project manager or human resource representative, intervened when scorer performance statistics did not meet quality standards or a scorer violated other Questar policies. Intervention included calibration, retraining, direct counseling and review of papers, and requalification. Scorer exception processing allowed Questar's project managers to define intervals at which the scoring system would check scorer validity for exact and adjacent agreement. If scorers were below pre-set standards, staff monitoring this process would interrupt their scoring process to review anchor papers or take other steps to improve their scoring. Through this process, Questar's scoring system could provide an additional training/requalification set, and if performance was not improved, could lock scorers out of the scoring system. This process prevented scorers from continuing to score if standards were not maintained.

Because the system monitored scorers and provided the scorers' information quickly, Questar's content staff continually focused on quality control measures. These measures included read-behinds, calibration, and responding to questions in the review queue. Content staff was able to spend more time working directly with scorers who had questions.

7.5.2.4 Validity

Validity responses are pre-scored responses strategically interspersed in the pool of live responses. These responses are not distinguishable from live responses and scorers' scores are only accepted for monitoring purposes, not in replacement of the true score.

The use of validity responses provides an objective procedure that helps ensure that scorers are applying the same standards throughout the project. This procedure offers feedback on the accuracy and consistency of individual scorers and groups of scorers assigned to a given item. Questar's validity mechanism provides an objective and systematic check of accuracy. It verifies that scorers are applying the same standards throughout the project and, therefore, guards against scorer drift and ultimately group drift. This procedure provides immediate feedback on individual scorers and the group as a whole.

Validity papers are actual student responses chosen by expert readers as examples that clearly earn certain scores. Following the standards established, scoring directors assigned "true scores" to validity responses to compare how often scorers match them throughout the scoring session. The validity pool included responses encompassing the entire score range for each item. Scorers scored them without being aware they were scoring validity papers rather than live responses. Validity responses were sent to scorers throughout the project.

Each MO EOC content area was set to contain validity papers at a frequency rate determined by the range of scores and complexity of each item. This means that each scorer would see a validity paper at varying times throughout the project. The scorers could not distinguish a validity paper from a live response since these papers are pulled from live scoring. The process of selecting validity papers, and keeping the pool fresh, was to select papers scored by expert readers. Questar's system allows a team leader, scoring director or content specialist to score validity items using a hierarchical approval process to ensure the score has been adequately confirmed. For instance, if a score of 3 was given by a team leader, it could not be selected for a validity response unless confirmed and approved by the scoring director. If the validity response has been chosen by the scoring director, the response must be confirmed and approved by the content specialist.

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Tables 7.1 and 7.2 show validity statistics at the end of the project for the Fall 2013 and Spring 2014 administrations, respectively. Summer 2013 validity statistics are unavailable due to the low n-counts and small number of scorers. Because Summer 2013 had such low n-counts, responses were read by expert scorers such as the Scoring Director and Team Leaders. Since validity is necessary with a larger pool of readers and for inter-rater reliability based on a number of available readings, Summer 2013 did not provide enough statistical numbers to support this function.

Table 7.1: Validity Statistics for Fall 2013

Item	N-Count	IRR Plan	IRR Actual	Variance
Algebra I – 100088976	5,299	80%	89%	9%
English II – 100085794	2,861	80%	97%	17%
Biology 1 – 100075926	2,853	100%	100%	0%
Biology 2 – 100075936	2,848	100%	100%	0%
Biology 3 – 100075927	2,844	100%	100%	0%
Biology 4 – 100075929	2,823	80%	98%	18%
Biology 5 – 100075928	2,833	95%	95%	0%
Biology 6 – 100075933	2,804	95%	97%	2%
Biology 7 – 100075930	2,808	95%	97%	2%
Biology 8 – 100075934	2,799	100%	100%	0%
Biology 9 – 100075935	2,789	100%	100%	0%
Biology 10 – 100075937	2,669	85%	94%	9%
Biology 11 – 100075938	2,626	95%	98%	3%

Table 7.2: Validity Statistics for Spring 2014

Item	N-Count	IRR Plan	IRR Actual	Variance
Algebra I – 100076686	62,964	80%	85%	5%
English II – 100076788	61,632	80%	81%	1%
Biology 1 – 100089024	61,057	100%	100%	0%
Biology 2 – 100089025	61,000	100%	100%	0%
Biology 3 – 100089036	60,988	100%	100%	0%
Biology 4 – 100089027	61,004	100%	100%	0%
Biology 5 – 100089029	60,580	85%	100%	15%
Biology 6 – 100089030	60,871	80%	100%	20%
Biology 7 – 100089038	61,014	100%	100%	0%
Biology 8 – 100089040	60,915	100%	100%	0%
Biology 9 – 100089034	60,858	100%	100%	0%
Biology 10 – 100089033	60,633	95%	100%	5%
Biology 11 – 100089039	60,676	100%	100%	0%
Biology 12 – 100089035	60,511	95%	100%	5%
Biology 13 – 100089022	60,646	100%	100%	0%

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7.5.2.6 Validity as Review

Selected validity responses were annotated by the content staff and flagged for review. If a scorer incorrectly scored one of these responses, content staff would address this with the scorer. This feedback helped in preventing scorer drift. Once a scorer received a validity response, it was not re-administered.

7.5.2.7 Frequency Distribution

Frequency distribution, or the number or percentage of scores assigned at each score point of a rubric, was another key metric tracked and managed during scoring. Questar evaluated any anomalous scoring trends at the item and scorer level and intervened with the individuals involved. Frequency distribution reports showed a breakdown of score points assigned on a given item. Expressed in percentages, data in these reports showed how often scorers, individually and as a group, assigned each score point.

7.5.2.8 Retraining and Resetting Scores

Questar's electronic scoring system could purge the scores assigned by a scorer whose work was deemed substandard and allowed scoring leadership staff to reset scores by individual scorer, date range, or item. In those cases, the scores assigned by that individual would be cleared from the database and the affected responses would be reset. The responses would then be rerouted to qualified scorers and rescored according to the original scoring design. Questar has not had to use this process to-date during this project.

7.5.2.9 Reporting and Data Analysis

Questar's digital scoring system automatically captured and tracked all score data. By reviewing up-to-date scorer performance statistics, Questar could quickly identify particular scorers whose performance fell outside of group norms while also keeping close track of the group as a whole. Reports for use in quality monitoring and project completion status were generated and updated automatically and were available to Questar scoring leadership staff at any time via the digital scoring system. Questar's reports gave daily and cumulative statistics and provided individual and group average agreement percentages.

7.5.3 Description of the Item Types and Score Points for each Content Area

7.5.3.1 Summer 2013

English: English II was a descriptive essay prompt, with score points 1–4.

Algebra: Multi-part (3 sections) with a graphing task. 0–4 score points.

Biology:
Item 1 – Constructed response. 0–1 score points.
Item 2 – Constructed response. 0–1 score points.
Item 3 – Constructed response. 0–1 score points
Item 4 – Graphing task, extended response. 0–4 score points.
Item 5 – Constructed response. 0–2 score points.
Item 6 – Constructed response. 0–2 score points.
Item 7 – Constructed response. 0–2 score points.
Item 8 – Constructed response. 0–1 score points.

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Item 9 – Constructed response, 0–1 score points.
Item 10 – Constructed response, extended response. 0–3 score points.
Item 11 – Constructed response. 0–2 score points.

7.5.3.2 Fall 2013

English: English II was a descriptive essay prompt, with score points 1–4.

Algebra: Multi-part (6 sections) with a graphing task. 0–4 score points.

Biology:
Item 1 – Constructed response. 0–1 score points.
Item 2 – Constructed response. 0–1 score points.
Item 3 – Constructed response. 0–1 score points.
Item 4 – Graphing task, extended response. 0–4 score points.
Item 5 – Constructed response. 0–2 score points.
Item 6 – Constructed response. 0–2 score points.
Item 7 – Constructed response. 0–2 score points.
Item 8 – Constructed response. 0–1 score points.
Item 9 – Constructed response. 0–1 score points.
Item 10 – Constructed response, extended response 0–3 score points.
Item 11 – Constructed response. 0–2 score points.

7.5.3.3 Spring 2014

English: English II was a descriptive essay prompt, with score points 1–4.

Algebra: Multi-part (3 sections) with a graphing task. 0–4 score points

Biology:
Item 1 – Constructed response. 0–1 score points.
Item 2 – Constructed response. 0–1 score points.
Item 3 – Constructed response. 0–1 score points.
Item 4 – Constructed response. 0–1 score points.
Item 5 – Constructed response, extended item 0–3 score points
Item 6 – Graphing task, extended response. 0–4 score points.
Item 7 – Constructed response. 0–1 score points.
Item 8 – Constructed response. 0–1 score points.
Item 9 – Constructed response. 0–1 score points.
Item 10 – Constructed response. 0–2 score points.
Item 11 – Constructed response. 0–1 score points.
Item 12 – Constructed response. 0–2 score points.
Item 13 – Constructed response. 0–1 score points.

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Chapter 8: Scaling and Equating

8.1 Introduction

This chapter details the scaling and equating procedures implemented for the MO EOC Assessments. The equating methods described in this chapter serve to maintain consistency of the MO EOC Assessments score scales over time and ensure that the achievement levels are applied consistently from year to year. In the 2013–2014 testing year, previously administered test forms were re-used for most of the test forms and raw score to scale score conversions were already in existence. Post equating was conducted for English II for the Fall 2013 administraion, and pre-equating was conducted for some of the tests in Spring 2014. The scaling and equating procedures established for the program and documented in previous technical reports are included here, as they are important psychometric procedures for the MO EOC Assessments.

A pre-equating model (Kolen & Brennan, 2004) has been used to produce scoring conversions for each MO EOC Assessment since the establishment of the program. This chapter begins with a description of the item response theory (IRT) models used for equating, which is followed by an overview of the scaling and equating procedures for the operational assessments.

8.2 Item Response Theory

WINSTEPS software (Linacre, 2006b) was used to perform the scaling and equating for the MO EOC Assessments during the administrations with and without PEs. WINSTEPS is designed to produce a single scale by jointly analyzing data from students' responses to both SR items and PE/WPs. SR items were calibrated using the Rasch model (Rasch, 1960; Wright & Stone, 1979), while the partial credit model (Masters, 1982) was used to calibrate the PE/WPs.

Rasch scaling is "a method for obtaining objective, fundamental, linear measures from stochastic observations of ordered category responses" (Linacre, 2006a, p. 10). One feature of the Rasch model that distinguishes it from classical test theory is the placement of estimates of a person's ability and item difficulty on the same scale. The Rasch model expresses the probability of a correct response to an item as a function of the ability of the person and the difficulty of the item. In the Rasch model, the probability of a correct response to item *i*, given θ, is

$$P_i(\theta) = \frac{e^{(\theta - b_i)}}{1 + e^{(\theta - b_i)}},$$

where θ = latent trait, or ability, level and b_i= the difficulty parameter for item *i*.

Masters (1982) developed the partial credit model as an extension of the Rasch model to handle polytomous items, or items that allow for partially correct responses (e.g., open-ended items).

For an item with possible scores ranging from zero to *J*, the probability of obtaining score *j* on item *i*, given θ, is

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$$P_{ij}(\theta) = \frac{e^{\sum_{k=0}^{j}(\theta - d_{ik})}}{\sum_{x=0}^{J} e^{\sum_{k=0}^{j}(\theta - d_{ik})}},$$

where d_{ij} is the difference between the overall item difficulty, b_i, and the step parameter γ_{ij} for level j of item i, and the sum of step parameters is zero across all levels of item i.

8.3 Scaling and Equating

IRT pre-equating involves scaling item parameters and equating test forms based on field-test data before the forms are administered operationally. Note, however, that for the 2008–2009 year the forms were pre-equated retroactively (after the Spring 2009 operational administration) to allow for a one-time re-centering of the item pool using Spring 2009 operational data. The following approach was used for pre-equating these MO EOC Assessments:

1. Calibrate all 2008 standalone field-test forms concurrently without constraint.
2. Establish the base scale through calibration of the Spring 2009 operational forms without constraint.
3. Examine the stability of the common items from the two calibrations (i.e., the operational form items).
4. Re-center the 2008 item bank to the 2009 base scale.
5. Place the 2009 embedded field-test items onto the 2009 operational scale.
6. Perform fixed calibrations on the Summer 2009, Fall 2009, and Spring 2010 operational forms.
7. Place the 2010 embedded field-test items onto the 2009 operational scale.

Detailed procedures used for conducting scaling and equating are provided for the assessments that consist of SR items and PEs in the *2008–2009 MO EOC Phase I Technical Report* and the *2009–2010 MO EOC Phase I Technical Report*. Similarly, detailed procedures used for conducting scaling and equating are provided for the assessments that consist of SR items only in the *2009–2010 MO EOC Phase II Technical Report*.[14]

8.3.1 Scaling Transformations

Total scores for the MO EOC Assessments are reported in scale scores with a range of 100–250. A scale score of 200 represents the cut point between Basic and Proficient, and a scale score of 225 represents the cut point between Proficient and Advanced. The scale score ranges are displayed in Table 8.1.

[14] Missouri technical reports can be found online at http://dese.mo.gov/college-career-readiness/assessment/assessment-technical-support-materials.

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Table 8.1: Form: Scale Score Ranges for the MO EOC Assessment Achievement Levels

Assessment	Achievement Level	Scale Score Range
English II	Below Basic	100–179
	Basic	180–199
	Proficient	200–224
	Advanced	225–250
Algebra I	Below Basic	100–176
	Basic	177–199
	Proficient	200–224
	Advanced	225–250
Biology	Below Basic	100–176
	Basic	177–199
	Proficient	200–224
	Advanced	225–250
English I	Below Basic	100–176
	Basic	177–199
	Proficient	200–224
	Advanced	225–250
Algebra II	Below Basic	100–181
	Basic	182–199
	Proficient	200–224
	Advanced	225–250
Geometry	Below Basic	100–181
	Basic	182–199
	Proficient	200–224
	Advanced	225–250
Government	Below Basic	100–178
	Basic	179–199
	Proficient	200–224
	Advanced	225–250
Am. History	Below Basic	100–181
	Basic	182–199
	Proficient	200–224
	Advanced	225–250

According to the *2009–2010 MO EOC Phase I and Phase II Technical Reports*, the procedure used to transform raw scores to scale scores was described as the following:

To produce these scale score ranges, linear transformations were applied to theta estimates and scale scores. The following formula was used to obtain the slopes and intercepts for the transformation functions:

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$$sc(y) = \left[\frac{sc(y_2) - sc(y_1)}{\theta_2 - \theta_1}\right] y + \left\{(sc(y_1) - \left[\frac{sc(y_2) - sc(y_1)}{\theta_2 - \theta_1}\right]\theta_1\right\},$$

where θ_1 and θ_2 are person parameter estimates that correspond to the cut score points, and $sc(y_1)$ and $sc(y_2)$ are scale score points. This formula was adapted from Kolen and Brennan (2004, p. 337). For both the Spring 2009 base scale for English II, Algebra I, and Biology and the Spring 2010 base scale for English I, Algebra II, Geometry, Government, and American History, sc(y1) was 200 and sc(y2) was 225. Slopes and intercepts of the transformation functions are summarized in Table 8.2. These same slopes and intercepts will be applied to all future forms for each content area.

Table 8.2: Summary of Slopes and Intercepts of Theta to Scale Score Transformation Functions by Content Area[15]

Content Area	Basic			Proficient			Advanced			Slope	Intercept
	Raw Score	Theta	Scale Score	Raw Score	Theta	Scale Score	Raw Score	Theta	Scale Score		
English II	15	-0.71	180	24	0.51	200	33	2.04	225	16.35	191.72
Algebra I	13	-0.80	177	22	0.36	200	31	1.61	225	19.96	192.83
Biology	18	-0.69	177	32	0.51	200	45	1.79	225	19.53	189.99
English I	16	-0.44	177	25	0.58	200	33	1.70	225	22.24	187.17
Algebra II	16	-0.45	182	24	0.46	200	33	1.71	225	20.06	190.76
Geometry	17	-0.36	182	24	0.47	200	32	1.60	225	22.12	189.57
Government	15	-0.56	179	25	0.56	200	34	1.86	225	19.11	189.37
Am. History	19	-0.11	182	25	0.56	200	32	1.49	225	26.64	185.19

In addition to the above scaling transformation, the following rules were also applied:

- The raw score cut (e.g., for Proficient) was selected as the lowest raw score associated with a rounded scale score of 200. The same strategy was also followed for a scale score of 225.
- If there was no raw score associated with a rounded scale score of 200, the raw score with the highest scale score below 200 was selected as the cut score and assigned a scale score of 200. For example, if two consecutive raw scores were associated with rounded scale scores of 198 and 201, the scale score of 198 was moved up to 200. The same strategy was also followed for a scale score of 225.
- Scale scores below 100 were rounded up to 100.
- Scale scores above 250 were rounded down to 250.
- For each test, for a perfect raw score, the scale score was set to 250.

[15] Scaling transformations were adjusted when PEs were removed (see p. 113 of the *2010–2011 MO EOC Phase I Technical Report*). These transformations are irrelevant in 2012–2013 since PEs were restored to the tests. Therefore, original transformations for these tests were used as documented in the *2008–2009 MO EOC Phase I Technical Report* and the *2009–2010 MO EOC Phase I Technical Report*, found online at http://dese.mo.gov/college-career-readiness/assessment/assessment-technical-support-materials.

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8.3.2 Post-equating of English II

The scheduled Fall 2013 general form of the English II Assessment was previously administered in Summer 2010 with only SR items. The WP was added to the form for the Fall 2013 administration where the WP, with a missing parameter estimation from field testing, was used operationally for the first time. In order to provide accurate scale scores and achievement level designations for students completing the English II Assessment in Fall 2013, post-equating was conducted using the operational data.

8.3.2.1 Equating Sample

The equating sample was selected using the following criteria:

1. Include only students who took the general form, which was also the online test form.
2. Include the cases that met the completion criteria for both the SR session and the WP. A student met the completion criterion if he or she started the test.
3. Exclude students who took the test on tablets or Chromebook on either of the sessions. Since tablets and Chromebooks were introduced for the SR session starting with Summer 2013 and for the WP starting with Fall 2013, comparability analyses using these devices could not be conducted due to small n-count at the time of equating.

The final equating sample included 2,855 students.

8.3.2.2 Equating Procedure

The equating procedure for the English II Assessment was conducted following the technical procedures that were previously used and documented in the MO EOC technical reports. Specifically, fixed calibration was conducted in WINSTEPS, with the SR items fixed to their bank value and used as linking items. The stability of the obtained SR item parameters was compared to the item bank values using the displacement criterion. Displacement is a statistic generated in WINSTEPS that captures the difference, or drift, between the anchored value and the value obtained from free (unanchored) estimation using the current data. According to the *2008–2009 MO EOC Phase I Technical Report* (pp. 129–130), a displacement value of .30 logits was used as the criterion to evaluate stability of item parameters. An anchored item with a displacement value that exceeded |.30| logits was removed from anchoring.

Detailed calibration and equating procedures are described below:

1. Conduct fixed calibration using the Fall 2013 data with all SR items fixed to their item bank value.
2. Examine item stability using displacement statistics. Items with a displacement value that exceeds |.30| logits will be removed from anchoring.
3. Conduct another fixed calibration with the unstable items free to be estimated and re-evaluate stability of the anchored items. The process will be repeated until no displacement values exceed |.30| logits.
4. Create the raw score to scale score conversion by applying the transformation constants to the obtained raw-to-theta relationship from the final run. Table 8.27 is a screenshot of the transformation constants for the Phase I assessments that include English II as specified in the *2008–2009 MO EOC Phase I Technical Repor*t.

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Table 8.3: Theta to Scale Score Transformation Function for English II from the *2008–2009 MO EOC Phase I Technical Report* (p.129)

Content Area	Basic			Proficient			Advanced			Slope	Intercept
	Raw Score	Theta	Scale Score	Raw Score	Theta	Scale Score	Raw Score	Theta	Scale Score		
English II	15	-0.71	180	24	0.51	200	33	2.04	225	16.35	191.72

5. Apply the rules specified in the *2008–2009 MO EOC Phase I Technical Report* (p.129) to determine achievement levels. The rules are:

    - The raw score cut (e.g., for Proficient) was selected as the lowest raw score associated with a rounded scale score of 200. The same strategy was also followed for a scale score of 225.
    - If no raw score was associated with a rounded scale score of 200, the raw score with the highest scale score below 200 was selected as the cut score and assigned a scale score of 200. For example, if two consecutive raw scores were associated with rounded scale scores of 198 and 201, the scale score of 198 was moved up to 200. The same strategy was also followed for a scale score of 225.
    - Scale scores below 100 were rounded up to 100.
    - Scale scores above 250 were rounded down to 250.
    - For each test, for a perfect raw score, the scale score was set to 250.

8.3.2.3 Equating Results

The English II assessment consisted of 35 SR items and one WP. In the first run, all of the SR items were fixed to their bank value. The results show that 20 items had a displacement value that exceeded |.30| logits. Using the displacement criterion, these items were removed from the linking set in the next run. Therefore, in the second run, the linking set consisted of 15 SR items with stable statistics. In this run, none of the items was found to fall outside |.30| logits. The obtained raw-to-theta relationship from this run was used to generate the raw-to-scale score conversion by applying the linking constants provided in Table 8.27 and the cut score rules. The final scoring table, with conditional standard error of measurement (CSEM) and achievement level, is provided in Table 8.11.

Questar's equating process constitutes equating performed independently by two psychometricians. Matching results were obtained from the two independent equatings.

8.3.3 Pre-equating

For the Spring 2014 test administration, the forms originally scheduled for English II, Algebra I, and Biology consisted of only SR items. Therefore, PE/WPs were added to these forms using Form A as the target. The test characteristic curves (TCCs) of these forms with PE/WPs and the target forms are presented in Figures 8.1 to 8.3. Pre-equating was conducted to produce the raw-to-scale score conversion tables.

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Figure 8.1: English II TCC

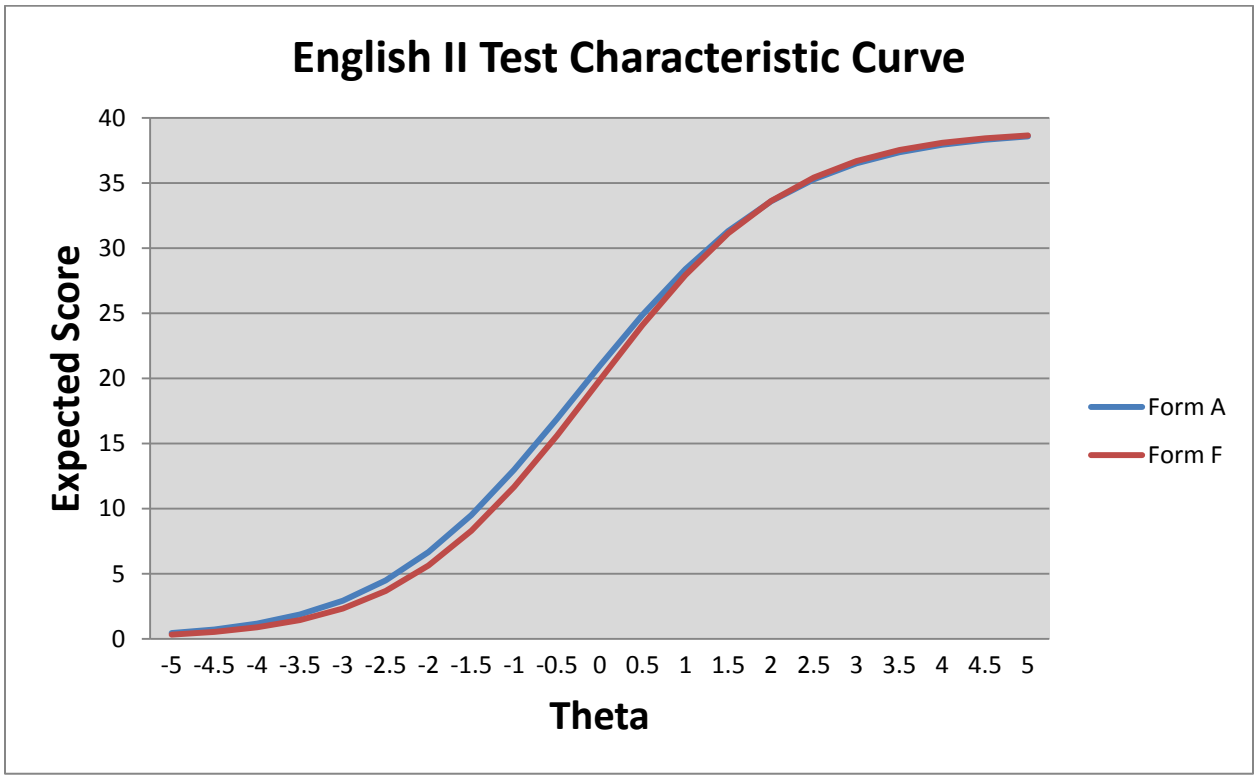

Figure 8.2: Algebra I TCC

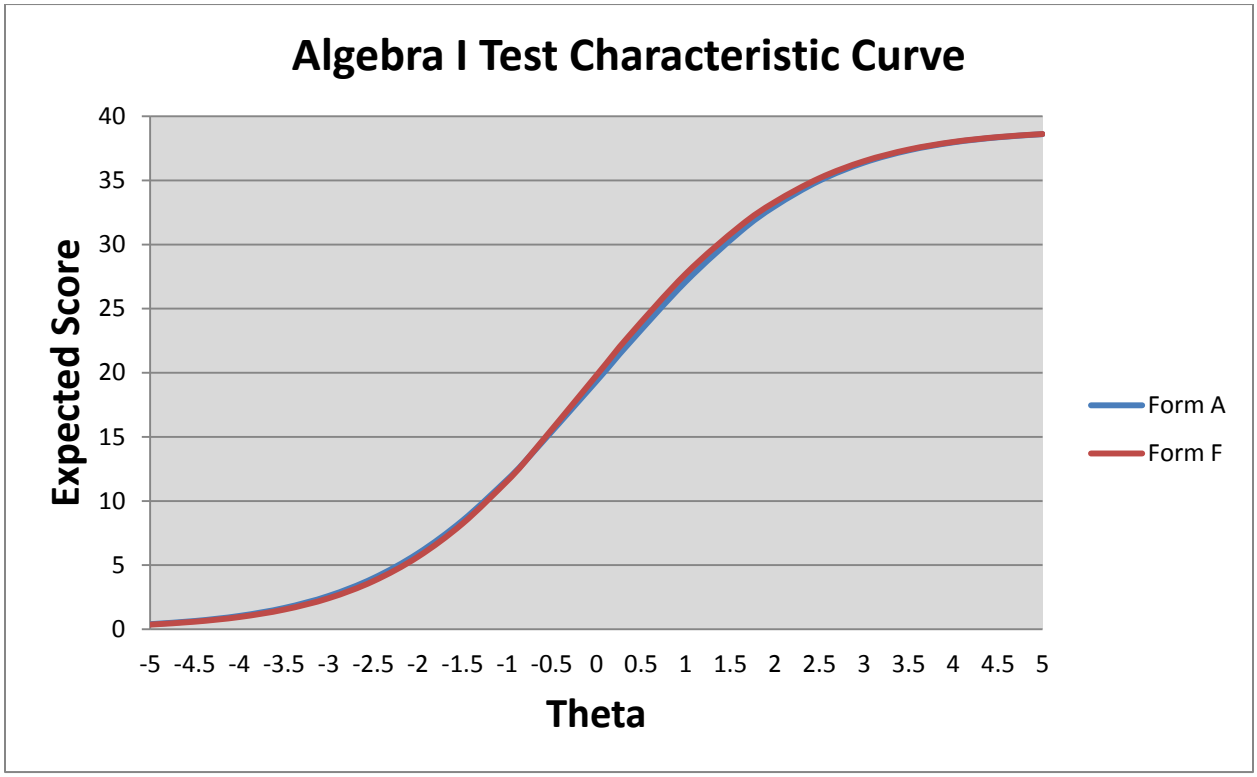

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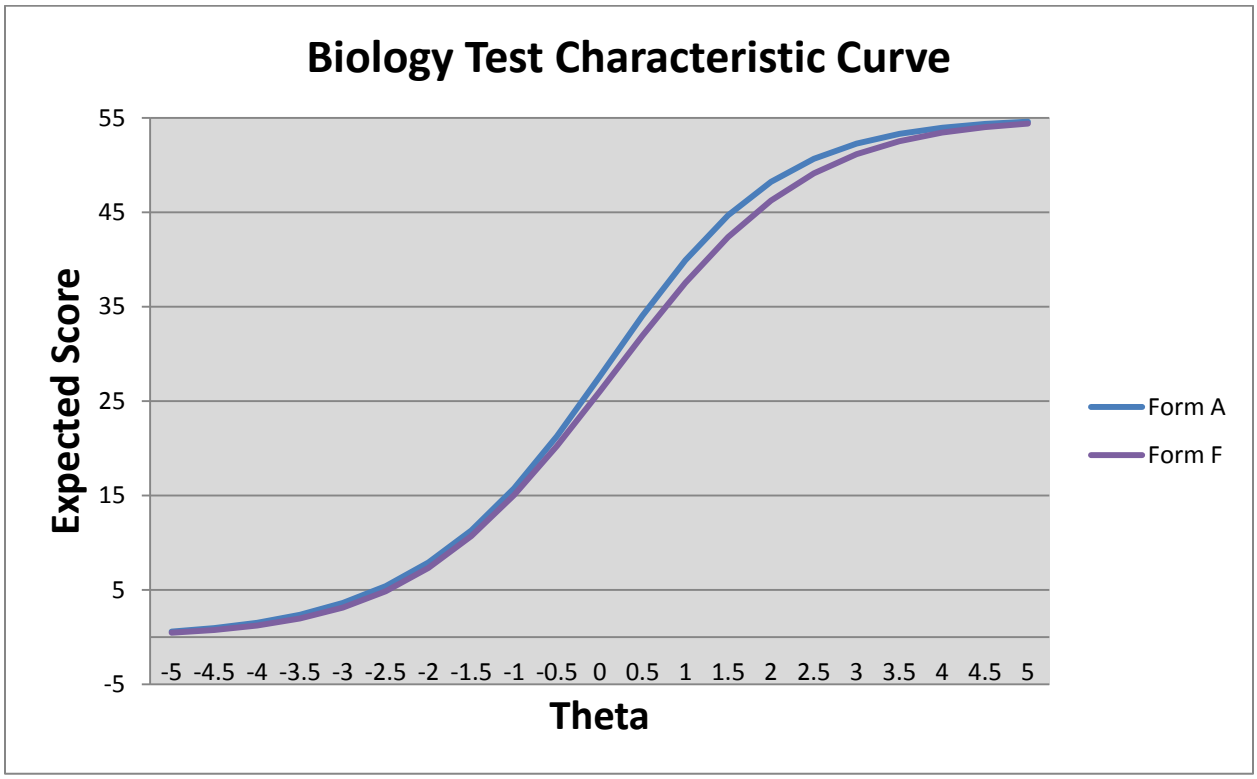
Figure 8.3: Biology TCC



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8.3.4 Raw Score to Scale Score Conversions

Tables 8.3 to 8.26 provide the raw score to scale score conversions for Summer 2013, Fall 2013, and Spring 2014.

Table 8.4: Raw Score to Scale Score Conversions for Summer 2013, English II

Raw Score	Scale Score	*CSEM*
0	100	30
1	105	30
2	125	17
3	137	12
4	145	10
5	150	9
6	155	8
7	158	8
8	162	7
9	165	7
10	168	7
11	171	7
12	173	6
13	176	6
14	178	6
15	180	6
16	182	6
17	185	6
18	187	6
19	189	6
20	191	6
21	193	6
22	196	6
23	198	6
24	200	6
25	202	6
26	205	6
27	207	6
28	210	7
29	212	7
30	215	7
31	218	7
32	221	7
33	225	8
34	229	8
35	234	9
36	240	10
37	248	12
38	250	17
39	250	30

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Table 8.5: Raw Score to Scale Score Conversions for Summer 2013, Algebra I

Raw Score	Scale Score	*CSEM*
0	100	37
1	111	21
2	126	15
3	136	13
4	143	11
5	148	10
6	153	9
7	157	9
8	161	9
9	165	8
10	168	8
11	171	8
12	174	8
13	177	7
14	180	7
15	182	7
16	185	7
17	187	7
18	190	7
19	192	7
20	195	7
21	197	7
22	200	7
23	203	7
24	205	7
25	208	7
26	210	7
27	213	7
28	216	8
29	219	8
30	222	8
31	225	8
32	229	9
33	232	9
34	237	10
35	242	11
36	249	12
37	250	15
38	250	21
39	250	37

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Table 8.6: Raw Score to Scale Score Conversions for Summer 2013, Biology

Raw Score	Scale Score	*CSEM*
0	100	36
1	107	20
2	121	14
3	130	12
4	137	11
5	142	10
6	146	9
7	150	8
8	153	8
9	156	8
10	159	7
11	162	7
12	164	7
13	166	7
14	169	6
15	171	6
16	173	6
17	175	6
18	177	6
19	178	6
20	180	6
21	182	6
22	184	6
23	185	6
24	187	6
25	189	6
26	190	6
27	192	6
28	193	6
29	195	6
30	197	6
31	198	6
32	200	6
33	202	6
34	203	6
35	205	6
36	207	6
37	208	6
38	210	6
39	212	6
40	214	6
41	216	6

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Raw Score	Scale Score	*CSEM*
42	218	6
43	220	7
44	223	7
45	225	7
46	228	7
47	231	8
48	234	8
49	238	9
50	242	9
51	247	10
52	250	12
53	250	14
54	250	20
55	250	36

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Table 8.7: Raw Score to Scale Score Conversions for Summer 2013, English I

Raw Score	Scale Score	*CSEM*
0	100	41
1	100	23
2	116	16
3	126	14
4	133	12
5	139	11
6	144	10
7	149	10
8	153	9
9	156	9
10	160	9
11	163	8
12	166	8
13	169	8
14	172	8
15	174	8
16	177	8
17	180	8
18	182	8
19	185	8
20	187	7
21	190	8
22	192	8
23	195	8
24	198	8
25	200	8
26	203	8
27	206	8
28	209	8
29	212	8
30	215	9
31	218	9
32	225	9
33	226	10
34	230	10
35	235	11
36	241	12
37	249	14
38	250	16
39	250	23
40	250	41

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Table 8.8: Raw Score to Scale Score Conversions for Summer 2013, Algebra II

Raw Score	Scale Score	*CSEM*
0	100	37
1	111	21
2	126	15
3	135	12
4	142	11
5	148	10
6	152	9
7	156	9
8	160	8
9	163	8
10	167	8
11	169	8
12	172	7
13	175	7
14	178	7
15	182	7
16	183	7
17	185	7
18	187	7
19	190	7
20	192	7
21	194	7
22	197	7
23	200	7
24	201	7
25	204	7
26	206	7
27	209	7
28	211	7
29	214	7
30	217	8
31	220	8
32	225	8
33	227	9
34	231	9
35	235	10
36	241	11
37	247	12
38	250	15
39	250	20
40	250	37

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Table 8.9: Raw Score to Scale Score Conversions for Summer 2013, Geometry

Raw Score	Scale Score	*CSEM*
0	100	41
1	101	23
2	117	16
3	127	14
4	135	12
5	141	11
6	146	10
7	150	10
8	154	9
9	158	9
10	161	9
11	164	8
12	168	8
13	171	8
14	173	8
15	176	8
16	179	8
17	182	8
18	184	8
19	187	8
20	189	8
21	192	8
22	195	8
23	197	8
24	200	8
25	203	8
26	206	8
27	208	8
28	211	8
29	215	8
30	218	9
31	221	9
32	225	9
33	229	10
34	234	10
35	239	11
36	245	12
37	250	14
38	250	16
39	250	23
40	250	41

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Table 8.10: Raw Score to Scale Score Conversions for Summer 2013, Government

Raw Score	Scale Score	*CSEM*
0	100	35
1	113	20
2	127	14
3	136	12
4	142	10
5	147	9
6	151	9
7	155	8
8	159	8
9	162	8
10	165	7
11	168	7
12	170	7
13	173	7
14	175	7
15	179	7
16	180	7
17	182	7
18	185	7
19	187	7
20	189	7
21	191	7
22	194	7
23	196	7
24	200	7
25	201	7
26	203	7
27	206	7
28	208	7
29	211	7
30	214	7
31	217	8
32	220	8
33	225	8
34	228	9
35	232	10
36	237	10
37	244	12
38	250	14
39	250	20
40	250	35

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Table 8.11: Raw Score to Scale Score Conversions for Summer 2013, Am. History

Raw Score	Scale Score	*CSEM*
0	100	49
1	100	27
2	100	20
3	112	16
4	120	14
5	128	13
6	134	12
7	139	12
8	144	11
9	148	11
10	152	10
11	156	10
12	160	10
13	163	10
14	166	9
15	170	9
16	173	9
17	176	9
18	179	9
19	182	9
20	185	9
21	188	9
22	191	9
23	194	9
24	200	9
25	201	9
26	204	9
27	207	10
28	211	10
29	214	10
30	218	10
31	225	11
32	227	11
33	231	12
34	237	12
35	243	13
36	250	14
37	250	16
38	250	20
39	250	27
40	250	49

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Table 8.12: Raw Score to Scale Score Conversions for Fall 2013, English II

Raw Score	Scale Score	*CSEM*
0	106	30
1	126	17
2	139	12
3	147	10
4	152	9
5	157	8
6	161	8
7	164	7
8	167	7
9	170	7
10	172	6
11	175	6
12	177	6
13	180	6
14	181	6
15	183	6
16	185	6
17	187	6
18	189	6
19	191	6
20	193	6
21	195	6
22	197	6
23	200	6
24	201	6
25	203	6
26	205	6
27	207	6
28	209	6
29	212	6
30	214	7
31	217	7
32	220	7
33	225	8
34	227	8
35	231	9
36	237	10
37	244	12
38	250	17
39	250	30

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Table 8.13: Raw Score to Scale Score Conversions for Fall 2013, Algebra I

Raw Score	Scale Score	*CSEM*
0	100	37
1	110	21
2	125	15
3	134	13
4	141	11
5	147	10
6	152	10
7	157	9
8	161	9
9	164	8
10	168	8
11	171	8
12	174	8
13	177	8
14	180	8
15	183	8
16	186	7
17	189	7
18	192	7
19	194	7
20	197	7
21	200	7
22	202	7
23	205	7
24	208	7
25	210	7
26	213	7
27	216	8
28	219	8
29	222	8
30	225	8
31	229	8
32	232	9
33	236	9
34	241	10
35	247	11
36	250	12
37	250	15
38	250	21
39	250	37

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Table 8.14: Raw Score to Scale Score Conversions for Fall 2013, Biology

Raw Score	Scale Score	*CSEM*
0	100	36
1	107	20
2	121	14
3	130	12
4	137	11
5	142	10
6	146	9
7	150	8
8	153	8
9	156	8
10	159	7
11	162	7
12	164	7
13	166	7
14	169	6
15	171	6
16	173	6
17	175	6
18	177	6
19	178	6
20	180	6
21	182	6
22	184	6
23	185	6
24	187	6
25	189	6
26	190	6
27	192	6
28	193	6
29	195	6
30	197	6
31	198	6
32	200	6
33	202	6
34	203	6
35	205	6
36	207	6
37	208	6
38	210	6
39	212	6
40	214	6
41	216	6

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Raw Score	Scale Score	*CSEM*
42	218	6
43	220	7
44	223	7
45	225	7
46	228	7
47	231	8
48	234	8
49	238	9
50	242	9
51	247	10
52	250	12
53	250	14
54	250	20
55	250	36

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Table 8.15: Raw Score to Scale Score Conversions for Fall 2013, English I

Raw Score	Scale Score	*CSEM*
0	100	41
1	100	23
2	115	17
3	125	14
4	133	12
5	139	11
6	144	10
7	149	10
8	153	9
9	157	9
10	161	9
11	164	9
12	167	8
13	170	8
14	173	8
15	177	8
16	179	8
17	182	8
18	184	8
19	187	8
20	190	8
21	192	8
22	195	8
23	198	8
24	200	8
25	203	8
26	206	8
27	209	8
28	212	8
29	215	8
30	218	9
31	221	9
32	225	9
33	229	10
34	234	10
35	239	11
36	245	12
37	250	14
38	250	16
39	250	23
40	250	41

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Table 8.16: Raw Score to Scale Score Conversions for Fall 2013, Algebra II

Raw Score	Scale Score	*CSEM*
0	100	37
1	118	20
2	132	15
3	141	12
4	148	11
5	153	10
6	157	9
7	161	9
8	164	8
9	168	8
10	171	8
11	173	7
12	176	7
13	178	7
14	182	7
15	183	7
16	185	7
17	188	7
18	190	7
19	192	7
20	194	7
21	196	7
22	200	7
23	201	7
24	203	7
25	205	7
26	208	7
27	210	7
28	213	7
29	215	7
30	218	8
31	221	8
32	225	8
33	228	9
34	231	9
35	236	10
36	241	11
37	248	12
38	250	15
39	250	20
40	250	37

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Table 8.17: Raw Score to Scale Score Conversions for Fall 2013, Geometry

Raw Score	Scale Score	*CSEM*
0	100	41
1	103	23
2	119	16
3	129	14
4	137	12
5	142	11
6	147	10
7	152	10
8	156	9
9	159	9
10	163	8
11	166	8
12	169	8
13	171	8
14	174	8
15	177	8
16	179	7
17	182	7
18	184	7
19	187	7
20	189	7
21	192	7
22	194	7
23	196	7
24	200	7
25	201	8
26	204	8
27	207	8
28	209	8
29	212	8
30	215	8
31	219	9
32	225	9
33	226	9
34	230	10
35	235	11
36	241	12
37	248	13
38	250	16
39	250	22
40	250	41

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Table 8.18: Raw Score to Scale Score Conversions for Fall 2013, Government

Raw Score	Scale Score	*CSEM*
0	100	35
1	117	19
2	131	14
3	139	12
4	145	10
5	150	9
6	154	9
7	158	8
8	161	8
9	164	7
10	167	7
11	170	7
12	172	7
13	175	7
14	177	7
15	179	6
16	181	6
17	183	6
18	185	6
19	187	6
20	189	6
21	191	6
22	193	6
23	195	6
24	197	6
25	200	6
26	202	7
27	204	7
28	206	7
29	209	7
30	211	7
31	214	7
32	217	8
33	220	8
34	225	9
35	228	9
36	233	10
37	239	12
38	248	14
39	250	19
40	250	35

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Table 8.19: Raw Score to Scale Score Conversions for Fall 2013, Am. History

Raw Score	Scale Score	*CSEM*
0	100	49
1	100	27
2	105	19
3	117	16
4	125	14
5	132	13
6	138	12
7	143	11
8	148	11
9	152	10
10	156	10
11	160	10
12	163	10
13	166	9
14	170	9
15	173	9
16	176	9
17	179	9
18	182	9
19	185	9
20	187	9
21	190	9
22	193	9
23	196	9
24	200	9
25	202	9
26	205	9
27	209	9
28	212	10
29	216	10
30	219	10
31	225	10
32	227	11
33	232	11
34	237	12
35	243	13
36	250	14
37	250	16
38	250	20
39	250	27
40	250	49

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Table 8.20: Raw Score to Scale Score Conversions for Spring 2014, English II

Raw Score	Scale Score	*CSEM*
0	108	30
1	128	17
2	140	12
3	147	10
4	152	9
5	157	8
6	160	7
7	163	7
8	166	7
9	169	6
10	172	6
11	174	6
12	176	6
13	178	6
14	180	6
15	182	6
16	184	6
17	186	6
18	188	6
19	190	6
20	192	6
21	194	6
22	196	6
23	198	6
24	200	6
25	202	6
26	204	6
27	206	6
28	208	6
29	211	6
30	213	7
31	216	7
32	219	7
33	225	8
34	226	8
35	230	9
36	236	10
37	243	12
38	250	17
39	250	30

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Table 8.21: Raw Score to Scale Score Conversions for Spring 2014, Algebra I

Raw Score	Scale Score	*CSEM*
0	100	37
1	114	20
2	129	15
3	138	12
4	144	11
5	150	10
6	154	9
7	158	9
8	162	8
9	165	8
10	168	8
11	171	7
12	174	7
13	177	7
14	179	7
15	182	7
16	184	7
17	186	7
18	189	7
19	191	7
20	193	7
21	196	7
22	198	7
23	200	7
24	203	7
25	205	7
26	208	7
27	211	7
28	214	8
29	217	8
30	220	8
31	225	8
32	227	9
33	231	9
34	236	10
35	242	11
36	248	12
37	250	15
38	250	21
39	250	37

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Table 8.22: Raw Score to Scale Score Conversions for Spring 2014, Biology

Raw Score	Scale Score	*CSEM*
0	100	36
1	108	20
2	122	14
3	130	12
4	137	10
5	142	9
6	146	9
7	150	8
8	153	8
9	156	7
10	159	7
11	161	7
12	164	7
13	166	7
14	168	6
15	170	6
16	172	6
17	174	6
18	177	6
19	178	6
20	180	6
21	182	6
22	183	6
23	185	6
24	187	6
25	188	6
26	190	6
27	192	6
28	193	6
29	195	6
30	197	6
31	198	6
32	200	6
33	202	6
34	203	6
35	205	6
36	207	6
37	209	6
38	210	6
39	212	6
40	214	6
41	216	6

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Raw Score	Scale Score	*CSEM*
42	218	7
43	221	7
44	225	7
45	226	7
46	228	7
47	231	8
48	235	8
49	238	9
50	243	9
51	248	10
52	250	12
53	250	14
54	250	20
55	250	36

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Table 8.23: Raw Score to Scale Score Conversions for Spring 2014, English I

Raw Score	Scale Score	*CSEM*
0	100	41
1	101	23
2	118	16
3	128	14
4	135	12
5	141	11
6	146	10
7	151	10
8	155	9
9	159	9
10	162	9
11	165	8
12	168	8
13	171	8
14	174	8
15	177	8
16	179	8
17	182	8
18	185	8
19	187	8
20	190	7
21	192	7
22	195	8
23	197	8
24	200	8
25	202	8
26	205	8
27	208	8
28	211	8
29	214	8
30	217	8
31	220	9
32	225	9
33	228	10
34	232	10
35	237	11
36	243	12
37	250	14
38	250	16
39	250	23
40	250	41

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Table 8.24: Raw Score to Scale Score Conversions for Spring 2014, Algebra II

Raw Score	Scale Score	*CSEM*
0	100	37
1	117	20
2	132	15
3	140	12
4	147	11
5	152	10
6	157	9
7	160	9
8	164	8
9	167	8
10	170	8
11	173	7
12	175	7
13	178	7
14	182	7
15	183	7
16	185	7
17	187	7
18	189	7
19	192	7
20	194	7
21	196	7
22	198	7
23	200	7
24	203	7
25	205	7
26	207	7
27	210	7
28	212	7
29	215	7
30	218	8
31	221	8
32	225	8
33	227	9
34	231	9
35	236	10
36	241	11
37	247	12
38	250	15
39	250	20
40	250	37

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Table 8.25: Raw Score to Scale Score Conversions for Spring 2014, Geometry

Raw Score	Scale Score	*CSEM*
0	100	41
1	106	23
2	122	16
3	132	13
4	139	12
5	145	11
6	150	10
7	154	9
8	158	9
9	161	9
10	165	8
11	168	8
12	171	8
13	173	8
14	176	8
15	179	8
16	182	7
17	184	7
18	186	7
19	188	7
20	191	7
21	193	7
22	196	7
23	200	7
24	201	7
25	203	7
26	206	8
27	208	8
28	211	8
29	214	8
30	217	8
31	220	9
32	225	9
33	228	9
34	232	10
35	237	11
36	242	12
37	250	13
38	250	16
39	250	22
40	250	41

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Table 8.26: Raw Score to Scale Score Conversions for Spring 2014, Government

Raw Score	Scale Score	*CSEM*
0	100	35
1	114	19
2	128	14
3	137	12
4	143	10
5	148	9
6	152	9
7	156	8
8	159	8
9	162	7
10	165	7
11	168	7
12	170	7
13	173	7
14	175	7
15	177	6
16	179	6
17	181	6
18	184	6
19	186	6
20	188	6
21	190	6
22	192	6
23	194	6
24	196	6
25	200	7
26	201	7
27	203	7
28	205	7
29	208	7
30	210	7
31	213	7
32	216	8
33	220	8
34	225	9
35	228	9
36	233	10
37	239	12
38	247	14
39	250	19
40	250	35

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Table 8.27: Raw Score to Scale Score Conversions for Spring 2014, Am. History

Raw Score	Scale Score	*CSEM*
0	100	49
1	100	27
2	102	20
3	114	16
4	123	14
5	130	13
6	136	12
7	142	12
8	146	11
9	151	11
10	155	10
11	159	10
12	162	10
13	166	10
14	169	9
15	173	9
16	176	9
17	179	9
18	182	9
19	185	9
20	188	9
21	191	9
22	194	9
23	197	9
24	200	9
25	203	9
26	206	9
27	210	9
28	213	10
29	217	10
30	221	10
31	225	11
32	229	11
33	234	11
34	239	12
35	245	13
36	250	14
37	250	16
38	250	20
39	250	27
40	250	49

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Chapter 9: Reporting

9.1 Introduction

The purpose of reporting assessment data is to communicate test results to students, parents, teachers, administrators, and other stakeholders. The MO EOC Assessment reports provide useful information for determining the performance of students in a particular district, school, or classroom. These reports help describe students' knowledge and skills with respect to a set of expectations, allowing educators to determine specific instructional needs, measure student mastery toward post-secondary readiness, provide evidence of accountability for Missouri and national programs, and evaluate educational programs. Additionally, districts may use locally designed assessments aligned to the Show-Me Standards and CLEs to provide more detailed information for each student in specific test areas.

Questar delivers a General Research File (GRF) to DESE at the end of each test administration that contains all of the raw data collected for each administration. In addition, Questar provides a Guide to Interpreting Results for DESE to post on their website that provides explanations of the CLEs and ALDs for each content area, as well as samples of the Individual Student Report (ISR) and the Student Score Label with descriptions of the information they contain. ISRs were provided in the online assessment platform for all assessment windows. Student Score Labels were provided in hard copy to districts following each administration.

For each testing event, Questar converted each student's raw score points earned into an EOC scale score, as described in Chapter 8 of this report. A student received an EOC scale score when he or she had made a valid attempt for the session. EOC scale scores range in value from 100 to 250. The EOC scale score determines the student's achievement level. For all content areas, a scale score of 200 to 224 is considered Proficient and a scale score of 225 and above is considered Advanced. Each achievement level represents standards of performance for each assessed content area: English II, Algebra I, Biology, English I, Algebra II, Geometry, Government, and American History. Achievement-level scores describe what students can do in terms of the content and skills assessed. These scores provide a way to compare test results with standards of academic performance. Panels drawn from Missouri's educational, business, and professional communities recommended the raw score cuts—based on field-test data from the 2008 field test for English II, Algebra I, and Biology and the 2009 field-test forms for English I, Algebra II, Geometry, Government, and American History—to be used for each achievement level. These cuts were then reviewed and adopted by the Missouri State Board of Education. For more information on how the achievement levels were set, refer to Chapter 3 of this report.

No test provides a perfect measure of a student's ability because all tests have a known standard error of measurement (SEM). The SEM represents the amount of variability that can be expected in a student's test score because of the inherent imprecision of the test. For example, if the student were tested again with a new test of comparable difficulty, he or she would likely obtain a slightly different score. The expected range for this new score is provided as a standard error (SE) and gives an indication of the margin of error for the reported scale score.

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9.2 Individual Student Report (ISR)

The 2013–2014 Individual Student Report (ISR) provides information about performance on the MO EOC Assessment, describing the results in terms of four levels of achievement in a content area. It is used for measuring an individual student's mastery toward post-secondary readiness for the content area. It is also used in instructional planning as a point of reference during parent-teacher conferences and for permanent recordkeeping. Teachers are informed that other sources of information should be used along with this report when determining the student's areas of strength or need.

On the report, achievement-level scores describe what students can do in terms of the CLEs for the content and skills assessed by the MO EOC Assessment. A student at the Proficient or Advanced level has met the standard.

A sample of the ISR appears in Figure 9.1. A brief description of selected parts of the report is as follows:

A. The heading of the ISR includes the content area for the results being presented. A separate report is produced for each content area tested.

B. The Student Information section contains the biographic data for the individual student taking the assessment. Identifying information, including the MOSIS ID, gender, building, and district, is listed, followed by the test period.

C. The individual student's results are presented numerically as a three-digit scale score with the SE. An accompanying bar graph to the right of the scale score illustrates the achievement level obtained by the student. Achievement levels (whether Below Basic, Basic, Proficient, or Advanced) are based on the scale score ranges listed beneath the Achievement Level heading in the table.

D. The mean scale scores for the student's building and district are displayed in the two rows below the student's individual results. The mean scale score, with an associated SE, and the bar graph provide a way to view the individual's results in contrast to the group's results for the content area during the same test period.

E. The narrative describes the student performance characteristics corresponding to the obtained achievement level. The text is specific to the content area tested. At the bottom of the narrative is a URL for a website that provides additional information for all of the achievement levels for the content area.

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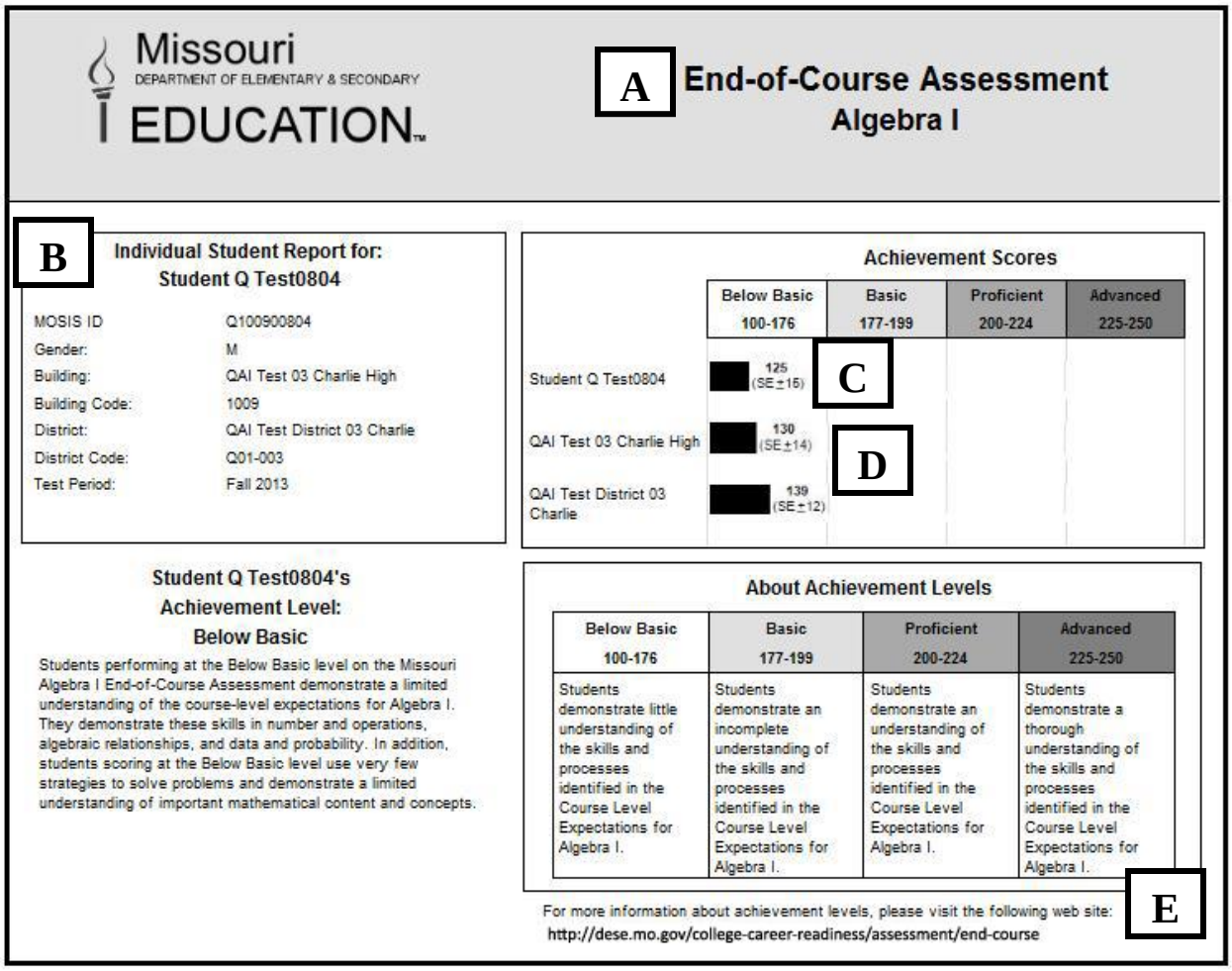
Figure 9.1: Individual Student Report (ISR)



Missouri DEPARTMENT OF ELEMENTARY & SECONDARY EDUCATION

A

End-of-Course Assessment
Algebra I

B

Individual Student Report for:
Student Q Test0804

MOSIS ID	Q100900804
Gender:	M
Building:	QAI Test 03 Charlie High
Building Code:	1009
District:	QAI Test District 03 Charlie
District Code:	Q01-003
Test Period:	Fall 2013

Achievement Scores

	Below Basic 100-176	Basic 177-199	Proficient 200-224	Advanced 225-250
Student Q Test0804	125 (SE±16)			
QAI Test 03 Charlie High	130 (SE±14)			
QAI Test District 03 Charlie	139 (SE±12)			

C

D

Student Q Test0804's
Achievement Level:
Below Basic

Students performing at the Below Basic level on the Missouri Algebra I End-of-Course Assessment demonstrate a limited understanding of the course-level expectations for Algebra I. They demonstrate these skills in number and operations, algebraic relationships, and data and probability. In addition, students scoring at the Below Basic level use very few strategies to solve problems and demonstrate a limited understanding of important mathematical content and concepts.

About Achievement Levels

Below Basic 100-176	Basic 177-199	Proficient 200-224	Advanced 225-250
Students demonstrate little understanding of the skills and processes identified in the Course Level Expectations for Algebra I.	Students demonstrate an incomplete understanding of the skills and processes identified in the Course Level Expectations for Algebra I.	Students demonstrate an understanding of the skills and processes identified in the Course Level Expectations for Algebra I.	Students demonstrate a thorough understanding of the skills and processes identified in the Course Level Expectations for Algebra I.

For more information about achievement levels, please visit the following web site:
http://dese.mo.gov/college-career-readiness/assessment/end-course

E

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9.3 Student Score Label

The 2013–2014 Student Score Label provides a summary of a student's results on the MO EOC Assessment. A separate label is produced for each content area tested. The individual label provides the student's biographic data, scale score, and achievement level. The labels have adhesive backing so they can be easily transferred onto the student record folders.

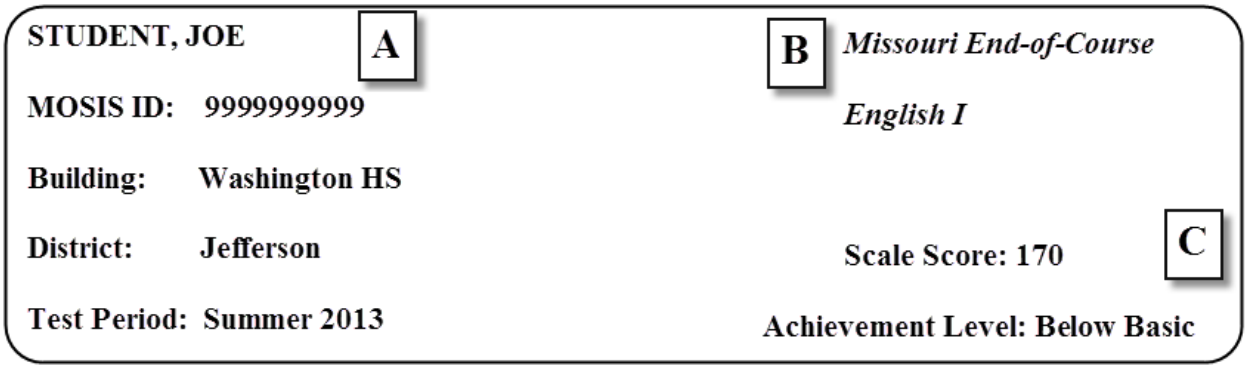
A sample label is shown in Figure 9.2. A brief description of selected parts of the label is as follows:

A. The left side of the label shows the student's name and identifying information.

B. The upper right side shows the content area tested. If a student has results for more than one content area, the next label is printed below the first one.

C. The lower right side shows the student's scale score and achievement level.

Figure 9.2: Student Score Label



9.4 Missouri Comprehensive Data System Portal

For the first two years of MO EOC Assessment administration, summary-level EOC results were available to school district personnel in a set of standard reporting configurations through the Department's Crystal Reporting system. Reporting options included administrative reports, adequate yearly progress (AYP) reports, achievement level reports, content standard reports, and item analysis reports. Beginning with the 2011–2012 school year, the Department transitioned all assessment reporting to the state's data portal, the Missouri Comprehensive Data System (MCDS). MCDS provides the general public with access to high-level EOC summary reports and allows school district personnel with appropriate permissions to access EOC data at a variety of levels. Through MCDS, designated district personnel are able to request on-demand, customized reports that are configured and disaggregated in ways that best meet their needs for such activities as evaluating programs, revising curriculum, and improving teaching and learning.

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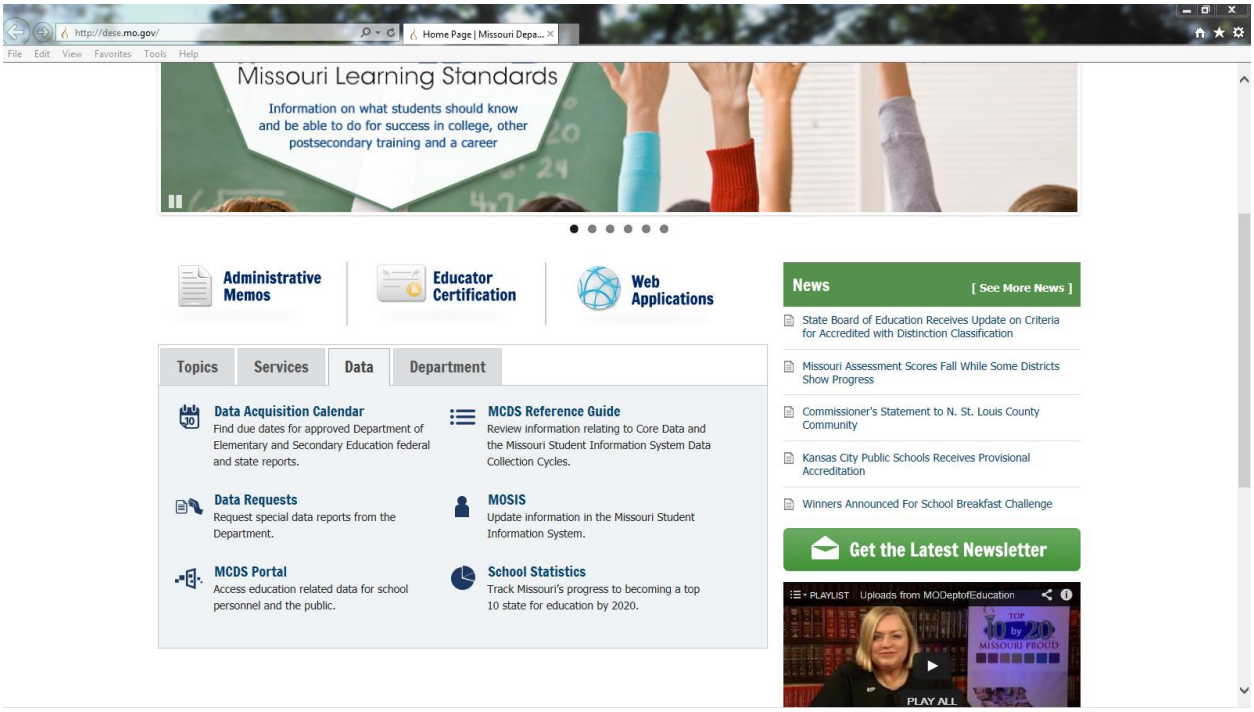
Users access MCDS from a link to the portal on the Department's homepage (http://dese.mo.gov/). From there, they access the data portal directly through the MCDS link.



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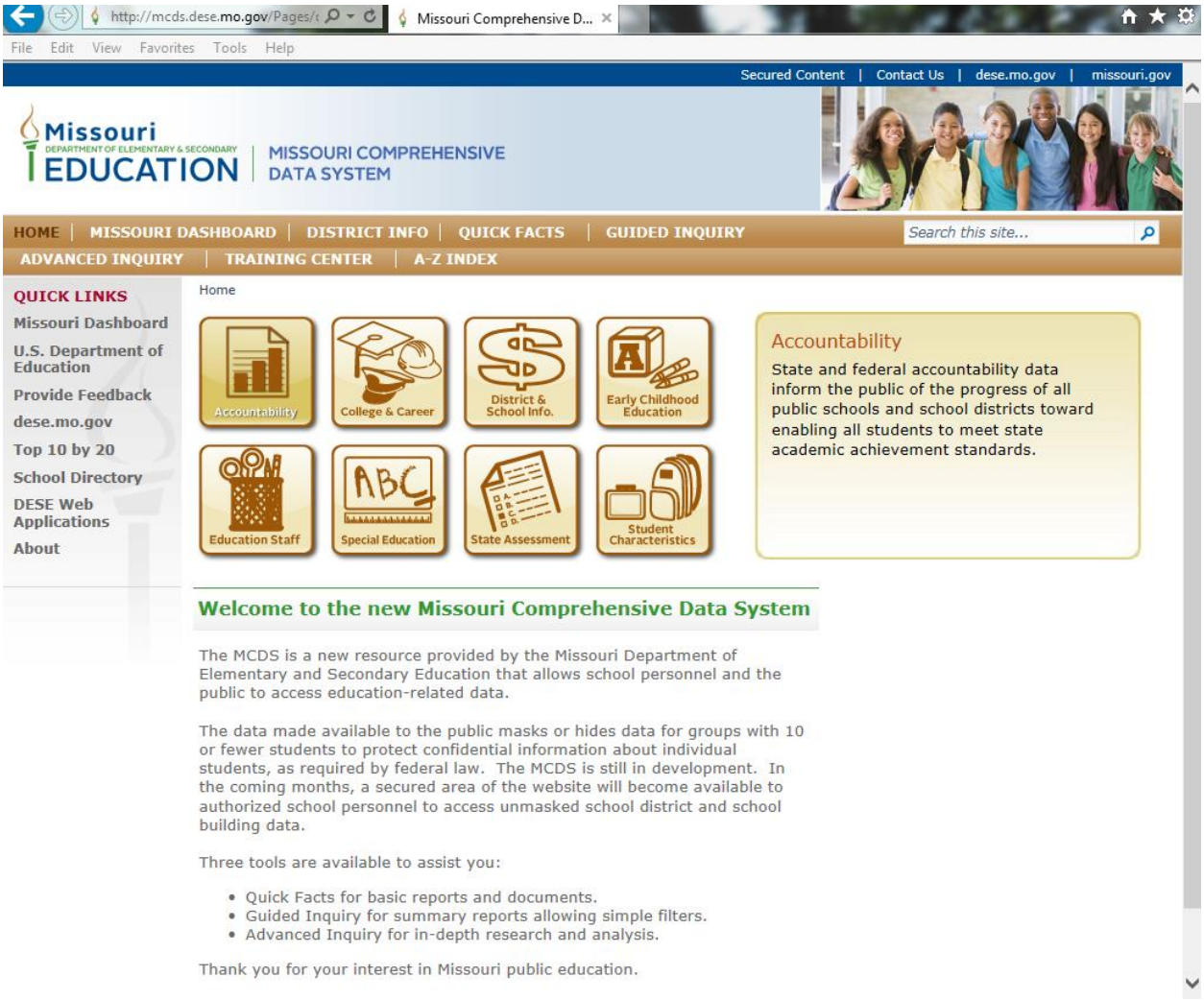
Secure content is available through a link at the top of the MCDS portal's homepage. District users with appropriate permissions can log in to access data. Once users have logged in, they are returned to the MCDS portal page where they can locate EOC data through the State Assessment link.



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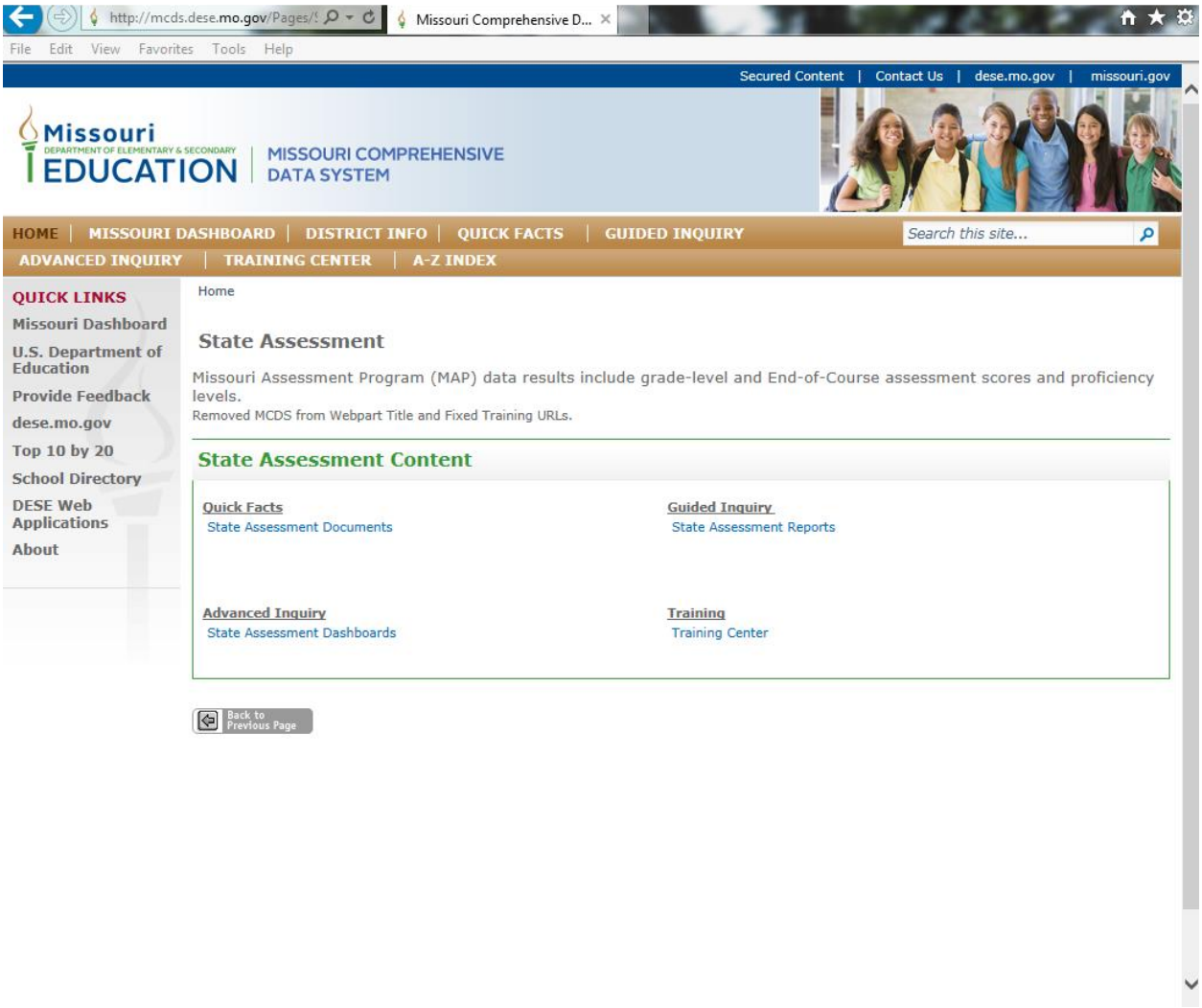
On the State Assessment page, a Guided Inquiry link allows users to create summary Administrative reports, Achievement Level reports, and historical AYP reports. Authenticated users can also download student-level data from the Guided Inquiry link.



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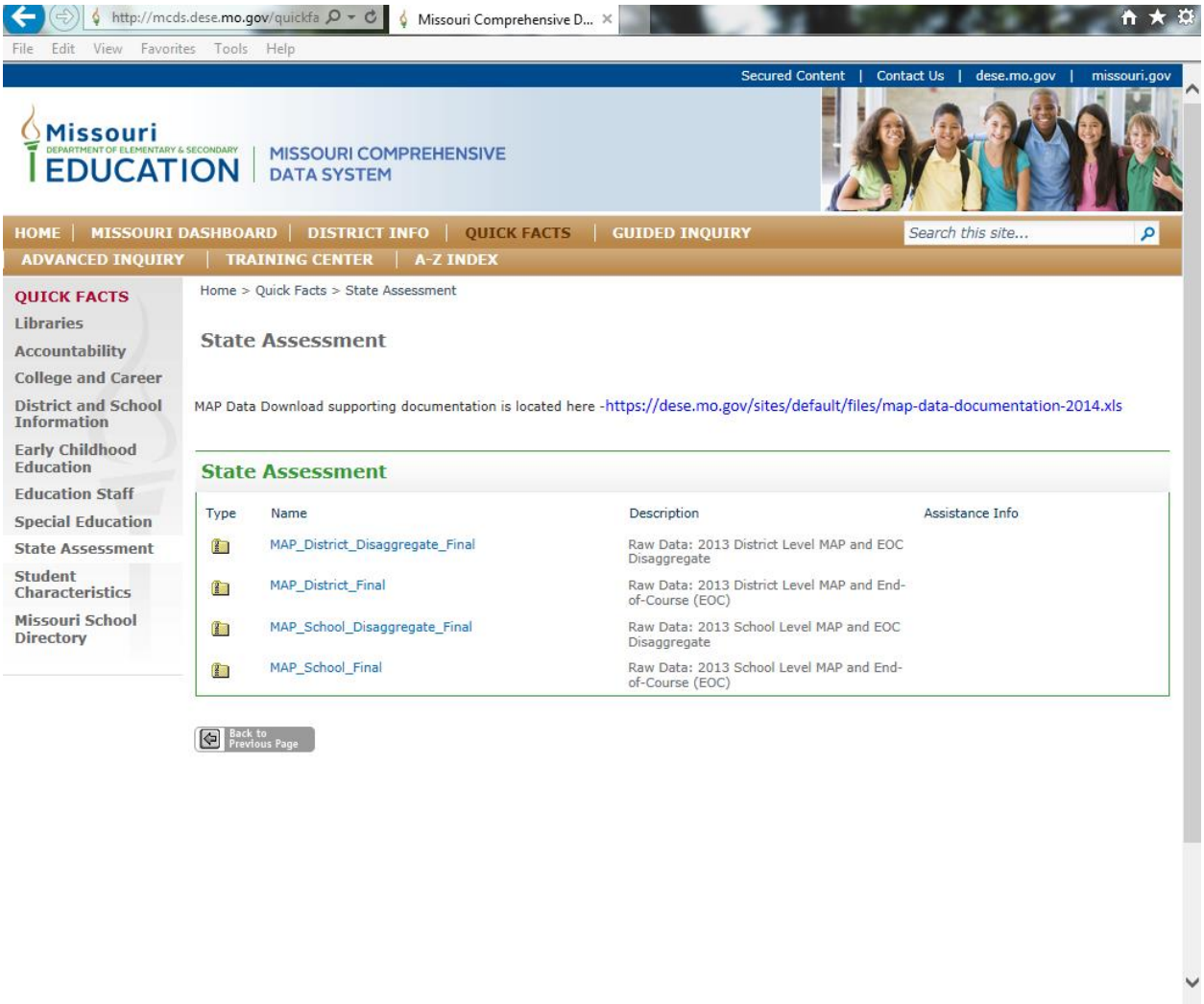

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An unlimited number and configuration of reports may be created through MCDS. In addition to Administrative Reports, the MCDS portal also provides an unlimited configuration of summary reports, as shown in Table 9.1, that are beyond the scope of this technical report. Additional information and training pertaining to MCDS capabilities are available on DESE's website at http://mcds.dese.mo.gov/trainingcenter/Pages/default.aspx.

Table 9.1: Reports Available on the MCDS Portal

Report Type	Report
Administrative Reports	Guided Inquiry - State Assessment Administrative: MAP Scale Score Summary
	Guided Inquiry - State Assessment Administrative: MAP Student Demographics
	Guided Inquiry - State Assessment Administrative: MAP Participation Invalidation
	Guided Inquiry - State Assessment Administrative: MAP Student Achievement Level
	Guided Inquiry - State Assessment Administrative: EOC History Report
Achievement Level Reports	Guided Inquiry - State Assessment Achievement Level - 4 Levels: Achievement Level 4 Report
	Guided Inquiry - State Assessment Achievement Level - 4 Levels: Achievement Level 4 Charts
Content Standards Report	Guided Inquiry - State Assessment Content Standard - Item Analysis: Content Standard Summary
Item Analysis Expanded Reports	Guided Inquiry - State Assessment Content Standard - Item Analysis: Content Standard IBD
	Guided Inquiry - State Assessment Content Standard - Item Analysis: Goal Process IBD

9.4.1 Administrative Reports

These reports provide student-level test data. Based on only the MO EOC Assessment results, four reports are generated: MO EOC Scale Score Summary, MO EOC Student Demographic, Student Achievement Level, and Student Report. Additionally, a historical report of the student's EOC participation is located within the Administrative Reports.

MO EOC Scale Score Summary: This report lists each student in the school or district along with his or her MOSIS ID, testing year, content area, grade level, MO EOC scale score, and achievement level.

MO EOC Student Demographic: This report lists all students in the school or district along with their date of birth (DOB), content area, MOSIS ID, district ID, and relevant demographic information, including if the student has been in the district for less than a year, if the student has been in the building for less than a year, if the student is limited English proficient (LEP), the student's race, if the student qualifies for free and reduced lunch (FRL), if the student has an

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individualized education program (IEP), if the student is an English-language learner (ELL)/LEP who has been in the school for less than one year and in the country for less than three years, if the student is an LEP/ELL Title 3, the number of months the LEP/ELL student has been in the United States, the student's disability diagnosis, and if the student is Title 1.

Student Achievement Level: This report lists all students in a school or district along with the year of testing, content area, grade-level, achievement level, and MOSIS ID.

Student Report: For each school or district, this report contains the following information: student name, DOB, MOSIS ID, content area tested, grade level, achievement level, and scale score for each content area tested.

EOC History Report: This report lists the history of MO EOC completion for all students in the school or district.

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Chapter 10: Summary Statistics

10.1 Introduction

This chapter provides descriptive statistics for the number correct raw score and for scale scores for each of the eight MO EOC Assessments from the Summer 2013, Fall 2013, and Spring 2014 administrations. Statistics include n-counts, means, standard deviations (SD), minimum and maximum values, and a variety of data disaggregations.

10.2 Descriptive Statistics for Total Raw Score

Table 10.1 summarizes the descriptive statistics for total raw score (RS) by test administration (test period) and content area; the total number of students who took the particular MO EOC Assessment (n-count); the minimum, maximum, and mean raw scores; and the SD.

Table 10.1: Descriptive Statistics for Total Raw Score

Test Period	Content Area	N-Count	Min.	Max.	Mean	SD
Summer 2013	English II	359	0	38	20.64	8.72
	Algebra I	896	0	38	19.37	7.81
	Biology	386	0	51	23.27	11.10
	English I	410	5	37	19.96	7.03
	Algebra II	95	8	33	18.97	6.18
	Geometry	223	2	37	18.97	7.15
	Government	872	4	39	24.39	7.65
	Am. History	259	5	37	20.50	6.71
Fall 2013	English II	2,888	0	39	23.22	7.83
	Algebra I	5,424	0	39	21.13	7.73
	Biology	2,885	0	55	29.22	12.48
	English I	894	6	40	23.66	7.69
	Algebra II	411	7	39	26.64	7.13
	Geometry	926	5	40	26.69	8.05
	Government	15,264	0	40	25.28	8.24
	Am. History	1,640	4	40	22.53	7.41
Spring 2014	English II	61,836	0	39	27.88	6.78
	Algebra I	63,192	0	39	23.23	7.58
	Biology	61,275	0	55	35.28	9.54
	English I	60,367	0	40	25.09	7.35
	Algebra II	25,851	3	40	25.20	7.67
	Geometry	35,721	0	40	25.61	7.40
	Government	44,887	0	40	26.83	7.52
	Am. History	50,090	0	40	23.00	7.16

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10.3 Descriptive Statistics for Total Raw Score by Cluster

Tables 10.2 through 10.4 summarize the number correct RS—including the average raw score, the SD, and the standard error of measurement (SEM)—by test administration (test period), content area, and cluster. More information on SEM is provided in Chapter 11.

Table 10.2: Descriptive Statistics for Total Raw Score by Test Administration, Content Area, and Cluster—Summer 2013

Test Period	Content Area	Cluster	Mean	SD	SEM
Summer 2013	English II	Reading	15.78	6.55	2.40
		Writing	5.34	2.18	1.47
	Algebra I	Number and Operations	4.33	2.03	1.27
		Algebraic Relationships	10.77	4.68	2.35
		Data and Probability	4.43	1.85	1.20
	Biology	Characteristics and Interactions of Living Organisms	9.88	4.11	2.13
		Changes in Ecosystems and Interactions of Organisms with their Environments	6.63	2.93	1.61
		Scientific Inquiry	7.35	5.13	2.05
	English I	Reading	19.96	7.03	2.90
	Algebra II	Algebraic Relationships	4.59	2.16	1.33
		Data and Probability	10.30	3.30	2.20
		Numbers and Operations	4.11	1.88	1.39
	Geometry	Algebraic Relationships	3.35	1.70	1.23
		Geometric and Spatial Relationships	11.80	4.47	2.23
		Measurement	3.82	2.00	1.23
	Government	Principles and Processes of Governance Systems	11.81	4.21	1.91
		Principles of Constitutional Democracy	12.58	3.91	1.88
	Am. History	Missouri, United States, and World History	20.48	6.72	2.83

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Table 10.3: Descriptive Statistics for Total Raw Score by Test Administration, Content Area, and Cluster—Fall 2013

Test Period	Content Area	Cluster	Mean	SD	SEM
Fall 2013	English II	Reading	17.21	6.38	2.40
		Writing	6.01	1.96	1.27
	Algebra I	Number and Operations	5.73	2.28	1.22
		Algebraic Relationships	9.57	4.13	2.07
		Data and Probability	5.83	2.21	1.24
	Biology	Characteristics and Interactions of Living Organisms	11.81	5.06	2.03
		Changes in Ecosystems and Interactions of Organisms with their Environments	7.76	3.12	1.54
		Scientific Inquiry	9.65	5.55	2.18
	English I	Reading	23.66	7.69	2.77
	Algebra II	Algebraic Relationships	5.64	1.68	1.16
		Data and Probability	14.15	4.38	2.02
		Numbers and Operations	6.84	2.12	1.27
	Geometry	Algebraic Relationships	5.32	1.87	1.17
		Geometric and Spatial Relationships	15.98	5.05	2.04
		Measurement	5.38	1.98	1.14
	Government	Principles and Processes of Governance Systems	12.68	4.13	1.95
		Principles of Constitutional Democracy	12.60	4.56	1.90
	Am. History	Missouri, United States, and World History	22.53	7.41	2.82

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Table 10.4: Descriptive Statistics for Total Raw Score by Test Administration, Content Area, and Cluster—Spring 2014

Test Period	Content Area	Cluster	Mean	SD	SEM
Spring 2014	English II	Reading	21.37	5.56	2.23
		Writing	6.52	1.67	1.13
	Algebra I	Number and Operations	5.14	2.09	1.18
		Algebraic Relationships	12.73	4.97	2.23
		Data and Probability	5.36	1.43	1.02
	Biology	Characteristics and Interactions of Living Organisms	14.04	4.13	2.03
		Changes in Ecosystems and Interactions of Organisms with their Environments	9.39	2.60	1.39
		Scientific Inquiry	11.86	4.18	2.14
	English I	Reading	25.10	7.33	2.70
	Algebra II	Algebraic Relationships	5.48	1.78	1.16
		Data and Probability	13.38	4.67	2.05
		Numbers and Operations	6.34	2.20	1.33
	Geometry	Algebraic Relationships	4.72	1.91	1.23
		Geometric and Spatial Relationships	15.48	4.50	2.14
		Measurement	5.40	1.91	1.13
	Government	Principles and Processes of Governance Systems	13.32	3.89	1.88
		Principles of Constitutional Democracy	11.97	3.74	1.77
	Am. History	Missouri, United States, and World History	22.99	7.16	2.78

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10.4 Descriptive Statistics for Scale Scores by Test Administration and Content Area

Descriptive statistics of scale scores and percentage distributions of students' achievement levels are summarized in Tables 10.5 and 10.6. Table 10.5 summarizes student scale scores by each MO EOC Assessment for the Summer 2013, Fall 2013, and Spring 2014 administrations. Table 10.6 lists the percentage and frequency of students in each achievement level.

Table 10.5: Scale Score Distributions for Each MO EOC Assessment

Descriptive Statistics						
Test Period	**Content Area**	**N-Count**	**Min.**	**Max.**	**Mean**	**SD**
Summer 2013	English II	359	100	250	192.47	23.96
	Algebra I	896	100	250	192.77	23.70
	Biology	386	100	247	184.35	21.51
	English I	410	139	249	187.59	20.07
	Algebra II	95	160	227	189.63	15.63
	Geometry	223	117	250	186.84	20.96
	Government	872	142	250	201.40	20.95
	Am. History	259	128	250	187.18	22.55
Fall 2013	English II	2,888	106	250	200.78	18.23
	Algebra I	5,424	100	250	200.16	23.11
	Biology	2,885	100	250	196.20	23.84
	English I	894	144	250	200.95	23.52
	Algebra II	411	161	250	211.54	19.03
	Geometry	926	142	250	209.34	24.78
	Government	15,264	100	250	202.81	21.29
	Am. History	1,640	125	250	196.18	24.64
Spring 2014	English II	61,836	108	250	211.12	17.77
	Algebra I	63,192	100	250	202.93	21.38
	Biology	61,275	100	250	207.14	18.65
	English I	60,367	100	250	204.64	22.11
	Algebra II	25,851	140	250	207.71	20.59
	Geometry	35,721	100	250	207.14	21.70
	Government	44,887	100	250	205.66	20.53
	Am. History	50,090	100	250	198.22	24.33

The scale score range is 100 to 250 for every content area. Table 10.6 summarizes the minimum scale score needed to obtain each level of achievement. Note that the cut scores for the achievement levels of Proficient and Advanced are 200 and 225, respectively, for each content area.

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Table 10.6: Scale Score Cuts by Content Area

Content Area	Basic	Proficient	Advanced
English II	180	200	225
Algebra I	177	200	225
Biology	178	200	225
English I	177	200	225
Algebra II	182	200	225
Geometry	182	200	225
Government	179	200	225
Am. History	182	200	225

Tables 10.7 through 10.9 show the number of participating students and the proportion in each level of achievement across years and administrations by content area. Table 10.10 shows the percentage of students in each achievement level by test administration and content area from Fall 2008 to Spring 2014, and Table 10.11 shows the percentage of students in each achievement level by content area for the entire administration year from 2008–2009 to 2013–2014.

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Table 10.7: Achievement-Level Distributions for Each MO EOC Assessment—Summer 2013

Test Period	Content Area	Achievement Level	Freq.	%
Summer 2013	English II	Below Basic	93	25.91
		Basic	114	31.75
		Proficient	124	34.54
		Advanced	28	7.80
		Total	359	100.00
	Algebra I	Below Basic	195	21.76
		Basic	344	38.39
		Proficient	271	30.25
		Advanced	86	9.60
		Total	896	100.00
	Biology	Below Basic	144	37.31
		Basic	145	37.56
		Proficient	82	21.24
		Advanced	15	3.89
		Total	386	100.00
	English I	Below Basic	125	30.49
		Basic	173	42.20
		Proficient	83	20.24
		Advanced	29	7.07
		Total	410	100.00
	Algebra II	Below Basic	22	23.16
		Basic	49	51.58
		Proficient	21	22.11
		Advanced	3	3.16
		Total	95	100.00
	Geometry	Below Basic	87	39.01
		Basic	77	34.53
		Proficient	44	19.73
		Advanced	15	6.73
		Total	223	100.00
	Government	Below Basic	101	11.58
		Basic	289	33.14
		Proficient	338	38.76
		Advanced	144	16.51
		Total	872	100.00
	Am. History	Below Basic	106	40.93
		Basic	60	23.17
		Proficient	70	27.03
		Advanced	23	8.88
		Total	259	100.00

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Table 10.8: Achievement-Level Distributions for Each MO EOC Assessment—Fall 2013

Test Period	Content Area	Achievement Level	Freq.	%
Fall 2013	English II	Below Basic	321	11.11
		Basic	947	32.79
		Proficient	1,255	43.46
		Advanced	365	12.64
		Total	2,888	100.00
	Algebra I	Below Basic	818	15.08
		Basic	1,778	32.78
		Proficient	1,931	35.60
		Advanced	897	16.54
		Total	5,424	100.00
	Biology	Below Basic	660	22.88
		Basic	951	32.96
		Proficient	863	29.91
		Advanced	411	14.25
		Total	2,885	100.00
	English I	Below Basic	118	13.20
		Basic	322	36.02
		Proficient	295	33.00
		Advanced	159	17.79
		Total	894	100.00
	Algebra II	Below Basic	27	6.57
		Basic	67	16.30
		Proficient	193	46.96
		Advanced	124	30.17
		Total	411	100.00
	Geometry	Below Basic	108	11.66
		Basic	237	25.59
		Proficient	274	29.59
		Advanced	307	33.15
		Total	926	100.00
	Government	Below Basic	1,982	12.98
		Basic	4,656	30.50
		Proficient	5,721	37.48
		Advanced	2,905	19.03
		Total	15,264	100.00
	Am. History	Below Basic	459	27.99
		Basic	432	26.34
		Proficient	479	29.21
		Advanced	270	16.46
		Total	1,640	100.00

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Table 10.9: Achievement-Level Distributions for Each MO EOC Assessment—Spring 2014

Test Period	Content Area	Achievement Level	Freq.	%
Spring 2014	English II	Below Basic	2,277	3.68
		Basic	12,776	20.66
		Proficient	28,611	46.27
		Advanced	18,172	29.39
		Total	61,836	100.00
	Algebra I	Below Basic	6,242	9.88
		Basic	22,031	34.86
		Proficient	22,533	35.66
		Advanced	12,386	19.60
		Total	63,192	100.00
	Biology	Below Basic	3,335	5.44
		Basic	15,994	26.10
		Proficient	29,006	47.34
		Advanced	12,940	21.12
		Total	61,275	100.00
	English I	Below Basic	5,799	9.61
		Basic	18,185	30.12
		Proficient	23,014	38.12
		Advanced	13,369	22.15
		Total	60,367	100.00
	Algebra II	Below Basic	1,995	7.72
		Basic	7,409	28.66
		Proficient	10,274	39.74
		Advanced	6,173	23.88
		Total	25,851	100.00
	Geometry	Below Basic	3,812	10.67
		Basic	8,240	23.07
		Proficient	14,972	41.91
		Advanced	8,697	24.35
		Total	35,721	100.00
	Government	Below Basic	4,181	9.31
		Basic	12,030	26.80
		Proficient	18,667	41.59
		Advanced	10,009	22.30
		Total	44,887	100.00
	Am. History	Below Basic	12,485	24.93
		Basic	13,465	26.88
		Proficient	15,780	31.50
		Advanced	8,360	16.69
		Total	50,090	100.00

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Table 10.10: Percentage of Students in Each Achievement Level by Test Administration and Content Area

Content Area	Achievement Level	Test Administration									
		Fall 2008		Spring 2009		Summer 2009		Fall 2009		Spring 2010	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
English II	Below Basic	52	3.9	2,377	4.1	74	10.5	23	1.6	1,830	3.0
	Basic	258	19.6	12,321	21.4	318	45.0	325	22.9	14,260	23.0
	Proficient	693	52.6	30,403	52.7	286	40.5	884	62.2	31,658	51.1
	Advanced	314	23.8	12,593	21.8	28	4.0	190	13.4	14,163	22.9
	Total	1,317	100.0	57,694	100.0	706	100.0	1,422	100.0	61,911	100.0
Algebra I	Below Basic	141	6.3	5,368	10.0	271	21.1	208	8.4	3,733	6.2
	Basic	621	27.6	19,555	36.5	629	49.0	963	38.7	20,593	34.0
	Proficient	1,094	48.7	20,822	38.9	320	24.9	943	37.9	25,381	41.9
	Advanced	392	17.4	7,781	14.5	64	5.0	374	15.0	10,837	17.9
	Total	2,248	100.0	53,526	100.0	1,284	100.0	2,488	100.0	60,544	100.0
Biology	Below Basic	84	4.5	4,148	7.4	99	20.2	187	8.8	3,703	6.2
	Basic	576	31.1	19,435	34.9	270	55.0	706	33.3	20,890	34.9
	Proficient	954	51.4	25,538	45.8	104	21.2	867	40.9	27,984	46.7
	Advanced	241	13.0	6,611	11.9	18	3.7	362	17.1	7,327	12.2
	Total	1,855	100.0	55,732	100.0	491	100.0	2,122	100.0	59,904	100.0
English I	Below Basic	--	--	--	--	--	--	42	13.2	5,283	12.5
	Basic	--	--	--	--	--	--	118	37.1	13,254	31.3
	Proficient	--	--	--	--	--	--	105	33.0	16,699	39.5
	Advanced	--	--	--	--	--	--	53	16.7	7,081	16.7
	Total	--	--	--	--	--	--	318	100.0	42,317	100.0
Algebra II	Below Basic	--	--	--	--	--	--	48	9.1	4,266	19.5
	Basic	--	--	--	--	--	--	174	33.1	8,470	38.8
	Proficient	--	--	--	--	--	--	201	38.3	6,909	31.7
	Advanced	--	--	--	--	--	--	102	19.4	2,179	10.0
	Total	--	--	--	--	--	--	525	100.0	21,824	100.0
Geometry	Below Basic	--	--	--	--	--	--	48	8.1	5,151	19.2
	Basic	--	--	--	--	--	--	121	20.5	7,913	29.5
	Proficient	--	--	--	--	--	--	234	39.6	9,246	34.4
	Advanced	--	--	--	--	--	--	188	31.8	4,548	16.9
	Total	--	--	--	--	--	--	591	100.0	26,858	100.0
Government	Below Basic	--	--	--	--	--	--	3,179	15.0	4,628	12.5
	Basic	--	--	--	--	--	--	7,501	35.4	13,710	37.1
	Proficient	--	--	--	--	--	--	7,470	35.3	13,144	35.6
	Advanced	--	--	--	--	--	--	3,018	14.3	5,448	14.8
	Total	--	--	--	--	--	--	21,168	100.0	36,930	100.0
Am. History	Below Basic	--	--	--	--	--	--	166	23.8	10,385	31.8
	Basic	--	--	--	--	--	--	176	25.2	9,047	27.7
	Proficient	--	--	--	--	--	--	235	33.7	9,275	28.4
	Advanced	--	--	--	--	--	--	121	17.3	3,929	12.0
	Total	--	--	--	--	--	--	698	100.0	32,636	100.0

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Table 10.10 (continued): Percentage of Students in Each Achievement Level by Test Administration and Content Area

Content Area	Achievement Level	Test Administration											
		Summer 2010		Fall 2010		Spring 2011		Summer 2011		Fall 2011		Spring 2012	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
English II	Below Basic	76	16.0	145	7.9	2,548	4.0	44	14.1	386	12.8	3,323	5.4
	Basic	213	44.7	537	29.3	13,463	21.1	132	42.2	1,050	34.8	12,701	20.5
	Proficient	168	35.3	780	42.6	30,712	48.2	121	38.7	1,301	43.1	33,536	54.1
	Advanced	19	4.0	371	20.2	16,959	26.6	16	5.1	285	9.4	12,464	20.1
	Total	476	100.0	1,833	100.0	63,682	100.0	313	100.0	3,022	100.0	62,024	100.0
Algebra I	Below Basic	133	11.8	353	12.9	5,381	8.4	85	13.5	794	19.9	5,311	8.2
	Basic	562	49.9	993	36.2	18,914	29.6	335	53.3	1,212	30.3	22,278	34.6
	Proficient	340	30.2	721	26.3	26,590	41.5	167	26.6	1,116	27.9	23,244	36.1
	Advanced	91	8.1	674	24.6	13,112	20.5	42	6.7	877	21.9	13,613	21.1
	Total	1,126	100.0	2,741	100.0	63,997	100.0	629	100.0	3,999	100.0	64,446	100.0
Biology	Below Basic	89	23.2	292	12.2	3,932	6.3	56	20.1	501	16.5	4,804	7.8
	Basic	160	41.7	831	34.8	19,250	31.0	137	49.1	1,269	41.9	22,522	36.5
	Proficient	117	30.5	760	31.8	29,029	46.8	74	26.5	916	30.2	25,845	41.9
	Advanced	18	4.7	508	21.2	9,857	15.9	12	4.3	343	11.3	8,575	13.9
	Total	384	100.0	2,391	100.0	62,068	100.0	279	100.0	3,029	100.0	61,746	100.0
English I	Below Basic	37	18.9	40	12.2	4,564	10.8	57	23.2	40	18.2	4,220	9.5
	Basic	81	41.3	87	26.6	13,035	30.9	110	44.7	69	31.4	12,504	28.2
	Proficient	64	32.7	116	35.5	16,204	38.4	66	26.8	71	32.4	20,164	45.5
	Advanced	14	7.1	84	25.7	8,368	19.8	13	5.3	40	18.2	7,415	16.7
	Total	196	100.0	327	100.0	42,171	100.0	246	100.0	220	100.0	44,303	100.0
Algebra II	Below Basic	39	34.5	46	9.0	1,905	8.5	57	46.0	41	8.0	2,791	11.1
	Basic	62	54.9	155	30.3	8,606	38.2	55	44.4	112	21.8	8,229	32.7
	Proficient	10	8.8	226	44.2	9,391	41.7	10	8.1	216	42.0	10,088	40.1
	Advanced	2	1.8	84	16.4	2,604	11.6	2	1.6	145	28.2	4,042	16.1
	Total	113	100.0	511	100.0	22,506	100.0	124	100.0	514	100.0	25,150	100.0
Geometry	Below Basic	96	41.9	143	16.3	4,248	16.3	61	31.8	128	17.6	3,610	11.9
	Basic	95	41.5	227	25.9	8,783	33.7	77	40.1	140	19.2	7,659	25.3
	Proficient	34	14.8	321	36.6	10,291	39.4	45	23.4	226	31.0	15,024	49.7
	Advanced	4	1.7	187	21.3	2,766	10.6	9	4.7	235	32.2	3,958	13.1
	Total	229	100.0	878	100.0	26,088	100.0	192	100.0	729	100.0	30,251	100.0
Government	Below Basic	177	20.1	1,591	9.0	2,998	7.5	69	8.4	2,689	15.6	3,440	8.6
	Basic	304	34.5	6,540	37.2	12,622	31.6	342	41.7	6,345	36.8	15,288	38.0
	Proficient	246	27.9	7,411	42.1	17,626	44.2	297	36.2	5,778	33.5	15,391	38.3
	Advanced	154	17.5	2,047	11.6	6,661	16.7	113	13.8	2,416	14.0	6,080	15.1
	Total	881	100.0	17,589	100.0	39,907	100.0	821	100.0	17,228	100.0	40,199	100.0
Am. History	Below Basic	26	56.5	170	26.1	8,458	24.3	97	52.4	213	25.6	9,775	25.3
	Basic	8	17.4	165	25.3	8,842	25.4	48	26.0	209	25.2	10,146	26.3
	Proficient	10	21.7	231	35.4	13,182	37.9	36	19.5	287	34.5	14,434	37.4
	Advanced	2	4.3	86	13.2	2,296	12.4	4	2.2	122	14.7	4,216	10.9
	Total	46	100.0	652	100.0	34,778	100.0	185	100.0	831	100.0	38,571	100.0

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Table 10.10 (continued): Percentage of Students in Each Achievement Level by Test Administration and Content Area

Content Area	Achievement Level	Test Administration											
		Summer 2012		Fall 2012		Spring 2013		Summer 2013		Fall 2013		Spring 2014	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
English II	Below Basic	60	14.0	499	16.9	2,529	4.1	93	26.0	321	11.1	2,277	3.6
	Basic	198	46.3	908	30.9	15,783	25.8	114	31.8	947	32.8	12,776	20.7
	Proficient	148	34.5	1,312	44.7	31,320	51.1	124	34.5	1,255	43.5	28,611	46.3
	Advanced	22	5.2	221	7.5	11,605	19.0	28	7.8	365	12.7	18,172	29.4
	Total	428	100.0	2,940	100.0	61,237	100.0	359	100.0	2,888	100.0	61,836	100.0
Algebra I	Below Basic	161	18.2	815	20.9	4,958	7.7	195	21.8	818	15.1	6,242	9.9
	Basic	381	42.9	1,226	31.5	22,134	34.3	344	38.4	1,778	32.8	22,031	34.9
	Proficient	301	33.9	1,096	28.2	26,867	41.6	271	30.3	1,931	35.6	22,533	35.6
	Advanced	45	5.1	759	19.5	10,585	16.4	86	9.6	897	16.5	12,386	19.6
	Total	888	100.0	3,896	100.0	64,544	100.0	896	100.0	5,424	100.0	63,192	100.0
Biology	Below Basic	70	21.8	590	20.8	1,928	3.1	144	37.3	660	22.9	3,335	5.4
	Basic	175	54.6	1,049	37.0	12,804	20.5	145	37.5	951	33.0	15,994	26.1
	Proficient	64	19.9	880	31.0	31,454	50.4	82	21.2	863	29.9	29,006	47.3
	Advanced	12	3.7	318	11.2	16,169	25.9	15	3.9	411	14.3	12,940	21.1
	Total	321	100.0	2,837	100.0	62,355	100.0	386	100.0	2,885	100.0	61,275	100.0
English I	Below Basic	77	25.1	92	10.9	7,004	11.2	125	30.5	118	13.2	5,799	9.6
	Basic	132	43.0	235	27.8	17,799	28.4	173	42.2	322	36.0	18,185	30.1
	Proficient	74	24.1	381	45.0	24,615	39.3	83	20.2	295	33.0	23,014	38.2
	Advanced	24	7.8	138	16.3	13,265	21.2	29	7.0	159	17.8	13,369	22.1
	Total	307	100.0	846	100.0	62,683	100.0	410	100.0	894	100.0	60,367	100.0
Algebra II	Below Basic	71	49.3	29	6.5	2,879	12.3	22	23.2	27	6.6	1,995	7.7
	Basic	56	38.9	65	14.6	7,910	33.8	49	51.6	67	16.3	7,409	28.7
	Proficient	13	9.0	200	45.0	9,011	38.5	21	22.1	193	47.0	10,274	39.7
	Advanced	4	2.8	151	33.9	3,626	15.5	3	3.2	124	30.1	6,173	23.9
	Total	144	100.0	445	100.0	23,426	100.0	95	100.0	411	100.0	25,851	100.0
Geometry	Below Basic	106	44.0	70	9.4	4,103	13.5	87	39.1	108	11.7	3,812	10.7
	Basic	79	32.8	148	19.7	7,910	25.9	77	34.5	237	25.6	8,240	23.1
	Proficient	45	18.7	330	43.8	11,832	38.8	44	19.7	274	29.6	14,972	41.9
	Advanced	11	4.4	205	27.2	6,637	21.8	15	6.7	307	33.1	8,697	24.3
	Total	241	100.0	753	100.0	30,482	100.0	223	100.0	926	100.0	35,721	100.0
Government	Below Basic	136	16.2	1,557	9.2	4,899	11.6	101	11.6	1,982	13.0	4,181	9.4
	Basic	295	35.2	6,721	40.0	13,883	32.9	289	33.1	4,656	30.5	12,030	26.8
	Proficient	289	34.4	6,122	36.4	15,796	37.4	338	38.7	5,721	37.5	18,667	41.6
	Advanced	119	14.2	2,405	14.3	7,640	18.1	144	16.5	2,905	19.0	10,009	22.3
	Total	839	100.0	16,805	100.0	42,218	100.0	872	100.0	15,264	100.0	44,887	100.0
Am. History	Below Basic	119	45.1	361	27.3	14,232	27.2	106	40.9	459	27.9	12,485	25.0
	Basic	74	28.1	327	24.8	13,525	25.8	60	23.2	432	26.3	13,465	26.8
	Proficient	57	21.6	523	39.5	16,081	30.7	70	27.1	479	29.3	15,780	31.5
	Advanced	14	5.3	112	8.5	8,486	16.2	23	8.9	270	16.5	8,360	16.7
	Total	264	100.0	1,323	100.0	52,324	100.0	259	100.0	1,640	100.0	50,090	100.0

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Table 10.11: Percentage of Students in Each Achievement Level by Administration Year and Content Area

Content Area	Achievement Level	Administration Year											
		2008–2009		2009–2010		2010–2011		2011–2012		2012–2013		2013-2014	
		Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
English II	Below Basic	2,429	4.1	1,927	3.0	2,769	4.2	3,753	5.7	3,088	4.8	2,691	4.1
	Basic	12,579	21.3	14,903	23.3	14,213	21.5	13,883	21.2	16,889	26.1	13,837	21.3
	Proficient	31,096	52.7	32,828	51.3	31,660	48.0	34,958	53.5	32,780	50.7	29,990	46.1
	Advanced	12,907	21.9	14,381	22.5	17,349	26.3	12,765	19.5	11,848	18.3	18,565	28.5
	Total	59,011	100.0	64,039	100.0	65,991	100.0	65,359	100.0	64,605	100.0	65,083	100.0
Algebra I	Below Basic	5,509	9.9	4,212	6.5	5,867	8.6	6,190	9.0	5,934	8.6	7,255	10.4
	Basic	20,176	36.2	22,185	34.5	20,469	30.2	23,825	34.5	23,741	34.2	24,153	34.7
	Proficient	21,916	39.3	26,644	41.4	27,651	40.7	24,527	35.5	28,264	40.8	24,735	35.6
	Advanced	8,173	14.7	11,275	17.5	13,877	20.4	14,532	21.0	11,389	16.4	13,369	19.2
	Total	55,774	100.0	64,316	100.0	67,864	100.0	69,074	100.0	69,328	100.0	69,512	100.0
Biology	Below Basic	4,232	7.3	3,989	6.4	4,313	6.7	5,361	8.2	2,588	4.0	4,139	6.4
	Basic	20,011	34.7	21,866	35.0	20,241	31.2	23,928	36.8	14,028	21.4	17,090	26.5
	Proficient	26,492	46.0	28,955	46.3	29,906	46.1	26,835	41.3	32,398	49.5	29,951	46.4
	Advanced	6,852	11.9	7,707	12.3	10,383	16.0	8,930	13.7	16,499	25.2	13,366	20.7
	Total	57,587	100.0	62,517	100.0	64,843	100.0	65,054	100.0	65,513	100.0	64,546	100.0
English I	Below Basic	--	--	5,325	12.5	4,641	10.9	4,317	9.6	7,173	11.2	6,042	9.8
	Basic	--	--	13,372	31.4	13,203	30.9	12,683	28.3	18,166	28.5	18,680	30.3
	Proficient	--	--	16,804	39.4	16,384	38.4	20,301	45.3	25,070	39.3	23,392	37.9
	Advanced	--	--	7,134	16.7	8,466	19.8	7,468	16.7	13,427	21.0	13,557	22.0
	Total	--	--	42,635	100.0	42,694	100.0	44,769	100.0	63,836	100.0	61,671	100.0
Algebra II	Below Basic	--	--	4,314	19.3	1,990	8.6	2,889	11.2	2,979	12.4	2,044	7.8
	Basic	--	--	8,644	38.7	8,823	38.1	8,396	32.6	8,031	33.4	7,525	28.6
	Proficient	--	--	7,110	31.8	9,627	41.6	10,314	40.0	9,224	38.4	10,488	39.8
	Advanced	--	--	2,281	10.2	2,690	11.6	4,189	16.2	3,781	15.7	6,300	23.9
	Total	--	--	22,349	100.0	23,130	100.0	25,788	100.0	24,015	100.0	26,357	100.0
Geometry	Below Basic	--	--	5,199	18.9	4,487	16.5	3,799	12.2	4,279	13.6	4,007	10.9
	Basic	--	--	8,034	29.3	9,105	33.5	7,876	25.3	8,137	25.9	8,554	23.2
	Proficient	--	--	9,480	34.5	10,646	39.1	15,295	49.1	12,207	38.8	15,290	41.5
	Advanced	--	--	4,736	17.3	2,957	10.9	4,202	13.5	6,853	21.8	9,019	24.5
	Total	--	--	27,449	100.0	27,195	100.0	31,172	100.0	31,476	100.0	36,870	100.0
Government	Below Basic	--	--	7,807	13.4	4,766	8.2	6,198	10.6	6,592	11.0	6,264	10.3
	Basic	--	--	21,211	36.5	19,466	33.3	21,975	37.7	20,899	34.9	16,975	27.8
	Proficient	--	--	20,614	35.5	25,283	43.3	21,466	36.9	22,207	37.1	24,726	40.5
	Advanced	--	--	8,466	14.6	8,862	15.2	8,609	14.8	10,164	17.0	13,058	21.4
	Total	--	--	58,098	100.0	58,377	100.0	58,248	100.0	59,862	100.0	61,023	100.0
Am. History	Below Basic	--	--	10,551	31.7	8,654	24.4	10,085	25.5	14,712	27.3	13,050	25.1
	Basic	--	--	9,223	27.7	9,015	25.4	10,403	26.3	13,926	25.8	13,957	26.8
	Proficient	--	--	9,510	28.5	13,423	37.8	14,757	37.3	16,661	30.9	16,329	31.4
	Advanced	--	--	4,050	12.1	2,384	6.7	4,342	11.0	8,612	16.0	8,653	16.6
	Total	--	--	33,334	100.0	35,476	100.0	39,587	100.0	53,911	100.0	51,989	100.0

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Table 10.10 demonstrates that percentages of students at each achievement level for the 2013–2014 testing year are consistent with historical data for comparable test administrations, except those for Biology, during the Spring 2013 administration. For Biology, noticeable growth is observed in the Spring 2013 results where 50% of the students reached the Proficient level and 26% attained the Advanced level. Historically, the percentages of students in those categories ranged between 42% and 47% at the Proficient level and between 12% and 16% at the Advanced level.

10.4.1 MO EOC Calendar of Major Events

Table 10.12 provides the major events that have occurred for the MO EOC Assessments from 2008–2009 to 2013–2014 to assist with the understanding and interpretation of test results.

Table 10.12: Calendar of Major Events from 2008–2009 to 2013–2014

Administration Year	Event(s)
2008–2009	1. English II, Algebra I, and Biology were administered operationally starting in Fall 2008. These assessments consisted of both SR items and PE/WPs.
2009–2010	1. English I, Algebra II, Geometry, Government, and American History were administered operationally starting in Fall 2009. These assessments consisted of SR items only.
2010–2011	1. PE/WPs were temporarily suspended from English II, Algebra I, and Biology starting in Summer 2010. 2. Phase II assessments were available in online format only.
2011–2012	1. All assessments were administered online.
2012–2013	1. PE/WPs were added back to English II, Algebra I, and Biology starting in Fall 2012.
2013–2014	1. iPads and Chromebooks began being used for SR items in Summer 2013. 2. iPads and Chromebooks began being used for PE/WPs starting in Fall 2013.

10.5 Descriptive Statistics by Demographic Group

Descriptive statistics of scale scores and percentage distributions of students' achievement levels by demographic groups are summarized in Tables 10.13 through 10.60. The results are only reported for groups with 10 or more students.

The demographic variables included are gender, ethnicity, migrant status, free and reduced lunch (FRL), limited English proficient (LEP), Title I, individualized education program (IEP), and accommodations.

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Table 10.13: Scale Score Distributions by Demographic Group—Gender, Summer 2013

Test Period	Content Area	Gender	N-Count	Min.	Max.	Mean	SD
Summer 2013	English II	Female	139	100	250	196.65	24.50
		Male	220	125	248	189.83	23.29
	Algebra I	Female	360	100	250	193.94	24.53
		Male	536	100	250	191.99	23.12
	Biology	Female	186	100	247	185.18	22.40
		Male	200	100	231	183.59	20.68
	English I	Female	168	139	241	188.74	20.80
		Male	242	139	249	186.79	19.55
	Algebra II	Female	34	160	220	190.21	14.12
		Male	61	160	227	189.31	16.51
	Geometry	Female	108	117	239	183.94	19.59
		Male	115	150	250	189.57	21.90
	Government	Female	433	142	250	200.66	19.78
		Male	439	142	250	202.14	22.05
	Am. History	Female	127	139	250	187.14	22.41
		Male	132	128	243	187.22	22.78

Table 10.14: Scale Score Distributions by Demographic Group—Gender, Fall 2013

Test Period	Content Area	Gender	N-Count	Min.	Max.	Mean	SD
Fall 2013	English II	Female	1,304	106	250	203.42	17.80
		Male	1,584	126	250	198.62	18.29
	Algebra I	Female	2,669	100	250	200.62	22.27
		Male	2,755	100	250	199.71	23.89
	Biology	Female	1,306	137	250	197.72	23.73
		Male	1,579	100	250	194.95	23.87
	English I	Female	435	144	250	203.93	24.02
		Male	459	149	250	198.14	22.71
	Algebra II	Female	217	161	250	210.04	19.14
		Male	194	168	250	213.22	18.82
	Geometry	Female	443	142	250	206.82	25.45
		Male	483	142	250	211.66	23.94
	Government	Female	7,613	139	250	201.35	20.63
		Male	7,651	100	250	204.26	21.83
	Am. History	Female	817	125	250	193.00	23.66
		Male	823	125	250	199.34	25.19

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Table 10.15: Scale Score Distributions by Demographic Group—Gender, Spring 2014

Test Period	Content Area	Gender	N-Count	Min.	Max.	Mean	SD
Spring 2014	English II	Female	30,665	108	250	213.48	17.51
		Male	31,171	108	250	208.79	17.72
	Algebra I	Female	31,424	100	250	202.85	20.69
		Male	31,768	100	250	203.01	22.04
	Biology	Female	30,368	100	250	207.41	18.44
		Male	30,907	100	250	206.88	18.86
	English I	Female	30,140	100	250	206.03	21.76
		Male	30,227	100	250	203.26	22.37
	Algebra II	Female	13,760	147	250	206.33	20.32
		Male	12,091	140	250	209.28	20.78
	Geometry	Female	18,333	100	250	206.33	21.47
		Male	17,388	100	250	208.00	21.90
	Government	Female	22,179	128	250	204.02	19.84
		Male	22,708	100	250	207.26	21.06
	Am. History	Female	24,702	100	250	194.85	23.32
		Male	25,388	100	250	201.51	24.83

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Table 10.16: Scale Score Distributions by Demographic Group—Ethnicity, Summer 2013

Test Period	Content Area	Ethnicity	N-Count	Min.	Max.	Mean	SD
Summer 2013	English II	American Indian/ Alaskan Native	--	--	--	--	--
		Asian	--	--	--	--	--
		Pacific Islander	--	--	--	--	--
		Black (not Hispanic)	128	125	248	188.31	21.11
		Hispanic	35	125	240	195.23	22.91
		White (not Hispanic)	187	100	250	194.96	25.99
		Multi-racial	--	--	--	--	--
	Algebra I	American Indian/ Alaskan Native	--	--	--	--	--
		Asian	15	148	249	197.60	23.18
		Pacific Islander	--	--	--	--	--
		Black (not Hispanic)	306	100	242	183.72	21.31
		Hispanic	39	111	232	189.44	23.56
		White (not Hispanic)	505	100	250	198.59	23.40
		Multi-racial	24	111	237	191.00	24.52
	Biology	American Indian/ Alaskan Native	--	--	--	--	--
		Asian	--	--	--	--	--
		Pacific Islander	--	--	--	--	--
		Black (not Hispanic)	135	142	225	176.80	17.29
		Hispanic	23	164	234	189.13	15.88
		White (not Hispanic)	216	100	238	188.44	22.99
		Multi-racial	--	--	--	--	--

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Table 10.16 (continued): Scale Score Distributions by Demographic Group—Ethnicity, Summer 2013

Test Period	Content Area	Ethnicity	N-Count	Min.	Max.	Mean	SD
Summer 2013	English I	American Indian/ Alaskan Native	--	--	--	--	--
		Asian	--	--	--	--	--
		Pacific Islander	--	--	--	--	--
		Black (not Hispanic)	146	139	230	182.62	17.77
		Hispanic	23	149	249	187.09	20.65
		White (not Hispanic)	223	139	241	190.45	20.77
		Multi-racial	11	163	226	195.18	23.41
	Algebra II	American Indian/ Alaskan Native	--	--	--	--	--
		Asian	--	--	--	--	--
		Pacific Islander	--	--	--	--	--
		Black (not Hispanic)	56	160	225	182.34	13.11
		Hispanic	--	--	--	--	--
		White (not Hispanic)	30	169	227	198.07	12.19
		Multi-racial	--	--	--	--	--
	Geometry	American Indian/ Alaskan Native	--	--	--	--	--
		Asian	--	--	--	--	--
		Pacific Islander	--	--	--	--	--
		Black (not Hispanic)	106	117	225	177.69	15.68
		Hispanic	12	161	197	179.08	13.19
		White (not Hispanic)	93	150	250	196.19	22.35
		Multi-racial	--	--	--	--	--
	Government	American Indian/ Alaskan Native	--	--	--	--	--
		Asian	33	173	250	210.24	22.32
		Pacific Islander	--	--	--	--	--
		Black (not Hispanic)	152	142	250	190.27	19.30
		Hispanic	68	162	250	196.18	17.27
		White (not Hispanic)	596	142	250	204.30	20.78
		Multi-racial	14	180	228	203.57	15.40
	Am. History	American Indian/ Alaskan Native	--	--	--	--	--
		Asian	--	--	--	--	--
		Pacific Islander	--	--	--	--	--
		Black (not Hispanic)	82	128	225	173.99	19.84
		Hispanic	13	156	194	175.08	12.84
		White (not Hispanic)	154	148	250	195.11	20.84
		Multi-racial	--	--	--	--	--

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Table 10.17: Scale Score Distribution by Demographic Group—Ethnicity, Fall 2013

Test Period	Content Area	Ethnicity	N-Count	Min.	Max.	Mean	SD
Fall 2013	English II	American Indian/ Alaskan Native	11	170	217	201.18	12.42
		Asian	46	164	244	202.54	20.01
		Pacific Islander	--	--	--	--	--
		Black (not Hispanic)	1,087	126	250	197.37	16.77
		Hispanic	138	157	244	196.44	15.97
		White (not Hispanic)	1,517	106	250	203.11	18.73
		Multi-racial	85	172	250	209.07	20.77
	Algebra I	American Indian/ Alaskan Native	24	161	241	192.67	21.37
		Asian	106	157	250	216.78	26.50
		Pacific Islander	11	141	241	197.27	24.98
		Black (not Hispanic)	1,126	141	250	190.02	20.63
		Hispanic	227	147	250	195.72	20.33
		White (not Hispanic)	3,856	100	250	203.04	22.89
		Multi-racial	74	152	247	197.27	20.15
	Biology	American Indian/ Alaskan Native	--	--	--	--	--
		Asian	66	153	250	217.59	23.81
		Pacific Islander	--	--	--	--	--
		Black (not Hispanic)	766	100	247	180.37	17.42
		Hispanic	123	153	242	193.33	18.70
		White (not Hispanic)	1,848	137	250	202.00	23.24
		Multi-racial	71	146	250	199.61	24.08

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Table 10.17 (continued): Scale Score Distributions by Demographic Group—Ethnicity, Fall 2013

Test Period	Content Area	Ethnicity	N-Count	Min.	Max.	Mean	SD
Fall 2013	English I	American Indian/ Alaskan Native	--	--	--	--	--
		Asian	13	173	234	198.85	17.53
		Pacific Islander	--	--	--	--	--
		Black (not Hispanic)	180	144	239	187.27	18.39
		Hispanic	84	153	250	198.23	22.43
		White (not Hispanic)	591	144	250	205.88	23.52
		Multi-racial	18	149	229	190.67	21.07
	Algebra II	American Indian/ Alaskan Native	--	--	--	--	--
		Asian	16	190	250	223.88	17.72
		Pacific Islander	--	--	--	--	--
		Black (not Hispanic)	50	168	241	200.72	18.25
		Hispanic	30	176	248	210.97	16.15
		White (not Hispanic)	298	161	250	212.70	18.82
		Multi-racial	15	173	236	212.33	20.07
	Geometry	American Indian/ Alaskan Native	--	--	--	--	--
		Asian	24	179	250	229.21	24.92
		Pacific Islander	--	--	--	--	--
		Black (not Hispanic)	114	147	250	194.05	19.95
		Hispanic	69	166	250	210.78	23.59
		White (not Hispanic)	689	142	250	210.96	24.65
		Multi-racial	26	166	250	210.92	22.41
	Government	American Indian/ Alaskan Native	60	161	250	204.02	17.51
		Asian	400	158	250	213.86	23.13
		Pacific Islander	27	164	248	194.30	21.20
		Black (not Hispanic)	2,889	100	250	190.82	18.45
		Hispanic	674	150	250	197.60	20.53
		White (not Hispanic)	10,963	117	250	205.88	20.72
		Multi-racial	251	154	250	203.47	21.14
	Am. History	American Indian/ Alaskan Native	--	--	--	--	--
		Asian	29	148	232	193.07	20.93
		Pacific Islander	--	--	--	--	--
		Black (not Hispanic)	207	125	250	183.40	22.98
		Hispanic	91	138	250	188.00	22.81
		White (not Hispanic)	1,276	125	250	198.80	24.39
		Multi-racial	29	152	250	200.55	24.05

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Table 10.18: Scale Score Distribution by Demographic Group—Ethnicity, Spring 2014

Test Period	Content Area	Ethnicity	N-Count	Min.	Max.	Mean	SD
Spring 2014	English II	American Indian/ Alaskan Native	297	152	250	207.89	17.28
		Asian	1,144	152	250	216.13	19.84
		Pacific Islander	131	152	250	204.07	17.41
		Black (not Hispanic)	8,841	108	250	201.23	16.36
		Hispanic	2,631	108	250	206.87	16.96
		White (not Hispanic)	47,667	108	250	213.11	17.34
		Multi-racial	1,125	108	250	210.72	17.86
	Algebra I	American Indian/ Alaskan Native	288	150	250	200.63	20.99
		Asian	1,201	114	250	215.52	23.21
		Pacific Islander	116	150	250	195.47	19.06
		Black (not Hispanic)	9,362	100	250	189.85	18.39
		Hispanic	2,942	129	250	200.25	20.44
		White (not Hispanic)	48,136	100	250	205.36	20.91
		Multi-racial	1,147	114	250	202.75	21.38
	Biology	American Indian/ Alaskan Native	284	159	250	204.76	17.41
		Asian	1,141	146	250	213.41	21.89
		Pacific Islander	120	159	243	200.49	19.08
		Black (not Hispanic)	9,025	100	250	194.08	18.22
		Hispanic	2,611	137	250	202.20	17.91
		White (not Hispanic)	46,955	100	250	209.81	17.54
		Multi-racial	1,139	137	250	207.14	18.38

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Table 10.18 (continued): Scale Score Distributions by Demographic Group—Ethnicity, Spring 2014

Test Period	Content Area	Ethnicity	N-Count	Min.	Max.	Mean	SD
Spring 2014	English I	American Indian/ Alaskan Native	272	151	250	203.54	21.57
		Asian	1,116	100	250	212.68	23.45
		Pacific Islander	107	141	250	194.15	20.41
		Black (not Hispanic)	8,206	100	250	192.39	19.87
		Hispanic	2,695	100	250	199.35	20.99
		White (not Hispanic)	46,807	100	250	206.95	21.71
		Multi-racial	1,164	100	250	204.06	22.72
	Algebra II	American Indian/ Alaskan Native	109	157	250	204.64	20.72
		Asian	528	157	250	220.31	22.11
		Pacific Islander	57	152	250	203.39	20.66
		Black (not Hispanic)	2,309	147	250	194.63	18.81
		Hispanic	974	157	250	203.56	19.80
		White (not Hispanic)	21,468	140	250	209.03	20.15
		Multi-racial	406	157	250	207.48	21.19
	Geometry	American Indian/ Alaskan Native	193	154	250	202.45	20.75
		Asian	738	154	250	218.31	23.55
		Pacific Islander	94	154	250	197.30	21.50
		Black (not Hispanic)	3,675	139	250	192.68	19.60
		Hispanic	1,479	139	250	201.09	20.82
		White (not Hispanic)	28,844	100	250	209.15	21.09
		Multi-racial	698	100	250	203.63	22.23
	Government	American Indian/ Alaskan Native	188	165	250	204.76	19.97
		Asian	825	152	250	210.67	21.07
		Pacific Islander	77	168	239	195.01	16.84
		Black (not Hispanic)	6,105	143	250	193.46	18.37
		Hispanic	1,828	100	250	202.05	19.87
		White (not Hispanic)	35,105	100	250	207.90	20.12
		Multi-racial	759	152	250	205.02	20.56
	Am. History	American Indian/ Alaskan Native	238	146	250	198.43	24.06
		Asian	939	142	250	206.91	26.43
		Pacific Islander	96	146	250	191.89	23.99
		Black (not Hispanic)	6,768	100	250	184.93	21.94
		Hispanic	2,073	130	250	192.54	22.60
		White (not Hispanic)	39,099	100	250	200.63	23.94
		Multi-racial	877	130	250	198.15	23.88

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Table 10.19: Scale Score Distribution by Demographic Group—Migrant Status, Summer 2013

Test Period	Content Area	Migrant	N-Count	Min.	Max.	Mean	SD
Summer 2013	English II	No	354	100	250	192.66	23.89
		Yes	--	--	--	--	--
	Algebra I	No	888	100	250	192.93	23.33
		Yes	--	--	--	--	--
	Biology	No	382	100	247	184.52	21.44
		Yes	--	--	--	--	--
	English I	No	407	139	249	187.75	20.05
		Yes	--	--	--	--	--
	Algebra II	No	94	160	227	189.66	15.71
		Yes	--	--	--	--	--
	Geometry	No	223	117	250	186.84	20.96
		Yes	--	--	--	--	--
	Government	No	855	142	250	201.49	21.02
		Yes	--	--	--	--	--
	Am. History	No	257	128	250	187.15	22.64
		Yes	--	--	--	--	--

Table 10.20: Scale Score Distribution by Demographic Group—Migrant Status, Fall 2013

Test Period	Content Area	Migrant	N-Count	Min.	Max.	Mean	SD
Fall 2013	English II	No	2,878	106	250	200.80	18.24
		Yes	--	--	--	--	--
	Algebra I	No	5,380	100	250	200.24	23.14
		Yes	--	--	--	--	--
	Biology	No	2,873	100	250	196.27	23.86
		Yes	--	--	--	--	--
	English I	No	894	144	250	200.95	23.52
		Yes	--	--	--	--	--
	Algebra II	No	410	161	250	211.59	19.03
		Yes	--	--	--	--	--
	Geometry	No	925	142	250	209.35	24.79
		Yes	--	--	--	--	--
	Government	No	15,238	100	250	202.82	21.29
		Yes	--	--	--	--	--
	Am. History	No	1,638	125	250	196.19	24.64
		Yes	--	--	--	--	--

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Table 10.21: Scale Score Distribution by Demographic Group—Migrant Status, Spring 2014

Test Period	Content Area	Migrant	N-Count	Min.	Max.	Mean	SD
Spring 2014	English II	No	61,775	108	250	211.13	17.77
		Yes	24	163	226	189.21	17.13
	Algebra I	No	63,067	100	250	202.95	21.37
		Yes	27	154	227	185.59	19.56
	Biology	No	61,215	100	250	207.16	18.65
		Yes	14	161	210	184.36	14.04
	English I	No	60,307	100	250	204.66	22.10
		Yes	19	141	243	183.74	23.50
	Algebra II	No	25,848	140	250	207.71	20.59
		Yes	--	--	--	--	--
	Geometry	No	35,702	100	250	207.15	21.70
		Yes	--	--	--	--	--
	Government	No	44,833	100	250	205.68	20.52
		Yes	18	168	228	193.00	17.46
	Am. History	No	50,056	100	250	198.23	24.32
		Yes	18	151	229	179.50	24.74

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Table 10.22: Scale Distributions by Demographic Group—Free and Reduced Lunch, Summer 2013

Test Period	Content Area	FRL	N-Count	Min.	Max.	Mean	SD
Summer 2013	English II	No	147	125	248	196.88	20.76
		Yes	207	100	250	189.66	25.52
	Algebra I	No	452	100	250	198.58	22.44
		Yes	436	100	250	187.08	22.81
	Biology	No	163	100	247	188.68	22.63
		Yes	219	100	234	181.42	20.00
	English I	No	172	153	241	191.74	21.26
		Yes	236	139	249	184.75	18.63
	Algebra II	No	41	163	225	192.61	16.46
		Yes	53	160	227	187.38	14.86
	Geometry	No	112	150	250	191.02	21.52
		Yes	111	117	234	182.63	19.58
	Government	No	492	159	250	207.08	21.00
		Yes	363	142	250	193.93	18.56
	Am. History	No	121	148	250	194.54	22.49
		Yes	136	128	237	180.58	20.73

Table 10.23: Scale Distributions by Demographic Group—Free and Reduced Lunch, Fall 2013

Test Period	Content Area	FRL	N-Count	Min.	Max.	Mean	SD
Fall 2013	English II	No	1,253	139	250	205.85	18.96
		Yes	1,625	106	250	196.91	16.67
	Algebra I	No	2,969	100	250	206.82	22.99
		Yes	2,411	110	250	192.15	20.62
	Biology	No	1,482	142	250	206.16	23.28
		Yes	1,392	100	250	185.71	19.58
	English I	No	397	144	250	211.38	22.79
		Yes	497	144	250	192.63	20.62
	Algebra II	No	292	161	250	214.44	18.11
		Yes	118	161	250	204.53	19.48
	Geometry	No	608	142	250	215.93	24.10
		Yes	317	142	250	196.74	20.94
	Government	No	8,942	117	250	208.90	20.67
		Yes	6,299	100	250	194.18	19.06
	Am. History	No	1,007	125	250	201.27	24.06
		Yes	631	125	250	188.10	23.37

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Table 10.24: Scale Distributions by Demographic Group—Free and Reduced Lunch, Spring 2014

Test Period	Content Area	FRL	N-Count	Min.	Max.	Mean	SD
Spring 2014	English II	No	35,850	108	250	215.87	16.80
		Yes	25,949	108	250	204.57	16.97
	Algebra I	No	35,014	100	250	208.86	20.64
		Yes	28,080	100	250	195.56	19.93
	Biology	No	35,473	100	250	212.29	17.24
		Yes	25,756	100	250	200.07	18.19
	English I	No	34,006	100	250	210.84	21.07
		Yes	26,320	100	250	196.65	20.82
	Algebra II	No	18,038	147	250	210.56	20.38
		Yes	7,811	140	250	201.13	19.53
	Geometry	No	23,132	100	250	211.03	21.45
		Yes	12,578	100	250	200.00	20.28
	Government	No	26,566	114	250	210.98	19.78
		Yes	18,285	100	250	197.95	19.08
	Am. History	No	29,268	100	250	204.40	23.43
		Yes	20,806	100	250	189.53	22.87

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Table 10.25: Scale Score Distributions by Demographic Group—Limited English Proficient, Summer 2013

Test Period	Content Area	LEP	N-Count	Min.	Max.	Mean	SD
Summer 2013	English II	No	334	100	250	192.61	24.17
		Yes	20	158	225	193.50	19.19
	Algebra I	No	862	100	250	193.37	23.17
		Yes	26	111	232	178.46	24.53
	Biology	No	375	100	247	184.54	21.60
		Yes	--	--	--	--	--
	English I	No	396	139	249	187.86	20.12
		Yes	12	160	206	182.33	17.68
	Algebra II	No	94	160	227	189.66	15.71
		Yes	--	--	--	--	--
	Geometry	No	217	117	250	186.79	20.88
		Yes	--	--	--	--	--
	Government	No	829	142	250	201.81	21.09
		Yes	26	162	228	191.42	15.90
	Am. History	No	250	128	250	187.56	22.72
		Yes	--	--	--	--	--

Table 10.26: Scale Score Distributions by Demographic Group—Limited English Proficient, Fall 2013

Test Period	Content Area	LEP	N-Count	Min.	Max.	Mean	SD
Fall 2013	English II	No	2,788	106	250	201.18	18.23
		Yes	90	152	237	189.06	14.46
	Algebra I	No	5,250	100	250	200.46	23.13
		Yes	130	147	250	191.38	21.69
	Biology	No	2,829	100	250	196.53	23.82
		Yes	45	137	242	178.89	20.59
	English I	No	841	144	250	201.72	23.66
		Yes	53	153	229	188.74	17.26
	Algebra II	No	396	161	250	211.39	19.12
		Yes	14	194	250	217.07	15.89
	Geometry	No	906	142	250	209.60	24.79
		Yes	19	166	250	197.74	22.61
	Government	No	14,968	100	250	203.12	21.24
		Yes	273	154	250	186.20	17.01
	Am. History	No	1,603	125	250	196.44	24.61
		Yes	35	143	237	184.66	23.34

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Table 10.27: Scale Score Distributions by Demographic Group—Limited English Proficient, Spring 2014

Test Period	Content Area	LEP	N-Count	Min.	Max.	Mean	SD
Spring 2014	English II	No	60,613	108	250	211.41	17.69
		Yes	1,186	108	250	196.32	15.29
	Algebra I	No	61,676	100	250	203.15	21.37
		Yes	1,418	129	250	193.73	19.60
	Biology	No	60,070	100	250	207.46	18.52
		Yes	1,159	137	248	191.11	18.49
	English I	No	59,274	100	250	204.96	22.05
		Yes	1,052	100	250	187.10	17.86
	Algebra II	No	25,600	140	250	207.80	20.56
		Yes	249	152	250	198.51	21.75
	Geometry	No	35,183	100	250	207.35	21.64
		Yes	527	145	250	193.16	21.09
	Government	No	44,037	100	250	205.94	20.50
		Yes	814	143	250	191.37	16.01
	Am. History	No	49,242	100	250	198.52	24.27
		Yes	832	130	250	180.92	21.21

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Table 10.28: Scale Score Distributions by Demographic Group—Title I, Summer 2013

Test Period	Content Area	Title I	N-Count	Min.	Max.	Mean	SD
Summer 2013	English II	No	330	100	250	192.86	24.03
		Yes	24	125	225	189.88	22.26
	Algebra I	No	790	100	250	193.88	23.73
		Yes	98	148	232	185.33	18.26
	Biology	No	328	100	247	184.95	22.15
		Yes	54	156	234	181.94	16.42
	English I	No	359	139	249	189.10	20.17
		Yes	49	139	218	177.41	15.95
	Algebra II	No	83	160	227	187.89	15.62
		Yes	11	185	217	203.00	8.51
	Geometry	No	211	117	250	186.96	21.39
		Yes	12	161	206	184.75	11.04
	Government	No	808	142	250	201.90	21.17
		Yes	47	162	244	194.45	16.86
	Am. History	No	251	128	250	187.23	22.79
		Yes	--	--	--	--	--

Table 10.29: Scale Score Distributions by Demographic Group—Title I, Fall 2013

Test Period	Content Area	Title I	N-Count	Min.	Max.	Mean	SD
Fall 2013	English II	No	2,627	106	250	201.63	18.33
		Yes	251	126	244	192.08	14.77
	Algebra I	No	4,772	100	250	201.78	23.33
		Yes	608	141	250	188.15	17.37
	Biology	No	2,602	137	250	198.15	23.78
		Yes	272	100	223	178.15	15.80
	English I	No	700	144	250	203.58	23.68
		Yes	194	144	250	191.46	20.33
	Algebra II	No	399	161	250	211.98	18.93
		Yes	11	176	225	197.36	17.96
	Geometry	No	902	142	250	209.61	24.97
		Yes	23	179	230	199.22	13.10
	Government	No	14,217	100	250	203.68	21.14
		Yes	1,024	154	250	190.80	19.75
	Am. History	No	1,611	125	250	196.53	24.63
		Yes	27	148	205	175.93	14.80

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Table 10.30: Scale Score Distributions by Demographic Group—Title I, Spring 2014

Test Period	Content Area	Title I	N-Count	Min.	Max.	Mean	SD
Spring 2014	English II	No	57,192	108	250	211.96	17.62
		Yes	4,607	108	250	200.82	16.39
	Algebra I	No	56,642	100	250	204.04	21.16
		Yes	6,452	114	250	193.31	20.89
	Biology	No	56,880	100	250	208.19	18.20
		Yes	4,349	100	250	193.59	19.09
	English I	No	55,841	100	250	205.49	21.99
		Yes	4,485	100	250	194.18	20.89
	Algebra II	No	25,134	140	250	207.92	20.63
		Yes	715	147	250	200.29	17.75
	Geometry	No	34,511	100	250	207.40	21.67
		Yes	1,199	139	250	199.74	21.21
	Government	No	41,663	100	250	206.72	20.35
		Yes	3,188	143	250	191.91	17.65
	Am. History	No	47,237	100	250	199.22	24.13
		Yes	2,837	100	250	181.63	21.35

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Table 10.31: Scale Score Distributions by Demographic Group—Students with IEPs, Summer 2013

Test Period	Content Area	IEP	N-Count	Min.	Max.	Mean	SD
Summer 2013	English II	No	324	100	250	193.33	23.61
		Yes	30	105	248	185.40	26.08
	Algebra I	No	793	100	250	193.97	22.75
		Yes	95	100	242	184.31	26.34
	Biology	No	335	100	247	185.15	21.67
		Yes	47	130	218	180.04	19.34
	English I	No	363	139	249	189.12	19.52
		Yes	45	144	235	176.18	20.84
	Algebra II	No	83	160	227	189.88	15.53
		Yes	11	160	220	188.00	17.74
	Geometry	No	203	117	250	187.38	21.34
		Yes	20	150	221	181.40	16.04
	Government	No	797	142	250	202.43	21.01
		Yes	58	155	244	188.69	16.67
	Am. History	No	231	128	250	188.44	21.86
		Yes	26	139	243	175.73	26.46

Table 10.32: Scale Score Distributions by Demographic Group—Students with IEPs, Fall 2013

Test Period	Content Area	IEP	N-Count	Min.	Max.	Mean	SD
Fall 2013	English II	No	2,503	106	250	202.85	17.90
		Yes	375	126	227	187.11	14.19
	Algebra I	No	4,825	100	250	202.65	22.42
		Yes	555	100	250	179.31	18.21
	Biology	No	2,537	100	250	198.77	23.44
		Yes	337	150	247	177.30	17.80
	English I	No	792	149	250	203.45	22.85
		Yes	102	144	229	181.57	19.40
	Algebra II	No	401	161	250	211.86	18.91
		Yes	--	--	--	--	--
	Geometry	No	890	142	250	209.90	24.56
		Yes	35	142	250	195.43	26.97
	Government	No	13,722	139	250	204.58	20.81
		Yes	1,519	100	250	186.91	18.90
	Am. History	No	1,510	125	250	197.72	24.14
		Yes	128	125	250	178.13	23.30

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Table 10.33: Scale Score Distributions by Demographic Group—Students with IEPs, Spring 2014

Test Period	Content Area	IEP	N-Count	Min.	Max.	Mean	SD
Spring 2014	English II	No	55,855	108	250	213.21	16.59
		Yes	5,944	108	250	191.52	16.44
	Algebra I	No	56,747	100	250	205.12	20.58
		Yes	6,347	100	250	183.48	18.29
	Biology	No	55,169	100	250	209.21	17.52
		Yes	6,060	100	250	188.46	18.25
	English I	No	54,800	100	250	206.87	21.01
		Yes	5,526	100	250	182.71	20.70
	Algebra II	No	25,216	140	250	208.17	20.38
		Yes	633	147	250	189.32	20.65
	Geometry	No	33,808	100	250	208.18	21.25
		Yes	1,902	139	250	188.76	21.32
	Government	No	40,459	100	250	207.55	19.85
		Yes	4,392	100	250	188.33	18.42
	Am. History	No	45,570	100	250	199.94	23.82
		Yes	4,504	100	250	180.83	22.44

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Table 10.34: Scale Score Distributions by Demographic Group—Students with Accommodations, Summer 2013

Test Period	Content Area	Accom.	N-Count	Min.	Max.	Mean	SD
Summer 2013	English II	No	359	100	250	192.47	23.96
		Yes	--	--	--	--	--
	Algebra I	No	896	100	250	192.77	23.70
		Yes	--	--	--	--	--
	Biology	No	386	100	247	184.35	21.51
		Yes	--	--	--	--	--
	English I	No	410	139	249	187.59	20.07
		Yes	--	--	--	--	--
	Algebra II	No	95	160	227	189.63	15.63
		Yes	--	--	--	--	--
	Geometry	No	223	117	250	186.84	20.96
		Yes	--	--	--	--	--
	Government	No	872	142	250	201.40	20.95
		Yes	--	--	--	--	--
	Am. History	No	259	128	250	187.18	22.55
		Yes	--	--	--	--	--

Table 10.35: Scale Score Distributions by Demographic Group—Students with Accommodations, Fall 2013

Test Period	Content Area	Accom.	N-Count	Min.	Max.	Mean	SD
Fall 2013	English II	No	2,843	106	250	201.02	18.19
		Yes	45	161	214	186.09	14.41
	Algebra I	No	5,281	100	250	200.74	23.00
		Yes	143	147	225	178.73	15.83
	Biology	No	2,784	100	250	197.00	23.70
		Yes	101	146	234	174.07	16.01
	English I	No	877	144	250	201.44	23.33
		Yes	17	144	212	175.59	19.79
	Algebra II	No	409	161	250	211.64	19.00
		Yes	--	--	--	--	--
	Geometry	No	915	142	250	209.51	24.77
		Yes	11	171	248	195.27	21.60
	Government	No	14,696	117	250	203.58	21.08
		Yes	568	100	239	182.79	16.28
	Am. History	No	1,579	125	250	197.08	24.34
		Yes	61	138	227	172.87	20.59

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Table 10.36: Scale Score Distributions by Demographic Group—Students with Accommodations, Spring 2014

Test Period	Content Area	Accom.	N-Count	Min.	Max.	Mean	SD
Spring 2014	English II	No	60,052	108	250	211.78	17.35
		Yes	1,784	108	250	188.69	17.32
	Algebra I	No	60,356	100	250	203.97	21.01
		Yes	2,836	129	250	180.85	16.57
	Biology	No	58,103	100	250	208.32	18.02
		Yes	3,172	100	243	185.57	16.73
	English I	No	58,844	100	250	205.28	21.74
		Yes	1,523	100	250	179.98	22.23
	Algebra II	No	25,592	140	250	207.93	20.50
		Yes	259	147	250	186.00	18.24
	Geometry	No	34,995	100	250	207.62	21.48
		Yes	726	139	250	183.91	19.38
	Government	No	42,559	100	250	206.73	20.18
		Yes	2,328	137	250	186.08	16.50
	Am. History	No	47,863	100	250	199.22	24.03
		Yes	2,227	100	250	176.73	20.33

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Table 10.37: Achievement-Level Distributions—Gender, Summer 2013

Test Period	Content Area	Gender	Achievement Level	Freq.	%
Summer 2013	English II	Female	Below Basic	25	17.99
			Basic	47	33.81
			Proficient	50	35.97
			Advanced	17	12.23
			Total	139	100.00
		Male	Below Basic	68	30.91
			Basic	67	30.45
			Proficient	74	33.64
			Advanced	11	5.00
			Total	220	100.00
	Algebra I	Female	Below Basic	67	18.61
			Basic	146	40.56
			Proficient	105	29.17
			Advanced	42	11.67
			Total	360	100.00
		Male	Below Basic	128	23.88
			Basic	198	36.94
			Proficient	166	30.97
			Advanced	44	8.21
			Total	536	100.00
	Biology	Female	Below Basic	68	36.56
			Basic	72	38.71
			Proficient	36	19.35
			Advanced	10	5.38
			Total	186	100.00
		Male	Below Basic	76	38.00
			Basic	73	36.50
			Proficient	46	23.00
			Advanced	5	2.50
			Total	200	100.00

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Table 10.37 (continued): Achievement-Level Distributions—Gender, Summer 2013

Test Period	Content Area	Gender	Achievement Level	Freq.	%
Summer 2013	English I	Female	Below Basic	50	29.76
			Basic	67	39.88
			Proficient	37	22.02
			Advanced	14	8.33
			Total	168	100.00
		Male	Below Basic	75	30.99
			Basic	106	43.80
			Proficient	46	19.01
			Advanced	15	6.20
			Total	242	100.00
	Algebra II	Female	Below Basic	6	17.65
			Basic	19	55.88
			Proficient	9	26.47
			Advanced	--	--
			Total	34	100.00
		Male	Below Basic	16	26.23
			Basic	30	49.18
			Proficient	12	19.67
			Advanced	3	4.92
			Total	61	100.00
	Geometry	Female	Below Basic	44	40.74
			Basic	41	37.96
			Proficient	20	18.52
			Advanced	3	2.78
			Total	108	100.00
		Male	Below Basic	43	37.39
			Basic	36	31.30
			Proficient	24	20.87
			Advanced	12	10.43
			Total	115	100.00
	Government	Female	Below Basic	42	9.70
			Basic	159	36.72
			Proficient	173	39.95
			Advanced	59	13.63
			Total	433	100.00
		Male	Below Basic	59	13.44
			Basic	130	29.61
			Proficient	165	37.59
			Advanced	85	19.36
			Total	439	100.00
	Am. History	Female	Below Basic	52	40.94
			Basic	29	22.83
			Proficient	35	27.56
			Advanced	11	8.66
			Total	127	100.00
		Male	Below Basic	54	40.91
			Basic	31	23.48
			Proficient	35	26.52
			Advanced	12	9.09
			Total	132	100.00

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Table 10.38: Achievement-Level Distributions—Gender, Fall 2013

Test Period	Content Area	Gender	Achievement Level	Freq.	%
Fall 2013	English II	Female	Below Basic	104	7.98
			Basic	398	30.52
			Proficient	604	46.32
			Advanced	198	15.18
			Total	1,304	100.00
		Male	Below Basic	217	13.70
			Basic	549	34.66
			Proficient	651	41.10
			Advanced	167	10.54
			Total	1,584	100.00
	Algebra I	Female	Below Basic	360	13.49
			Basic	892	33.42
			Proficient	987	36.98
			Advanced	430	16.11
			Total	2,669	100.00
		Male	Below Basic	458	16.62
			Basic	886	32.16
			Proficient	944	34.26
			Advanced	467	16.95
			Total	2,755	100.00
	Biology	Female	Below Basic	269	20.60
			Basic	432	33.08
			Proficient	396	30.32
			Advanced	209	16.00
			Total	1,306	100.00
		Male	Below Basic	391	24.76
			Basic	519	32.87
			Proficient	467	29.58
			Advanced	202	12.79
			Total	1,579	100.00

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Table 10.38 (continued): Achievement-Level Distributions—Gender, Fall 2013

Test Period	Content Area	Gender	Achievement Level	Freq.	%
Fall 2013	English I	Female	Below Basic	55	12.64
			Basic	135	31.03
			Proficient	152	34.94
			Advanced	93	21.38
			Total	435	100.00
		Male	Below Basic	63	13.73
			Basic	187	40.74
			Proficient	143	31.15
			Advanced	66	14.38
			Total	459	100.00
	Algebra II	Female	Below Basic	18	8.29
			Basic	36	16.59
			Proficient	99	45.62
			Advanced	64	29.49
			Total	217	100.00
		Male	Below Basic	9	4.64
			Basic	31	15.98
			Proficient	94	48.45
			Advanced	60	30.93
			Total	194	100.00
	Geometry	Female	Below Basic	69	15.58
			Basic	123	27.77
			Proficient	107	24.15
			Advanced	144	32.51
			Total	443	100.00
		Male	Below Basic	39	8.07
			Basic	114	23.60
			Proficient	167	34.58
			Advanced	163	33.75
			Total	483	100.00
	Government	Female	Below Basic	1,038	13.63
			Basic	2,484	32.63
			Proficient	2,820	37.04
			Advanced	1,271	16.70
			Total	7,613	100.00
		Male	Below Basic	944	12.34
			Basic	2,172	28.39
			Proficient	2,901	37.92
			Advanced	1,634	21.36
			Total	7,651	100.00
	Am. History	Female	Below Basic	265	32.44
			Basic	230	28.15
			Proficient	217	26.56
			Advanced	105	12.85
			Total	817	100.00
		Male	Below Basic	194	23.57
			Basic	202	24.54
			Proficient	262	31.83
			Advanced	165	20.05
			Total	823	100.00

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Table 10.39: Achievement-Level Distributions—Gender, Spring 2014

Test Period	Content Area	Gender	Achievement Level	Freq.	%
Spring 2014	English II	Female	Below Basic	710	2.32
			Basic	5,507	17.96
			Proficient	14,113	46.02
			Advanced	10,335	33.70
			Total	30,665	100.00
		Male	Below Basic	1,567	5.03
			Basic	7,269	23.32
			Proficient	14,498	46.51
			Advanced	7,837	25.14
			Total	31,171	100.00
	Algebra I	Female	Below Basic	2,827	9.00
			Basic	11,235	35.75
			Proficient	11,534	36.70
			Advanced	5,828	18.55
			Total	31,424	100.00
		Male	Below Basic	3,415	10.75
			Basic	10,796	33.98
			Proficient	10,999	34.62
			Advanced	6,558	20.64
			Total	31,768	100.00
	Biology	Female	Below Basic	1,518	5.00
			Basic	7,903	26.02
			Proficient	14,517	47.80
			Advanced	6,430	21.17
			Total	30,368	100.00
		Male	Below Basic	1,817	5.88
			Basic	8,091	26.18
			Proficient	14,489	46.88
			Advanced	6,510	21.06
			Total	30,907	100.00

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Table 10.39 (continued): Achievement-Level Distributions—Gender, Spring 2014

Test Period	Content Area	Gender	Achievement Level	Freq.	%
Spring 2014	English I	Female	Below Basic	2,419	8.03
			Basic	8,909	29.56
			Proficient	11,663	38.70
			Advanced	7,149	23.72
			Total	30,140	100.00
		Male	Below Basic	3,380	11.18
			Basic	9,276	30.69
			Proficient	11,351	37.55
			Advanced	6,220	20.58
			Total	30,227	100.00
	Algebra II	Female	Below Basic	1,153	8.38
			Basic	4,232	30.76
			Proficient	5,398	39.23
			Advanced	2,977	21.64
			Total	13,760	100.00
		Male	Below Basic	842	6.96
			Basic	3,177	26.28
			Proficient	4,876	40.33
			Advanced	3,196	26.43
			Total	12,091	100.00
	Geometry	Female	Below Basic	2,051	11.19
			Basic	4,385	23.92
			Proficient	7,666	41.82
			Advanced	4,231	23.08
			Total	18,333	100.00
		Male	Below Basic	1,761	10.13
			Basic	3,855	22.17
			Proficient	7,306	42.02
			Advanced	4,466	25.68
			Total	17,388	100.00
	Government	Female	Below Basic	2,152	9.70
			Basic	6,557	29.56
			Proficient	9,194	41.45
			Advanced	4,276	19.28
			Total	22,179	100.00
		Male	Below Basic	2,029	8.94
			Basic	5,473	24.10
			Proficient	9,473	41.72
			Advanced	5,733	25.25
			Total	22,708	100.00
	Am. History	Female	Below Basic	7,187	29.09
			Basic	7,017	28.41
			Proficient	7,424	30.05
			Advanced	3,074	12.44
			Total	24,702	100.00
		Male	Below Basic	5,298	20.87
			Basic	6,448	25.40
			Proficient	8,356	32.91
			Advanced	5,286	20.82
			Total	25,388	100.00

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Table 10.40: Achievement-Level Distribution—Ethnicity, Summer 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Summer 2013	English II	American Indian/ Alaskan Native	Below Basic	1	100.00
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	1	100.00
		Asian	Below Basic	--	--
			Basic	4	66.67
			Proficient	2	33.33
			Advanced	--	--
			Total	6	100.00
		Pacific Islander	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
		Black (not Hispanic)	Below Basic	40	31.25
			Basic	48	37.50
			Proficient	36	28.13
			Advanced	4	3.13
			Total	128	100.00
		Hispanic	Below Basic	9	25.71
			Basic	6	17.14
			Proficient	16	45.71
			Advanced	4	11.43
			Total	35	100.00
		White (not Hispanic)	Below Basic	42	22.46
			Basic	55	29.41
			Proficient	70	37.43
			Advanced	20	10.70
			Total	187	100.00
		Multi-racial	Below Basic	1	50.00
			Basic	1	50.00
			Proficient	--	--
			Advanced	--	--
			Total	2	100.00

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Table 10.40 (continued): Achievement-Level Distributions—Ethnicity, Summer 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Summer 2013	Algebra I	American Indian/ Alaskan Native	Below Basic	1	25.00
			Basic	1	25.00
			Proficient	2	50.00
			Advanced	--	--
			Total	4	100.00
		Asian	Below Basic	2	13.33
			Basic	6	40.00
			Proficient	5	33.33
			Advanced	2	13.33
			Total	15	100.00
		Pacific Islander	Below Basic	1	33.33
			Basic	2	66.67
			Proficient	--	--
			Advanced	--	--
			Total	3	100.00
		Black (not Hispanic)	Below Basic	100	32.68
			Basic	136	44.44
			Proficient	63	20.59
			Advanced	7	2.29
			Total	306	100.00
		Hispanic	Below Basic	11	28.21
			Basic	14	35.90
			Proficient	11	28.21
			Advanced	3	7.69
			Total	39	100.00
		White (not Hispanic)	Below Basic	75	14.85
			Basic	176	34.85
			Proficient	181	35.84
			Advanced	73	14.46
			Total	505	100.00
		Multi-racial	Below Basic	5	20.83
			Basic	9	37.50
			Proficient	9	37.50
			Advanced	1	4.17
			Total	24	100.00

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Table 10.40 (continued): Achievement-Level Distributions—Ethnicity, Summer 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Summer 2013	Biology	American Indian/ Alaskan Native	Below Basic	1	20.00
			Basic	2	40.00
			Proficient	2	40.00
			Advanced	--	--
			Total	5	100.00
		Asian	Below Basic	1	20.00
			Basic	3	60.00
			Proficient	--	--
			Advanced	1	20.00
			Total	5	100.00
		Pacific Islander	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
		Black (not Hispanic)	Below Basic	72	53.33
			Basic	46	34.07
			Proficient	16	11.85
			Advanced	1	0.74
			Total	135	100.00
		Hispanic	Below Basic	5	21.74
			Basic	11	47.83
			Proficient	6	26.09
			Advanced	1	4.35
			Total	23	100.00
		White (not Hispanic)	Below Basic	63	29.17
			Basic	83	38.43
			Proficient	58	26.85
			Advanced	12	5.56
			Total	216	100.00
		Multi-racial	Below Basic	2	100.00
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	2	100.00

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Table 10.40 (continued): Achievement-Level Distributions—Ethnicity, Summer 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Summer 2013	English I	American Indian/ Alaskan Native	Below Basic	1	100.00
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	1	100.00
		Asian	Below Basic	1	25.00
			Basic	--	--
			Proficient	3	75.00
			Advanced	--	--
			Total	4	100.00
		Pacific Islander	Below Basic	--	--
			Basic	2	100.00
			Proficient	--	--
			Advanced	--	--
			Total	2	100.00
		Black (not Hispanic)	Below Basic	57	39.04
			Basic	62	42.47
			Proficient	22	15.07
			Advanced	5	3.42
			Total	146	100.00
		Hispanic	Below Basic	6	26.09
			Basic	12	52.17
			Proficient	4	17.39
			Advanced	1	4.35
			Total	23	100.00
		White (not Hispanic)	Below Basic	57	25.56
			Basic	94	42.15
			Proficient	51	22.87
			Advanced	21	9.42
			Total	223	100.00
		Multi-racial	Below Basic	3	27.27
			Basic	3	27.27
			Proficient	3	27.27
			Advanced	2	18.18
			Total	11	100.00

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Table 10.40 (continued): Achievement-Level Distributions—Ethnicity, Summer 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Summer 2013	Algebra II	American Indian/ Alaskan Native	Below Basic	--	--
			Basic	--	--
			Proficient	1	100.00
			Advanced	--	--
			Total	1	100.00
		Asian	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	1	100.00
			Total	1	100.00
		Pacific Islander	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
		Black (not Hispanic)	Below Basic	21	37.50
			Basic	31	55.36
			Proficient	3	5.36
			Advanced	1	1.79
			Total	56	100.00
		Hispanic	Below Basic	--	--
			Basic	1	20.00
			Proficient	4	80.00
			Advanced	--	--
			Total	5	100.00
		White (not Hispanic)	Below Basic	1	3.33
			Basic	16	53.33
			Proficient	12	40.00
			Advanced	1	3.33
			Total	30	100.00
		Multi-racial	Below Basic	--	--
			Basic	1	50.00
			Proficient	1	50.00
			Advanced	--	--
			Total	2	100.00

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Table 10.40 (continued): Achievement-Level Distributions—Ethnicity, Summer 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Summer 2013	Geometry	American Indian/ Alaskan Native	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
		Asian	Below Basic	1	25.00
			Basic	--	--
			Proficient	3	75.00
			Advanced	--	--
			Total	4	100.00
		Pacific Islander	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
		Black (not Hispanic)	Below Basic	60	56.60
			Basic	36	33.96
			Proficient	8	7.55
			Advanced	2	1.89
			Total	106	100.00
		Hispanic	Below Basic	6	50.00
			Basic	6	50.00
			Proficient	--	--
			Advanced	--	--
			Total	12	100.00
		White (not Hispanic)	Below Basic	20	21.51
			Basic	32	34.41
			Proficient	29	31.18
			Advanced	12	12.90
			Total	93	100.00
		Multi-racial	Below Basic	--	--
			Basic	3	37.50
			Proficient	4	50.00
			Advanced	1	12.50
			Total	8	100.00

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Table 10.40 (continued): Achievement-Level Distributions—Ethnicity, Summer 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Summer 2013	Government	American Indian/ Alaskan Native	Below Basic	1	12.50
			Basic	2	25.00
			Proficient	5	62.50
			Advanced	--	--
			Total	8	100.00
		Asian	Below Basic	1	3.03
			Basic	9	27.27
			Proficient	12	36.36
			Advanced	11	33.33
			Total	33	100.00
		Pacific Islander	Below Basic	--	--
			Basic	--	--
			Proficient	1	100.00
			Advanced	--	--
			Total	1	100.00
		Black (not Hispanic)	Below Basic	44	28.95
			Basic	56	36.84
			Proficient	44	28.95
			Advanced	8	5.26
			Total	152	100.00
		Hispanic	Below Basic	5	7.35
			Basic	34	50.00
			Proficient	25	36.76
			Advanced	4	5.88
			Total	68	100.00
		White (not Hispanic)	Below Basic	50	8.39
			Basic	182	30.54
			Proficient	245	41.11
			Advanced	119	19.97
			Total	596	100.00
		Multi-racial	Below Basic	--	--
			Basic	6	42.86
			Proficient	6	42.86
			Advanced	2	14.29
			Total	14	100.00

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Table 10.40 (continued): Achievement-Level Distributions—Ethnicity, Summer 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Summer 2013	Am. History	American Indian/ Alaskan Native	Below Basic	--	--
			Basic	1	100.00
			Proficient	--	--
			Advanced	--	--
			Total	1	100.00
		Asian	Below Basic	2	50.00
			Basic	--	--
			Proficient	2	50.00
			Advanced	--	--
			Total	4	100.00
		Pacific Islander	Below Basic	--	--
			Basic	1	100.00
			Proficient	--	--
			Advanced	--	--
			Total	1	100.00
		Black (not Hispanic)	Below Basic	55	67.07
			Basic	15	18.29
			Proficient	10	12.20
			Advanced	2	2.44
			Total	82	100.00
		Hispanic	Below Basic	9	69.23
			Basic	4	30.77
			Proficient	--	--
			Advanced	--	--
			Total	13	100.00
		White (not Hispanic)	Below Basic	38	24.68
			Basic	38	24.68
			Proficient	58	37.66
			Advanced	20	12.99
			Total	154	100.00
		Multi-racial	Below Basic	2	50.00
			Basic	1	25.00
			Proficient	--	--
			Advanced	1	25.00
			Total	4	100.00

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Table 10.41: Achievement-Level Distributions—Ethnicity, Fall 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Fall 2013	English II	American Indian/ Alaskan Native	Below Basic	1	9.09
			Basic	2	18.18
			Proficient	8	72.73
			Advanced	--	--
			Total	11	100.00
		Asian	Below Basic	5	10.87
			Basic	16	34.78
			Proficient	16	34.78
			Advanced	9	19.57
			Total	46	100.00
		Pacific Islander	Below Basic	1	25.00
			Basic	1	25.00
			Proficient	2	50.00
			Advanced	--	--
			Total	4	100.00
		Black (not Hispanic)	Below Basic	140	12.88
			Basic	431	39.65
			Proficient	428	39.37
			Advanced	88	8.10
			Total	1,087	100.00
		Hispanic	Below Basic	15	10.87
			Basic	62	44.93
			Proficient	54	39.13
			Advanced	7	5.07
			Total	138	100.00
		White (not Hispanic)	Below Basic	153	10.09
			Basic	416	27.42
			Proficient	708	46.67
			Advanced	240	15.82
			Total	1,517	100.00
		Multi-racial	Below Basic	6	7.06
			Basic	19	22.35
			Proficient	39	45.88
			Advanced	21	24.71
			Total	85	100.00

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Table 10.41 (continued): Achievement-Level Distributions—Ethnicity, Fall 2012

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Fall 2012	Algebra I	American Indian/ Alaskan Native	Below Basic	7	29.17
			Basic	8	33.33
			Proficient	8	33.33
			Advanced	1	4.17
			Total	24	100.00
		Asian	Below Basic	10	9.43
			Basic	15	14.15
			Proficient	36	33.96
			Advanced	45	42.45
			Total	106	100.00
		Pacific Islander	Below Basic	1	9.09
			Basic	4	36.36
			Proficient	5	45.45
			Advanced	1	9.09
			Total	11	100.00
		Black (not Hispanic)	Below Basic	299	26.55
			Basic	457	40.59
			Proficient	301	26.73
			Advanced	69	6.13
			Total	1,126	100.00
		Hispanic	Below Basic	36	15.86
			Basic	90	39.65
			Proficient	78	34.36
			Advanced	23	10.13
			Total	227	100.00
		White (not Hispanic)	Below Basic	454	11.77
			Basic	1,177	30.52
			Proficient	1,474	38.23
			Advanced	751	19.48
			Total	3,856	100.00
		Multi-racial	Below Basic	11	14.86
			Basic	27	36.49
			Proficient	29	39.19
			Advanced	7	9.46
			Total	74	100.00

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Table 10.41 (continued): Achievement-Level Distributions—Ethnicity, Fall 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Fall 2013	Biology	American Indian/ Alaskan Native	Below Basic	1	12.50
			Basic	1	12.50
			Proficient	6	75.00
			Advanced	--	--
			Total	8	100.00
		Asian	Below Basic	4	6.06
			Basic	9	13.64
			Proficient	22	33.33
			Advanced	31	46.97
			Total	66	100.00
		Pacific Islander	Below Basic	--	--
			Basic	1	33.33
			Proficient	2	66.67
			Advanced	--	--
			Total	3	100.00
		Black (not Hispanic)	Below Basic	327	42.69
			Basic	329	42.95
			Proficient	99	12.92
			Advanced	11	1.44
			Total	766	100.00
		Hispanic	Below Basic	26	21.14
			Basic	51	41.46
			Proficient	40	32.52
			Advanced	6	4.88
			Total	223	100.00
		White (not Hispanic)	Below Basic	290	15.69
			Basic	538	29.11
			Proficient	670	36.26
			Advanced	350	18.94
			Total	1,848	100.00
		Multi-racial	Below Basic	12	16.90
			Basic	22	30.99
			Proficient	24	33.80
			Advanced	13	18.31
			Total	71	100.00

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Table 10.41 (continued): Achievement-Level Distributions—Ethnicity, Fall 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Fall 2013	English I	American Indian/ Alaskan Native	Below Basic	--	--
			Basic	1	33.33
			Proficient	2	66.67
			Advanced	--	--
			Total	3	100.00
		Asian	Below Basic	1	7.69
			Basic	5	38.46
			Proficient	6	46.15
			Advanced	1	7.69
			Total	13	100.00
		Pacific Islander	Below Basic	1	20.00
			Basic	1	20.00
			Proficient	2	40.00
			Advanced	1	20.00
			Total	5	100.00
		Black (not Hispanic)	Below Basic	46	25.56
			Basic	88	48.89
			Proficient	41	22.78
			Advanced	5	2.78
			Total	180	100.00
		Hispanic	Below Basic	12	14.29
			Basic	33	39.29
			Proficient	28	33.33
			Advanced	11	13.10
			Total	84	100.00
		White (not Hispanic)	Below Basic	54	9.14
			Basic	186	31.47
			Proficient	212	35.87
			Advanced	139	23.52
			Total	591	100.00
		Multi-racial	Below Basic	4	22.22
			Basic	8	44.44
			Proficient	4	22.22
			Advanced	2	11.11
			Total	18	100.00

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Table 10.41 (continued): Achievement-Level Distributions—Ethnicity, Fall 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Fall 2013	Algebra II	American Indian/ Alaskan Native	Below Basic	--	--
			Basic	--	--
			Proficient	1	50.00
			Advanced	1	50.00
			Total	2	100.00
		Asian	Below Basic	--	--
			Basic	2	12.50
			Proficient	5	31.25
			Advanced	9	56.25
			Total	16	100.00
		Pacific Islander	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
		Black (not Hispanic)	Below Basic	8	16.00
			Basic	14	28.00
			Proficient	22	44.00
			Advanced	6	12.00
			Total	50	100.00
		Hispanic	Below Basic	2	6.67
			Basic	3	10.00
			Proficient	19	63.33
			Advanced	6	20.00
			Total	30	100.00
		White (not Hispanic)	Below Basic	16	5.37
			Basic	45	15.10
			Proficient	142	47.65
			Advanced	95	31.88
			Total	298	100.00
		Multi-racial	Below Basic	1	6.67
			Basic	3	20.00
			Proficient	4	26.67
			Advanced	7	46.67
			Total	15	100.00

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Table 10.41 (continued): Achievement-Level Distributions—Ethnicity, Fall 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Fall 2013	Geometry	American Indian/ Alaskan Native	Below Basic	--	--
			Basic	--	--
			Proficient	1	50.00
			Advanced	1	50.00
			Total	2	100.00
		Asian	Below Basic	1	4.17
			Basic	3	12.50
			Proficient	4	16.67
			Advanced	16	66.67
			Total	24	100.00
		Pacific Islander	Below Basic	--	--
			Basic	1	100.00
			Proficient	--	--
			Advanced	1	100.00
			Total	2	100.00
		Black (not Hispanic)	Below Basic	25	21.93
			Basic	49	42.98
			Proficient	28	24.56
			Advanced	12	10.53
			Total	114	100.00
		Hispanic	Below Basic	3	4.35
			Basic	21	30.43
			Proficient	20	28.99
			Advanced	25	36.23
			Total	69	100.00
		White (not Hispanic)	Below Basic	77	11.18
			Basic	158	22.93
			Proficient	211	30.62
			Advanced	243	35.27
			Total	689	100.00
		Multi-racial	Below Basic	2	7.69
			Basic	5	19.23
			Proficient	10	38.46
			Advanced	9	34.62
			Total	26	100.00

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Table 10.41 (continued): Achievement-Level Distributions—Ethnicity, Fall 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Fall 2013	Government	American Indian/ Alaskan Native	Below Basic	3	5.00
			Basic	17	28.33
			Proficient	33	55.00
			Advanced	7	11.67
			Total	60	100.00
		Asian	Below Basic	27	6.75
			Basic	84	21.00
			Proficient	130	32.50
			Advanced	159	39.75
			Total	400	100.00
		Pacific Islander	Below Basic	4	14.81
			Basic	14	51.85
			Proficient	5	18.52
			Advanced	4	14.81
			Total	27	100.00
		Black (not Hispanic)	Below Basic	802	27.76
			Basic	1,146	39.67
			Proficient	784	27.14
			Advanced	157	5.43
			Total	2,889	100.00
		Hispanic	Below Basic	128	18.99
			Basic	234	34.72
			Proficient	226	33.53
			Advanced	86	12.76
			Total	674	100.00
		White (not Hispanic)	Below Basic	989	9.02
			Basic	3,084	28.13
			Proficient	4,446	40.55
			Advanced	2,444	22.29
			Total	10,963	100.00
		Multi-racial	Below Basic	29	11.55
			Basic	77	30.68
			Proficient	97	38.65
			Advanced	48	19.12
			Total	251	100.00

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Table 10.41 (continued): Achievement-Level Distributions—Ethnicity, Fall 2013

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Fall 2013	Am. History	American Indian/ Alaskan Native	Below Basic	1	16.67
			Basic	2	33.33
			Proficient	2	33.33
			Advanced	1	16.67
			Total	6	100.00
		Asian	Below Basic	6	20.69
			Basic	13	44.83
			Proficient	7	24.14
			Advanced	3	10.34
			Total	29	100.00
		Pacific Islander	Below Basic	--	--
			Basic	1	50.00
			Proficient	1	50.00
			Advanced	--	--
			Total	2	100.00
		Black (not Hispanic)	Below Basic	99	47.83
			Basic	60	28.99
			Proficient	33	15.94
			Advanced	15	7.25
			Total	207	100.00
		Hispanic	Below Basic	34	37.36
			Basic	27	29.67
			Proficient	22	24.18
			Advanced	8	8.79
			Total	91	100.00
		White (not Hispanic)	Below Basic	315	24.69
			Basic	318	24.92
			Proficient	407	31.90
			Advanced	236	18.50
			Total	1,276	100.00
		Multi-racial	Below Basic	4	13.79
			Basic	11	37.93
			Proficient	7	24.14
			Advanced	7	24.14
			Total	29	100.00

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Table 10.42: Achievement-Level Distributions—Ethnicity, Spring 2014

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Spring 2014	English II	American Indian/ Alaskan Native	Below Basic	13	4.38
			Basic	79	26.60
			Proficient	139	46.80
			Advanced	66	22.22
			Total	297	100.00
		Asian	Below Basic	44	3.85
			Basic	177	15.47
			Proficient	430	37.59
			Advanced	493	43.09
			Total	1,144	100.00
		Pacific Islander	Below Basic	9	6.87
			Basic	44	33.59
			Proficient	53	40.46
			Advanced	25	19.08
			Total	131	100.00
		Black (not Hispanic)	Below Basic	724	8.19
			Basic	3,187	36.05
			Proficient	3,913	44.26
			Advanced	1,017	11.50
			Total	8,841	100.00
		Hispanic	Below Basic	127	4.83
			Basic	702	26.68
			Proficient	1,291	49.07
			Advanced	511	19.42
			Total	2,631	100.00
		White (not Hispanic)	Below Basic	1,317	2.76
			Basic	8,366	17.55
			Proficient	22,239	46.65
			Advanced	15,745	33.03
			Total	47,667	100.00
		Multi-racial	Below Basic	43	3.82
			Basic	221	19.64
			Proficient	546	48.53
			Advanced	315	28.00
			Total	1,125	100.00

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Table 10.42 (continued): Achievement-Level Distributions—Ethnicity, Spring 2014

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Spring 2014	Algebra I	American Indian/ Alaskan Native	Below Basic	33	11.46
			Basic	107	37.15
			Proficient	101	35.07
			Advanced	47	16.32
			Total	288	100.00
		Asian	Below Basic	52	4.33
			Basic	249	20.73
			Proficient	389	32.39
			Advanced	511	42.55
			Total	1,201	100.00
		Pacific Islander	Below Basic	19	16.38
			Basic	53	45.69
			Proficient	34	29.31
			Advanced	10	8.62
			Total	116	100.00
		Black (not Hispanic)	Below Basic	2,071	22.12
			Basic	4,607	49.21
			Proficient	2,201	23.51
			Advanced	483	5.16
			Total	9,362	100.00
		Hispanic	Below Basic	314	10.67
			Basic	1,161	39.46
			Proficient	1,009	34.30
			Advanced	458	15.57
			Total	2,942	100.00
		White (not Hispanic)	Below Basic	3,641	7.56
			Basic	15,462	32.12
			Proficient	18,364	38.15
			Advanced	10,669	22.16
			Total	48,136	100.00
		Multi-racial	Below Basic	112	9.76
			Basic	392	34.18
			Proficient	435	37.93
			Advanced	208	18.13
			Total	1,147	100.00

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Table 10.42 (continued): Achievement-Level Distributions—Ethnicity, Spring 2014

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Spring 2014	Biology	American Indian/ Alaskan Native	Below Basic	18	6.34
			Basic	76	26.76
			Proficient	146	51.41
			Advanced	44	15.49
			Total	284	100.00
		Asian	Below Basic	73	6.40
			Basic	191	16.74
			Proficient	448	39.26
			Advanced	429	37.60
			Total	1,141	100.00
		Pacific Islander	Below Basic	10	8.33
			Basic	46	38.33
			Proficient	47	39.17
			Advanced	17	14.17
			Total	120	100.00
		Black (not Hispanic)	Below Basic	1,445	16.01
			Basic	3,983	44.13
			Proficient	3,060	33.91
			Advanced	537	5.95
			Total	9,025	100.00
		Hispanic	Below Basic	217	8.31
			Basic	845	32.36
			Proficient	1,208	46.27
			Advanced	341	13.06
			Total	2,611	100.00
		White (not Hispanic)	Below Basic	1,516	3.23
			Basic	10,543	22.45
			Proficient	23,555	50.17
			Advanced	11,341	24.15
			Total	46,955	100.00
		Multi-racial	Below Basic	56	4.92
			Basic	310	27.22
			Proficient	542	47.59
			Advanced	231	20.28
			Total	1,139	100.00

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Table 10.42 (continued): Achievement-Level Distributions—Ethnicity, Spring 2014

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Spring 2014	English I	American Indian/ Alaskan Native	Below Basic	31	11.40
			Basic	69	25.37
			Proficient	118	43.38
			Advanced	54	19.85
			Total	272	100.00
		Asian	Below Basic	79	7.08
			Basic	204	18.28
			Proficient	412	36.92
			Advanced	421	37.72
			Total	1,116	100.00
		Pacific Islander	Below Basic	20	18.69
			Basic	43	40.19
			Proficient	36	33.64
			Advanced	--	--
			Total	107	100.00
		Black (not Hispanic)	Below Basic	1,616	19.69
			Basic	3,655	44.54
			Proficient	2,316	28.22
			Advanced	619	7.54
			Total	8,206	100.00
		Hispanic	Below Basic	321	11.91
			Basic	1,039	38.55
			Proficient	941	34.92
			Advanced	394	14.62
			Total	2,695	100.00
		White (not Hispanic)	Below Basic	3,619	7.73
			Basic	12,794	27.33
			Proficient	18,778	40.12
			Advanced	11,616	24.82
			Total	48,807	100.00
		Multi-racial	Below Basic	113	9.71
			Basic	381	32.73
			Proficient	413	35.48
			Advanced	257	22.08
			Total	1,164	100.00

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Table 10.42 (continued): Achievement-Level Distributions—Ethnicity, Spring 2014

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Spring 2014	Algebra II	American Indian/ Alaskan Native	Below Basic	12	11.01
			Basic	33	30.28
			Proficient	43	39.45
			Advanced	21	19.27
			Total	109	100.00
		Asian	Below Basic	15	2.84
			Basic	89	16.86
			Proficient	171	32.39
			Advanced	253	47.92
			Total	528	100.00
		Pacific Islander	Below Basic	6	10.53
			Basic	19	33.33
			Proficient	20	35.09
			Advanced	12	21.05
			Total	57	100.00
		Black (not Hispanic)	Below Basic	524	22.69
			Basic	884	38.28
			Proficient	715	30.97
			Advanced	186	8.06
			Total	2,309	100.00
		Hispanic	Below Basic	100	10.27
			Basic	343	35.22
			Proficient	353	36.24
			Advanced	178	18.28
			Total	974	100.00
		White (not Hispanic)	Below Basic	1,302	6.06
			Basic	5,920	27.58
			Proficient	8,820	41.08
			Advanced	5,426	25.27
			Total	21,468	100.00
		Multi-racial	Below Basic	36	8.87
			Basic	121	29.80
			Proficient	152	37.44
			Advanced	97	23.89
			Total	406	100.00

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Table 10.42 (continued): Achievement-Level Distributions—Ethnicity, Spring 2014

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Spring 2014	Geometry	American Indian/ Alaskan Native	Below Basic	30	15.54
			Basic	49	25.39
			Proficient	81	41.97
			Advanced	33	17.10
			Total	193	100.00
		Asian	Below Basic	45	6.10
			Basic	108	14.63
			Proficient	240	32.52
			Advanced	345	46.75
			Total	738	100.00
		Pacific Islander	Below Basic	21	22.34
			Basic	24	25.53
			Proficient	36	38.30
			Advanced	13	13.83
			Total	94	100.00
		Black (not Hispanic)	Below Basic	1,026	27.92
			Basic	1,263	34.37
			Proficient	1,103	30.01
			Advanced	283	7.70
			Total	3,675	100.00
		Hispanic	Below Basic	240	16.23
			Basic	407	27.52
			Proficient	603	40.77
			Advanced	229	15.48
			Total	1,479	100.00
		White (not Hispanic)	Below Basic	2,357	8.17
			Basic	6,199	21.49
			Proficient	12,637	43.81
			Advanced	7,651	26.53
			Total	28,844	100.00
		Multi-racial	Below Basic	93	13.32
			Basic	190	27.22
			Proficient	272	38.97
			Advanced	143	20.49
			Total	698	100.00

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Table 10.42 (continued): Achievement-Level Distributions—Ethnicity, Spring 2014

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Spring 2014	Government	American Indian/ Alaskan Native	Below Basic	18	9.57
			Basic	52	27.66
			Proficient	78	41.49
			Advanced	40	21.28
			Total	188	100.00
		Asian	Below Basic	57	6.91
			Basic	175	21.21
			Proficient	338	40.97
			Advanced	255	30.91
			Total	825	100.00
		Pacific Islander	Below Basic	13	16.88
			Basic	32	41.56
			Proficient	25	32.47
			Advanced	7	9.09
			Total	77	100.00
		Black (not Hispanic)	Below Basic	1,320	21.62
			Basic	2,408	39.44
			Proficient	1,934	31.68
			Advanced	443	7.26
			Total	6,105	100.00
		Hispanic	Below Basic	222	12.14
			Basic	545	29.81
			Proficient	751	41.08
			Advanced	310	16.96
			Total	1,828	100.00
		White (not Hispanic)	Below Basic	2,475	7.05
			Basic	8,612	24.53
			Proficient	15,228	43.38
			Advanced	8,790	25.04
			Total	35,105	100.00
		Multi-racial	Below Basic	76	10.01
			Basic	206	27.14
			Proficient	313	41.24
			Advanced	164	21.61
			Total	759	100.00

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Table 10.42 (continued): Achievement-Level Distributions—Ethnicity, Spring 2014

Test Period	Content Area	Ethnicity	Achievement Level	Freq.	%
Spring 2014	Am. History	American Indian/ Alaskan Native	Below Basic	59	24.79
			Basic	63	26.47
			Proficient	74	31.09
			Advanced	42	17.65
			Total	238	100.00
		Asian	Below Basic	167	17.78
			Basic	190	20.23
			Proficient	284	30.24
			Advanced	298	31.74
			Total	939	100.00
		Pacific Islander	Below Basic	34	35.42
			Basic	25	26.04
			Proficient	26	27.08
			Advanced	11	11.46
			Total	96	100.00
		Black (not Hispanic)	Below Basic	3,093	45.70
			Basic	1,949	28.80
			Proficient	1,347	19.90
			Advanced	379	5.60
			Total	6,768	100.00
		Hispanic	Below Basic	661	31.89
			Basic	637	30.73
			Proficient	559	26.97
			Advanced	216	10.42
			Total	2,073	100.00
		White (not Hispanic)	Below Basic	8,255	21.11
			Basic	10,358	26.49
			Proficient	13,213	33.79
			Advanced	7,273	18.60
			Total	39,099	100.00
		Multi-racial	Below Basic	216	24.63
			Basic	243	27.71
			Proficient	277	31.58
			Advanced	141	16.08
			Total	877	100.00

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Table 10.43: Achievement-Level Distributions—Migrant, Summer 2013

Test Period	Content Area	Migrant	Achievement Level	Freq.	%
Summer 2013	English II	No	Below Basic	90	25.42
			Basic	114	32.20
			Proficient	122	34.46
			Advanced	28	7.91
			Total	354	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Algebra I	No	Below Basic	191	21.51
			Basic	343	38.63
			Proficient	269	30.29
			Advanced	85	9.57
			Total	888	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Biology	No	Below Basic	142	37.17
			Basic	143	37.43
			Proficient	82	21.47
			Advanced	15	3.93
			Total	382	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--

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Table 10.43 (continued): Achievement-Level Distributions—Migrant, Summer 2013

Test Period	Content Area	Migrant	Achievement Level	Freq.	%
Summer 2013	English I	No	Below Basic	122	29.98
			Basic	173	42.51
			Proficient	83	20.39
			Advanced	29	7.13
			Total	407	100.00
		Yes	Below Basic	1	100.00
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	1	100.00
	Algebra II	No	Below Basic	22	23.40
			Basic	48	51.06
			Proficient	21	22.34
			Advanced	3	3.19
			Total	94	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Geometry	No	Below Basic	87	39.01
			Basic	77	34.53
			Proficient	44	19.73
			Advanced	15	6.73
			Total	223	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Government	No	Below Basic	99	11.58
			Basic	282	32.98
			Proficient	331	38.71
			Advanced	143	16.73
			Total	855	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Am. History	No	Below Basic	106	41.25
			Basic	58	22.57
			Proficient	70	27.24
			Advanced	23	8.95
			Total	257	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--

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Table 10.44: Achievement-Level Distributions—Migrant, Fall 2013

Test Period	Content Area	Migrant	Achievement Level	Freq.	%
Fall 2013	English II	No	Below Basic	321	11.15
			Basic	941	32.70
			Proficient	1,251	43.47
			Advanced	365	12.68
			Total	2,878	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Algebra I	No	Below Basic	810	15.06
			Basic	1,753	32.58
			Proficient	1,920	35.69
			Advanced	897	16.67
			Total	5,380	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Biology	No	Below Basic	655	22.80
			Basic	944	32.86
			Proficient	863	30.04
			Advanced	411	14.31
			Total	2,873	100.00
		Yes	Below Basic	1	100.00
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	1	100.00

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Table 10.44 (continued): Achievement-Level Distributions—Migrant, Fall 2013

Test Period	Content Area	Migrant	Achievement Level	Freq.	%
Fall 2013	English I	No	Below Basic	118	13.20
			Basic	322	36.02
			Proficient	295	33.00
			Advanced	159	17.79
			Total	894	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Algebra II	No	Below Basic	27	6.59
			Basic	66	16.10
			Proficient	193	47.07
			Advanced	124	30.24
			Total	410	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Geometry	No	Below Basic	108	11.68
			Basic	237	25.62
			Proficient	273	29.51
			Advanced	307	33.19
			Total	925	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Government	No	Below Basic	1,980	12.99
			Basic	4,641	30.46
			Proficient	5,715	37.50
			Advanced	2,902	19.04
			Total	15,238	100.00
		Yes	Below Basic	--	--
			Basic	2	66.67
			Proficient	--	--
			Advanced	1	33.33
			Total	3	100.00
	Am. History	No	Below Basic	458	27.96
			Basic	432	26.37
			Proficient	478	29.18
			Advanced	270	16.48
			Total	1,638	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--

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Table 10.45: Achievement-Level Distributions—Migrant, Spring 2014

Test Period	Content Area	Migrant	Achievement Level	Freq.	%
Spring 2014	English II	No	Below Basic	2,267	3.67
			Basic	12,745	20.63
			Proficient	28,597	46.29
			Advanced	18,166	29.41
			Total	61,775	100.00
		Yes	Below Basic	5	20.83
			Basic	14	58.33
			Proficient	3	12.50
			Advanced	2	8.33
			Total	24	100.00
	Algebra I	No	Below Basic	6,220	9.86
			Basic	21,972	34.84
			Proficient	22,503	35.68
			Advanced	12,372	19.62
			Total	63,067	100.00
		Yes	Below Basic	10	37.04
			Basic	10	37.04
			Proficient	6	22.22
			Advanced	1	3.70
			Total	27	100.00
	Biology	No	Below Basic	3,320	5.42
			Basic	15,966	26.08
			Proficient	28,991	47.36
			Advanced	12,938	21.14
			Total	61,215	100.00
		Yes	Below Basic	4	28.57
			Basic	8	57.14
			Proficient	2	14.29
			Advanced	--	--
			Total	14	100.00

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Table 10.45 (continued): Achievement-Level Distributions—Migrant, Spring 2014

Test Period	Content Area	Migrant	Achievement Level	Freq.	%
Spring 2014	English I	No	Below Basic	5,783	9.59
			Basic	18,159	30.11
			Proficient	23,000	38.14
			Advanced	13,365	22.16
			Total	60,307	100.00
		Yes	Below Basic	5	26.32
			Basic	11	57.89
			Proficient	2	10.53
			Advanced	1	5.26
			Total	19	100.00
	Algebra II	No	Below Basic	1,994	7.71
			Basic	7,408	28.66
			Proficient	10,273	39.74
			Advanced	6,173	23.88
			Total	25,848	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	1	100.00
			Advanced	--	--
			Total	1	100.00
	Geometry	No	Below Basic	3,807	10.66
			Basic	8,233	23.06
			Proficient	14,967	41.92
			Advanced	8,695	24.35
			Total	35,702	100.00
		Yes	Below Basic	3	37.50
			Basic	4	50.00
			Proficient	--	--
			Advanced	1	12.50
			Total	4	100.00
	Government	No	Below Basic	4,169	9.30
			Basic	12,010	26.79
			Proficient	18,650	41.60
			Advanced	10,004	22.31
			Total	44,833	100.00
		Yes	Below Basic	6	33.33
			Basic	4	22.22
			Proficient	7	38.89
			Advanced	1	5.56
			Total	18	100.00
	Am. History	No	Below Basic	12,469	24.91
			Basic	13,459	26.89
			Proficient	15,771	31.51
			Advanced	8,357	16.70
			Total	50,056	100.00
		Yes	Below Basic	10	55.56
			Basic	3	16.67
			Proficient	4	22.22
			Advanced	1	5.56
			Total	18	100.00

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Table 10.46: Achievement-Level Distributions—Free and Reduced Lunch, Summer 2013

Test Period	Content Area	FRL	Achievement Level	Freq.	%
Summer 2013	English II	No	Below Basic	26	17.69
			Basic	52	35.37
			Proficient	56	38.10
			Advanced	13	8.84
			Total	147	100.00
		Yes	Below Basic	64	30.92
			Basic	62	29.95
			Proficient	66	31.88
			Advanced	15	7.25
			Total	207	100.00
	Algebra I	No	Below Basic	64	14.16
			Basic	159	35.18
			Proficient	168	37.17
			Advanced	61	13.50
			Total	452	100.00
		Yes	Below Basic	127	29.13
			Basic	184	42.20
			Proficient	101	23.17
			Advanced	24	5.50
			Total	436	100.00
	Biology	No	Below Basic	51	31.29
			Basic	59	36.20
			Proficient	42	25.77
			Advanced	11	6.75
			Total	163	100.00
		Yes	Below Basic	91	41.55
			Basic	84	38.36
			Proficient	40	18.26
			Advanced	4	1.83
			Total	219	100.00

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Table 10.46 (continued): Achievement-Level Distributions—Free and Reduced Lunch, Summer 2013

Test Period	Content Area	FRL	Achievement Level	Freq.	%
Summer 2013	English I	No	Below Basic	43	25.00
			Basic	67	38.95
			Proficient	44	25.58
			Advanced	18	10.47
			Total	172	100.00
		Yes	Below Basic	80	33.90
			Basic	106	44.92
			Proficient	39	16.53
			Advanced	11	4.66
			Total	236	100.00
	Algebra II	No	Below Basic	8	19.51
			Basic	18	43.90
			Proficient	14	34.15
			Advanced	1	2.44
			Total	41	100.00
		Yes	Below Basic	14	26.42
			Basic	30	56.60
			Proficient	7	13.21
			Advanced	2	3.77
			Total	53	100.00
	Geometry	No	Below Basic	36	32.14
			Basic	40	35.71
			Proficient	25	22.32
			Advanced	11	9.82
			Total	112	100.00
		Yes	Below Basic	51	45.95
			Basic	37	33.33
			Proficient	19	17.12
			Advanced	4	3.60
			Total	111	100.00
	Government	No	Below Basic	37	7.52
			Basic	126	25.61
			Proficient	210	42.68
			Advanced	119	24.19
			Total	492	100.00
		Yes	Below Basic	62	17.08
			Basic	156	42.98
			Proficient	121	33.33
			Advanced	24	6.61
			Total	363	100.00
	Am. History	No	Below Basic	32	26.45
			Basic	27	22.31
			Proficient	46	38.02
			Advanced	16	13.22
			Total	121	100.00
		Yes	Below Basic	74	54.41
			Basic	31	22.79
			Proficient	24	17.65
			Advanced	7	5.15
			Total	136	100.00

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Table 10.47: Achievement-Level Distributions—Free and Reduced Lunch, Fall 2013

Test Period	Content Area	FRL	Achievement Level	Freq.	%
Fall 2013	English II	No	Below Basic	103	8.22
			Basic	304	24.26
			Proficient	593	47.33
			Advanced	253	20.19
			Total	1,253	100.00
		Yes	Below Basic	218	13.42
			Basic	637	39.20
			Proficient	658	40.49
			Advanced	112	6.89
			Total	1,625	100.00
	Algebra I	No	Below Basic	268	9.03
			Basic	765	25.77
			Proficient	1,215	40.92
			Advanced	721	24.28
			Total	2,969	100.00
		Yes	Below Basic	542	22.48
			Basic	988	40.98
			Proficient	705	29.24
			Advanced	176	7.30
			Total	2,411	100.00
	Biology	No	Below Basic	183	12.35
			Basic	373	25.17
			Proficient	562	37.92
			Advanced	364	24.56
			Total	1,482	100.00
		Yes	Below Basic	473	33.98
			Basic	571	41.02
			Proficient	301	21.62
			Advanced	47	3.38
			Total	1,392	100.00

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Table 10.47 (continued): Achievement-Level Distributions—Free and Reduced Lunch, Fall 2013

Test Period	Content Area	FRL	Achievement Level	Freq.	%
Fall 2013	English I	No	Below Basic	25	6.30
			Basic	99	24.94
			Proficient	146	36.78
			Advanced	127	31.99
			Total	397	100.00
		Yes	Below Basic	93	18.71
			Basic	223	44.87
			Proficient	149	29.98
			Advanced	32	6.44
			Total	497	100.00
	Algebra II	No	Below Basic	11	3.77
			Basic	42	14.38
			Proficient	136	46.58
			Advanced	103	35.27
			Total	292	100.00
		Yes	Below Basic	16	13.56
			Basic	24	20.34
			Proficient	57	48.31
			Advanced	21	17.80
			Total	118	100.00
	Geometry	No	Below Basic	42	6.91
			Basic	123	20.23
			Proficient	178	29.28
			Advanced	265	43.59
			Total	608	100.00
		Yes	Below Basic	66	20.82
			Basic	114	35.96
			Proficient	95	29.97
			Advanced	42	13.25
			Total	317	100.00
	Government	No	Below Basic	618	6.91
			Basic	2,211	24.73
			Proficient	3,719	41.59
			Advanced	2,394	26.77
			Total	8,942	100.00
		Yes	Below Basic	1,362	21.62
			Basic	2,432	38.61
			Proficient	1,996	31.69
			Advanced	1,362	21.62
			Total	6,299	100.00
	Am. History	No	Below Basic	208	20.66
			Basic	252	25.02
			Proficient	334	33.17
			Advanced	213	21.15
			Total	1,007	100.00
		Yes	Below Basic	250	39.62
			Basic	180	28.53
			Proficient	144	22.82
			Advanced	57	9.03
			Total	631	100.00

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Table 10.48: Achievement-Level Distributions—Free and Reduced Lunch, Spring 2014

Test Period	Content Area	FRL	Achievement Level	Freq.	%
Spring 2014	English II	No	Below Basic	612	1.71
			Basic	4,837	13.49
			Proficient	16,512	46.06
			Advanced	13,889	38.74
			Total	35,850	100.00
		Yes	Below Basic	1,660	6.40
			Basic	7,922	30.53
			Proficient	12,088	46.58
			Advanced	4,279	16.49
			Total	25,949	100.00
	Algebra I	No	Below Basic	1,810	5.17
			Basic	9,709	27.73
			Proficient	13,970	39.90
			Advanced	9,525	27.20
			Total	35,014	100.00
		Yes	Below Basic	4,420	15.74
			Basic	12,273	43.71
			Proficient	8,539	30.41
			Advanced	2,848	10.14
			Total	28,080	100.00
	Biology	No	Below Basic	865	2.44
			Basic	6,505	18.34
			Proficient	17,914	50.50
			Advanced	10,189	28.72
			Total	35,473	100.00
		Yes	Below Basic	2,459	9.55
			Basic	9,469	36.76
			Proficient	11,079	43.02
			Advanced	2,749	10.67
			Total	25,756	100.00

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Table 10.48 (continued): Achievement-Level Distributions—Free and Reduced Lunch, Spring 2014

Test Period	Content Area	FRL	Achievement Level	Freq.	%
Spring 2014	English I	No	Below Basic	1,705	5.01
			Basic	7,758	22.81
			Proficient	14,243	41.88
			Advanced	10,300	30.29
			Total	34,006	100.00
		Yes	Below Basic	4,083	15.51
			Basic	10,412	39.56
			Proficient	8,759	33.28
			Advanced	3,066	11.65
			Total	26,320	100.00
	Algebra II	No	Below Basic	981	5.44
			Basic	4,603	25.52
			Proficient	7,415	41.11
			Advanced	5,039	27.94
			Total	18,038	100.00
		Yes	Below Basic	1,013	12.97
			Basic	2,805	35.91
			Proficient	2,859	36.60
			Advanced	1,134	14.52
			Total	7,811	100.00
	Geometry	No	Below Basic	1,692	7.31
			Basic	4,519	19.54
			Proficient	9,976	43.13
			Advanced	6,945	30.02
			Total	23,132	100.00
		Yes	Below Basic	2,118	16.84
			Basic	3,718	29.56
			Proficient	4,991	39.68
			Advanced	1,751	13.92
			Total	12,578	100.00
	Government	No	Below Basic	1,297	4.88
			Basic	5,475	20.61
			Proficient	11,877	44.71
			Advanced	7,917	29.80
			Total	26,566	100.00
		Yes	Below Basic	2,878	15.74
			Basic	6,539	35.76
			Proficient	6,780	37.08
			Advanced	2,088	11.42
			Total	18,285	100.00
	Am. History	No	Below Basic	4,671	15.96
			Basic	7,389	25.25
			Proficient	10,630	36.32
			Advanced	6,578	22.48
			Total	29,268	100.00
		Yes	Below Basic	7,808	37.53
			Basic	6,073	29.19
			Proficient	5,145	24.73
			Advanced	1,780	8.56
			Total	20,806	100.00

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Table 10.49: Achievement-Level Distributions—Limited English Proficient, Summer 2013

Test Period	Content Area	LEP	Achievement Level	Freq.	%
Summer 2013	English II	No	Below Basic	85	25.45
			Basic	110	32.93
			Proficient	112	33.53
			Advanced	27	8.08
			Total	334	100.00
		Yes	Below Basic	5	25.00
			Basic	4	20.00
			Proficient	10	50.00
			Advanced	1	5.00
			Total	20	100.00
	Algebra I	No	Below Basic	179	20.77
			Basic	335	38.86
			Proficient	264	30.63
			Advanced	84	9.74
			Total	862	100.00
		Yes	Below Basic	12	46.15
			Basic	8	30.77
			Proficient	5	19.23
			Advanced	1	3.85
			Total	26	100.00
	Biology	No	Below Basic	141	37.60
			Basic	137	36.53
			Proficient	82	21.87
			Advanced	15	4.00
			Total	375	100.00
		Yes	Below Basic	1	14.29
			Basic	6	85.71
			Proficient	--	--
			Advanced	--	--
			Total	7	100.00

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Table 10.49 (continued): Achievement-Level Distributions—Limited English Proficient, Summer 2013

Test Period	Content Area	LEP	Achievement Level	Freq.	%
Summer 2013	English I	No	Below Basic	119	30.05
			Basic	168	42.42
			Proficient	80	20.20
			Advanced	29	7.32
			Total	396	100.00
		Yes	Below Basic	4	33.33
			Basic	5	41.67
			Proficient	3	25.00
			Advanced	--	--
			Total	12	100.00
	Algebra II	No	Below Basic	22	23.40
			Basic	48	51.06
			Proficient	21	22.34
			Advanced	3	3.19
			Total	94	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Geometry	No	Below Basic	84	38.71
			Basic	76	35.02
			Proficient	42	19.35
			Advanced	15	6.91
			Total	217	100.00
		Yes	Below Basic	3	50.00
			Basic	1	16.67
			Proficient	2	33.33
			Advanced	--	--
			Total	6	100.00
	Government	No	Below Basic	95	11.46
			Basic	269	32.45
			Proficient	323	38.96
			Advanced	142	17.13
			Total	829	100.00
		Yes	Below Basic	4	15.38
			Basic	13	50.00
			Proficient	8	30.77
			Advanced	1	3.85
			Total	26	100.00
	Am. History	No	Below Basic	101	40.40
			Basic	56	22.40
			Proficient	70	28.00
			Advanced	23	9.20
			Total	250	100.00
		Yes	Below Basic	5	71.43
			Basic	2	28.57
			Proficient	--	--
			Advanced	--	--
			Total	7	100.00

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Table 10.50: Achievement-Level Distributions—Limited English Proficient, Fall 2013

Test Period	Content Area	LEP	Achievement Level	Freq.	%
Fall 2013	English II	No	Below Basic	300	10.76
			Basic	896	32.14
			Proficient	1,229	44.08
			Advanced	363	13.02
			Total	2,788	100.00
		Yes	Below Basic	21	23.33
			Basic	45	50.00
			Proficient	22	24.44
			Advanced	2	2.22
			Total	90	100.00
	Algebra I	No	Below Basic	781	14.88
			Basic	1,694	32.27
			Proficient	1,890	36.00
			Advanced	885	16.86
			Total	5,250	100.00
		Yes	Below Basic	29	22.31
			Basic	59	45.38
			Proficient	30	23.08
			Advanced	12	9.23
			Total	130	100.00
	Biology	No	Below Basic	633	22.38
			Basic	927	32.77
			Proficient	860	30.40
			Advanced	409	14.46
			Total	2,829	100.00
		Yes	Below Basic	23	51.11
			Basic	17	37.78
			Proficient	3	6.67
			Advanced	2	4.44
			Total	45	100.00

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Table 10.50 (continued): Achievement-Level Distributions—Limited English Proficient, Fall 2013

Test Period	Content Area	LEP	Achievement Level	Freq.	%
Fall 2013	English I	No	Below Basic	107	12.72
			Basic	298	35.43
			Proficient	278	33.06
			Advanced	158	18.79
			Total	841	100.00
		Yes	Below Basic	11	20.75
			Basic	24	45.28
			Proficient	17	32.08
			Advanced	1	1.89
			Total	53	100.00
	Algebra II	No	Below Basic	27	6.82
			Basic	64	16.16
			Proficient	186	46.97
			Advanced	119	30.05
			Total	396	100.00
		Yes	Below Basic	--	--
			Basic	2	14.29
			Proficient	7	50.00
			Advanced	5	35.71
			Total	14	100.00
	Geometry	No	Below Basic	105	11.59
			Basic	228	25.17
			Proficient	268	29.58
			Advanced	305	33.66
			Total	906	100.00
		Yes	Below Basic	3	15.79
			Basic	9	47.37
			Proficient	5	26.32
			Advanced	2	10.53
			Total	19	100.00
	Government	No	Below Basic	1,883	12.58
			Basic	4,520	30.20
			Proficient	5,669	37.87
			Advanced	2,896	19.35
			Total	14,968	100.00
		Yes	Below Basic	97	35.53
			Basic	123	45.05
			Proficient	46	16.85
			Advanced	7	2.56
			Total	273	100.00
	Am. History	No	Below Basic	442	27.57
			Basic	423	26.39
			Proficient	472	29.44
			Advanced	266	16.59
			Total	1,603	100.00
		Yes	Below Basic	16	45.71
			Basic	9	25.71
			Proficient	6	17.14
			Advanced	4	11.43
			Total	35	100.00

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Table 10.51: Achievement-Level Distributions—Limited English Proficient, Spring 2014

Test Period	Content Area	LEP	Achievement Level	Freq.	%
Spring 2014	English II	No	Below Basic	2,125	3.51
			Basic	12,228	20.17
			Proficient	28,154	46.45
			Advanced	18,106	29.87
			Total	60,613	100.00
		Yes	Below Basic	147	12.39
			Basic	531	44.77
			Proficient	446	37.61
			Advanced	62	5.23
			Total	1,186	100.00
	Algebra I	No	Below Basic	5,979	9.69
			Basic	21,306	34.55
			Proficient	22,144	35.90
			Advanced	12,247	19.86
			Total	61,676	100.00
		Yes	Below Basic	251	17.70
			Basic	676	47.67
			Proficient	365	25.74
			Advanced	126	8.89
			Total	1,418	100.00
	Biology	No	Below Basic	3,071	5.11
			Basic	15,462	25.74
			Proficient	28,658	47.71
			Advanced	12,879	21.44
			Total	60,070	100.00
		Yes	Below Basic	253	21.83
			Basic	512	44.18
			Proficient	335	28.90
			Advanced	59	5.09
			Total	1,159	100.00

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Table 10.51 (continued): Achievement-Level Distributions—Limited English Proficient, Spring 2014

Test Period	Content Area	LEP	Achievement Level	Freq.	%
Spring 2014	English I	No	Below Basic	5,505	9.29
			Basic	17,674	29.82
			Proficient	22,765	38.41
			Advanced	13,330	22.49
			Total	59,274	100.00
		Yes	Below Basic	283	26.90
			Basic	496	47.15
			Proficient	237	22.53
			Advanced	36	3.42
			Total	1,052	100.00
	Algebra II	No	Below Basic	1,947	7.61
			Basic	7,316	28.58
			Proficient	10,200	39.84
			Advanced	6,137	23.97
			Total	25,600	100.00
		Yes	Below Basic	47	18.88
			Basic	92	36.95
			Proficient	74	29.72
			Advanced	36	14.46
			Total	249	100.00
	Geometry	No	Below Basic	3,660	10.40
			Basic	8,059	22.91
			Proficient	14,824	42.13
			Advanced	8,640	24.56
			Total	35,183	100.00
		Yes	Below Basic	150	28.46
			Basic	178	33.78
			Proficient	143	27.13
			Advanced	56	10.63
			Total	527	100.00
	Government	No	Below Basic	3,984	9.05
			Basic	11,668	26.50
			Proficient	18,409	41.80
			Advanced	9,976	22.65
			Total	44,037	100.00
		Yes	Below Basic	191	23.46
			Basic	346	42.51
			Proficient	248	30.47
			Advanced	29	3.56
			Total	814	100.00
	Am. History	No	Below Basic	12,029	24.43
			Basic	13,243	26.89
			Proficient	15,644	31.77
			Advanced	8,326	16.91
			Total	49,242	100.00
		Yes	Below Basic	450	54.09
			Basic	219	26.32
			Proficient	131	15.75
			Advanced	32	3.85
			Total	832	100.00

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Table 10.52: Achievement-Level Distributions—Title I, Summer 2013

Test Period	Content Area	Title I	Achievement Level	Freq.	%
Summer 2013	English II	No	Below Basic	84	25.45
			Basic	105	31.82
			Proficient	114	34.55
			Advanced	27	8.18
			Total	330	100.00
		Yes	Below Basic	6	25.00
			Basic	9	37.50
			Proficient	8	33.33
			Advanced	1	4.17
			Total	24	100.00
	Algebra I	No	Below Basic	159	20.13
			Basic	304	38.48
			Proficient	243	30.76
			Advanced	84	10.63
			Total	790	100.00
		Yes	Below Basic	32	32.65
			Basic	39	39.80
			Proficient	26	26.53
			Advanced	1	1.02
			Total	98	100.00
	Biology	No	Below Basic	121	36.89
			Basic	118	35.98
			Proficient	75	22.87
			Advanced	14	4.27
			Total	328	100.00
		Yes	Below Basic	21	38.89
			Basic	25	46.30
			Proficient	7	12.96
			Advanced	1	1.85
			Total	54	100.00

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Table 10.52 (continued): Achievement-Level Distributions—Title I, Summer 2013

Test Period	Content Area	Title I	Achievement Level	Freq.	%
Summer 2013	English I	No	Below Basic	98	27.30
			Basic	154	42.90
			Proficient	78	21.73
			Advanced	29	8.08
			Total	359	100.00
		Yes	Below Basic	25	51.02
			Basic	19	38.78
			Proficient	5	10.20
			Advanced	25	51.02
			Total	49	100.00
	Algebra II	No	Below Basic	22	26.51
			Basic	46	55.42
			Proficient	12	14.46
			Advanced	3	3.61
			Total	83	100.00
		Yes	Below Basic	--	--
			Basic	2	18.18
			Proficient	9	81.82
			Advanced	--	--
			Total	11	100.00
	Geometry	No	Below Basic	84	39.81
			Basic	69	32.70
			Proficient	43	20.38
			Advanced	15	7.11
			Total	211	100.00
		Yes	Below Basic	3	25.00
			Basic	8	66.67
			Proficient	1	8.33
			Advanced	--	--
			Total	12	100.00
	Government	No	Below Basic	91	11.26
			Basic	262	32.43
			Proficient	315	38.99
			Advanced	140	17.33
			Total	808	100.00
		Yes	Below Basic	8	17.02
			Basic	20	42.55
			Proficient	16	34.04
			Advanced	3	6.38
			Total	47	100.00
	Am. History	No	Below Basic	104	41.43
			Basic	55	21.91
			Proficient	69	27.49
			Advanced	23	9.16
			Total	251	100.00
		Yes	Below Basic	2	33.33
			Basic	3	50.00
			Proficient	1	16.67
			Advanced	--	--
			Total	6	100.00

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Table 10.53: Achievement-Level Distributions—Title I, Fall 2013

Test Period	Content Area	Title I	Achievement Level	Freq.	%
Fall 2013	English II	No	Below Basic	276	10.51
			Basic	818	31.14
			Proficient	1,173	44.65
			Advanced	360	13.70
			Total	2,627	100.00
		Yes	Below Basic	45	17.93
			Basic	123	49.00
			Proficient	78	31.08
			Advanced	5	1.99
			Total	251	100.00
	Algebra I	No	Below Basic	670	14.04
			Basic	1,456	30.51
			Proficient	1,765	36.99
			Advanced	881	18.46
			Total	4,772	100.00
		Yes	Below Basic	140	23.03
			Basic	297	48.85
			Proficient	155	25.49
			Advanced	16	2.63
			Total	608	100.00
	Biology	No	Below Basic	533	20.48
			Basic	821	31.55
			Proficient	837	32.17
			Advanced	411	15.80
			Total	2,602	100.00
		Yes	Below Basic	123	45.22
			Basic	123	45.22
			Proficient	26	9.56
			Advanced	--	--
			Total	272	100.00

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Table 10.53 (continued): Achievement-Level Distributions—Title I, Fall 2013

Test Period	Content Area	Title I	Achievement Level	Freq.	%
Fall 2013	English I	No	Below Basic	76	10.86
			Basic	238	34.00
			Proficient	239	34.14
			Advanced	147	21.00
			Total	700	100.00
		Yes	Below Basic	42	21.65
			Basic	84	43.30
			Proficient	56	28.87
			Advanced	12	6.19
			Total	194	100.00
	Algebra II	No	Below Basic	25	6.27
			Basic	62	15.54
			Proficient	189	47.37
			Advanced	123	30.83
			Total	399	100.00
		Yes	Below Basic	2	18.18
			Basic	4	36.36
			Proficient	4	36.36
			Advanced	1	9.09
			Total	11	100.00
	Geometry	No	Below Basic	107	11.86
			Basic	226	25.06
			Proficient	264	29.27
			Advanced	305	33.81
			Total	902	100.00
		Yes	Below Basic	1	4.35
			Basic	11	47.83
			Proficient	9	39.13
			Advanced	2	8.70
			Total	23	100.00
	Government	No	Below Basic	1,677	11.80
			Basic	4,240	29.82
			Proficient	5,471	38.48
			Advanced	2,829	19.90
			Total	14,217	100.00
		Yes	Below Basic	303	29.59
			Basic	403	39.36
			Proficient	244	23.83
			Advanced	74	7.23
			Total	1,024	100.00
	Am. History	No	Below Basic	441	27.37
			Basic	423	26.26
			Proficient	477	29.61
			Advanced	270	16.76
			Total	1,611	100.00
		Yes	Below Basic	17	62.96
			Basic	9	33.33
			Proficient	1	3.70
			Advanced	--	--
			Total	27	100.00

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Table 10.54: Achievement-Level Distributions—Title I, Spring 2014

Test Period	Content Area	Title I	Achievement Level	Freq.	%
Spring 2014	English II	No	Below Basic	1,872	3.27
			Basic	11,056	19.33
			Proficient	26,624	46.55
			Advanced	17,640	30.84
			Total	57,192	100.00
		Yes	Below Basic	400	8.68
			Basic	1,703	36.97
			Proficient	1,976	42.89
			Advanced	528	11.46
			Total	4,607	100.00
	Algebra I	No	Below Basic	4,881	8.62
			Basic	19,203	33.90
			Proficient	20,814	36.75
			Advanced	11,744	20.73
			Total	56,642	100.00
		Yes	Below Basic	1,349	20.91
			Basic	2,779	43.07
			Proficient	1,695	26.27
			Advanced	629	9.75
			Total	6,452	100.00
	Biology	No	Below Basic	2,554	4.49
			Basic	14,066	24.73
			Proficient	27,633	48.58
			Advanced	12,627	22.20
			Total	56,880	100.00
		Yes	Below Basic	770	17.71
			Basic	1,908	43.87
			Proficient	1,360	31.27
			Advanced	311	7.15
			Total	4,349	100.00

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Table 10.54 (continued): Achievement-Level Distributions—Title I, Spring 2014

Test Period	Content Area	Title I	Achievement Level	Freq.	%
Spring 2014	English I	No	Below Basic	4,984	8.93
			Basic	16,244	29.09
			Proficient	21,680	38.82
			Advanced	12,933	23.16
			Total	55,841	100.00
		Yes	Below Basic	804	17.93
			Basic	1,926	42.94
			Proficient	1,322	29.48
			Advanced	433	9.65
			Total	4,485	100.00
	Algebra II	No	Below Basic	1,917	7.63
			Basic	7,129	28.36
			Proficient	9,999	39.78
			Advanced	6,089	24.23
			Total	25,134	100.00
		Yes	Below Basic	77	10.77
			Basic	279	39.02
			Proficient	275	38.46
			Advanced	84	11.75
			Total	715	100.00
	Geometry	No	Below Basic	3,579	10.37
			Basic	7,892	22.87
			Proficient	14,527	42.09
			Advanced	8,513	24.67
			Total	34,511	100.00
		Yes	Below Basic	231	19.27
			Basic	345	28.77
			Proficient	440	36.70
			Advanced	183	15.26
			Total	1,199	100.00
	Government	No	Below Basic	3,413	8.19
			Basic	10,715	25.72
			Proficient	17,724	42.54
			Advanced	9,811	23.55
			Total	41,663	100.00
		Yes	Below Basic	762	23.90
			Basic	1,299	40.75
			Proficient	933	29.27
			Advanced	194	6.09
			Total	3,188	100.00
	Am. History	No	Below Basic	10,986	23.26
			Basic	12,721	26.93
			Proficient	15,277	32.34
			Advanced	8,253	17.47
			Total	47,237	100.00
		Yes	Below Basic	1,493	52.63
			Basic	741	26.12
			Proficient	498	17.55
			Advanced	105	3.70
			Total	2,837	100.00

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Table 10.55: Achievement-Level Distributions—Individualized Education Program, Summer 2013

Test Period	Content Area	IEP	Achievement Level	Freq.	%
Summer 2013	English II	No	Below Basic	82	25.31
			Basic	100	30.86
			Proficient	115	35.49
			Advanced	27	8.33
			Total	324	100.00
		Yes	Below Basic	8	26.67
			Basic	14	46.67
			Proficient	7	23.33
			Advanced	1	3.33
			Total	30	100.00
	Algebra I	No	Below Basic	156	19.67
			Basic	311	39.22
			Proficient	245	30.90
			Advanced	81	10.21
			Total	793	100.00
		Yes	Below Basic	35	36.84
			Basic	32	33.68
			Proficient	24	25.26
			Advanced	4	4.21
			Total	95	100.00
	Biology	No	Below Basic	121	36.12
			Basic	126	37.61
			Proficient	73	21.79
			Advanced	15	4.48
			Total	335	100.00
		Yes	Below Basic	21	44.68
			Basic	17	36.17
			Proficient	9	19.15
			Advanced	--	--
			Total	47	100.00

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Table 10.55 (continued): Achievement-Level Distributions—Individualized Education Program, Summer 2013

Test Period	Content Area	IEP	Achievement Level	Freq.	%
Summer 2013	English I	No	Below Basic	96	26.45
			Basic	160	44.08
			Proficient	81	22.31
			Advanced	26	7.16
			Total	363	100.00
		Yes	Below Basic	27	60.00
			Basic	13	28.89
			Proficient	2	4.44
			Advanced	3	6.67
			Total	45	100.00
	Algebra II	No	Below Basic	20	24.10
			Basic	42	50.60
			Proficient	18	21.69
			Advanced	3	3.61
			Total	83	100.00
		Yes	Below Basic	2	18.18
			Basic	6	54.55
			Proficient	3	27.27
			Advanced	--	--
			Total	11	100.00
	Geometry	No	Below Basic	78	38.42
			Basic	68	33.50
			Proficient	42	20.69
			Advanced	15	7.39
			Total	203	100.00
		Yes	Below Basic	9	45.00
			Basic	9	45.00
			Proficient	2	10.00
			Advanced	--	--
			Total	20	100.00
	Government	No	Below Basic	85	10.66
			Basic	255	31.99
			Proficient	315	39.52
			Advanced	142	17.82
			Total	797	100.00
		Yes	Below Basic	14	24.14
			Basic	27	46.55
			Proficient	16	27.59
			Advanced	1	1.72
			Total	58	100.00
	Am. History	No	Below Basic	87	37.66
			Basic	55	23.81
			Proficient	69	29.87
			Advanced	20	8.66
			Total	231	100.00
		Yes	Below Basic	19	73.08
			Basic	3	11.54
			Proficient	1	3.85
			Advanced	3	11.54
			Total	26	100.00

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Table 10.56: Achievement-Level Distributions—Individualized Education Program, Fall 2013

Test Period	Content Area	IEP	Achievement Level	Freq.	%
Fall 2013	English II	No	Below Basic	207	8.27
			Basic	767	30.64
			Proficient	1,168	46.66
			Advanced	361	14.42
			Total	2,503	100.00
		Yes	Below Basic	114	30.40
			Basic	174	46.40
			Proficient	83	22.13
			Advanced	4	1.07
			Total	375	100.00
	Algebra I	No	Below Basic	544	11.27
			Basic	1,547	32.06
			Proficient	1,846	38.26
			Advanced	888	18.40
			Total	4,825	100.00
		Yes	Below Basic	266	47.93
			Basic	206	37.12
			Proficient	74	13.33
			Advanced	9	1.62
			Total	555	100.00
	Biology	No	Below Basic	467	18.41
			Basic	839	33.07
			Proficient	826	32.56
			Advanced	405	15.96
			Total	2,537	100.00
		Yes	Below Basic	189	56.08
			Basic	105	31.16
			Proficient	37	10.98
			Advanced	6	1.78
			Total	337	100.00

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Table 10.56 (continued): Achievement-Level Distributions—Individualized Education Program, Fall 2013

Test Period	Content Area	IEP	Achievement Level	Freq.	%
Fall 2013	English I	No	Below Basic	81	10.23
			Basic	273	34.47
			Proficient	282	35.61
			Advanced	156	19.70
			Total	792	100.00
		Yes	Below Basic	37	36.27
			Basic	49	48.04
			Proficient	13	12.75
			Advanced	3	2.94
			Total	102	100.00
	Algebra II	No	Below Basic	24	5.99
			Basic	64	15.96
			Proficient	190	47.38
			Advanced	123	30.67
			Total	401	100.00
		Yes	Below Basic	3	33.33
			Basic	2	22.22
			Proficient	3	33.33
			Advanced	1	11.11
			Total	9	100.00
	Geometry	No	Below Basic	98	11.01
			Basic	227	25.51
			Proficient	263	29.55
			Advanced	302	33.93
			Total	890	100.00
		Yes	Below Basic	10	28.57
			Basic	10	28.57
			Proficient	10	28.57
			Advanced	5	14.29
			Total	35	100.00
	Government	No	Below Basic	1,420	10.35
			Basic	4,056	29.56
			Proficient	5,428	39.56
			Advanced	2,818	20.54
			Total	13,722	100.00
		Yes	Below Basic	560	36.87
			Basic	587	38.64
			Proficient	287	18.89
			Advanced	85	5.60
			Total	1,519	100.00
	Am. History	No	Below Basic	382	25.30
			Basic	404	26.75
			Proficient	463	30.66
			Advanced	261	17.28
			Total	1,510	100.00
		Yes	Below Basic	76	59.38
			Basic	28	21.88
			Proficient	15	11.72
			Advanced	9	7.03
			Total	128	100.00

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Table 10.57: Achievement-Level Distributions—Individualized Education Program, Spring 2014

Test Period	Content Area	IEP	Achievement Level	Freq.	%
Spring 2014	English II	No	Below Basic	1,008	1.80
			Basic	9,861	17.65
			Proficient	27,074	48.47
			Advanced	17,912	32.07
			Total	55,855	100.00
		Yes	Below Basic	1,264	21.27
			Basic	2,898	48.76
			Proficient	1,526	25.67
			Advanced	256	4.31
			Total	5,944	100.00
	Algebra I	No	Below Basic	3,881	6.84
			Basic	19,139	33.73
			Proficient	21,593	38.05
			Advanced	12,134	21.38
			Total	56,747	100.00
		Yes	Below Basic	2,349	37.01
			Basic	2,843	44.79
			Proficient	916	14.43
			Advanced	239	3.77
			Total	6,347	100.00
	Biology	No	Below Basic	1,815	3.29
			Basic	13,071	23.69
			Proficient	27,573	49.98
			Advanced	12,710	23.04
			Total	55,169	100.00
		Yes	Below Basic	1,509	24.90
			Basic	2,903	47.90
			Proficient	1,420	23.43
			Advanced	228	3.76
			Total	6,060	100.00

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Table 10.57 (continued): Achievement-Level Distributions—Individualized Education Program, Spring 2014

Test Period	Content Area	IEP	Achievement Level	Freq.	%
Spring 2014	English I	No	Below Basic	3,588	6.55
			Basic	15,981	29.16
			Proficient	22,110	40.35
			Advanced	13,121	23.94
			Total	54,800	100.00
		Yes	Below Basic	2,200	39.81
			Basic	2,189	39.61
			Proficient	892	16.14
			Advanced	245	4.43
			Total	5,526	100.00
	Algebra II	No	Below Basic	1,762	6.99
			Basic	7,187	28.50
			Proficient	10,144	40.23
			Advanced	6,123	24.28
			Total	25,216	100.00
		Yes	Below Basic	232	36.65
			Basic	221	34.91
			Proficient	130	20.54
			Advanced	50	7.90
			Total	633	100.00
	Geometry	No	Below Basic	3,034	8.97
			Basic	7,711	22.81
			Proficient	14,513	42.93
			Advanced	8,550	25.29
			Total	33,808	100.00
		Yes	Below Basic	776	40.80
			Basic	526	27.66
			Proficient	454	23.87
			Advanced	146	7.68
			Total	1,902	100.00
	Government	No	Below Basic	2,704	6.68
			Basic	10,293	25.44
			Proficient	17,683	43.71
			Advanced	9,779	24.17
			Total	40,459	100.00
		Yes	Below Basic	1,471	33.49
			Basic	1,721	39.18
			Proficient	974	22.18
			Advanced	226	5.15
			Total	4,392	100.00
	Am. History	No	Below Basic	10,026	22.00
			Basic	12,369	27.14
			Proficient	15,035	32.99
			Advanced	8,140	17.86
			Total	45,570	100.00
		Yes	Below Basic	2,453	54.46
			Basic	1,093	24.27
			Proficient	740	16.43
			Advanced	218	4.84
			Total	4,504	100.00

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Table 10.58: Achievement-Level Distributions—Accommodations, Summer 2013

Test Period	Content Area	Accom.	Achievement Level	Freq.	%
Summer 2013	English II	No	Below Basic	93	25.91
			Basic	114	31.75
			Proficient	124	34.54
			Advanced	28	7.80
			Total	359	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Algebra I	No	Below Basic	195	21.76
			Basic	344	38.39
			Proficient	271	30.25
			Advanced	86	9.60
			Total	896	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Biology	No	Below Basic	144	37.31
			Basic	145	37.56
			Proficient	82	21.24
			Advanced	15	3.89
			Total	386	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--

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Table 10.58 (continued): Achievement-Level Distributions—Accommodations, Summer 2013

Test Period	Content Area	Accom.	Achievement Level	Freq.	%
Summer 2013	English I	No	Below Basic	125	30.49
			Basic	173	42.20
			Proficient	83	20.24
			Advanced	29	7.07
			Total	410	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Algebra II	No	Below Basic	22	23.16
			Basic	49	51.58
			Proficient	21	22.11
			Advanced	3	3.16
			Total	95	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Geometry	No	Below Basic	87	39.01
			Basic	77	34.53
			Proficient	44	19.73
			Advanced	15	6.73
			Total	223	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Government	No	Below Basic	101	11.58
			Basic	289	33.14
			Proficient	338	38.76
			Advanced	144	16.51
			Total	872	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--
	Am. History	No	Below Basic	106	40.93
			Basic	60	23.17
			Proficient	70	27.03
			Advanced	23	8.88
			Total	259	100.00
		Yes	Below Basic	--	--
			Basic	--	--
			Proficient	--	--
			Advanced	--	--
			Total	--	--

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Table 10.59: Achievement-Level Distributions—Accommodations, Fall 2013

Test Period	Content Area	Accom.	Achievement Level	Freq.	%
Fall 2013	English II	No	Below Basic	307	10.80
			Basic	928	32.64
			Proficient	1,243	43.72
			Advanced	365	12.84
			Total	2,843	100.00
		Yes	Below Basic	14	31.11
			Basic	19	42.22
			Proficient	12	26.67
			Advanced	--	--
			Total	45	100.00
	Algebra I	No	Below Basic	752	14.24
			Basic	1,720	32.57
			Proficient	1,913	36.22
			Advanced	896	16.97
			Total	5,281	100.00
		Yes	Below Basic	66	46.15
			Basic	58	40.56
			Proficient	18	12.59
			Advanced	1	0.70
			Total	143	100.00
	Biology	No	Below Basic	596	21.41
			Basic	922	33.12
			Proficient	856	30.75
			Advanced	410	14.73
			Total	2,784	100.00
		Yes	Below Basic	64	63.37
			Basic	29	28.71
			Proficient	7	6.93
			Advanced	1	0.99
			Total	101	100.00

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Table 10.59 (continued): Achievement-Level Distributions—Accommodations, Fall 2013

Test Period	Content Area	Accom.	Achievement Level	Freq.	%
Fall 2013	English I	No	Below Basic	112	12.77
			Basic	313	35.69
			Proficient	293	33.41
			Advanced	159	18.13
			Total	877	100.00
		Yes	Below Basic	6	35.29
			Basic	9	52.94
			Proficient	2	11.76
			Advanced	--	--
			Total	17	100.00
	Algebra II	No	Below Basic	26	6.36
			Basic	67	16.38
			Proficient	192	46.94
			Advanced	124	30.32
			Total	409	100.00
		Yes	Below Basic	1	50.00
			Basic	--	--
			Proficient	1	50.00
			Advanced	--	--
			Total	2	100.00
	Geometry	No	Below Basic	106	11.58
			Basic	232	25.36
			Proficient	271	29.62
			Advanced	306	33.44
			Total	915	100.00
		Yes	Below Basic	2	18.18
			Basic	5	45.45
			Proficient	3	27.27
			Advanced	1	9.09
			Total	11	100.00
	Government	No	Below Basic	1,722	11.72
			Basic	4,441	30.22
			Proficient	5,639	38.37
			Advanced	2,894	19.69
			Total	14,696	100.00
		Yes	Below Basic	260	45.77
			Basic	215	37.85
			Proficient	82	14.44
			Advanced	11	1.94
			Total	568	100.00
	Am. History	No	Below Basic	417	26.41
			Basic	419	26.54
			Proficient	476	30.15
			Advanced	267	16.91
			Total	1,579	100.00
		Yes	Below Basic	42	68.85
			Basic	13	21.31
			Proficient	3	4.92
			Advanced	3	4.92
			Total	61	100.00

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Table 10.60: Achievement-Level Distributions—Accommodations, Spring 2014

Test Period	Content Area	Accom.	Achievement Level	Freq.	%
Spring 2014	English II	No	Below Basic	1,828	3.04
			Basic	11,873	19.77
			Proficient	28,231	47.01
			Advanced	18,120	30.17
			Total	60,052	100.00
		Yes	Below Basic	449	25.17
			Basic	903	50.62
			Proficient	380	21.30
			Advanced	52	2.91
			Total	1,784	100.00
	Algebra I	No	Below Basic	5,073	8.41
			Basic	20,747	34.37
			Proficient	22,211	36.80
			Advanced	12,325	20.42
			Total	60,356	100.00
		Yes	Below Basic	1,169	41.22
			Basic	1,284	45.28
			Proficient	322	11.35
			Advanced	61	2.15
			Total	2,836	100.00
	Biology	No	Below Basic	2,448	4.21
			Basic	14,367	24.73
			Proficient	28,410	48.90
			Advanced	12,878	22.16
			Total	58,103	100.00
		Yes	Below Basic	887	27.96
			Basic	1,627	51.29
			Proficient	596	18.79
			Advanced	62	1.95
			Total	3,172	100.00

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Table 10.60 (continued): Achievement-Level Distributions—Accommodations, Spring 2014

Test Period	Content Area	Accom.	Achievement Level	Freq.	%
Spring 2014	English I	No	Below Basic	5,121	8.70
			Basic	17,624	29.95
			Proficient	22,790	38.73
			Advanced	13,309	22.62
			Total	58,844	100.00
		Yes	Below Basic	678	44.52
			Basic	561	36.84
			Proficient	224	14.71
			Advanced	60	3.94
			Total	1,523	100.00
	Algebra II	No	Below Basic	1,891	7.39
			Basic	7,306	28.55
			Proficient	10,234	39.99
			Advanced	6,161	24.07
			Total	25,592	100.00
		Yes	Below Basic	104	40.15
			Basic	103	39.77
			Proficient	40	15.44
			Advanced	12	4.63
			Total	259	100.00
	Geometry	No	Below Basic	3,454	9.87
			Basic	8,032	22.95
			Proficient	14,841	42.41
			Advanced	8,668	24.77
			Total	34,995	100.00
		Yes	Below Basic	358	49.31
			Basic	208	28.65
			Proficient	131	18.04
			Advanced	29	3.99
			Total	726	100.00
	Government	No	Below Basic	3,342	7.85
			Basic	11,054	25.97
			Proficient	18,218	42.81
			Advanced	9,945	23.37
			Total	42,559	100.00
		Yes	Below Basic	839	36.04
			Basic	976	41.92
			Proficient	449	19.29
			Advanced	64	2.75
			Total	2,328	100.00
	Am. History	No	Below Basic	11,104	23.20
			Basic	12,948	27.05
			Proficient	15,507	32.40
			Advanced	8,304	17.35
			Total	47,863	100.00
		Yes	Below Basic	1,381	62.01
			Basic	517	23.22
			Proficient	273	12.26
			Advanced	56	2.51
			Total	2,227	100.00

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Chapter 11: Reliability

11.1 Introduction

DESE is required by federal law to ensure that the instruments used to measure student achievement for school accountability provide reliable results. This chapter provides evidence that scores from the MO EOC Assessments measure student achievement in a reliable manner and that the size of the measurement error associated with reported test scores is reasonable, especially at the Proficient cut score.

11.2 Reliability and Measurement Error

11.2.1 Defining Reliability

Reliability refers to the consistency of student test scores. Measurement error refers to the random variability in the test scores. Both are indicators of the degree of precision in a test score. Measurement error and reliability are inversely related. When measurement error is large, reliability is small. Increasing reliability by minimizing measurement error is an important goal in the construction of any test.

Errors in measurement can result from any of a multitude of factors, including environmental factors (e.g., testing conditions) and examinee factors (e.g., fatigue, stress). Feldt and Brennan (1989) note that "Quantification of the consistency and inconsistency in examinee performance constitutes the essence of reliability analysis" (p. 105). Classical test theory (CTT) provides a means for this quantification of examinee inconsistency (i.e., measurement error). This approach builds on the notion of an ideal error-free, or true, measurement score. Any observed measurement, such as test score *X*, is defined as a composite of true score, *T*, and its associated random error component:

$$X = T + \text{error}.$$

The definitions or assumptions in CTT lead to several important properties. For example, it can be demonstrated that observed score variance equals the sum of true score variance plus error variance:

$$\sigma_x^2 = \sigma_t^2 + \sigma_e^2$$

The relationship among variance terms in the equation above is critical in defining important CTT concepts, including reliability and the standard error of measurement (SEM). For example, CTT equivalence reliability is defined as the correlation between observed scores on parallel test forms, which is also equal to the proportion of true score variance to observed score variance,

$$\rho_{x_1 x_2} = \frac{\sigma_t^2}{\sigma_x^2}$$

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The CTT definition of the SEM can be derived from the above as the following:

$$\sigma_e = \sigma_x \sqrt{1 - \rho_{x_1 x_2}}$$

11.2.2 Estimating Reliability

The reliability and SEM of a specific test cannot be estimated directly from the equations above. However, reliability can be estimated via the correlation of scores on forms assumed to be parallel (equivalence reliability), from test-retest data (stability reliability), or from a single test administration (internal consistency reliability) using any one of a variety of techniques (e.g., Brown, 1910; Cronbach, 1951; Kuder & Richardson, 1937). A standard index for describing internal consistency reliability based on a single test administration is Cronbach's coefficient alpha, which provides an estimate of reliability that is mathematically equivalent to the average of all possible split-half reliability estimates. For a test consisting of p items, in which the item scores Y_j are summed to get a total score X, coefficient alpha is as follows:

$$\alpha = \left(\frac{p}{1-p}\right)\left(1 - \frac{\sum_{j=1}^{p} \sigma_{Y_j}^2}{\sigma_X^2}\right)$$

11.2.3 Sources of Measurement Error

Errors in measurement can result from environmental factors and examinee factors. To reduce other sources of measurement error, the scoring of student responses to SR items was done electronically.

The PEs and WPs are also susceptible to scoring error due to the differences among raters and ambiguity in the scoring rubric. In order to minimize the effect of these errors, rubrics were written to balance generality and specificity and to cover the range of student responses, while at the same time allowing raters to easily identify the response characteristics distinguishing each score category. To minimize rater error, raters were thoroughly trained and monitored throughout the scoring process. Only raters who met criteria for consistent scoring during training were retained as scorers.

11.3 Evidence of Raw-Score Internal Consistency

Consistency of individual student performance was estimated using Cronbach's coefficient alpha, which is an appropriate index of internal consistency for use on untimed tests such as the MO EOC Assessments. Cronbach's alpha can be interpreted as a lower bound to reliability.

When using coefficient alpha, the SEM can be interpreted as "the square root of the average of the person-specific error variances of all examinees who participated in the reliability estimation experiment" (Traub, 1994, p. 114). SEMs were estimated by using alpha as the estimate of reliability, and the observed raw score standard deviation as the estimate of the population score standard deviation:

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$$SEM = \sigma_X\sqrt{1-\alpha}$$

Separate analyses were performed for each EOC content area. Tables 11.1 through 11.25 show the SEMs based on the raw-score metric for the total population and for select student subgroups. A separate reliability coefficient, estimated through coefficient alpha, is reported for each group of students, provided at least 30 students are in the group.

Finally, an effect size is reported within each group, provided minimal sample size requirements are met. Effect size is a measure of how much the scores of two groups of students differ from each other. It is based on score standard deviations, and is defined by the following equation, also known as Cohen's *d*:

$$d = \frac{\bar{X}_F - \bar{X}_R}{\hat{\sigma}_X}$$

where the numerator is the difference in average scores between a focal and a reference group, and the denominator is an estimate of total score standard deviation. In this case, the standard deviations across groups were pooled to generate the standard deviation estimate.

An effect size of one is equivalent to a difference of one standard deviation. An effect size of .8 is considered large; an effect size of .5 is considered medium; an effect size of .2 is considered small.

Effect size is reported whenever the reference and focal groups each have a minimum of 50 students.

Following EOC program convention, the reference groups are gender = Male, ethnicity = White, LEP status = no, IEP status = no, Migrant status = no, FRL status = no, Title 1 status = no, and Accommodations status = no.

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Table 11.1: Alpha Coefficients and Standard Errors of Measurement, English II, Summer 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	359	20.64	8.72	--	0.88	2.97
Gender						
Female	139	22.25	8.47	0.31	0.88	2.97
Male	220	19.62	8.75		0.89	2.97
Ethnicity						
American Indian/ Alaskan Native	1	13.00	--	--	--	--
Asian	6	22.17	5.31	--	--	--
Pacific Islander	--	--	--	--	--	--
Black (not Hispanic)	128	18.98	8.02	-0.31	0.86	2.99
Hispanic	35	21.77	8.49	--	0.88	2.91
White (not Hispanic)	187	21.65	9.18	--	0.90	2.97
Multi-racial	2	12.50	3.54	--	--	--
LEP						
No	334	20.69	8.76	--	0.88	2.97
Yes	20	21.05	7.93	--	--	--
IEP						
No	324	20.94	8.73	--	0.89	2.93
Yes	30	18.17	8.15	--	0.83	3.32
Migrant						
No	354	20.71	8.70	--	0.88	2.96
Yes	--	--	--	--	--	--
FRL						
No	147	22.25	7.71	--	0.85	2.94
Yes	207	19.61	9.20	-0.31	0.90	2.96
Title I						
No	330	20.78	8.75	--	0.89	2.95
Yes	24	19.75	8.21	--	--	--
Accommodations						
No	359	20.64	8.72	--	0.88	2.97
Yes	--	--	--	--	--	--

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Table 11.2: Alpha Coefficients and Standard Errors of Measurement, Algebra I, Summer 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	896	19.37	7.81	--	0.85	3.00
Gender						
Female	360	19.83	7.91	0.10	0.85	3.05
Male	536	19.05	7.73	--	0.85	2.97
Ethnicity						
American Indian/ Alaskan Native	4	19.00	7.26	--	--	--
Asian	15	20.87	7.72	--	--	--
Pacific Islander	3	11.67	4.04	--	--	--
Black (not Hispanic)	306	16.21	6.76	-0.70	0.78	3.14
Hispanic	39	18.28	7.70	--	0.85	3.00
White (not Hispanic)	505	21.39	7.79	--	0.86	2.92
Multi-racial	24	18.96	7.57	--	--	--
LEP						
No	862	19.55	7.72	--	0.85	2.99
Yes	26	14.54	7.57	--	--	--
IEP						
No	793	19.72	7.67	--	0.85	2.96
Yes	95	16.72	7.97	-0.39	0.84	3.15
Migrant						
No	888	19.40	7.76	--	0.85	2.99
Yes	--	--	--	--	--	--
FRL						
No	452	21.39	7.56	--	0.85	2.93
Yes	436	17.33	7.42	-0.54	0.83	3.04
Title I						
No	790	19.75	7.82	--	0.85	3.00
Yes	98	16.54	6.60	-0.42	0.81	2.89
Accommodations						
No	896	19.36	7.81	--	0.85	3.01
Yes	--	--	--	--	--	--

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Table 11.3: Alpha Coefficients and Standard Errors of Measurement, Biology, Summer 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	386	23.27	11.10	--	0.90	3.59
Gender						
Female	186	23.68	11.46	0.07	0.90	3.56
Male	200	22.89	10.78		0.89	3.61
Ethnicity						
American Indian/ Alaskan Native	5	24.60	10.60	--	--	--
Asian	5	28.40	14.38	--	--	--
Pacific Islander	--	--	--	--	--	--
Black (not Hispanic)	135	19.02	9.12	-0.62	0.86	3.39
Hispanic	23	25.35	8.82	--	--	--
White (not Hispanic)	216	25.67	11.64	--	0.90	3.73
Multi-racial	2	11.00	0.00	--	--	--
LEP						
No	375	23.37	11.17	--	0.90	3.57
Yes	7	22.14	5.15	--	--	--
IEP						
No	335	23.68	11.20	--	0.90	3.58
Yes	47	20.91	10.07	--	0.88	3.53
Migrant						
No	382	23.34	11.09	--	0.90	3.57
Yes	--	--	--	--	--	--
FRL						
No	163	25.57	11.72	--	0.90	3.67
Yes	219	21.68	10.31	-0.36	0.88	3.51
Title I						
No	328	23.65	11.37	--	0.90	3.60
Yes	54	21.46	9.05	-0.20	0.86	3.40
Accommodations						
No	386	23.27	11.10	--	0.90	3.59
Yes	--	--	--	--	--	--

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Table 11.4: Alpha Coefficients and Standard Errors of Measurement, English I, Summer 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	410	19.96	7.03	--	0.83	2.90
Gender						
Female	168	20.35	7.27	0.09	0.84	2.87
Male	242	19.69	6.86		0.82	2.92
Ethnicity						
American Indian/ Alaskan Native	1	14.00	--	--	--	--
Asian	4	23.75	8.22	--	--	--
Pacific Islander	2	18.50	0.71	--	--	--
Black (not Hispanic)	146	18.23	6.34	-0.40	0.79	2.92
Hispanic	23	19.74	6.85	--	--	--
White (not Hispanic)	223	20.96	7.24	--	0.84	2.88
Multi-racial	11	22.55	8.26	--	--	--
LEP						
No	396	20.05	7.04	--	0.83	2.90
Yes	12	18.17	6.59	--	--	--
IEP						
No	363	20.52	6.84	--	0.82	2.91
Yes	45	15.82	7.18	--	0.84	2.83
Migrant						
No	407	20.02	7.02	--	0.83	2.90
Yes	1	12.00	--	--	--	--
FRL						
No	172	21.41	7.39	--	0.85	2.87
Yes	236	18.97	6.58	-0.35	0.80	2.93
Title I						
No	359	20.49	7.04	--	0.83	2.89
Yes	49	16.37	5.74	--	0.73	2.97
Accommodations						
No	410	19.96	7.03	--	0.83	2.90
Yes	--	--	--	--	--	--

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Table 11.5: Alpha Coefficients and Standard Errors of Measurement, Algebra II, Summer 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	95	18.97	6.18	--	0.78	2.91
Gender						
Female	34	19.18	5.71	--	0.75	2.87
Male	61	18.85	6.48	--	0.80	2.92
Ethnicity						
American Indian/ Alaskan Native	1	26.00	--	--	--	--
Asian	1	33.00	--	--	--	--
Pacific Islander	--	--	--	--	--	--
Black (not Hispanic)	56	16.02	5.06	-1.29	--	2.94
Hispanic	5	25.60	2.88	--	--	--
White (not Hispanic)	30	22.40	4.86	--	0.14	2.87
Multi-racial	2	23.00	11.31	--	--	--
LEP						
No	94	18.98	6.21	--	0.78	2.91
Yes	--	--	--	--	--	--
IEP						
No	83	19.06	6.14	--	0.78	2.91
Yes	11	18.36	7.02	--	--	--
Migrant						
No	94	18.98	6.21	--	0.78	2.91
Yes	--	--	--	--	--	--
FRL						
No	41	20.20	6.55	--	0.81	2.85
Yes	53	18.04	5.83	-0.35	0.74	2.95
Title I						
No	83	18.25	6.14	--	0.78	2.91
Yes	11	24.45	3.53	--	0.38	2.78
Accommodations						
No	95	18.97	6.18	--	0.78	2.91
Yes	--	--	--	--	--	--

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Table 11.6: Alpha Coefficients and Standard Errors of Measurement, Geometry, Summer 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	223	18.97	7.15	--	0.84	2.83
Gender						
Female	108	18.05	6.66	-0.25	0.82	2.85
Male	115	19.83	7.50		0.86	2.81
Ethnicity						
American Indian/ Alaskan Native	--	--	--	--	--	--
Asian	4	24.25	8.06	--	--	--
Pacific Islander	--	--	--	--	--	--
Black (not Hispanic)	106	15.79	5.29	-1.00	0.70	2.87
Hispanic	12	16.25	4.73	--	--	--
White (not Hispanic)	93	22.19	7.56	--	0.87	2.75
Multi-racial	8	25.00	4.99	--	--	--
LEP						
No	217	18.95	7.11	--	0.84	2.83
Yes	6	19.67	9.07	--	--	--
IEP						
No	203	19.16	7.26	--	0.85	2.82
Yes	20	17.00	5.61	--	--	--
Migrant						
No	223	18.97	7.15	--	0.84	2.83
Yes	--	--	--	--	--	--
FRL						
No	112	20.37	7.39	--	0.86	2.80
Yes	111	17.56	6.63	-0.40	0.82	2.85
Title I						
No	211	19.01	7.29	--	0.85	2.82
Yes	12	18.25	3.98	--	0.45	2.95
Accommodations						
No	223	18.97	7.15	--	0.84	2.83
Yes	--	--	--	--	--	--

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Table 11.7: Alpha Coefficients and Standard Errors of Measurement, Government, Summer 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	872	24.39	7.65	--	0.88	2.68
Gender						
Female	433	24.21	7.27	-0.05	0.86	2.70
Male	439	24.58	8.01	--	0.89	2.66
Ethnicity						
American Indian/ Alaskan Native	8	24.75	6.69	--	--	--
Asian	33	27.36	7.64	--	0.89	2.56
Pacific Islander	1	24.00	--	--	--	--
Black (not Hispanic)	152	20.20	7.49	-0.71	0.86	2.84
Hispanic	68	22.59	6.61	-0.20	0.82	2.80
White (not Hispanic)	596	25.47	7.45	--	0.88	2.63
Multi-racial	14	25.64	5.85	--	--	--
LEP						
No	829	24.54	7.68	--	0.88	2.68
Yes	26	20.73	6.37	--	--	--
IEP						
No	797	24.77	7.63	--	0.88	2.67
Yes	58	19.59	6.61	-0.69	0.81	2.87
Migrant						
No	855	24.42	7.67	--	0.88	2.68
Yes	--	--	--	--	--	--
FRL						
No	492	26.45	7.44	--	0.88	2.58
Yes	363	21.68	7.11	-0.65	0.84	2.81
Title I						
No	808	24.57	7.71	--	0.88	2.68
Yes	47	21.94	6.58	--	0.82	2.78
Accommodations						
No	872	24.39	7.65	--	0.88	2.68
Yes	--	--	--	--	--	--

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Table 11.8: Alpha Coefficients and Standard Errors of Measurement, Am. History, Summer 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	259	20.50	6.71	--	0.82	2.83
Gender						
Female	127	20.50	6.69	0.00	0.82	2.82
Male	132	20.49	6.76	--	0.83	2.82
Ethnicity						
American Indian/ Alaskan Native	1	22.00	--	--	--	--
Asian	4	20.00	7.87	--	--	--
Pacific Islander	1	23.00	--	--	--	--
Black (not Hispanic)	82	16.55	5.95	-1.04	0.77	2.87
Hispanic	13	16.85	4.06	--	--	--
White (not Hispanic)	154	22.88	6.16	--	0.80	2.75
Multi-racial	4	21.25	8.77	--	--	--
LEP						
No	250	20.61	6.76	--	0.83	2.82
Yes	7	16.00	4.32	--	--	--
IEP						
No	231	20.89	6.54	--	0.82	2.81
Yes	26	16.88	7.47	--	0.85	2.89
Migrant						
No	257	20.49	6.74	--	0.82	2.82
Yes	--	--	--	--	--	--
FRL						
No	121	22.69	6.64	--	0.83	2.74
Yes	136	18.52	6.22	-0.65	0.79	2.88
Title I						
No	251	20.51	6.78	--	0.83	2.82
Yes	6	19.67	5.01	--	--	--
Accommodations						
No	259	20.50	6.71	--	0.82	2.82
Yes	--	--	--	--	--	--

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Table 11.9: Alpha Coefficients and Standard Errors of Measurement, English II, Fall 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	2,888	23.22	7.83	--	0.88	2.73
Gender						
Female	1,304	24.39	7.49	0.28	0.87	2.70
Male	1,584	22.25	7.97		0.88	2.75
Ethnicity						
American Indian/ Alaskan Native	11	23.91	5.87	--	--	--
Asian	46	23.80	8.46	--	0.90	2.68
Pacific Islander	4	22.25	10.05	--	--	--
Black (not Hispanic)	1,087	21.81	7.45	-0.31	0.86	2.75
Hispanic	138	21.38	7.15	-0.36	0.85	2.79
White (not Hispanic)	1,517	24.20	7.94	--	0.88	2.71
Multi-racial	85	26.31	8.08	0.27	0.90	2.58
LEP						
No	2,788	23.39	7.82	--	0.88	2.73
Yes	90	17.99	6.65	-0.69	0.82	2.86
IEP						
No	2,503	24.14	7.59	--	0.87	2.70
Yes	375	17.10	6.61	-0.94	0.82	2.83
Migrant						
No	2,878	23.22	7.84	--	0.88	2.73
Yes	--	--	--	--	--	--
FRL						
No	1,253	25.30	7.86	--	0.89	2.64
Yes	1,625	21.62	7.44	-0.48	0.86	2.78
Title I						
No	2,627	23.58	7.84	--	0.88	2.72
Yes	251	19.46	6.71	-0.53	0.82	2.82
Accommodations						
No	2,843	23.32	7.80	--	0.88	2.73
Yes	45	16.67	6.91	--	0.83	2.83

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Table 11.10: Alpha Coefficients and Standard Errors of Measurement, Algebra I, Fall 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	5,424	21.13	7.73	--	0.88	2.72
Gender						
Female	2,669	21.28	7.50	0.04	0.87	2.72
Male	2,755	20.97	7.95	--	0.88	2.72
Ethnicity						
American Indian/ Alaskan Native	24	18.54	7.40	--	--	--
Asian	106	26.49	8.64	0.57	0.91	2.56
Pacific Islander	11	20.36	7.76	--	--	--
Black (not Hispanic)	1,126	17.68	7.00	-0.59	0.84	2.77
Hispanic	227	19.59	6.91	-0.33	0.85	2.72
White (not Hispanic)	3,856	22.11	7.62	--	0.87	2.70
Multi-racial	74	20.16	6.90	-0.26	0.84	2.77
LEP						
No	5,250	21.23	7.74	--	0.88	2.72
Yes	130	18.10	7.33	-0.41	0.86	2.76
IEP						
No	4,825	21.97	7.51	--	0.87	2.71
Yes	555	14.08	5.92	-1.07	0.79	2.73
Migrant						
No	5,380	21.15	7.74	--	0.88	2.72
Yes	--	--	--	--	--	--
FRL						
No	2,969	23.39	7.60	--	0.88	2.69
Yes	2,411	18.40	6.98	-0.68	0.85	2.74
Title I						
No	4,772	21.68	7.78	--	0.88	2.71
Yes	608	17.02	5.94	-0.61	0.79	2.74
Accommodations						
No	5,281	21.32	7.69	--	0.88	2.72
Yes	143	13.85	5.27	-0.98	0.72	2.80

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Table 11.11: Alpha Coefficients and Standard Errors of Measurement, Biology, Fall 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	2,885	29.22	12.48	--	0.92	3.47
Gender						
Female	1,306	29.99	12.41	0.11	0.92	3.46
Male	1,579	28.59	12.51	--	0.92	3.47
Ethnicity						
American Indian/ Alaskan Native	8	35.13	9.72	--	--	--
Asian	66	39.70	11.26	0.61	0.92	3.12
Pacific Islander	3	34.00	11.53	--	--	--
Black (not Hispanic)	766	20.80	9.24	-1.02	0.86	3.41
Hispanic	123	27.88	10.38	-0.37	0.88	3.58
White (not Hispanic)	1,848	32.32	12.10	--	0.92	3.43
Multi-racial	71	31.28	12.48	-0.09	0.93	3.38
LEP						
No	2,829	29.40	12.46	--	0.92	3.47
Yes	45	19.82	10.34	--	0.90	3.35
IEP						
No	2,537	30.60	12.23	--	0.92	3.46
Yes	337	19.14	9.43	-0.96	0.87	3.34
Migrant						
No	2,873	29.26	12.48	--	0.92	3.47
Yes	1	9.00	--	--	--	--
FRL						
No	1,482	34.44	11.96	--	0.92	3.37
Yes	1,392	23.73	10.52	-0.95	0.89	3.48
Title I						
No	2,602	30.26	12.43	--	0.92	3.46
Yes	272	19.63	8.22	-0.88	0.83	3.36
Accommodations						
No	2,784	29.65	12.40	--	0.92	3.47
Yes	101	17.46	8.34	-0.99	0.85	3.25

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Table 11.12: Alpha Coefficients and Standard Errors of Measurement, English I, Fall 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	894	23.66	7.69	--	0.87	2.77
Gender						
Female	435	24.63	7.78	0.25	0.88	2.73
Male	459	22.75	7.49	--	0.86	2.79
Ethnicity						
American Indian/ Alaskan Native	3	25.67	5.13	--	--	--
Asian	13	23.15	6.03	--	--	--
Pacific Islander	5	22.40	9.61	--	--	--
Black (not Hispanic)	180	19.16	6.37	-0.84	0.79	2.91
Hispanic	84	22.79	7.42	-0.33	0.85	2.83
White (not Hispanic)	591	25.27	7.56	--	0.87	2.70
Multi-racial	18	20.33	7.23	--	--	--
LEP						
No	841	23.91	7.71	--	0.87	2.75
Yes	53	19.72	6.07	-0.55	0.76	2.96
IEP						
No	792	24.49	7.42	--	0.86	2.75
Yes	102	17.24	6.61	-0.99	0.81	2.88
Migrant						
No	894	23.66	7.68	--	0.87	2.76
Yes	--	--	--	--	--	--
FRL						
No	397	27.05	7.17	--	0.87	2.62
Yes	497	20.96	6.99	-0.86	0.83	2.87
Title I						
No	700	24.52	7.66	--	0.87	2.73
Yes	194	20.58	6.95	-0.52	0.83	2.88
Accommodations						
No	877	23.83	7.62	--	0.87	2.76
Yes	17	15.29	6.53	--	--	--

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Table 11.13: Alpha Coefficients and Standard Errors of Measurement, Algebra II, Fall 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	411	26.64	7.13	--	0.86	2.66
Gender						
Female	217	26.12	7.31	-0.16	0.87	2.67
Male	194	27.23	6.90	--	0.85	2.64
Ethnicity						
American Indian/ Alaskan Native	2	27.50	6.36	--	--	--
Asian	16	31.00	5.87	--	--	--
Pacific Islander	--	--	--	--	--	--
Black (not Hispanic)	50	22.52	7.45	-0.65	0.86	2.78
Hispanic	30	26.63	6.07	--	0.80	2.71
White (not Hispanic)	298	27.08	6.99	--	0.86	2.64
Multi-racial	15	26.87	7.56	--	--	--
LEP						
No	396	26.58	7.18	--	0.86	2.66
Yes	14	28.93	5.41	--	--	--
IEP						
No	401	26.76	7.07	--	0.86	2.65
Yes	9	22.11	8.78	--	--	--
Migrant						
No	410	26.66	7.13	--	0.86	2.66
Yes	--	--	--	--	--	--
FRL						
No	292	27.76	6.64	--	0.84	2.62
Yes	118	23.93	7.59	-0.55	0.87	2.76
Title I						
No	399	26.81	7.07	--	0.86	2.65
Yes	11	21.18	7.59	--	--	--
Accommodations						
No	409	26.68	7.12	--	0.86	2.65
Yes	2	19.00	7.07	--	--	--

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Table 11.14: Alpha Coefficients and Standard Errors of Measurement, Geometry, Fall 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	926	26.69	8.05	--	0.89	2.61
Gender						
Female	443	25.77	8.36	-0.22	0.90	2.64
Male	483	27.53	7.65	--	0.89	2.58
Ethnicity						
American Indian/ Alaskan Native	2	30.50	7.78	--	--	--
Asian	24	32.67	7.69	--	--	--
Pacific Islander	2	25.50	10.61	--	--	--
Black (not Hispanic)	114	21.65	6.98	-0.71	0.83	2.84
Hispanic	69	27.13	7.49	-0.01	0.88	2.62
White (not Hispanic)	689	27.23	7.97	--	0.89	2.59
Multi-racial	26	27.38	7.27	--	--	--
LEP						
No	906	26.77	8.04	--	0.89	2.61
Yes	19	22.89	7.83	--	--	--
IEP						
No	890	26.88	7.96	--	0.89	2.61
Yes	35	21.83	8.83	--	0.90	2.77
Migrant						
No	925	26.69	8.05	--	0.89	2.61
Yes	--	--	--	--	--	--
FRL						
No	608	28.83	7.60	--	0.89	2.50
Yes	317	22.58	7.28	-0.84	0.85	2.82
Title I						
No	902	26.76	8.10	--	0.90	2.61
Yes	23	23.78	4.74	--	--	--
Accommodations						
No	915	26.75	8.04	--	0.89	2.61
Yes	11	21.64	6.90	--	--	--

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Table 11.15: Alpha Coefficients and Standard Errors of Measurement, Government, Fall 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	15,264	25.28	8.24	--	0.89	2.72
Gender						
Female	7,613	24.76	8.10	-0.13	0.89	2.75
Male	7,651	25.80	8.34	--	0.90	2.70
Ethnicity						
American Indian/ Alaskan Native	60	26.22	6.94	-0.04	0.84	2.76
Asian	400	29.09	8.11	0.33	0.91	2.49
Pacific Islander	27	21.59	8.23	--	--	--
Black (not Hispanic)	2,889	20.50	7.80	-0.77	0.86	2.89
Hispanic	674	23.23	8.30	-0.42	0.89	2.80
White (not Hispanic)	10,963	26.52	7.85	--	0.88	2.68
Multi-racial	251	25.55	8.10	-0.12	0.89	2.72
LEP						
No	14,968	25.41	8.21	--	0.89	2.72
Yes	273	18.51	7.26	-0.84	0.84	2.91
IEP						
No	13,722	26.01	7.96	--	0.88	2.70
Yes	1,519	18.75	7.89	-0.91	0.87	2.88
Migrant						
No	15,238	25.28	8.24	--	0.89	2.72
Yes	3	24.00	10.15	--	--	--
FRL						
No	8,942	27.65	7.62	--	0.88	2.62
Yes	6,299	21.92	7.92	-0.74	0.87	2.85
Title I						
No	14,217	25.64	8.13	--	0.89	2.71
Yes	1,024	20.34	8.19	-0.65	0.88	2.85
Accommodations						
No	14,696	25.60	8.12	--	0.89	2.71
Yes	568	17.05	6.91	-1.06	0.82	2.94

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Table 11.16: Alpha Coefficients and Standard Errors of Measurement, Am. History, Fall 2013

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	1,640	22.53	7.41	--	0.85	2.82
Gender						
Female	817	21.57	7.19	-0.26	0.84	2.85
Male	823	23.48	7.51		0.86	2.79
Ethnicity						
American Indian/ Alaskan Native	6	23.33	6.65	--	--	--
Asian	29	21.72	6.54	--	--	--
Pacific Islander	2	23.50	0.71	--	--	--
Black (not Hispanic)	207	18.59	7.02	-0.65	0.83	2.89
Hispanic	91	20.07	7.00	-0.45	0.83	2.90
White (not Hispanic)	1,276	23.32	7.30	--	0.85	2.80
Multi-racial	29	23.79	7.14	--	--	--
LEP						
No	1,603	22.61	7.40	--	0.85	2.82
Yes	35	18.97	7.23	--	0.84	2.93
IEP						
No	1,510	23.00	7.25	--	0.85	2.82
Yes	128	17.00	7.07	-0.83	0.83	2.88
Migrant						
No	1,638	22.53	7.41	--	0.85	2.82
Yes	--	--	--	--	--	--
FRL						
No	1,007	24.07	7.15	--	0.85	2.78
Yes	631	20.07	7.15	-0.56	0.84	2.88
Title I						
No	1,611	22.63	7.40	--	0.85	2.82
Yes	27	16.26	4.74	--	0.75	2.86
Accommodations						
No	1,579	22.80	7.31	--	0.85	2.82
Yes	61	15.34	6.28	-1.03	0.79	2.88

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Table 11.17: Alpha Coefficients and Standard Errors of Measurement, English II, Spring 2014

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	61,836	27.88	6.78	--	0.86	2.52
Gender						
Female	30,665	28.75	6.43	0.26	0.85	2.46
Male	31,171	27.01	7.01	--	0.87	2.57
Ethnicity						
American Indian/ Alaskan Native	297	26.69	6.94	-0.30	0.86	2.58
Asian	1,144	29.38	7.21	0.11	0.89	2.38
Pacific Islander	131	25.08	7.22	-0.55	0.85	2.75
Black (not Hispanic)	8,841	24.03	6.97	-0.71	0.85	2.73
Hispanic	2,631	26.34	6.79	-0.36	0.85	2.64
White (not Hispanic)	47,667	28.66	6.47	--	0.85	2.47
Multi-racial	1,125	27.78	6.71	-0.14	0.85	2.57
LEP						
No	60,613	28.00	6.73	--	0.86	2.51
Yes	1,186	21.91	6.80	-0.90	0.83	2.81
IEP						
No	55,855	28.75	6.13	--	0.84	2.47
Yes	5,944	19.68	7.13	-1.46	0.84	2.86
Migrant						
No	61,775	27.88	6.78	--	0.86	2.52
Yes	24	18.38	7.72	--	--	--
FRL						
No	35,850	29.70	6.00	--	0.84	2.40
Yes	25,949	25.37	7.00	-0.67	0.86	2.66
Title I						
No	57,192	28.21	6.66	--	0.86	2.50
Yes	4,607	23.83	6.99	-0.66	0.85	2.73
Accommodations						
No	60,052	28.15	6.58	--	0.86	2.50
Yes	1,784	18.52	7.01	-1.46	0.82	2.97

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Table 11.18: Alpha Coefficients and Standard Errors of Measurement, Algebra I, Spring 2014

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	63,192	23.23	7.58	--	0.87	2.74
Gender						
Female	31,424	23.23	7.36	0.00	0.86	2.74
Male	31,768	23.23	7.79	--	0.88	2.74
Ethnicity						
American Indian/ Alaskan Native	288	22.37	7.51	-0.24	0.86	2.78
Asian	1,201	27.37	7.61	0.44	0.89	2.56
Pacific Islander	116	20.55	7.06	-0.49	0.84	2.81
Black (not Hispanic)	9,362	18.47	6.90	-0.78	0.84	2.80
Hispanic	2,942	22.30	7.35	-0.25	0.86	2.78
White (not Hispanic)	48,136	24.12	7.34	--	0.86	2.72
Multi-racial	1,147	23.20	7.56	-0.13	0.87	2.75
LEP						
No	61,676	23.31	7.57	--	0.87	2.74
Yes	1,418	19.86	7.21	-0.46	0.85	2.82
IEP						
No	56,747	24.04	7.22	--	0.86	2.72
Yes	6,347	16.00	6.83	-1.12	0.83	2.78
Migrant						
No	63,067	23.24	7.58	--	0.87	2.74
Yes	27	16.89	7.51	--	--	--
FRL						
No	35,014	25.35	7.09	--	0.86	2.67
Yes	28,080	20.59	7.33	-0.66	0.85	2.80
Title I						
No	56,642	23.64	7.46	--	0.87	2.73
Yes	6,452	19.70	7.65	-0.53	0.87	2.80
Accommodations						
No	60,356	23.62	7.41	--	0.86	2.73
Yes	2,836	15.00	6.22	-1.17	0.80	2.77

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Table 11.19: Alpha Coefficients and Standard Errors of Measurement, Biology, Spring 2014

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	61,275	35.28	9.54	--	0.88	3.30
Gender						
Female	30,368	35.42	9.41	0.03	0.88	3.31
Male	30,907	35.14	9.66	--	0.88	3.29
Ethnicity						
American Indian/ Alaskan Native	284	34.15	9.15	-0.29	0.87	3.34
Asian	1,141	38.06	10.69	0.16	0.91	3.13
Pacific Islander	120	31.70	10.20	-0.56	0.89	3.36
Black (not Hispanic)	9,025	28.42	9.84	-0.92	0.88	3.45
Hispanic	2,611	32.79	9.53	-0.44	0.87	3.37
White (not Hispanic)	46,955	36.68	8.82	--	0.86	3.26
Multi-racial	1,139	35.27	9.38	-0.16	0.87	3.32
LEP						
No	60,070	35.45	9.45	--	0.88	3.30
Yes	1,159	26.76	10.02	-0.92	0.88	3.44
IEP						
No	55,169	36.38	8.84	--	0.86	3.27
Yes	6,060	25.30	9.81	-1.24	0.88	3.43
Migrant						
No	61,215	35.29	9.53	--	0.88	3.30
Yes	14	23.00	7.90	--	--	--
FRL						
No	35,473	37.93	8.49	--	0.86	3.21
Yes	25,756	31.64	9.70	-0.70	0.88	3.40
Title I						
No	56,880	35.83	9.25	--	0.87	3.29
Yes	4,349	28.09	10.23	-0.83	0.89	3.42
Accommodations						
No	58,103	35.91	9.15	--	0.87	3.29
Yes	3,172	23.70	9.05	-1.33	0.86	3.44

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Table 11.20: Alpha Coefficients and Standard Errors of Measurement, English I, Spring 2014

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	60,367	25.09	7.35	--	0.86	2.70
Gender						
Female	30,140	25.55	7.19	0.13	0.86	2.69
Male	30,227	24.63	7.48	--	0.87	2.71
Ethnicity						
American Indian/ Alaskan Native	272	24.78	7.32	-0.15	0.86	2.71
Asian	1,116	27.65	7.43	0.25	0.88	2.59
Pacific Islander	107	21.58	7.15	-0.60	0.84	2.82
Black (not Hispanic)	8,206	20.94	6.94	-0.69	0.83	2.85
Hispanic	2,695	23.32	7.16	-0.36	0.85	2.77
White (not Hispanic)	46,807	25.87	7.15	--	0.86	2.67
Multi-racial	1,164	24.86	7.50	-0.14	0.87	2.71
LEP						
No	59,274	25.20	7.32	--	0.86	2.70
Yes	1,052	19.06	6.36	-0.84	0.79	2.89
IEP						
No	54,800	25.86	6.93	--	0.85	2.68
Yes	5,526	17.49	7.09	-1.21	0.84	2.88
Migrant						
No	60,307	25.09	7.35	--	0.86	2.70
Yes	19	17.89	7.74	--	--	--
FRL						
No	34,006	27.17	6.78	--	0.85	2.62
Yes	26,320	22.41	7.19	-0.68	0.85	2.80
Title I						
No	55,841	25.38	7.29	--	0.86	2.70
Yes	4,485	21.54	7.21	-0.53	0.85	2.82
Accommodations						
No	58,844	25.31	7.23	--	0.86	2.70
Yes	1,523	16.68	7.24	-1.19	0.83	2.97

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Table 11.21: Alpha Coefficients and Standard Errors of Measurement, Algebra II, Spring 2014

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	25,851	25.20	7.67	--	0.88	2.71
Gender						
Female	13,760	24.70	7.65	-0.14	0.87	2.73
Male	12,091	25.78	7.66	--	0.88	2.68
Ethnicity						
American Indian/ Alaskan Native	109	24.03	7.79	-0.23	0.88	2.74
Asian	528	29.53	7.62	0.51	0.90	2.44
Pacific Islander	57	23.65	8.07	-0.28	0.88	2.77
Black (not Hispanic)	2,309	20.17	7.52	-0.74	0.86	2.84
Hispanic	974	23.64	7.58	-0.28	0.87	2.77
White (not Hispanic)	21,468	25.72	7.45	--	0.87	2.70
Multi-racial	406	25.02	7.85	-0.09	0.88	2.71
LEP						
No	25,600	25.24	7.65	--	0.87	2.71
Yes	249	21.59	8.39	-0.48	0.89	2.81
IEP						
No	25,216	25.39	7.57	--	0.87	2.71
Yes	633	17.95	8.10	-0.98	0.88	2.82
Migrant						
No	25,848	25.20	7.67	--	0.88	2.71
Yes	1	31.00	--	--	--	--
FRL						
No	18,038	26.27	7.45	--	0.87	2.67
Yes	7,811	22.74	7.59	-0.47	0.86	2.80
Title I						
No	25,134	25.28	7.67	--	0.88	2.70
Yes	715	22.49	6.99	-0.36	0.84	2.80
Accommodations						
No	25,592	25.29	7.63	--	0.87	2.71
Yes	259	16.68	7.22	-1.13	0.84	2.87

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Table 11.22: Alpha Coefficients and Standard Errors of Measurement, Geometry, Spring 2014

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	35,721	25.61	7.40	--	0.87	2.72
Gender						
Female	18,333	25.34	7.37	-0.07	0.86	2.74
Male	17,388	25.89	7.42	--	0.87	2.69
Ethnicity						
American Indian/ Alaskan Native	193	23.99	7.28	-0.33	0.85	2.77
Asian	738	29.13	7.62	0.39	0.89	2.49
Pacific Islander	94	22.06	7.70	-0.60	0.87	2.80
Black (not Hispanic)	3,675	20.49	7.18	-0.82	0.84	2.87
Hispanic	1,479	23.53	7.36	-0.39	0.86	2.79
White (not Hispanic)	28,844	26.33	7.11	--	0.86	2.69
Multi-racial	698	24.41	7.58	-0.27	0.86	2.79
LEP						
No	35,183	25.68	7.37	--	0.86	2.71
Yes	527	20.57	7.57	-0.69	0.86	2.85
IEP						
No	33,808	25.98	7.20	--	0.86	2.71
Yes	1,902	18.95	7.70	-0.97	0.86	2.84
Migrant						
No	35,702	25.61	7.40	--	0.87	2.72
Yes	8	17.88	6.08	--	--	--
FRL						
No	23,132	26.94	7.15	--	0.86	2.66
Yes	12,578	23.16	7.24	-0.53	0.85	2.81
Title I						
No	34,511	25.70	7.38	--	0.86	2.71
Yes	1,199	23.03	7.55	-0.36	0.86	2.80
Accommodations						
No	34,995	25.78	7.31	--	0.86	2.71
Yes	726	17.17	6.99	-1.18	0.83	2.87

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Table 11.23: Alpha Coefficients and Standard Errors of Measurement, Government, Spring 2014

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	44,887	26.83	7.52	--	0.88	2.64
Gender						
Female	22,179	26.26	7.39	-0.15	0.87	2.67
Male	22,708	27.37	7.60	--	0.88	2.60
Ethnicity						
American Indian/ Alaskan Native	188	26.52	7.37	-0.16	0.87	2.68
Asian	825	28.54	7.34	0.12	0.88	2.53
Pacific Islander	77	22.83	6.91	-0.67	0.83	2.83
Black (not Hispanic)	6,105	22.17	7.47	-0.76	0.86	2.84
Hispanic	1,828	25.57	7.55	-0.29	0.87	2.71
White (not Hispanic)	35,105	27.68	7.22	--	0.87	2.60
Multi-racial	759	26.60	7.59	-0.15	0.88	2.65
LEP						
No	44,037	26.93	7.50	--	0.88	2.63
Yes	814	21.42	6.79	-0.74	0.82	2.89
IEP						
No	40,459	27.57	7.13	--	0.87	2.61
Yes	4,392	19.98	7.54	-1.06	0.85	2.88
Migrant						
No	44,833	26.83	7.52	--	0.88	2.64
Yes	18	22.11	7.58	--	--	--
FRL						
No	26,566	28.80	6.87	--	0.86	2.53
Yes	18,285	23.97	7.50	-0.68	0.86	2.78
Title I						
No	41,663	27.23	7.38	--	0.87	2.62
Yes	3,188	21.55	7.30	-0.77	0.85	2.86
Accommodations						
No	42,559	27.25	7.32	--	0.87	2.62
Yes	2,328	19.08	6.94	-1.12	0.82	2.91

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Table 11.24: Alpha Coefficients and Standard Errors of Measurement, Am. History, Spring 2014

Group	N-Count	Mean Raw Score	SD Raw Score	Effect Size	Reliability	SEM
All Students	50,090	23.00	7.16	--	0.85	2.78
Gender						
Female	24,702	22.01	6.94	-0.27	0.84	2.81
Male	25,388	23.95	7.23		0.86	2.74
Ethnicity						
American Indian/ Alaskan Native	238	23.04	7.10	-0.10	0.85	2.77
Asian	939	25.46	7.63	0.25	0.88	2.67
Pacific Islander	96	21.14	7.22	-0.37	0.85	2.83
Black (not Hispanic)	6,768	19.03	6.61	-0.67	0.81	2.87
Hispanic	2,073	21.32	6.77	-0.34	0.82	2.84
White (not Hispanic)	39,099	23.72	7.01	--	0.85	2.76
Multi-racial	877	22.97	7.03	-0.11	0.84	2.78
LEP						
No	49,242	23.08	7.14	--	0.85	2.78
Yes	832	17.78	6.39	-0.74	0.79	2.91
IEP						
No	45,570	23.51	6.99	--	0.84	2.77
Yes	4,504	17.78	6.73	-0.82	0.82	2.88
Migrant						
No	50,056	23.00	7.16	--	0.85	2.78
Yes	18	17.44	7.53	--	--	--
FRL						
No	29,268	24.83	6.79	--	0.84	2.72
Yes	20,806	20.41	6.86	-0.65	0.83	2.85
Title I						
No	47,237	23.29	7.09	--	0.85	2.77
Yes	2,837	18.02	6.43	-0.75	0.80	2.88
Accommodations						
No	47,863	23.29	7.06	--	0.85	2.77
Yes	2,227	16.55	6.11	-0.96	0.77	2.91

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11.4 Conditional Standard Error Estimates for Scale Scores

The overall SEM in Tables 11.1 to 11.24 represent the standard deviations of projected replications of the testing procedure averaged over all students. In contrast, conditional standard errors of measurement (CSEMs) are conditioned on the ability of the student. Rasch-based CSEMs (CSEM (θ)) for each scale score are defined as the reciprocal of the square root of the test information function (I(θ)) at the point on the ability continuum that corresponds to each scale score (Hambleton & Swaminathan, 1985):

$$CSEM(\theta) = \frac{1}{\sqrt{I(\theta)}}.$$

CSEMs are especially useful for characterizing measurement precision in the neighborhood of score levels used for decision making, such as cut scores at various achievement levels. The CSEMs for the Proficient cut scores for the MO EOC Assessments are presented in Table 11.25. CSEMs for other scale scores are reported in Chapter 8 of this report. Note that CSEMs are smaller in the middle of the score distribution than at the extremes. This pattern is expected for CSEMs based on item response theory (IRT). The value for all CSEMs was either 6 or 7 scale-score points for English II, Algebra I, and Biology and between 7 and 9 scale-score points for English I, Algebra II, Geometry, Government, and American History.

Table 11.25: CSEMs at the Proficient Cut Score

Test Period	Content Area	SS Cut*	CSEM
Summer 2013	English II	200	6
	Algebra I	200	7
	Biology	200	6
	English I	200	8
	Algebra II	200	7
	Geometry	200	8
	Government	200	7
	Am. History	200	9
Fall 2013	English II	200	6
	Algebra I	200	7
	Biology	200	6
	English I	200	8
	Algebra II	200	7
	Geometry	200	7
	Government	200	6
	Am. History	200	9
Spring 2014	English II	200	6
	Algebra I	200	7
	Biology	200	6
	English I	200	8
	Algebra II	200	7
	Geometry	200	7
	Government	200	7
	Am. History	200	9

*See Tables 8.3 through 8.26 in Chapter 8 for the CSEM at each scale score.

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11.5 Evidence Supporting Scorer Reliability

11.5.1 Inter-rater Reliabilities

Questar performed the scoring of the PE/WPs for the 2013–2014 MO EOC administration. Please see Chapter 7 for more information on Questar's scoring procedures. Tables 11.26, 11.27, and 11.28 depict the inter-rater reliability, including perfect and adjacent agreement for each item for Summer 2013, Fall 2013, and Spring 2014, respectively. The tables also provide the total n-count for each item and the n-count of double reads (i.e., the responses that received a second read). The agreement rates were calculated based on the double reads.

Table 11.26: Inter-rater Reliability for Summer 2013

Item	N-Count	N-Count of Double Reads	Perfect Agreement Plan	Perfect Agreement Actual	Perfect + Adjacent Plan	Perfect + Adjacent Actual
Summer 2013						
Algebra I – 100076682	900	88	80%	92%	95%	100%
English II – 100076781	363	34	80%	88%	95%	100%
Biology 1 – 100075926	382	35	100%	100%	100%	100%
Biology 2 – 100075936	381	35	100%	100%	100%	100%
Biology 3 – 100075927	382	36	100%	100%	100%	100%
Biology 4 – 100075929	378	34	80%	94%	95%	100%
Biology 5 – 100075928	381	35	95%	97%	100%	100%
Biology 6 – 100075933	376	38	95%	100%	100%	100%
Biology 7 – 100075930	373	35	95%	100%	100%	100%
Biology 8 – 100075934	375	35	100%	97%	100%	100%
Biology 9 – 100075935	374	35	100%	100%	100%	100%
Biology 10 – 100075937	356	34	85%	97%	95%	100%
Biology 11 – 100075938	339	29	95%	100%	100%	100%

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Table 11.27: Inter-rater Reliability for Fall 2013

Item	N-Count	N-Count of Double Reads	Perfect Agreement Plan	Perfect Agreement Actual	Perfect + Adjacent Plan	Perfect + Adjacent Actual
Fall 2013						
Algebra I – 100088976	5,299	528	80%	89%	95%	99%
English II – 100085794	2,861	278	80%	97%	95%	99%
Biology 1 – 100075926	2,853	281	100%	100%	100%	100%
Biology 2 – 100075927	2,848	279	100%	100%	100%	100%
Biology 3 – 100075929	2,844	280	100%	100%	100%	100%
Biology 4 – 100075930	2,823	275	80%	98%	95%	100%
Biology 5 – 100075933	2,833	281	95%	95%	100%	100%
Biology 6 – 100075934	2,804	275	95%	97%	100%	100%
Biology 7 – 100075935	2,808	277	95%	97%	100%	100%
Biology 8 – 100075936	2,799	270	100%	100%	100%	100%
Biology 9 – 100075937	2,789	276	100%	100%	100%	100%
Biology 10 – 100075938	2,669	251	85%	94%	95%	99%
Biology 11 – 100075928	2,626	251	95%	98%	100%	100%

Table 11.28: Inter-rater Reliability for Spring 2014

Item	N-Count	N-Count of Double Reads	Perfect Agreement Plan	Perfect Agreement Actual	Perfect + Adjacent Plan	Perfect + Adjacent Actual
Spring 2014						
Algebra I – 100076686	62,964	6,222	80%	85%	95%	100%
English II – 100076788	61,610	6,126	80%	81%	95%	100%
Biology 1 – 100089024	61,057	3,039	100%	100%	100%	100%
Biology 2 – 100089025	61,000	3,042	100%	100%	100%	100%
Biology 3 – 100089036	60,988	3,030	100%	100%	100%	100%
Biology 4 – 100089027	61,004	3,032	100%	100%	100%	100%
Biology 5 – 100089029	60,580	3,010	85%	100%	95%	100%
Biology 6 – 100089030	60,871	3,013	80%	100%	95%	100%
Biology 7 – 100089038	61,014	2,988	100%	100%	100%	100%
Biology 8 – 100089040	60,915	2,911	100%	100%	100%	100%
Biology 9 – 100089034	60,858	3,028	100%	100%	100%	100%
Biology 10 – 100089033	60,633	3,018	95%	100%	100%	98%
Biology 11 – 100089039	60,676	3,020	100%	100%	100%	100%
Biology 12 – 100089035	60,511	3,009	95%	100%	100%	98%
Biology 13 – 100089022	60,646	3,019	100%	100%	100%	100%

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11.6 Reliability of Classifications

Decision consistency is the extent to which a student's achievement level can be replicated given a second, parallel form of the test. As in previous years, the reliability of student achievement-level classifications (Below Basic, Basic, Proficient, and Advanced) was evaluated using a computer program developed by Huynh (1979). This program is based on the beta-binomial model that also provides standard errors (SEs) for the consistency estimates. Classification consistency refers to the degree to which each student's achievement level can be replicated and is similar to the traditional test-retest or equivalent forms reliability. Using the maximum possible score, mean, standard deviation, and KR-21 reliability estimate, the program computes parameters (α, β) for the beta-binomial distribution. Kappa indices, which estimate the level of improvement in decision consistency beyond chance when test data are used, are then computed (Huynh, 1979). The Kappa indices are shown in Table 11.29.

Table 11.30 shows the decision consistency (Huynh, 1979) measure for each achievement level by content area. Across achievement levels and content areas, the decision consistency indices (p) are typically in the 60s. A second analysis was conducted to determine the indices if a student's achievement was labeled 'pass' for a classification of Proficient or Advanced, or 'fail' for a classification of Below Basic or Basic. As indicated in Table 11.32, the indices would then be in the 80s range. Kappa statistics shown in Table 11.31 were also higher than those in Table 11.29.

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Table 11.29: Classification Consistency Coefficients

Test Period	N-Count	#Items	Raw Cut Scores			Mean	SD	Kappa	SE (*k*)
			Basic	Proficient	Advanced				
Summer 2013									
English II	359	36	15	24	33	20.64	8.72	0.59	0.0101
Algebra I	896	36	13	22	31	19.37	7.81	0.54	0.0073
Biology	386	46	18	32	45	23.27	11.10	0.68	0.0077
English I	410	40	16	25	32	19.96	7.03	0.46	0.0128
Algebra II	95	40	15	23	32	18.97	6.18	0.41	0.0297
Geometry	223	40	17	24	32	18.97	7.15	0.47	0.0160
Government	872	40	15	24	33	24.39	7.65	0.50	0.0082
Am. History	259	40	19	24	31	20.50	6.71	0.46	0.0068
Fall 2013									
English II	2,888	36	13	23	33	23.22	7.83	0.57	0.0037
Algebra I	5,424	36	13	21	30	21.13	7.73	0.53	0.0032
Biology	2,885	46	18	32	45	29.22	12.48	0.69	0.0025
English I	894	40	15	24	32	23.66	7.69	0.50	0.0083
Algebra II	411	40	14	22	32	26.64	7.13	0.51	0.0122
Geometry	926	40	17	24	32	26.69	8.05	0.53	0.0079
Government	15,264	40	15	25	34	25.28	8.24	0.55	0.0018
Am. History	1,640	40	18	24	31	22.53	7.41	0.46	0.0068
Spring 2014									
English II	61,836	36	14	24	33	27.88	6.78	0.58	0.0009
Algebra I	63,192	36	13	23	31	23.23	7.58	0.54	0.0009
Biology	61,275	48	18	32	44	35.28	9.54	0.63	0.0008
English I	60,367	40	15	24	32	25.09	7.35	0.49	0.0010
Algebra II	25,851	40	14	23	32	25.20	7.67	0.52	0.0015
Geometry	35,721	40	16	23	32	25.61	7.40	0.49	0.0014
Government	44,887	40	16	25	34	26.83	7.52	0.52	0.0011
Am. History	50,090	40	18	24	31	23.00	7.16	0.44	0.0013

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Table 11.30: Raw Agreement Consistency Coefficients

Test Period	N-Count	#Items	Raw Cut Scores			Mean	SD	*p*	SE (*p*)
			Basic	Proficient	Advanced				
Summer 2013									
English II	359	36	15	24	33	20.64	8.72	0.71	0.0009
Algebra I	896	36	13	22	31	19.37	7.81	0.68	0.0031
Biology	386	46	18	32	45	23.27	11.10	0.79	0.0042
English I	410	40	16	25	32	19.96	7.03	0.64	0.0057
Algebra II	95	40	15	23	32	18.97	6.18	0.62	0.0106
Geometry	223	40	17	24	32	18.97	7.15	0.64	0.0109
Government	872	40	15	24	33	24.39	7.65	0.66	0.0029
Am. History	259	40	19	24	31	20.50	6.71	0.59	0.0123
Fall 2013									
English II	2,888	36	13	23	33	23.22	7.83	0.71	0.0009
Algebra I	5,424	36	13	21	30	21.13	7.73	0.66	0.0014
Biology	2,885	46	18	32	45	29.22	12.48	0.79	0.0011
English I	894	40	15	24	32	23.66	7.69	0.64	0.0036
Algebra II	411	40	14	22	32	26.64	7.13	0.68	0.0049
Geometry	926	40	17	24	32	26.69	8.05	0.67	0.0053
Government	15,264	40	15	25	34	25.28	8.24	0.68	0.0007
Am. History	1,640	40	18	24	31	22.53	7.41	0.60	0.0043
Spring 2014									
English II	61,836	36	14	24	33	27.88	6.78	0.72	0.0004
Algebra I	63,192	36	13	23	31	23.23	7.58	0.68	0.0004
Biology	61,275	48	18	32	44	35.28	9.54	0.75	0.0003
English I	60,367	40	15	24	32	25.09	7.35	0.64	0.0004
Algebra II	25,851	40	14	23	32	25.20	7.67	0.66	0.0007
Geometry	35,721	40	16	23	32	25.61	7.40	0.65	0.0006
Government	44,887	40	16	25	34	26.83	7.52	0.67	0.0005
Am. History	50,090	40	18	24	31	23.00	7.16	0.59	0.0008

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Table 11.31: Classification Consistency Coefficients (Two Classification Categories)

Test Period	N-Count	#Items	Raw Cut Scores Proficient/ Advanced	Mean	SD	Kappa	SE (*k*)
Summer 2013							
English II	359	36	24	20.64	8.72	0.74	0.0108
Algebra I	896	36	22	19.37	7.81	0.69	0.0079
Biology	386	46	32	23.27	11.10	0.75	0.0107
English I	410	40	25	19.96	7.03	0.60	0.0162
Algebra II	95	40	23	18.97	6.18	0.54	0.0383
Geometry	223	40	24	18.97	7.15	0.61	0.0214
Government	872	40	24	24.39	7.65	0.67	0.0086
Am. History	259	40	24	20.50	6.71	0.59	0.0202
Fall 2013							
English II	2,888	36	23	23.22	7.83	0.71	0.0042
Algebra I	5,424	36	21	21.13	7.73	0.70	0.0032
Biology	2,885	46	32	29.22	12.48	0.82	0.0027
English I	894	40	24	23.66	7.69	0.67	0.0084
Algebra II	411	40	22	26.64	7.13	0.64	0.0154
Geometry	926	40	24	26.69	8.05	0.70	0.0079
Government	15,264	40	25	25.28	8.24	0.71	0.0018
Am. History	1,640	40	24	22.53	7.41	0.65	0.0066
Spring 2014							
English II	61,836	36	24	27.88	6.78	0.71	0.0011
Algebra I	63,192	36	23	23.23	7.58	0.70	0.0009
Biology	61,275	48	32	35.28	9.54	0.75	0.0009
English I	60,367	40	24	25.09	7.35	0.66	0.0011
Algebra II	25,851	40	23	25.20	7.67	0.67	0.0016
Geometry	35,721	40	23	25.61	7.40	0.66	0.0015
Government	44,887	40	25	26.83	7.52	0.68	0.0012
Am. History	50,090	40	24	23.00	7.16	0.63	0.0012

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Table 11.32: Raw Agreement Consistency Coefficients (Two Classification Categories)

Test Period	N-Count	#Items	Raw Cut Scores Proficient/ Advanced	Mean	SD	*p*	SE (*p*)
Summer 2013							
English II	359	36	24	20.64	8.72	0.87	0.0050
Algebra I	896	36	22	19.37	7.81	0.85	0.0038
Biology	386	46	32	23.27	11.10	0.90	0.0037
English I	410	40	25	19.96	7.03	0.84	0.0061
Algebra II	95	40	23	18.97	6.18	0.81	0.0151
Geometry	223	40	24	18.97	7.15	0.84	0.0081
Government	872	40	24	24.39	7.65	0.84	0.0042
Am. History	259	40	24	20.50	6.71	0.82	0.0087
Fall 2013							
English II	2,888	36	23	23.22	7.83	0.86	0.0020
Algebra I	5,424	36	21	21.13	7.73	0.85	0.0016
Biology	2,885	46	32	29.22	12.48	0.91	0.0013
English I	894	40	24	23.66	7.69	0.84	0.0042
Algebra II	411	40	22	26.64	7.13	0.87	0.0053
Geometry	926	40	24	26.69	8.05	0.87	0.0033
Government	15,264	40	25	25.28	8.24	0.86	0.0009
Am. History	1,640	40	24	22.53	7.41	0.82	0.0033
Spring 2014							
English II	61,836	36	24	27.88	6.78	0.89	0.0004
Algebra I	63,192	36	23	23.23	7.58	0.85	0.0005
Biology	61,275	48	32	35.28	9.54	0.89	0.0003
English I	60,367	40	24	25.09	7.35	0.84	0.0005
Algebra II	25,851	40	23	25.20	7.67	0.85	0.0007
Geometry	35,721	40	23	25.61	7.40	0.85	0.0006
Government	44,887	40	25	26.83	7.52	0.85	0.0005
Am. History	50,090	40	24	23.00	7.16	0.82	0.0006

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Chapter 12: Validity

12.1 Introduction

Validity is the most fundamental consideration in educational and psychological testing. It refers to "the degree to which evidence and theory support the interpretations of test scores for proposed uses of tests" (AERA, APA, & NCME, 2014, p. 11). Validity evidence for the MO EOC Assessments is gathered and demonstrated from content, criterion, and construct. Since test forms used in the 2013–2014 testing year were intact forms previously administered, relevant information documented in previous technical reports is included in this chapter to provide historical information and assist with understanding validity evidence for the MO EOC Assessments.

According to the Standards (AERA, APA, & NCME, 1999), "Ultimately, the validity of an intended interpretation of test scores relies on all the available evidence relevant to the technical quality of a testing program. This includes evidence of careful test construction; adequate score reliability; appropriate test administration and scoring; accurate score scaling, equating, and standard setting; and careful attention to fairness for all examinees" (p. 17). While this chapter summarizes evidence that supports claims about the validity of the MO EOC Assessment scores, many other parts of this technical report also provide appropriate evidence for validity. Some of this evidence is cross-referenced below. The procedural and empirical evidence available, along with the rationale presented below, provides support for the standards-based interpretations of the MO EOC Assessments.

This chapter begins with a brief review of important federal statutes related to the MO EOC Assessments and explains the purposes and intended uses of test scores, suggesting the value implications of these assessments for schools, teachers, students, and parents. Validity evidence related to test content is presented in terms of the adequacy and appropriateness of the MO EOC Assessments for measuring progress on the Missouri content standards. Then, validity evidence based on the internal structure of the MO EOC Assessments is provided through a correlational analysis of MO EOC Assessment content clusters. References to specific standards are provided where appropriate.

12.2 Federal Authority for School Accountability

The U.S. Department of Education bases accountability on a school's achievement of annual measurable objectives (AMOs) in Reading/Language Arts and Mathematics. AMO determinations refer to the target percent proficient for each school and district during the course of one year. For Missouri schools and school districts, AMOs are set in terms of the percentage of all students, and all student groups of sufficient size, scoring Proficient or above on the required assessments including the English II and Algebra I MO EOC Assessments.

12.3 Purpose and Intended Uses of Test Scores

The Standards state that "Validation logically begins with an explicit statement of the proposed interpretation of the test scores, along with a rationale for the relevance of the interpretation to

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the proposed use" (AERA, APA, and NCME 1999). [16] The MO EOC Assessments were developed for the following purposes and uses:

- Measuring and reflecting students' mastery toward post-secondary readiness
- Identifying students' strengths and weaknesses
- Communicating expectations for all students
- Serving as the basis for state and national accountability plans
- Evaluating programs

The valid interpretation and appropriate use of MO EOC Assessment scores are supported in a variety of ways, including the training and consultation provided by personnel of DESE and publications such as the Test Administration Manual, Guide to Interpreting Results, and this technical report. The training and documentation provided to test users help them better administer, understand, and use test score results.

12.4 MO EOC Assessment Scores

The MO EOC Assessment scores are scaled in several ways: raw-score points, item response theory (IRT) derived scale scores, and achievement level (based on scale score cuts). Missouri actively promotes the use of achievement-level results, reporting them annually on each assessment at the student, school, district, and state levels. Individual student and average scale scores are also used, but they play a secondary role and are generally interpreted with reference to their distance from achievement-level cut points. Test results are reported for students as a whole as well as by student group, including gender, ethnicity, migrant status, free and reduced lunch (FRL) status, English language proficiency, Title I, Individualized Education Program (IEP) status, and accommodations used during testing. Scores are reported to schools and districts in annually published reports (see Chapter 9 of this report for more information).

The MO EOC Assessment score indicates that an individual student performs at the Below Basic, Basic, Proficient, or Advanced level in a given content area. Achievement-level descriptors (ALDs) provide details about the content expectations that students at each level meet or exceed. No stakes for teachers are attached to student-level scores by the state. Teachers are encouraged to consider student performance on the MO EOC Assessments in determining course grades. DESE recommends that EOC scores account for at least 10 percent but not more than 25 percent of a student's grade in a course with a corresponding MO EOC Assessment. Districts generally receive students' scores on the MO EOC Assessments within five business days after test administration, and DESE provides districts with "curved percentages" to assist teachers in appropriately considering EOC scores in determining course grades (http://dese.mo.gov/sites/default/files/asmt-eoc-curved-percentages-2012.pdf). Teachers are counseled to interpret individual student scores only in the context of other assessment results and their own experience.

[16] **Standard 1.2:** The test developer should set forth clearly how test scores are intended to be interpreted and used. The population(s) for which a test is appropriate should be clearly delimited, and the construct that the test is intended to assess should be clearly described (p. 17).

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12.5 Content-Related Evidence of Validity

Baker and Linn (2002) suggest that "Two questions are central in the evaluation of content aspects of validity. Is the definition of the content domain to be assessed adequate and appropriate? Does the test provide an adequate representation of the content domain the test is intended to measure?" (p. 6). The following sections help answer these two questions and address address Standard 1.6[17], which specifically relates to the definition and development of test content.

12.5.1 Appropriateness of Content Definition

In 1993, the Missouri legislature passed the Outstanding Schools Act (Senate Bill 380), requiring the State Board of Education to adopt challenging academic performance standards that define the skills and competencies necessary for students to successfully advance through the public school system, prepare for post-secondary education and the workplace, and participate as citizens in a democratic society. The Missouri State Board of Education formally adopted the academic standards known as the Show-Me Standards in January 1996.

In addition to mandating the development of rigorous academic standards, the Outstanding Schools Act of 1993 required the development and implementation of a comprehensive, primarily performance-based assessment program to measure student proficiency in the knowledge, skills, and competencies identified in the standards. Upon adoption of the standards in 1996, Missouri began developing the Missouri Assessment Program (MAP).

In January 2007, the Missouri State Board of Education approved a plan to replace the MAP for high school students, beginning in August of the 2008–2009 school year, with MO EOC Assessments in English II, Algebra I, and Biology. The remaining MO EOC Assessments (English I, Algebra II, Geometry, Government, and American History) were added the following year. The intent was to provide MO EOC Assessments that are an integral part of the statewide assessment system and, as such, are a logical extension of MAP Grade-Level Assessments.

12.5.2 Adequacy of Content Representation

Adequacy of the content representation of the MO EOC Assessments is critically important because the tests must provide an indication of student progress toward achieving the knowledge and skills identified in the Missouri Course-Level Expectations (CLEs), and they must fulfill the requirements of NCLB.

Adequate representation of the content domains defined in the CLEs is assured through the use of a test blueprint and a carefully documented test construction process. CLEs and the Show-Me Standards are taken into consideration in the writing of SR items. Each assessment must align with and proportionally represent the subdomains of the test blueprint. Following development of all MO EOC Assessments, DESE contracted for external studies to support the alignment of the assessments to the Show-Me Standards and CLEs. Results of those studies are available for review at http://dese.mo.gov/college-career-readiness/assessment/assessment-technical-support-

[17] **Standard 1.6:** When the validation rests in part on the appropriateness of test content, the procedures followed in specifying and generating test content should be described and justified in reference to the construct the test is intended to measure or the domain it is intended to represent. If the definition of the content sampled incorporates criteria such as importance, frequency, or criticality, these criteria should also be clearly explained and justified (p. 18).

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materials. Evidence to support the content validity of the MO EOC Assessments was provided in Chapter 2 through the documentation of the test specifications and blueprints, item-writing processes, and item-review processes.

Additional evidence to support the content validity of the MO EOC Assessments was provided in Chapter 2 and also in Chapter 4. Chapter 2 outlined the target strand and CLE point distributions on the English II, Algebra I, Biology, English I, Algebra II, Geometry, Government, and American History operational forms.

12.6 Validity Evidence Based on the Internal Structure of the MO EOC Assessments

Standard 1.11[18] pertains to the relationships between the parts of the test. Because the MO EOC Assessments measure student performance in several content areas, it is important to study the pattern of relationships among the content domains and clusters. One way to study patterns of relationships to provide evidence supporting the inferences made from test scores is the multitrait-multimethod matrix. Tables 12.1 through 12.3 summarize Pearson correlation coefficients among test domains and clusters for English II, Algebra I, Biology, Algebra II, Geometry, and Government. Because both English I and American History have only one content cluster, correlation coefficients were not calculated for these MO EOC Assessments. The correlations between clusters within each assessment are in the moderate to moderately high range, suggesting strong relationships between the clusters. Note that the high correlations between cluster scores and total assessment scores are inflated due to the overlap of items.

Table 12.1: Pearson Correlation Coefficients Between Domains and Clusters for English II

		Reading	Writing
Summer 2013	English II	0.98	0.84
	Reading	1.00	0.71
	Writing		1.00
Fall 2013	English II	0.98	0.79
	Reading	1.00	0.67
	Writing		1.00
Spring 2014	English II	0.98	0.78
	Reading	1.00	0.64
	Writing		1.00

[18] **Standard 1.11:** If the rationale for a test use or interpretation depends on premises about the relationships among parts of the test, evidence concerning the internal structure of the test should be provided (p. 20).

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Table 12.2: Pearson Correlation Coefficients Between Domains and Clusters for Algebra I

		Number and Operations	Algebraic Relationships	Data and Probability
Summer 2013	Algebra I	0.83	0.96	0.79
	Number and Operations	1.00	0.69	0.58
	Algebraic Relationships		1.00	0.64
	Data and Probability			1.00
Fall 2013	Algebra I	0.86	0.94	0.85
	Number and Operations	1.00	0.69	0.68
	Algebraic Relationships		1.00	0.68
	Data and Probability			1.00
Spring 2014	Algebra I	0.84	0.96	0.72
	Number and Operations	1.00	0.72	0.52
	Algebraic Relationships		1.00	0.58
	Data and Probability			1.00

Table 12.3: Pearson Correlation Coefficients Between Domains and Clusters for Biology

		Characteristics and Interactions	Changes in Ecosystems	Scientific Inquiry[19]
Summer 2013	Biology	0.87	0.85	0.88
	Characteristics and Interactions	1.00	0.67	0.65
	Changes in Ecosystems		1.00	0.68
Fall 2013	Biology	0.92	0.86	0.93
	Characteristics and Interactions	1.00	0.74	0.75
	Changes in Ecosystems		1.00	0.71
	Scientific Inquiry			1.00
Spring 2014	Biology	0.90	0.83	0.87
	Characteristics and Interactions	1.00	0.68	0.63
	Changes in Ecosystems		1.00	0.60
	Scientific Inquiry			1.00

[19] Scientific Inquiry was measured by PEs, which were not included in the Summer 2012 operational test forms.

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Table 12.4: Pearson Correlation Coefficients Between Domains and Clusters for Algebra II

		Algebraic Relationships	Data and Probability	Numbers and Operations
Summer 2013	Algebra II	0.83	0.90	0.77
	Algebraic Relationships	1.00	0.60	0.55
	Data and Probability		1.00	0.52
	Numbers and Operations			1.00
Fall 2013	Algebra II	0.78	0.94	0.81
	Algebraic Relationships	1.00	0.62	0.57
	Data and Probability		1.00	0.62
	Numbers and Operations			1.00
Spring 2014	Algebra II	0.80	0.95	0.82
	Algebraic Relationships	1.00	0.66	0.57
	Data and Probability		1.00	0.66
	Numbers and Operations			1.00

Table 12.5: Pearson Correlation Coefficients Between Domains and Clusters for Geometry

		Algebraic Relationships	Geometric and Spatial Relationships	Measurement
Summer 2013	Geometry	0.73	0.95	0.84
	Algebraic Relationships	1.00	0.55	0.53
	Geometric and Spatial Relationships		1.00	0.69
	Measurement			1.00
Fall 2013	Geometry	0.82	0.97	0.83
	Algebraic Relationships	1.00	0.71	0.59
	Geometric and Spatial Relationships		1.00	0.71
	Measurement			1.00
Spring 2014	Geometry	0.80	0.95	0.83
	Algebraic Relationships	1.00	0.64	0.58
	Geometric and Spatial Relationships		1.00	0.70
	Measurement			1.00

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Table 12.6: Pearson Correlation Coefficients Between Domains and Clusters for Government

		Principles and processes of governance systems	Principles in constitutional democracy
Summer 2013	Government	0.95	0.94
	Principles and processes of governance systems	1.00	0.77
	Principles in constitutional democracy		1.00
Fall 2013	Government	0.94	0.95
	Principles and processes of governance systems	1.00	0.80
	Principles in constitutional democracy		1.00
Spring 2014	Government	0.94	0.94
	Principles and processes of governance systems	1.00	0.78
	Principles in constitutional democracy		1.00

12.7 Discriminant Validity Evidence for the MO EOC Assessments

The Standards state the following regarding convergent and divergent validity: "Relationships between test scores and other measures intended to assess similar constructs provide convergent evidence, whereas relationships between test scores and measures purportedly of different constructs provide discriminant evidence" (AERA, APA, & NCME, 1999, p. 14). The MO EOC assessments were designed to measure different constructs as shown by both the standards they assess and the content coverage detailed in the test blueprints. To gather validity evidence for the MO EOC assessments, DESE commissioned a full convergent and divergent study. The results showed that, in general, the MO EOC Assessments are appropriately related to each other and measure their own content areas, regardless of when the tests are administered. The report was approved by the United Stated Department of Education during the peer review process. For the full report on this study, see Appendix B in the *2011–2012 MO EOC Technical Report* at http://dese.mo.gov/college-career-readiness/assessment/assessment-technical-support-materials.

The data presented in Table 12.7 show evidence of divergent validity for the content areas with both SRs and PE/WPs, using scale scores. The data sets used for the analysis were drawn from the Spring 2014 operational test administration. The students in the data sets were merged using Missouri's unique student identification number. Any student who took at least two of the three operational tests was included in the correlations. Table 12.7 shows the Pearson correlation coefficients between scale scores for the Spring 2014 administration, as well as the n-count for each correlation.

The results shown in Table 12.7 contain evidence of divergent validity. Evidence of divergent validity is supported by the lower correlations between content areas that measure dissimilar constructs. For example, the correlation between English II and Algebra I (0.59) is in a range typical of achievement constructs that are positively related primarily by virtue of their relation to general school achievement.

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For English II and Biology, challenging language and reading on both tests could account for the higher correlation value (0.71). This correlation value is still lower than the tests measuring a similar construct and is in the range of the correlations among high school MAP content area tests (the precursor to MAP End-of-Course Assessments) as reported in the Missouri Assessment Program Technical Report, 2008 (Missouri Department of Elementary and Secondary Education, 2008).

Table 12.7: Pearson Correlation Among Assessments with PEs, Spring 2014

	English II	Algebra I	Biology
English II	1.00 N=61,836	0.60 N= 10,123	0.74 N=32,795
Algebra I		1.00 N=63,192	0.70 N=15,459
Biology			1.00 N=61,275

The data presented in Table 12.8 show evidence of divergent validity for the content areas with only SR items, using scale scores. The data sets used for the analysis were drawn from the Spring 2014 operational test administration. The student records in the data sets were merged using Missouri's unique student identification number. Any student who took at least two of the five operational tests was included in the correlations. Table 12.8 shows the Pearson correlation coefficients between scale scores, as well as the n-count for each correlation.

Table 12.8: Pearson Correlation Coefficients Among Assessments with only SRs, Spring 2014

	English I	Algebra I	Geometry	Government	Am. History
English I	1.00 N=60,367	0.54 N=1,510	0.53 N=10,559	0.74 N=8,058	0.72 25,890
Algebra II		1.00 N=25,851	0.77 N=1,059	0.54 N=6,058	0.51 N=5,855
Geometry			1.00 N=35,721	0.62 N=5,806	0.56 N=9,909
Government				1.00 N=44,887	0.78 N=879
Am. History					1.00 N=50,090

The results shown in Table 12.8 contain evidence of divergent validity. Evidence of divergent validity is supported by the lower correlations between content areas that measure dissimilar constructs as compared to content areas that assess similar constructs. For example, the correlations between the similar constructs of Algebra II and Geometry (0.79), and Government and History (0.81) are higher than the correlations between the dissimilar constructs of English I and Algebra II (0.51).

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For English I and Government, challenging language and grammar on both tests could account for the higher correlation value. These correlation values are still lower than the tests measuring a similar construct and are in the range of the correlations among high school MAP content area tests (the precursor to MAP End-of-Course Assessments) as reported in the Missouri Assessment Program Technical Report, 2008 (Missouri Department of Elementary and Secondary Education, 2008).

Table 12.9 provides more evidence of discriminant validity with correlations between content areas with PE/WPs and content areas with only SR items content areas. Evidence of discriminant validity emerges when comparing correlations between the similar contents of Algebra I and Geometry (0.79), Algebra I and Algebra II (0.80), English I and English II (0.74) and the dissimilar contents of Algebra I and English I (0.60), Algebra II and English II (0.52) and Geometry and English II (0.53).

Table 12.9: Pearson Correlation Among All Assessments

	English I	Algebra II	Geometry	Government	Am. History
English II	0.72 N=597	0.52 N=11,515	0.54 N=17,781	0.72 N=7,802	0.64 N=10,328
Algebra I	0.58 N=29,687	0.79 N=325	0.81 N=523	0.62 N=7,640	0.53 N=16,051
Biology	0.75 N=14,383	0.68 N=8,398	0.68 N=15,921	0.75 N=9,146	0.71 N=14,894

12.8 Additional Validity Evidence for the MO EOC Assessments

Validity evidence related to other standards is described below.

Standard 1.5[20] relates to the characteristics of the sample of examinees from which validity evidence is inferred. The sample of examinees from which the validity evidence for the MO EOC Assessments was obtained is described in detail in Chapter 10 of this report, which includes tables with descriptive statistics for raw score, scale score, and achievement-level distributions. Statistics include n-counts, means, standard deviations, minimum and maximum values, for a variety of student groups.

Standard 1.7[21] relates to human judgment at various points in the test development and reporting process. For the MO EOC Assessments, human judgment was especially prevalent during the standard setting process. Chapter 3 contains summary information about the standard setting

[20] **Standard 1.5:** The composition of any sample of examinees from which validity evidence is obtained should be described in as much detail as is practical, including major relevant sociodemographic and developmental characteristics (p. 18).

[21] **Standard 1.7:** When a validation rests in part on the opinions or decisions of expert judges, observers, or raters, procedures for selecting such experts and for eliciting judgments or ratings should be fully described. The qualifications, and experience, of the judges should be presented. The description of procedures should include any training and instructions provided, should indicate whether participants reached their decisions independently, and should report the level of agreement reached. If participants interacted with one another or exchanged information, the procedures through which they may have influenced one another should be set forth (p. 19).

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procedures used for the MO EOC Assessments. From Spring 2008 through Spring 2010 and again in 2013–2014, PE/WPs were handscored. Chapter 7 contains detailed information about the processes involved with Questar's handscoring of the 2013–2014 PE/WPs, including scorer selection and training.

Standard 1.13[22] relates to the conditions under which the data used to support validity claims were collected. Chapter 5 contains information about how data were gathered in both the online and accommodated administrations, including the testing environment, materials distribution and security, Test Examiner training, student preparation, and allowable accommodations.

12.9 Summary

Validity is not an all-or-nothing property of a test; rather, validity evidence must be documented for a specific purpose and in the context of how the test scores will be interpreted and used. Much of the information contained in this technical report is documentation of the validity of the MO EOC Assessments for their stated purpose. This chapter provides a summary of the evidence presented elsewhere in the technical report and provides some additional types of validity evidence relevant to the content and internal structure of the assessments.

The overall technical quality of the MO EOC Assessments, as demonstrated by technical information and statistics, was sound. The Spring 2008 and Spring 2009 standalone field tests, the Spring 2009 embedded field test, and the Spring 2010 embedded field test produced pools of technically sound items, with more than a 90% retention rate after psychometric and content criteria were applied. From those pools, forms that were psychometrically similar were assembled, and that similarity helped support the pre-equating model that is in place. Application of item response theory (IRT) pre-equating resulted in congruent raw score to scale score conversions between the Summer, Fall, and Spring forms at the proficiency level cuts.

Post-administration test analyses supported the technical quality of the MO EOC Assessments. Evaluations of IRT model assumptions supported the use of the Rasch model for all tests. Test reliabilities ranged from 0.78 to 0.92 across the content areas and administrations for the 2013–2014 test forms. Conditional standard errors of measurement (CSEMs) were between 6 and 9 scale score points at the cut scores. The item analyses also showed that the MO EOC Assessments have sound psychometric properties. The p-value ranges were sufficiently broad, indicating that the items do measure achievement across a broad range of difficulty. Most of the items had discrimination values > .15, and only six items had a value < .10. Speededness was not a factor in students' test performance. Item bias analyses conducted on the pools further indicated that items were functioning equivalently for different gender and ethnic groups.

[22] **Standard 1.13:** When validity evidence includes statistical analyses of test results, either alone or together with data on other variables, the conditions under which the data were collected should be described in enough detail that users can judge the relevance of the statistical findings to local conditions.

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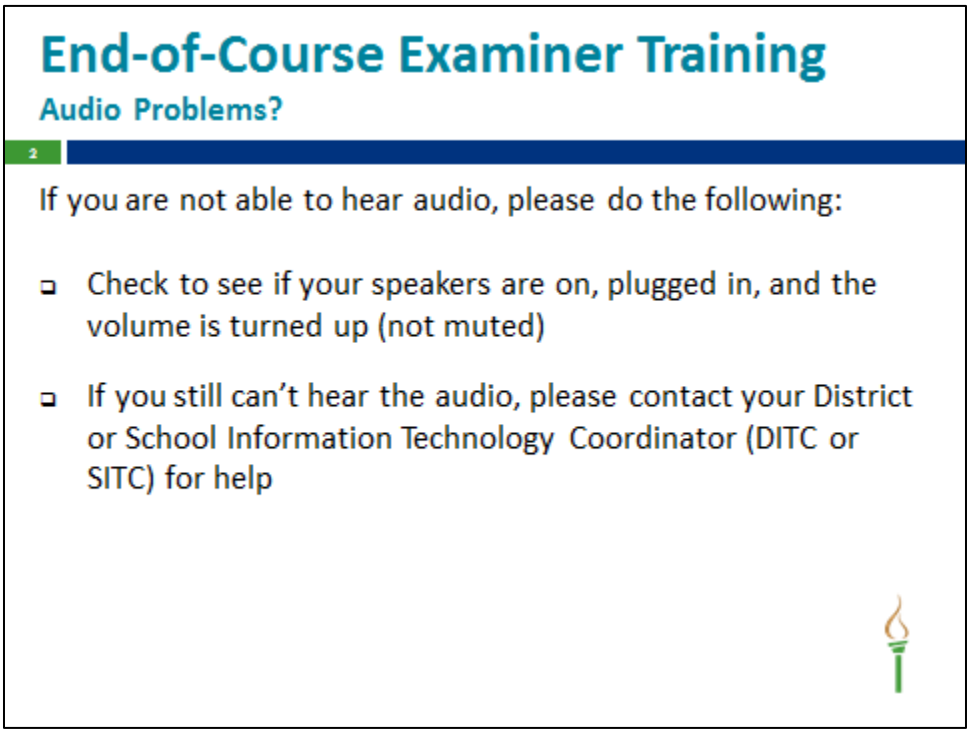
Appendix A: Training PowerPoint Presentations

Training for Test Examiners



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End-of-Course Examiner Training

Non-Discrimination

3

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End-of-Course Examiner Training

Who Receives Training?

4

Two-part Test Examiner training is available for End-of-Course (EOC) Assessments

- The first is presented by DESE
- The second is presented by Questar

Test Examiners must view training

- Test Examiners include classroom teachers, special education teachers, translators, proctors, or other district personnel helping with test administration
- District or School Test Coordinator is the "go-to" person for questions

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End-of-Course Examiner Training

Training Resources

5

Recorded Training and Resources are provided

- This pre-recorded training, accompanying print-ready PowerPoint slides and other training resources are available on the DESE End-of-Course website at: dese.mo.gov/divimprove/assess/eoc.html
- The Questar training is located in iTester under the Help tab. Be sure you are using Adobe Reader 9.0 or above

End-of-Course Examiner Training

Partnership With Questar

6

Questar Assessment, Inc., partners with DESE to produce End-of-Course Assessments

- Questar's online testing system is called iTester
- iTester has two main components—iTester Admin and iTester Student
- Technology is expanding. Watch Questar's training for the latest details

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End-of-Course Examiner Training

Performance Events

7

- English II, Algebra I, and Biology consist of two sessions:
  - Session I—selected response
  - Session II—performance event
- English I, Algebra II, Geometry, American History and Government—are one session and only selected response

End-of-Course Examiner Training

Required And Optional Assessments

8

Some assessments are required and some are optional

- For students graduating in 2014 or 2015, four EOCs are required—English II, Algebra I, Government, and Biology
- The class of 2016 and beyond, must participate in English I and American History as well as the above four
- The class of 2017 must add an additional mathematics EOC prior to graduation
- More information can be found at: dese.mo.gov/am/ccr/documents/CCR-12-004.pdf

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End-of-Course Examiner Training

Content Windows

9

Within the state window, the district sets a 7 business-day window for each content area assessed

- The 7-day windows for different content areas may overlap
- All assessments for a *content area* should be administered at the same time for the entire district
- When the window opens, students may begin testing
- After the 7-business day content window ends, iTester **LOCKS** and students may no longer log into iTester in that content area
- Questar reopens a window only on a limited basis – Contact your District Test Coordinator

End-of-Course Examiner Training

Timing Guidelines

10

Content	Time Suggestions
Two Session Assessments	
English II	Session I: 90 – 110 min / Session II: 90 – 110 min
Algebra I	Session I: 90 – 110 min / Session II: 60 - 70 min
Biology	Session I: 55 – 60 min / Session II: 65 - 70 min
Single Session Assessments	
English I	90 – 110 min
Algebra II	90 – 110 min
Geometry	90 – 110 min
American History	60 – 80 min
Government	60 – 80 min

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End-of-Course Examiner Training

Appropriate Time To Test

11

Examiners should administer the test when students have covered the Course-Level Expectations

- Districts must keep track of delayed students
- All students must be tested in required content before graduation, including Missouri Options students, fifth year seniors, special education, homebound, and out-of-district students
- Districts receive a Level-Not-Determined (LND) for students not tested before graduation unless s/he falls into an acceptable exemption category

End-of-Course Examiner Training

Test Security

12

Everyone **MUST** follow security procedures

- Examiners and proctors **MUST NOT** read, copy, score, or review test books
- Translators **MUST NOT** discuss test items or answers with anyone at any time
- Student testing materials must be stored **OUTSIDE** of the classroom in a secure locked location before and after testing
- Computer labs must be prepared with test security as a top concern

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End-of-Course Examiner Training

If In Doubt…

13

In the testing facility, if in doubt, cover or move materials

- Cover or remove materials that are related to processes or content
- Remove or cover anything that could not easily be defended during a Quality Assurance visit

End-of-Course Examiner Training

Test Administration Manual

14

The Test Administration Manual (TAM)

- The manual is available in iTester and on the DESE website
- The TAM is divided into sections by function and district role
- The TAM contains screen shots of iTester and step-by-step directions to navigate through iTester Admin and iTester Student
- Available at: http://dese.mo.gov/divimprove/assess/eoc.html

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End-of-Course Examiner Training

iTester Admin

15

Each Test Examiner has a unique account in iTester Admin

- Each role has different levels of access
- iTester The DTC can resend or reset passwords
- Correct student information affects score reports
- Examiner can view the testing status: **Not Started**, is **In Progress**, or **Finished**

End-of-Course Examiner Training

Accommodations

16

Mark all appropriate IEP accommodations in iTester Student (even if the student refuses them)

- If a student has an IEP (form D) accommodation, the accommodation must be marked in iTester and offered to the student during testing
- Tests must be initiated between 6:30 a.m. and 6:00 p.m.
- iTester automatically submits a test that was not started or abandoned at 6:00 p.m. The student receives a score for the items s/he completed
- Pause function is only for students with a timing accommodations or for emergencies

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End-of-Course Examiner Training

Paper/Pencil Edition

17

In order to take Paper/Pencil editions, students must meet one of these criteria:

- The student has an IEP stating that a computer may not be used for testing. Mark accommodation code #10
- The student is testing out-of-district
- The student is a homebound student who cannot test at school
- Return the Paper/Pencil assessment to the STC/DTC for shipment within 24 hours after the close of the district's content window

End-of-Course Examiner Training

Paper/Pencil Edition Continued

18

- Each Paper/Pencil edition test book has a unique security code on every page.
- The Examiner is accountable for a 100% return to the STC of every page of each hard copy test.
- Talk to the School Test Coordinator about any contaminated testing materials.

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End-of-Course Examiner Training

Braille/Large Print Editions

19

- Prior to testing the DTC or STC must mark
  - #01 for Braille and
  - #02 for Large Print in iTester

End-of-Course Examiner Training

Tutorial

20

Resources are available to help in test preparation

- The tutorials help familiarize students with test-taking functionality
- Students can use the tutorial as practice ahead of testing time, or on the day of testing, or both
- Released items are found on the DESE website at dese.mo.gov/divimprove/assess/eoc_resources.html

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End-of-Course Examiner Training

iTester Student

21

Students test in iTester Student

- Students login using provided username/password
- Tests downloads to a student's workstation
- A student must go through three separate exit steps when completing a test
- Tests upload as each student finishes testing

End-of-Course Examiner Training

Tools Used During Testing

22

What tools can be used during testing?

- Some tools and reference sheets are provided in iTester
- Hard copies of the mathematics reference sheets may be printed from the iTester **Help** tab
- Calculators that meet the guidelines
- The English II performance event allows for scrap paper, dictionaries, a thesaurus, and/or a grammar handbook
- Unlabeled grid or graph paper are permissible for the Biology and the mathematics assessments

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End-of-Course Examiner Training

Calculator Policy

23

During testing, calculators:

- Are not needed or required, and are not provided, endorsed, or recommended by DESE
- Cannot have Internet connectivity or connect to anyone inside or outside of the classroom during testing
- Cannot contain stored equations or functions at the time of testing
- Can only be used where specified in the Examiner's Manual

End-of-Course Examiner Training

Hours Of Testing

24

- Tests must be initiated between 6:30 a.m. and 6:00 p.m.
- iTester automatically submits a test not started or abandoned at 6:00 p.m. The student receives a score for the items s/he completes
- Pause function is only for students with a timing accommodations or for emergencies

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End-of-Course Examiner Training

Pause Function

25

Don't pause iTester in order to finish testing at a later time

- Unless a student has an allowable accommodation or an emergency occurs, the pause feature should not be used
- The pause option cannot be used for lunch, other classes or activities, appointments, or overnight
- Incomplete (paused) tests are automatically submitted and scored at 6:00 p.m.

End-of-Course Examiner Training

Status Codes

26

Only two status codes are found in iTester

- Absent: When the Absent status code is marked for a student, the district receives a Level-Not-Determined for that student
- Teacher Invalidation: This code is *only* used when a student cheats

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End-of-Course Examiner Training

Disruptions During Testing

27

A student may need to move during testing because of disruption or illness

- Procedures are in the TAM
- The student must be escorted and not allowed to converse with other students

End-of-Course Examiner Training

Test Results

28

Test results are available online via iTester Admin

- Raw scores and Individual Student Reports are available 5 business days after the district 7-day content window has closed
- Examiners should request scores from their DTC/STC

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End-of-Course Examiner Training

iTester Training

29

Please view the iTester training for Test Examiners

- It is located in iTester on the Help tab
- Use the TAM for step-by-step guides for specific iTester user functions

End-of-Course Examiner Training

Preparation Needed

30

Administering an EOC Assessment involves multiple layers of preparation

- Prepare each workstation meeting the system requirements outlined in the Technical Requirements document found in iTester Help tab
- Provide a safe and secure setting in a computer lab, with workstations positioned to avoid cheating
- Explain the iTester Student online system
- Notify parents of the testing schedule well in advance to avoid routine appointments or vacations

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End-of-Course Examiner Training

Evaluation

31

Thank you for attending this training

- Good luck with the End-of-Course Assessments for 2013-14 school year

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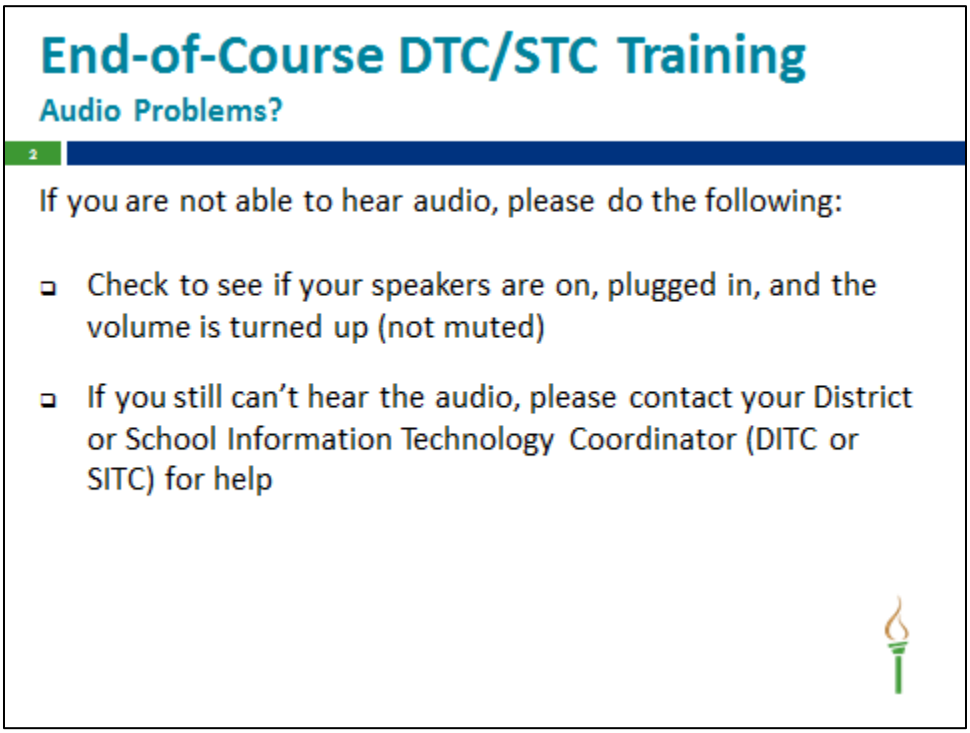
Training for District and School Test Administrators



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End-of-Course DTC/STC Training

Non-Discrimination

3

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End-of-Course DTC/STC Training

Who Receives Training?

4

- District Test Coordinators
- School Test Coordinators
- District and School Technology Coordinators
- The Test Examiners, including classroom teachers, special education teachers, translators, proctors, or other district personnel helping with test administration view a separate training

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End-of-Course DTC/STC Training

Training Resources

5

Recorded Training and Resources are provided

- This pre-recorded training, accompanying print-ready PowerPoint slides, and other training resources are available on the DESE End-of-Course website at: dese.mo.gov/divimprove/assess/eoc.html
- The Questar training is located in iTester under the Help tab. Ensure you are using Adobe Reader 9.0 or above

End-of-Course DTC/STC Training

Partnership With Questar

6

Questar Assessment, Inc., partners with DESE to produce End-of-Course Assessments

- iTester accommodates Windows, MAC, and Linux
- Expanded technology is coming—please watch Questar's training in iTester
- iTester has two main components—iTester Admin and iTester Student

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Performance Events

7

- English II, Algebra I, and Biology consist of two sessions:
  - Session I—selected response
  - Session II—performance event
- English I, Algebra II, Geometry, American History and Government—are one session and only selected response

End-of-Course DTC/STC Training

Required And Optional Assessments

8

Some assessments are required and some are optional

- For students graduating in 2014 or 2015, four EOCs are required—English II, Algebra I, Government, and Biology
- The class of 2016 and beyond, must participate in English I and American History as well as the above four
- The class of 2017 must add an additional mathematics EOC prior to graduation
- More information can be found at: dese.mo.gov/am/ccr/documents/CCR-12-004.pdf

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Content Windows

9

Within the state window, the district sets a 7 business-day window for each content area assessed

- The 7-day windows for different content areas may overlap
- All assessments for a *content area* should be administered at the same time for the entire district
- When the window opens, students may begin testing
- After the 7-business day content window ends, iTester **LOCKS** and students may no longer log into iTester in that content area
- Questar reopens a window only on a limited basis

End-of-Course DTC/STC Training

Sessions In One Sitting

10

- Tests must be initiated between 6:30 a.m. and 6:00 p.m.
- iTester automatically submits a test that was abandoned at 6:00 p.m. The student receives a score for the items he or she completed
- Pause function is only for students with a timing accommodations or for emergencies

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Timing Guidelines

11

Content	Time Suggestions
Two Session Assessments	
English II	Session I: 90 – 110 min / Session II: 90 – 110 min
Algebra I	Session I: 90 – 110 min / Session II: 60 - 70 min
Biology	Session I: 55 – 60 min / Session II: 65 - 70 min
Single Session Assessments	
English I	90 – 110 min
Algebra II	90 – 110 min
Geometry	90 – 110 min
American History	60 – 80 min
Government	60 – 80 min

End-of-Course DTC/STC Training

Appropriate Time To Test

Administer the test when students have covered the Course-Level Expectations

- Districts must keep track of delayed students
- All students must be tested in required contents before graduation, including Missouri Options students, fifth year seniors, special education, homebound, and out-of-district students
- Districts receive a Level-Not-Determined (LND) for students not tested before graduation unless s/he falls into an acceptable exemption category
- Questions about requirements or exemptions? Contact Accountability Data at 573-526-4886

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Pre-Code Collection

13

Student enrollment process uses the DESE pre-code collection

- The fall and spring windows feature two pre-code file certification deadlines
- Districts have a longer period to manually add, remove, or edit student information
- Test Examiner and student groups are imported into iTester
- Any changes made in iTester must also be made in the district student information and in MOSIS systems

End-of-Course DTC/STC Training

Test Administration Manual

14

The Test Administration Manual (TAM)

- The manual is available in iTester and on the DESE website
- The TAM is divided into sections by function and district role
- Available at: http://dese.mo.gov/divimprove/assess/eoc.html

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iTester Admin

15

iTester Admin is used by the DTC, STCs, Technology Coordinators, and Test Examiners

- Each role has different levels of access
- iTester Admin provides detailed and summary information on systems testing and site certification
- The DTC and STCs may add and edit students
- The DTC and STCs may receive score reports

End-of-Course DTC/STC Training

Username/Password

16

One week prior to statewide EOC window, Questar sends an e-mail to the DTC with the username and password

- DTC registers district information in iTester, including the district address, and the district-scheduled windows
- DTC changes content windows if needed by contacting Questar
- Questar Missouri Customer Service (800) 571-2545

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Test Examiner's Name In iTester

17

The Test Examiner's name remains in iTester until the end of the current statewide EOC window

- A new Test Examiner cannot simply take over classes for an inactive Test Examiner in iTester
- Test Examiners reload into iTester with each statewide window according to the pre-code file

End-of-Course DTC/STC Training

Status Codes

18

Only two status codes are found in iTester

- Absent: Use the absent status code for a student who will *never* take the assessment prior to graduation
- Teacher Invalidation: This code is used *only* if a student cheats

A student may receive a lowest obtainable scale score if:

- The student cheats
- The teacher paraphrases any content
- See the TAM for additional circumstances

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Accommodations

19

Mark all appropriate IEP accommodations in iTester Student (even if the student refuses them)

- If a student has an IEP (form D) accommodation, the accommodation must be marked in iTester and offered to the student during testing
  - NOTE: Oral reading, oral reading in native language, or signing during any English assessment results in the Lowest Obtainable Scale Score. The use of a dictionary, grammar handbook, thesaurus, or bilingual dictionary during the English I or English II (Session I) Assessment results in the Lowest Obtainable Scale Score

End-of-Course DTC/STC Training

Braille/Large Print Editions

20

Order Large Print and Braille through Questar's Missouri Customer Service

- (800) 571-2545
- MOCustomerSupport@QuestarAI.com

- Check—#01 for Braille and #02 for Large Print

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Paper/Pencil Edition

21

In order to take Paper/pencils editions, students must meet one of these criteria:

- The student has an IEP stating a computer may not be used for testing. Mark accommodation code #10
- The student is testing out-of-district
- The student is a homebound student who cannot test at school

A Paper/Pencil edition is downloadable as a PDF

- Download a test for each qualifying student
- Each test has a unique barcode located on every page

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Paper/Pencil Edition Continued

22

- Ship Paper/Pencil editions to Questar within 24-hours of the end of your district's content window using Questar provided shipping labels
- Scores are available 5-business days after Questar *receives* the assessment
- Report Braille, Large Print, and Paper/Pencil assessments to Questar using the Test Accountability Form
- The EOC Test Book Accountability Form is available at http://dese.mo.gov/divimprove/assess/eoc_resources.html
- See the TAM for instructions for contaminated test books

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Prepare The Computer Lab

23

Prepare the computer lab for online testing

- Test security is of the utmost importance
- Remember, districts are required to have a local test security policy in place
- Ensure all computers meet the online system requirements from the Technical Requirements document found in the iTester Help tab
- Conduct a dress rehearsal to ensure readiness using the Tutorial in iTester Student
- Released forms and practice items can be found at dese.mo.gov/divimprove/assess/eoc_resources.html

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iTester Student

24

Students test in iTester Student

- Tests downloads to a student's workstation
- Tests upload as each student finishes testing

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Tools Used During Testing

25

What tools can be used during testing?

- Some tools and reference sheets are provided in iTester
- Hard copies of the mathematics reference sheets may be printed from the iTester **Help** tab
- Calculators that meet the guidelines
- The English II performance event allows for scrap paper, dictionaries, a thesaurus, and/or a grammar handbook
- Unlabeled grid or graph paper are permissible for the Biology and the mathematics assessments

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Calculator Policy

26

During testing, calculators:

- Are not needed or required, and are not provided, endorsed, or recommended by DESE
- Cannot have Internet connectivity or connect to anyone inside or outside of the classroom during testing
- Cannot contain stored equations or functions at the time of testing
- Can only be used where specified in the Examiner's Manual

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Disruptions During Testing

27

A student may need to move during testing because of disruption or illness

- Procedures are in the TAM
- The student must be escorted and not allowed to converse with other students

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Individual Student Results/EOC Scores In Final Grade

28

District receive raw scores and official Individual Student Results Reports (ISRs)

- Within 5 business days after the district's content window closes, the DTC may:
  - Download a list of all student's raw scores
  - Download and print the Individual Student Results

The EOC score may be included in the student's grade

- The exact percent is a district-level decision

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Guide To Interpreting Results

29

Review the Guide to Interpreting Results (GIR)

- The 2013-14 GIR is on the DESE website
- Use reports available through the Missouri Comprehensive Data System (MCDS) Portal
- For questions about scores, reports, appeals, or interpreting APR, contact Accountability Data at 573-526-4886

End-of-Course DTC/STC Training

Charges For The Assessments

30

There are charges associated with assessments

- English II, Algebra I and Biology are $1.80 each
- All other EOC Assessments are free (including English I and American History)
- Districts are charged only when a student actually clicks "CONTINUE" to begin a test
- Paper/pencil tests (not required by a student's IEP) are $22

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Office Of Special Education

31

The Office of Special Education:

- covers the cost of the Paper/Pencil edition of EOC Assessments when required as an accommodation for students with disabilities
- covers the cost of the Braille and Large Print editions
- For any questions, please call the Office of Special Education at 573-751-5739

End-of-Course DTC/STC Training

Contact Information

32

Who should the district contact with questions?

- **First** – Questar's Missouri Customer Service:
  - (800) 571-2545
  - MOCustomerSupport@QuestarAI.com
- **Second** – DESE Assessment:
  - (573) 751-3545
  - assessment@dese.mo.gov

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Preparation Needed

33

- Watch the District administrator training
- Update the computer lab and workstations
- Provide a safe, secure testing environment
- Prepare students
- Prepare families
- Watch Questar Assessment's training in iTester
  Customer Service: 800-571-2545 or
  MOCustomerSupport@QuestarAI.com

DTC Annual Training and Updates

Evaluation

34

Thank you for attending this training

- Good luck with the End-of-Course Assessments for 2013-14

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Appendix B: Accommodation Codes

The following tables are from the 2013–2014 Test Administration Manual.

Table B.1: Accomodation Codes for English Language Learners (ELLs)

Accommodations List for Students Who Are English Language Learners (ELL) The following are the **only** accommodations allowed for ELL students:			
Code	**Invalidates**	**Administration Accommodations**	**Descriptions**
04	✔	Oral Reading of assessment (See NOTE 1.)	The Test Examiner reads items verbatim to the student in an isolated setting so that other students will neither benefit nor be disturbed.
11	✔	Oral Reading in native language (See NOTE 1.)	
		Timing Accommodations	**Descriptions**
21		Administer assessment using more than allotted periods	Dates for taking the EOC Assessments must occur within the EOC testing window.
22		Other: Specify	Other timing accommodations
		Response Accommodations	**Descriptions**
35		Use of scribe to record student response	The student conveys verbally or signs responses to a scribe in an isolated, individual setting so that other students cannot benefit or be disturbed. The scribe cannot suggest ideas, words, or concepts. The scribe records the student's answers verbatim. The student should indicate capitalization and punctuation if language mechanics are being assessed.
		Oral Response	The student provides oral responses to the Test Examiner.
43	✔	Use of bilingual dictionary (See NOTE 1.)	
		Setting Accommodations	**Descriptions**
50		Testing individually	The location should be free of noises, conversation, and distractions from adjoining rooms. Individual testing is appropriate when, for example, responses are given orally or questions are paraphrased.
51		Testing in small groups	The location should be free of noises, conversation, and distractions from adjoining rooms. Students may not interact with one another about questions or answers. The Test Examiner must be present at all times. Testing in small groups is not appropriate for students who give responses orally or require paraphrasing of questions.
53		Other: Specify	Other setting accommodations

NOTE 1: Oral reading, oral reading in native language, or signing during any English assessment will result in the LOSS (Lowest Obtainable Scale Score). The use of a dictionary, grammar handbook, thesaurus, or bilingual dictionary during the English I or English II, Session I Assessment will result in the LOSS (Lowest Obtainable Scale Score).

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Table B.2: Accomodation Codes for Students with Disabilities

Accommodations List for Students with Disabilities			
Code	**Invalidates**	**Administration Accommodations**	**Descriptions**
01		Braille edition of assessment	Braille edition of the assessment requires special processing. Consult the Braille edition test materials for specific instructions.
02		Large Print edition of assessment	Large Print edition of the assessment requires special processing. Consult the Large Print test materials for specific instructions.
04	✔	Oral Reading of assessment (See NOTE 1.)	The Test Examiner reads items verbatim to the student in an isolated setting so that other students will neither benefit nor be disturbed.
04		Oral Reading to Blind/ Partial Sight students	The Test Examiner reads items verbatim to the student who cannot read Braille in an isolated setting so that other students will neither benefit nor be disturbed.
05	✔	Signing (See NOTE 1.)	A certified sign language interpreter or deaf education instructor may sign directions for the English I and English II Assessments. All other EOC content area assessments may have both directions and the test items signed for students.
06	✔	Paraphrasing (See NOTE 2.)	The Test Examiner paraphrases questions to help student understanding in an isolated setting. Terms may be defined as long as they: 1) are not the actual concept or content being assessed, 2) would not give clues, or 3) would not disclose the answer.
10		**Other Administration Accommodations**	
		Use of Paper/Pencil edition (See NOTE 4.)	Students may have to take the Paper/Pencil edition because of disability or physical condition.
		Use of assistive devices	An assistive device, which permits a student to read and/or respond to the assessment, is used. Examples of assistive devices include computers that assist students with fine-motor problems, text enlargers that enable students to independently read and answer test questions, or augmentative communication devices.
		Use of visual aids: Specify	Visual aids include any type of optical or nonoptical devices used to enhance visual capability. Examples of visual aids include bold-line felt-tip markers, lamps, filters, bold-lined paper, writing guides, or other adaptations that alter the visual environment by adjusting the space, illumination, color, contrast, or other physical features of the environment.
11	✔	Oral reading in native language (See NOTE 1.)	
		Timing Accommodations	**Descriptions**
21		Administer assessment using more than allotted periods	Students with disabilities may need to complete the assessments over more than one test period as a result of fatigue and/or loss of concentration. Some students may require additional breaks. Dates for taking the EOC Assessments must occur within the EOC testing window.
22		Other: Specify	Other timing accommodations
		Response Accommodations	**Descriptions**
35		Use of scribe to record student response	The student conveys verbally or signs responses to a scribe in an isolated, individual setting so that other students cannot benefit or be disturbed. The scribe cannot suggest ideas, words, or concepts. The scribe records the student's answers verbatim. The student should indicate capitalization and punctuation if language mechanics are being assessed.
		Student taped response	The student speaks responses into a tape recorder in an isolated setting so that other students cannot benefit or be disturbed. The Test Examiner must be present at all times.

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		Signed response	The student uses sign language to convey responses. A certified sign language interpreter or deaf education instructor records responses.
		Pointing to respond	The student points to correct responses and the administrator records responses in the EOC test book.
		Oral response	The student provides oral responses to the Test Examiner.
		Use of a Brailler	A student records responses using a Brailler. Examples of a Brailler include a Braillewriter, a slate and stylus, or an electronic Brailler note taker.
		Use of a communication device	The student uses a communication device to provide responses to the Test Examiner.
		Use of a computer/word processor/typewriter to respond	The student uses a computer/word processor to write the responses. (Provide a nonnetworked computer to avoid inappropriate use of the computer to access answers.) The student uses a typewriter to write the responses. Responses must be transcribed to the appropriate answer sheet or test book.
39		Use of a calculator/math table/abacus	In all EOC mathematics assessments, calculators are permitted and the accommodation code should NOT be marked. The use of a calculator represents an accommodation when it is used for a content area for which calculator use is not allowed. Students may use talking calculators but only in an isolated setting. Students may use tables to assist in simple addition, subtraction, multiplication, and division facts using whole numbers. Students may use an abacus to perform mathematical computations by sliding beads along rods.
43	✔	Use of bilingual dictionary (See NOTE 1.)	
44		Other: Specify (See NOTE 3.)	Other response accommodations
		Setting Accommodations	**Description**
50		Testing individually	The location should be free of noises, conversation, and distractions from adjoining rooms. Individual testing is appropriate when, for example, responses are given orally or questions are paraphrased.
51		Testing in small groups	The location should be free of noises, conversation, and distractions from adjoining rooms. Students may not interact with one another about questions or answers. The Test Examiner must be present at all times. Testing in small groups is not appropriate for students who give responses orally or require paraphrasing of questions.
53		Other: Specify	Other setting accommodations

NOTE 1: Oral reading, oral reading in native language, or signing any English assessment will result in the LOSS (Lowest Obtainable Scale Score). The use of a dictionary, grammar handbook, thesaurus, or bilingual dictionary during the English I or English II, Session I Assessment will result in the LOSS (Lowest Obtainable Scale Score). Students identified as blind/visually impaired (who do not read Braille) may use the oral reading accommodation if it is their primary instructional method.

NOTE 2: Paraphrasing test questions invalidates all EOC Assessment student scores for accountability purposes.

NOTE 3: Use of magnifying equipment, amplification equipment, graph paper, and testing with the Test Examiner facing the student are not listed as accommodations because these are not required to be reported as accommodations for the EOC Assessments.

NOTE 4: The student is unable to take a computerized version of the assessment and a scribe is not appropriate.

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Appendix C: MO EOC Paper/Pencil vs. Online Comparability Study

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MISSOURI END-OF-COURSE
PAPER/PENCIL VERSUS ONLINE COMPARABILITY STUDY

Introduction

The Missouri End-of-Course (EOC) Assessments for English II, Algebra I, and Biology were developed by Riverside Publishing and first field tested in the spring of 2008. The first operational testing events occurred during the 2008/2009 school year. The EOC Assessments were created to be more targeted assessments to meet the needs of Missouri districts, schools, teachers, and students, while also meeting state and federal requirements.

Each MO EOC Assessment includes two types of test items: selected-response items and performance events (PE) or a writing task. The EOC Assessments are administered across two testing sessions of approximately one class period each. The selected-response items are administered in Session I, and the PE items are administered in Session II.

For each administration of the MO EOC Assessments, schools are given the option to administer the test in a paper-and-pencil (P/P) version, or to administer the test online. Approximately 10% of Missouri students took the EOC Assessments through the online administration option during the 2008–2009 school year.

The comparability of a computer-based assessment to its paper-and-pencil counterpart cannot be assumed. Conceivably, the mode of administration may affect the difficulty of the test, either through an overall shift in difficulty or through an item-by-mode interaction. Riverside Publishing conducted the current study for the purpose of describing a strategy for evaluating the comparability of Missouri's P/P and online EOC Assessments and to provide a summary of several analyses performed to determine the comparability of the two modes for the Spring 2009 administration. Because a relatively small number of students took the online assessment in Fall 2008, a comparability study could not be performed for that test administration.

Because of the potential confounding caused by sampling bias, and to help interpret the results in this context, this study employed two different types of samples and a number of different analyses. These analyses are presented as a "body of evidence" to assist in evaluating the potential effect of mode of administration on test results.

Sample

A specific challenge for the evaluation of comparability between the two modes of administration for the MO EOC Assessments was that the samples of students taking the test in each mode were not randomly equivalent. Participation in the online administration was voluntary; thus, the only students who took the test online were those from schools or districts that self-selected for online administration. In short, students who participated in the online testing were not representative of the total population of students in Missouri.

Any analyses using the entire data set ("total sample") would be impacted by this nonequivalence. More specifically, results from analyses on the total sample could be confounded by differences that might exist in the two samples due to sampling bias.

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Nevertheless, comparisons based on the total sample (all paper/pencil versus online test-takers) were performed to set a baseline for the differences between the online and paper/pencil assessments.

In an attempt to control for the differences in student ability and other demographic characteristics between the two samples, a second approach for data analysis was taken. In this approach, a "matched sample" was created from the larger total sample. In this matched sample, each student who took the test online was matched on important demographic variables with a student who took the P/P version of the test, so that the result was a sample of test-takers with more equivalent characteristics than the original total sample. The variables used to match the students from the P/P and online samples were content-area MAP scale scores, student grade level, and participation in free and reduced-price lunch programs (FRL).

The following steps were used to match students in each content area:

1. Using a student-level database containing grade-level content-area MAP scale scores, isolate the most recently administered MAP grade-level assessment for each student.
2. Create a student "matching variable" that is the concatenation of student grade level, MAP scale score, and participation in FRL.
3. Sort all online students and all paper/pencil students by the matching variable. Combine the two datasets by merging with the matching variable.
4. Create a uniform random variable and sort by student ID and the random variable. (Because the sample of paper/pencil test-takers was much larger than the sample of online test-takers, each online student matched with multiple P/P students. Therefore, this step was necessary to randomly select one paper/pencil student for each online student.)
5. Select the first paper/pencil student matched with each online student.

The percentage of matched cases for each MO EOC Assessment is included in Table 1. Note that the percentage of matched students who took the online Biology assessment was significantly lower than that of the English II and Algebra I assessments. This is because of the limited number of MAP grade-level Science scores available for the total sample. Because the MAP grade-level Science assessment was not required until the 2007-2008 school year, only students taking the Biology EOC in Grade 9 in Spring of 2009 had grade-level MAP Science scores from Grade 8 in the data file. Overall, however, the limited number of variables used for matching (three) and the high (ten to one) ratio of P/P to online test-takers led to a high overall percentage of matches when MAP scores were available.

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Table 1. Percentage of Matched Cases in the Online and P/P Matched Samples for Each EOC Assessment

	Total number of Students in Online Sample	Number of Online Students Matched with a Paper/Pencil Student	Percentage of Online Students Matched
English II	6,837	5,832	85%
Algebra I	3,956	3,678	93%
Biology	6,343	1,462	23%

Tables 2 through 5 provide distributions for ethnicity for the total sample and the matched sample. Distributions by EOC Assessment (i.e., English II, Algebra I, and Biology) had similar percentages and thus are not reported individually. Table 6 provides the grade-level distribution for each matched sample of paper/pencil and online test takers, and Table 7 provides the distribution of free and reduced lunch status for each matched sample. Table 8 provides the mean MAP scale score for each matched sample. Recall that the variables reported in Tables 6 through 8 were used for matching students. Because each student in the online sample corresponded perfectly to a student in the P/P sample on the three matching variables, the values reported in Tables 6 through 8 apply to both the matched online sample and the matched P/P sample.

Table 2: Ethnicity Distribution for Total Sample of Paper/Pencil Test Takers

Ethnicity	*N*	Percent
African American	20,523	13.9
Asian	714	0.4
Asian/Pacific Islander	2,737	1.8
Hispanic	4,261	2.8
White	119,222	80.8
Total	147,457	

Note: Percentages may not sum to 100 due to rounding.

Table 3: Ethnicity Distribution for Total Sample of Online Test Takers

Ethnicity	*N*	Percent
African American	4,276	23.2
Asian	71	0.4
Asian/Pacific Islander	265	1.4
Hispanic	555	3.0
White	12,227	71.9
Total	17,394	

Note: Percentages may not sum to 100 due to rounding.

Table 4: Ethnicity Distribution for the Matched Sample of Paper/Pencil Test Takers

Ethnicity	*N*	Percent
African American	1,695	15.5
Asian	39	0.4
Asian/Pacific Islander	202	1.8
Hispanic	313	2.9
White	8,723	79.5
Total	10,972	

Note: Percentages may not sum to 100 due to rounding.

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Table 5: Ethnicity Distribution for the Matched Sample of Online Test Takers

Ethnicity	*N*	Percent
African American	2,256	20.6
Asian	41	.40
Asian/Pacific Islander	128	1.2
Hispanic	328	3.0
White	8,219	74.9
Total	10,972	

Note: Percentages may not sum to 100 due to rounding.

Table 6: Grade-Level Distribution for each Matched Sample of Paper/Pencil and Online Test Takers

Grade Level	*N*	Percent
7	7	0.1
8	698	6.4
9	3,749	34.2
10	6,204	56.5
11	142	1.3
12	172	1.6

Note: Percentages may not sum to 100 due to rounding.

Table 7: Distribution of Free and Reduced Lunch Status for each Matched Sample of Paper/Pencil and Online Test Takers

Grade Level	*N*	Percent
Free and Reduced Lunch	4,076	37.2
Not Free and Reduced Lunch	6,896	62.9

Note: Percentages do not sum to 100 due to rounding.

Table 8: Mean MAP Scale Score for each Matched Sample of Paper/Pencil and Online Test Takers

Grade Level	*N*	Mean	SD
English II	5,832	694.5	32.3
Algebra I	3,678	707.3	33.7
Biology	1,462	703.2	26.1

To verify the representativeness of the matched samples with respect to other possible matched samples obtained from the population of online and paper/pencil test takers, the original matching process was replicated an additional 19 times. Results summarizing the means from all 20 matched samples (i.e., replications) generally support the use of the *first* or original matched sample that was selected and used for subsequent analyses.

Methods and Results

This section provides a summary of several analyses completed to investigate whether the online and paper/pencil versions of the MO EOC Assessments administered in Spring 2009 were comparable. Because the samples of students who took the test via each mode of administration were not randomly equivalent, a clear "yes" or "no" answer to the question of comparability was not possible. Rather, various analyses were employed to lend evidence to either support or refute the hypothesis that the test scores obtained from each mode of administration were comparable.

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Table 9 presents an overview of the analyses included in this study, separated by two different approaches to using the available sample data.

Table 9: Analyses Used to Evaluate the Comparability of Paper/Pencil and Online Administrations

Sample Approach		Purpose
Total Sample	**Matched Sample**	
Comparison of Summary Statistics and Item Means	Comparison of Summary Statistics and Item Means	Evaluate the observed differences in student performance between the P/P and online groups
ANCOVA		Evaluate the differences in mean student performance after statistically removing the effects of the covariates
	Comparison of Item Difficulties	Examine individual item difficulties within each mode
Differential Item Functioning Analysis	Differential Item Functioning Analysis	Using the online students as the focal group and the P/P students as the reference group, identify and review items that appear to function differently for the two modes of administration
	Hypothetical Equating	Evaluate the practical magnitude of potential mode effects by examining raw score-to-scale score tables as if the online administration was treated as a unique form equated to the P/P administration
	Confirmatory Factor Analysis	Evaluate the comparability of factor structures for the P/P and online administrations of the tests

The following sections describe the purpose of each analysis and detail the results and implications of each.

Comparison of Summary Statistics for the Total Sample and Matched Sample

To compare the total sample and the matched sample, summary statistics, including mean score, standard deviation, and minimum/maximum scores were calculated for each mode of administration in the total sample and the matched sample for each assessment. Tables 10 and 11 present summary statistics for the two samples. Note that mean raw score differences between paper/pencil and online modes are larger in Table 10, which contains the data for the total sample (all P/P and online test-takers). Recall that in this group, the online sample of students is not representative of the total student population. Differences generally become smaller (less than one raw score point) for the matched sample. These smaller differences in overall test scores between the two modes in the matched sample suggest that the lack of representation in the total sample did contribute to differences between the two modes.

In addition to the summary statistics for the first matched sample created from the total data set, Table 11 also provides mean summary statistics for all 20 replications. Note that

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the first matched sample created is representative of the mean of the replications. Thus, further analysis was done using only the first matched sample created.

Table 10: Summary Statistics for the Total Sample of Paper/Pencil and Online Test Takers

Content Area/ Mode of Administration	*N*	Mean	*SD*	Minimum	Maximum
English II					
Paper/Pencil	49,843	27.5	6.2	3	39
Online	6,837	26.3	6.1	5	39
Algebra I					
Paper/Pencil	48,622	21.8	7.0	2	38
Online	3,956	20.4	6.9	4	38
Biology					
Paper/Pencil	48,992	33.1	9.7	3	55
Online	6,343	32.2	9.6	5	55

Table 11: Summary Statistics for the Matched Sample of Paper/Pencil and Online Test Takers

Content Area/ Mode of Administration	***N***	**Mean**	***SD***	**Minimum**	**Maximum**
First Matched Sample					
English II					
Paper/Pencil	5,832	27.4	6.1	6	39
Online	5,832	26.6	6.0	5	39
Algebra I					
Paper/Pencil	3,678	21.4	7.1	2	38
Online	3,678	20.5	6.9	4	38
Biology					
Paper/Pencil	1,462	32.6	9.8	6	52
Online	1,462	32.2	9.7	6	52
All 20 Matched Samples					
English II					
Paper/Pencil	20	27.4	.049	27.3	27.5
Online	20	26.6	.001	26.6	26.6
Algebra I					
Paper/Pencil	20	21.4	.055	21.3	21.5
Online	20	20.5	.000	20.5	20.5
Biology					
Paper/Pencil	20	32.5	.136	32.3	32.8
Online	20	32.2	.006	32.2	32.2

To further support the results obtained from the matched sample, an analysis of covariance (ANCOVA) was performed to statistically remove variability associated with the three matching variables (i.e., MAP scale score, grade level, and FRL). More specifically, ANCOVA was used to provide verification of the matching results. The means adjusted for the covariates were obtained for comparison—and verification–of the means obtained with the matched samples. Additionally, ANCOVA can uncover the relative statistical contribution of each of the matching variables. Tables 12 through 14 present the results of the ANCOVA for each EOC Assessment. Table 15 provides the total raw score means adjusted for the covariates.

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Table 12: ANCOVA Results for English II

Source	SS	df	MS	*F*	Sig.
Corrected Model	248025.4	4	62006.4	3766.4	<.001
Error	193226.2	11737	16.5		
Corrected Total	441251.6	11741			
Mode (Online/Paper)	2270.4	1	2270.4	137.9	<.001
Map Scale Score	213108.7	1	213108.7	12944.7	<.001
Grade	217.1	1	217.1	13.2	<.001
FRL	2688.1	1	2688.1	163.3	<.001
R^2 = .56					

Table 13: ANCOVA Results for Algebra I

Source	SS	df	MS	*F*	Sig.
Corrected Model	214463.1	4	53615.8	2776.1	<.001
Error	143325.6	7421	19.3		
Corrected Total	357788.7	7425			
Mode (Online/Paper)	1268.3	1	1268.3	65.7	<.001
Map Scale Score	140297.8	1	140297.8	7264.2	<.001
Grade	3202.0	1	3202.0	165.8	<.001
FRL	1116.3	1	1116.3	57.8	<.001
R^2. = .60					

Table 14: ANCOVA Results for Biology

Source	SS	df	MS	*F*	Sig.
Corrected Model	184698.4	4	46174.6	1401.7	<.001
Error	98660.3	2995	32.9		
Corrected Total	283358.6	2999			
Mode (Online/Paper)	61.5	1	61.5	1.87	<.172
Map Scale Score	150227.5	1	150227.5	4560.4	<.001
Grade	4355.1	1	4355.1	132.2	<.001
FRL	2641.7	1	2641.7	80.19	<.001
R^2 = .65					

Table 15: ANCOVA Adjusted Means

Content Area/ Mode of Administration	Adjusted Means	Standard Error
English II		
Paper/Pencil	27.5	.053
Online	26.6	.053
Algebra I		
Paper/Pencil	21.5	.072
Online	20.7	.072
Biology		
Paper/Pencil	33.3	.149
Online	33.0	.149

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To balance the ANCOVA analysis, a random sample of P/P examinees equal to the number of online examinees was selected. An examination of Tables 12 through 14 shows that MAP scale scores are by far the most important covariate in the analysis and also in the matching process described earlier. Perhaps more importantly, the mean scores adjusted for the covariates are very similar in both magnitude and their respective differences when compared to the mean scores from the matched samples. Both analyses indicate that when the effects of the covariates or matching variables are statistically removed or balanced, there is a notable reduction in the differences between EOC Assessments' score means.

Comparison of Item Difficulties for the Matched Sample

One way to determine whether two modes of administration are equivalent is to examine individual item difficulties within each mode. Using the matched sample, item difficulties in the form of *p*-values were computed for each item within each mode of administration. For PE items, mean item scores were computed. Similar item difficulties between corresponding online and P/P items in the matched sample would suggest that the test item difficulties were not affected by mode of administration.

Tables 16 through 21 present comparisons between the item *p*-values and item means (for the PE items) for the matched samples. For each content area, the difference between the P/P and online item *p*-values is also provided (Tables 16, 18 and 20). In addition, the frequency of differences between *p*-values for each matched sample is given (Tables 17, 19 and 21). Differences between *p*-values were generally small, falling within the range of –.05 to .05. A few items did show larger differences, perhaps indicating an interaction between item difficulty and mode of administration.

Table 16: Difference between *p*-Values/Item Means for the Matched Sample–English II

Item	*p*-Value for Paper/Pencil	*p*-Value for Online	Paper/Pencil Minus Online *p*-Value
Item 1	0.74	0.69	0.05
Item 2	0.74	0.74	0.00
Item 3	0.88	0.86	0.02
Item 4	0.89	0.80	0.09
Item 5	0.90	0.88	0.02
Item 6	0.37	0.33	0.04
Item 7	0.85	0.85	0.00
Item 8	0.74	0.70	0.04
Item 9	0.48	0.45	0.03
Item 10	0.75	0.70	0.05
Item 11	0.84	0.80	0.04
Item 12	0.53	0.56	-0.03
Item 24	0.58	0.60	-0.02
Item 25	0.56	0.53	0.03
Item 26	0.86	0.86	0.00
Item 27	0.55	0.47	0.08

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Table 16: Difference Between *p*-Values/Item Means for the Matched Sample–English II (continued)

Item 28	0.66	0.67	-0.01
Item 29	0.46	0.48	-0.02
Item 30	0.44	0.39	0.05
Item 31	0.81	0.78	0.03
Item 32	0.75	0.70	0.05
Item 33	0.45	0.37	0.08
Item 34	0.64	0.63	0.01
Item 35	0.89	0.86	0.03
Item 36	0.92	0.90	0.02
Item 37	0.61	0.58	0.03
Item 38	0.58	0.54	0.04
Item 39	0.85	0.82	0.03
Item 40	0.64	0.62	0.02
Item 41	0.71	0.73	-0.02
Item 43	0.87	0.86	0.01
Item 44	0.54	0.52	0.02
Item 45	0.81	0.81	0.00
Item 46	0.79	0.80	-0.01
Item 47	0.74	0.72	0.02
Item 48*	3.03	2.92	0.11

*Item 48 is a performance event.

Table 17: Frequency of Differences between *p*-Values for the Matched Sample–English II

Difference (Paper/Pencil Minus Online *p*-Value)	Frequency	Percent
-0.03	1	2.8
-0.02	3	8.3
-0.01	2	5.6
0.00	4	11.1
0.01	2	5.6
0.02	6	16.7
0.03	6	16.7
0.04	4	11.1
0.05	4	11.1
0.08	2	5.6
0.09	1	2.8
0.11	1	2.8

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Table 18: Difference between *p*-Values and Item Means for the Matched Sample–Algebra I

Item	*p*-Value for Paper/Pencil	*p*-Value for Online	Paper/Pencil Minus Online *p*-Value
Item 1	0.9	0.9	0.00
Item 2	0.79	0.76	0.03
Item 3	0.72	0.69	0.03
Item 4	0.73	0.71	0.02
Item 5	0.72	0.68	0.04
Item 10	0.82	0.78	0.04
Item 11	0.70	0.68	0.02
Item 12	0.74	0.71	0.03
Item 13	0.60	0.57	0.03
Item 14	0.43	0.42	0.01
Item 15	0.67	0.66	0.01
Item 16	0.65	0.65	0.00
Item 17	0.81	0.84	-0.03
Item 18	0.81	0.77	0.04
Item 19	0.65	0.63	0.02
Item 20	0.55	0.57	-0.02
Item 21	0.51	0.53	-0.02
Item 27	0.49	0.40	0.09
Item 28	0.55	0.52	0.03
Item 29	0.52	0.50	0.02
Item 30	0.52	0.50	0.02
Item 31	0.57	0.57	0.00
Item 32	0.48	0.45	0.03
Item 33	0.40	0.31	0.09
Item 34	0.48	0.47	0.01
Item 35	0.61	0.59	0.02
Item 36	0.37	0.32	0.05
Item 37	0.57	0.54	0.03
Item 38	0.37	0.33	0.04
Item 43	0.31	0.29	0.02
Item 44	0.58	0.58	0.00
Item 45	0.41	0.38	0.03
Item 46	0.12	0.08	0.04
Item 47	0.33	0.27	0.06
Item 48*	1.92	1.84	0.08

*Item 48 is a performance event.

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Table 19: Frequency of Differences between *p*-Values for the Matched Sample–Algebra I

Difference (Paper/Pencil Minus Online *p*-Value)	Frequency	Percent
-0.03	1	2.9
-0.02	2	5.7
0	4	11.4
0.01	3	8.6
0.02	7	20.0
0.03	8	22.9
0.04	5	14.3
0.05	1	2.9
0.06	1	2.9
0.08	1	2.9
0.09	2	5.7

Table 20: Difference between *p*-Values/Item Means for the Matched Sample–Biology

Item	*p*-Value for Paper/Pencil	*p*-Value for Online	Paper/Pencil Minus Online *p*-Value
Item 1	0.81	0.74	0.07
Item 2	0.79	0.76	0.03
Item 3	0.91	0.91	0.00
Item 4	0.66	0.69	-0.03
Item 5	0.83	0.8	0.03
Item 10	0.64	0.64	0.00
Item 11	0.72	0.71	0.01
Item 12	0.57	0.56	0.01
Item 13	0.66	0.61	0.05
Item 14	0.46	0.47	-0.01
Item 15	0.58	0.66	-0.08
Item 16	0.76	0.72	0.04
Item 17	0.93	0.92	0.01
Item 18	0.68	0.65	0.03
Item 19	0.48	0.48	0.00
Item 20	0.33	0.35	-0.02
Item 21	0.58	0.54	0.04
Item 26	0.73	0.72	0.01
Item 27	0.68	0.59	0.09
Item 28	0.50	0.43	0.07
Item 29	0.45	0.42	0.03
Item 30	0.41	0.35	0.06
Item 31	0.44	0.38	0.06
Item 32	0.59	0.57	0.02
Item 33	0.62	0.58	0.04
Item 34	0.58	0.56	0.02
Item 35	0.72	0.66	0.06
Item 36	0.62	0.58	0.04
Item 37	0.50	0.54	-0.04
Item 38	0.71	0.67	0.04

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Table 20: Difference Between *p*-Values/Item Means for the Matched Sample–Biology (continued)

Item 43	0.61	0.58	0.03
Item 44	0.55	0.55	0.00
Item 45	0.41	0.42	-0.01
Item 46	0.58	0.52	0.06
Item 47	0.84	0.83	0.01
Item 48*	0.66	0.66	0.00
Item 49*	0.79	0.84	-0.05
Item 50*	0.73	0.79	-0.06
Item 51*	2.53	2.79	-0.26
Item 52*	0.75	0.72	0.03
Item 53*	0.94	1.02	-0.08
Item 54*	1.14	1.08	0.06
Item 55*	0.74	0.77	-0.03
Item 56*	0.66	0.67	-0.01
Item 57*	0.97	1.08	-0.11
Item 58*	0.84	0.71	0.13

*Items 48 through 58 are performance event items.

Table 21: Frequency of Differences between *p*-Values for the Matched Sample–Biology

Difference (Paper/Pencil Minus Online *p*-Value)	Frequency	Percent
-0.26	1	2.2
-0.11	1	2.2
-0.08	2	4.4
-0.06	1	2.2
-0.05	1	2.2
-0.04	1	2.2
-0.03	2	4.4
-0.02	1	2.2
-0.01	3	6.5
0.00	5	10.9
0.01	5	10.9
0.02	2	4.4
0.03	6	13.0
0.04	5	10.9
0.05	1	2.2
0.06	5	10.9
0.07	2	4.4
0.09	1	2.2
0.13	1	2.2

Comparison of the Raw Score-to-Scale Score Conversion Tables Based on the Total Sample

One practical way to evaluate whether the two modes are equivalent is to examine the raw score-to-scale score conversions obtained through the use of traditional equating methods. If the raw scores corresponding to each scale score were the same between the two modes of administration, it would suggest that students would not be disadvantaged by either mode of administration. Before the conversion tables could be created,

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however, the two "forms" were brought onto the same scale using traditional equating methods. In a typical equating study, only a percentage of the items would be common to both forms. In this application, however, all the items are common between the online and P/P versions. In other words, this procedure was similar to a common-item equating with the potential for all items to be in common.

In this application, the P/P was considered the "base" form. To bring the online administration onto the P/P scale, the online items were anchored to their Spring 2009 operational item difficulty values, and the online data were recalibrated. Displacement values were examined for each item, and items with displacements greater than 0.3 logits were removed from the "common" set of items and allowed to calibrate freely. The displacement values were examined again, and the process repeated until a stable set of common anchor items was established. Table 22 shows the number of items dropped from the set of operationally administered items (i.e., the common set of items) for each assessment due to instability. Figures 1 through 3 show scatterplots of the final set of common items used to bring the online "form" onto the paper/pencil scale.

Table 22: Number of Unstable Items Dropped from the Common Set of Anchor Items for Each Assessment

Assessment	Number of Items Dropped
English	2
Algebra	1
Biology	1

Figure 1. Scatterplot of the Common Items Between Online and P/P Administrations: English II

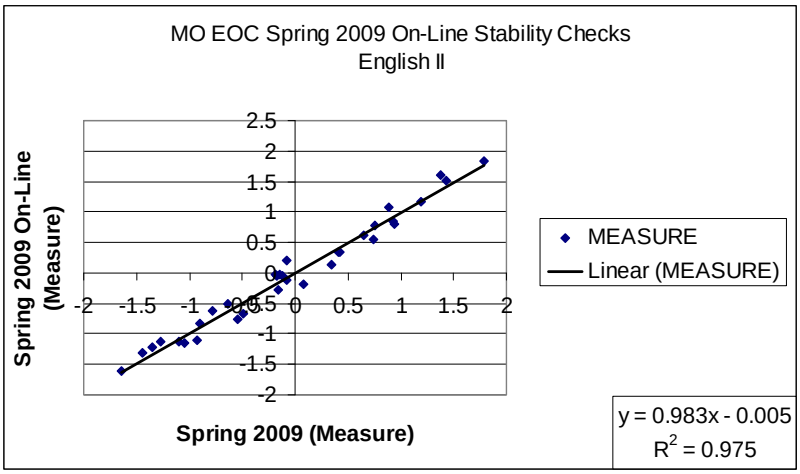

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Figure 2. Scatterplot of the Common Items Between Online and P/P Administrations: Algebra I

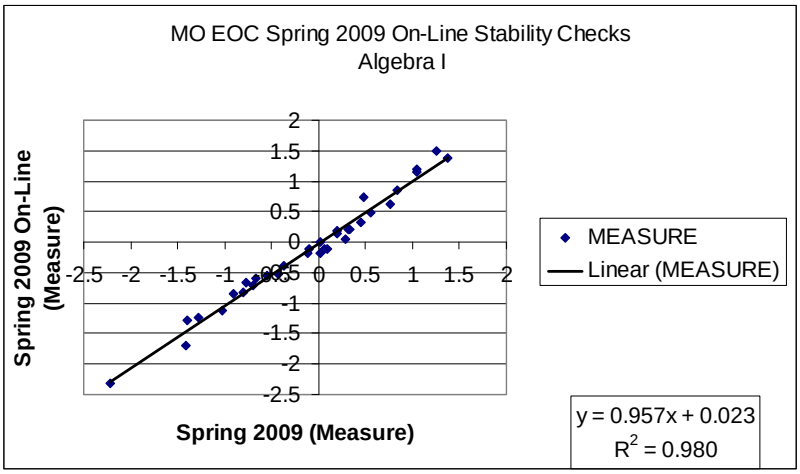
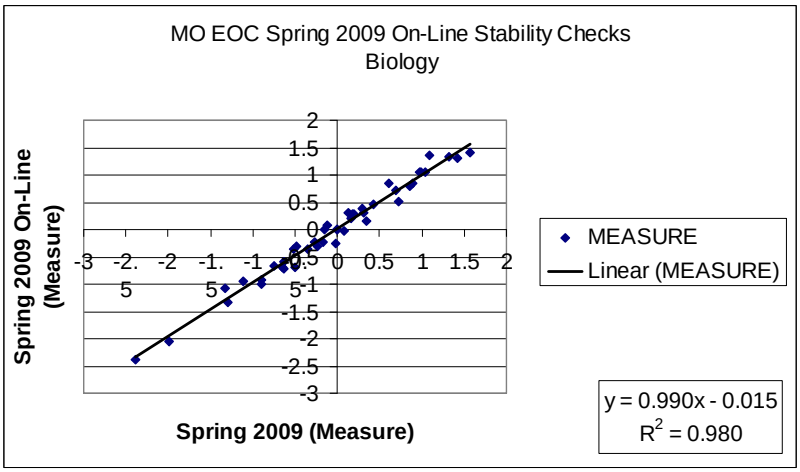


Figure 3. Scatterplot of the Common Items Between Online and P/P Administrations: Biology



A final fixed calibration was performed on the online data after removing the unstable item(s) from the common set of anchor items. Finally, raw score-to-scale score conversion tables were created using Rasch scaling with Winsteps software.

Tables 23 through 25 present the side-by-side raw score-to-scale score conversions for the paper/pencil and online "forms." Note that the raw score-to-scale score conversions for the online administration have not been used operationally. However, these analyses are included to represent the impact on the score scale should a decision be made to "equate" the online administrations onto the paper/pencil scale.

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Table 23: Differences between Scale Scores for Online Matched Sample–English II

Raw Score	Associated Scale Score for Paper/Pencil	Associated Scale Score for Online	Paper/Pencil Minus Online Scale Score
0	100	100	0
1	105	105	0
2	125	126	-1
3	137	138	-1
4	145	145	0
5	150	151	-1
6	155	155	0
7	158	159	-1
8	162	162	0
9	165	165	0
10	168	168	0
11	171	171	0
12	173	173	0
13	176	176	0
14	178	178	0
15	180*	180*	0
16	182	183	-1
17	185	185	0
18	187	187	0
19	189	189	0
20	191	191	0
21	193	193	0
22	196	196	0
23	198	198	0
24	200**	200**	0
25	202	202	0
26	205	205	0
27	207	207	0
28	210	210	0
29	212	212	0
30	215	215	0
31	218	218	0
32	221	221	0
33	225***	225***	0
34	229	229	0
35	234	234	0
36	240	240	0
37	248	248	0
38	250	250	0
39	250	250	0

* Basic cut.
** Proficient cut.
*** Advanced cut.

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Table 24: Difference between Scale Scores for Online Matched Sample–Algebra I

Raw Score	Associated Scale Score for Paper/Pencil	Associated Scale Score for Online	Paper/Pencil Minus Online Scale Score
0	100	100	0
1	112	112	0
2	127	127	0
3	136	136	0
4	143	143	0
5	149	149	0
6	154	154	0
7	158	158	0
8	162	162	0
9	165	166	-1
10	169	169	0
11	172	172	0
12	177*	177 (175)*	0
13	178	178	0
14	181	181	0
15	183	183	0
16	186	186	0
17	189	189	0
18	191	191	0
19	194	194	0
20	196	197	-1
21	200**	200 (199)**	0
22	202	202	0
23	204	204	0
24	207	207	0
25	210	210	0
26	212	213	-1
27	215	215	0
28	218	218	0
29	221	221	0
30*	225***	225***	0
31	228	228	0
32	232	232	0
33	236	237	-1
34	242	242	0
35	249	248	1
36	250	250	0
37	250	250	0
38	250	250	0

Notes: The paper/pencil calibration was run on 38 items, so the raw score-to-scale score conversion is not the same as the operational raw score-to-scale score tables used for reporting. Raw score cuts were reduced by one score point from the operational test because item #26 was dropped from the analysis.
* Basic cut.
** Proficient cut.
*** Advanced cut.

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Table 25: Difference between Scale Scores for Online Matched Sample–Biology

Raw Score	Associated Scale Score for Paper/Pencil	Associated Scale Score for Online	Paper/Pencil Minus Online Scale Score
0	100	100	0
1	107	107	0
2	121	121	0
3	130	130	0
4	137	136	1
5	142	142	0
6	146	146	0
7	150	150	0
8	153	153	0
9	156	156	0
10	159	159	0
11	162	162	0
12	164	164	0
13	166	166	0
14	169	168	1
15	171	171	0
16	173	173	0
17	175	174	1
18	177	176	1
19	178	178	0
20	180*	180*	0
21	182	182	0
22	184	183	1
23	185	185	0
24	187	187	0
25	189	188	1
26	190	190	0
27	192	192	0
28	193	193	0
29	195	195	0
30	197	197	0
31	198	198	0
32	200**	200**	0
33	202	202	0
34	203	203	0
35	205	205	0
36	207	207	0
37	208	208	0
38	210	210	0
39	212	212	0
40	214	214	0
41	216	216	0
42	218	218	0
43	220	220	0
44	223	222	1

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Table 25: Difference between Scale Scores for Online Matched Sample–Biology (continued)

45	225***	225***	0
46	228	228	0
47	231	230	1
48	234	234	0
49	238	237	1
50	242	242	0
51	247	247	0
52	250	250	0
53	250	250	0
54	250	250	0
55	250	250	0

* Basic cut.
** Proficient cut.
*** Advanced cut.

Differential Item Functioning Analysis

Differential item functioning (DIF) was used to further study the possible effects of mode on student item responses. DIF was examined with the Mantel-Haenszel (1959) procedure for the SR items and with a Rasch DIF analysis using Winsteps (v3.64, Linacre, 2006) for the PE items. The Mantel-Haenszel (MH) method is a nonparametric approach to DIF utilizing chi-square and delta statistics to classify each item. The classification system, as well as the computational formulas for Mantel-Haenszel and delta statistics, are described in detail elsewhere (e.g., Camilli and Shepard 1994; Dorans and Holland 1993). Items classified as "A" are considered to exhibit a negligible amount of DIF, "B" items to exhibit a moderate amount of DIF, while "C" items exhibit a large amount of DIF.

DIF detection with Winsteps is a Rasch-model-based approach. The Rasch and Mantel-Haenszel procedures for DIF are equivalent under certain conditions (Linacre and Wright, 1989; Schulz, Perlman, Rice, and Wright, 1996). Similar to the ETS classifications, the DIF output yielded by Winsteps is classified as negligible (A), slight to moderate (B), or moderate to severe (C). If a *t*-value is smaller than 2.58 or the DIF contrast is smaller than 0.45 logits, the item is flagged as A. If a *t*-value is larger than 2.58 and the DIF contrast is larger than 0.65 logits, the item is flagged as C. Otherwise, items are flagged as B.

In the DIF analysis, students who took the P/P test served as the reference group, while students who took the online test served as the focal group. Items exhibiting a moderate to large amount of DIF might be functioning differently between the two modes of administration (i.e., the items may be easier for students taking the test via one or the other mode of administration). Summaries of the results of the analyses for both the total sample and matched sample are presented in Table 26. Note that there was little evidence of DIF when either the total samples or the matched samples were examined.

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Table 26: Frequency Distribution of DIF Categories by Item Type for Total Sample and Matched Sample

Sample/ Assessment	Selected Response (SR) Items*						Performance Events (PE) Items*					
	A**	A–**	B**	B–**	C**	C–**	A**	A–**	B**	B–**	C**	C–**
Total												
English II	34	0	0	1	0	0	1	0	0	0	0	0
Algebra I	34	0	0	1	0	0	1	0	0	0	0	0
Biology	35	0	0	0	0	0	11	0	0	0	0	0
Matched												
English II	34	0	0	1	0	0	1	0	0	0	0	0
Algebra I	35	0	0	0	0	0	1	0	0	0	0	0
Biology	35	0	0	0	0	0	10	0	1	0	0	0

Note: Classifications with a negative sign ("–") favor the reference group, while classifications with no sign favor the focal group. DIF categories: A, negligible; B, slight to moderate; and C, moderate to severe.
* The Mantel-Haenszel procedure is applied for the SR items and Rasch DIF analysis for the PE/WP items.

Factor Analysis for Matched Sample

Both exploratory and confirmatory factor analyses were conducted using the matched sample. Exploratory analyses were conducted first to establish general factor models and evaluate the comparability of the paper/pencil and on-line solutions. The factor patterns for the P/P group were then input as fixed for confirmatory factor analyses to more precisely evaluate the congruence of the factor structures for the two groups.

Exploratory Factor Analyses

English II. The extraction method utilized was Iterated Principal Factors with an Oblique Varimax rotation. The initial runs with operational data yielded 5 eigenvalues that were greater than 1. Upon review of the initial eigenvalue scree plot as well as the difference between reduced correlation matrix eigenvalues (successive eigenvalues showed little change after the fourth factor), and factor loading interpretability issues, it was decided to retain 4 factors.

Algebra I. The extraction method utilized was Iterated Principal Factors with an Oblique Varimax rotation. The initial runs with operational data yielded 5 eigenvalues that were greater than 1. Upon review of the initial eigenvalue scree plot as well as the difference between reduced correlation matrix eigenvalues (successive eigenvalues showed little change after the fourth factor), and factor loading interpretability issues, it was decided to retain 4 factors.

Biology. The extraction method utilized was Iterated Principal Factors with an Oblique Equamax rotation. The initial run with the operational data yielded 13 eigenvalues that were greater than 1. After review of the initial eigenvalue scree plot, differences between reduced correlation matrix eigenvalues (successive eigenvalues showed little change after the fourth factor), and factor loading interpretability issues, it was decided to retain 4 factors.

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Table 27. Factor Analysis of Tetrachoric Correlation Coefficients for the Operational Items: English II

Item	Factor 1	Factor 2	Factor 3	Factor 4
Item 1	58*	41*	47*	35
Item 2	42*	33	22	22
Item 3	46*	25	16	15
Item 4	79*	51*	29	36
Item 5	54*	39	29	33
Item 6	8	10	36	17
Item 7	50*	40*	45*	37
Item 8	59*	44*	37	35
Item 9	28	25	50*	21
Item 10	47*	38	31	30
Item 11	72*	58*	40*	43*
Item 12	36	31	37	25
Item 24	32	30	36	25
Item 25	32	32	42*	26
Item 26	59*	55*	44*	44*
Item 27	60*	53*	61*	36
Item 28	32	31	27	21
Item 29	16	20	2	13
Item 30	34	38	54*	31
Item 31	43*	53*	38	40*
Item 32	53*	63*	52*	45*
Item 33	24	26	44*	26
Item 34	34	41*	35	30
Item 35	46*	62*	32	49*
Item 36	48*	84*	31	53*
Item 37	28	45*	28	24
Item 38	34	41*	39	29
Item 39	38	65*	26	52*
Item 40	30	45*	33	36
Item 41	34	53*	24	44*
Item 43	35	49*	31	57*
Item 44	34	33	41*	41*
Item 45	19	31	14	63*
Item 46	11	25	18	54*
Item 47	34	33	33	51*

Notes: Factor loading values are multiplied by 100 and rounded to the nearest integer. Factor loadings greater than 0.396931 are flagged by an asterisk. The flag criterion value of 0.396931 is the root mean square of all of the values in the matrix.

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Table 28. Factor Analysis of Tetrachoric Correlation Coefficients for the Operational Items: Algebra I

Item	Factor 1	Factor 2	Factor 3	Factor 4
Item 1	45*	44*	22	30
Item 2	21	26	12	20
Item 3	47*	47*	51*	24
Item 4	35	33	25	23
Item 5	40*	57*	58*	31
Item 10	24	44*	39	37
Item 11	42*	40*	27	22
Item 12	49*	47*	44*	25
Item 13	49*	38	39*	46*
Item 14	57*	21	33	38
Item 15	67*	47*	40*	34
Item 16	56*	47*	39*	35
Item 17	47*	49*	35	39*
Item 18	41*	63*	44*	33
Item 19	61*	60*	51*	43*
Item 20	47*	27	26	34
Item 21	58*	34	42*	41*
Item 27	33	44*	43*	30
Item 28	44*	35	44*	41*
Item 29	27	23	57*	38
Item 30	25	38	42*	35
Item 31	31	25	29	33
Item 32	36	32	50*	29
Item 33	56*	28	45*	38
Item 34	27	15	62*	38
dropped				
Item 36	24	27	41*	54*
Item 37	39*	15	45*	50*
Item 38	40*	41*	46*	22
Item 43	18	24	34	26
Item 44	38	28	35	30
Item 45	42*	26	22	37
Item 46	15	18	15	34
Item 47	22	-1	20	39*
Item 48	26	21	42*	30

Notes: Factor loading values are multiplied by 100 and rounded to the nearest integer. Factor loadings greater than 0.387648 are flagged by an asterisk. The flag criterion value of 0.387648 is the root mean square of all of the values in the matrix.

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Table 29. Factor Analysis of Tetrachoric Correlation Coefficients for the Operational Items: Biology

Item	Factor 1	Factor 2	Factor 3	Factor 4
Item 1	39 *	38	30	54 *
Item 2	51 *	47 *	45 *	51 *
Item 3	16	20	10	27
Item 4	41 *	37	37	15
Item 5	26	38	23	37
Item 10	36	40 *	34	48 *
Item 11	27	32	36	46 *
Item 12	34	24	39 *	20
Item 13	46 *	32	54 *	41 *
Item 14	30	32	34	28
Item 15	19	24	26	24
Item 16	30	34	37	53 *
Item 17	41 *	39	25	64 *
Item 18	39	38	48 *	59 *
Item 19	41 *	43 *	50 *	45 *
Item 20	25	12	33	10
Item 21	20	20	26	27
Item 26	43 *	43 *	50 *	40 *
Item 27	38	34	38	37
Item 28	60 *	58 *	59 *	48 *
Item 29	33	30	52 *	30
Item 30	19	20	27	31
Item 31	36	28	51 *	42 *
Item 32	41 *	41 *	44 *	52 *
Item 33	45 *	39 *	54 *	41 *
Item 34	44 *	38	56 *	33
Item 35	23	26	22	49 *
Item 36	35	43 *	42 *	31
Item 37	36	29	46 *	25
Item 38	34	30	32	41 *
Item 43	19	20	19	30
Item 44	38	40 *	47 *	24
Item 45	37	36	53 *	38
Item 46	31	34	45 *	31
Item 47	51 *	43 *	48 *	44 *
Item 48	33	53 *	18	34
Item 49	91 *	31	18	14
Item 50	92 *	37	20	14
Item 51	49 *	60 *	48 *	11
Item 52	40 *	38	28	28
Item 53	27	35	24	26
Item 54	41 *	55 *	33	38
Item 55	33	62 *	18	18
Item 56	42 *	77 *	20	42 *
Item 57	33	49 *	29	34
Item 58	22	37	14	11

Notes: Factor loading values are multiplied by 100 and rounded to the nearest integer. Factor loadings greater than 0.386801 are flagged by an asterisk. The flag criterion value of 0.386801 is the root mean square of all of the values in the matrix.

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Confirmatory Factor Analysis

The purpose of the confirmatory analyses was to evaluate the similarity of the factor structures across the online and P/P groups. Our approach represents somewhat of a departure from typical applications of confirmatory factor analysis. In the current analyses, we were primarily concerned not with model fit per se, but with the comparability of model fit between the P/P and online data. In the analyses reported below, the factor and factor correlation patterns as well as the specific values of the loadings and correlations were constrained. Thus, loadings and factor correlations were not estimated; rather, our interest was in the remaining residual item covariances and model fit under a fully constrained model, and more specifically in the similarity of the fit and residual covariances between the online and paper/pencil groups.

The analyses were carried out using a nonlinear factor analysis approach, as implemented by the program NOHARM (Fraser, 1988). The program computes the residual covariances of the items, after fitting the model, and gives the root mean square of the residual covariances as an overall measure of misfit of the model to the data, with the given number of dimensions and the given pattern of the coefficient matrix.

Input to the program consisted of the factor loadings and factor correlations obtained from the P/P exploratory factor analyses. The confirmatory analyses were run for both the online and P/P data sets, with the latter providing the baseline for comparison of the fit statistics. Fit and similarity of fit was evaluated using the sum of squared residual covariances (SSR) and the root mean squared residuals (RMSR) for each dataset, the mean absolute difference of residuals between data sets (MARD), and the matrix of absolute residual differences (ARD). An examination of the residual difference matrix for clusters of large residual differences may indicate items that do not fit the model similarly between the two groups.

Results of Confirmatory Factor Analyses

Global Model Fit. Table 30 provides the results of the summary fit indices. For English II and Algebra I, the SSR and RMSR values were somewhat higher for the online data. For Biology, the SSR and RMSR were slightly higher for the P/P data. According to Fraser (1988), if the root mean square residual is in the order of the typical standard error of the residuals (4 times the reciprocal of the square root of the sample size) we have a rough indication that a refined test of significance would not reject the hypothesized model. With the sample sizes involved in these analyses. the RMSR values in Table 30 are all well below their approximate standard errors, and therefore the constrained models obtained from the exploratory analyses appear to fit the data well, and do so for both the P/P and on-line data.

Also included in Table 30 is the Tanaka (1993) unweighted least squares goodness-of-fit index. There are no interpretative guidelines for Tanaka's index, other than in general a higher value implies better model fit. The values in Table 30 are high for all analyses. Consistent with the SSR and RMSR values, the Tanaka index indicates slightly better fit for the P/P data for Algebra I and English I, and for the on-line data for Biology.

Finally, the mean absolute residual difference (MARD) reflects the average absolute discrepancy in residual covariances between the online and paper/pencil data. The values

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in Table 30 are low; indicating that, on average, the differences in misfit between the two data sets was small. This is explored in more detail below.

Table 30: Summary of Fit Statistics from the Confirmatory Factor Analysis

	Mode of Administration	SSR	RMSR	Tanaka GFI	MARD (Online-P/P)
English II	P&P	.0257	.0066	.976	
	On-line	.0465	.0088	.957	.0043
Algebra I	P&P	.0497	.0091	.966	
	On-line	.0629	.0103	.955	.0048
Biology	P&P	.1289	.0112	.939	
	On-line	.1186	.0107	.944	.0070

Evaluation of Item Residual Covariances. Table 31 contains the frequencies of absolute residual differences (ARD) across the items in each test. As can be seen, the majority of the ARDs are below .01. The greatest similarity in residuals occurred for English II (93.95% below .01) followed by Algebra II (87.4%) and Biology (75.1%).

Table 31: Frequency Distribution of Absolute Residual Differences (ARD)*

	English II *N* (%)	Algebra I *N* (%)	Biology *N* (%)
ARD < .01	559 (93.95%)	520 (87.4%)	797 (75.1%)
ARD ≥ .01	36 (6.05%)	75 (12.6%)	238 (24.9%)

* Lower diagonal matrices

Tables 32 through 34 describe the contents of the residual difference (ARD) matrices for English II, Algebra I and Biology, respectively. Specifically, the tables report the number of items by frequency of occurrence of ARD ≥ .01 and the percent of total. This is computed using the full residual difference matrices. These tables provide a summary of the dispersion (or concentration) of ARD ≥ .01 across items. For example, for English II, there are 2 items associated with 8 occurrences of ARD ≥ .01 and 1 item with six occurrences of ARD ≥ .01. In the full residual differences matrix there are 72 total occurrences of ARD ≥ .01 so that these three items were associated with 30% of these occurrences. For Algebra I, it can be seen that two items were associated with 31 (12 + 19) of the 150 total occurrences, or 21%.

For Biology, there were several items associated with multiple occurrences of ARD ≥ .01, and the misfit and misfit differences were fairly spread out throughout the matrix. Three items had occurrences of at least 20, but given the spread and larger size of this matrix, these items did not account for a large proportion of the residual differences as was the case for the other tests.

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Table 32: Number of Items by Frequency of Occurrence of ARD ≥ .01: English II

Number of Items with ARD ≥ .01	Frequencies of ARD ≥ .01	Percent of Total ARD≥ .01*
9	1	.13
5	2	.14
5	3	.21
4	4	.22
1	6	.08
2	8	.22
Total: 26		

*** Full residual difference matrix**

Table 33: Number of Items by Frequency of Occurrence of ARD ≥ .01: Algebra I

Number of Items with ARD ≥ .01	Frequencies of ARD ≥ .01	Percent of Total ARD≥ .01*
1	1	.01
5	2	.07
11	3	.22
4	4	.11
4	5	.13
4	6	.16
1	7	.05
1	8	.05
1	12	.08
1	19	.13
Total: 34		

*** Full residual difference matrix**

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Table 34: Number of Items by Frequency of Occurrence of ARD ≥ .01: Biology

Number of Items with ARD ≥ .01	Frequencies of ARD ≥ .01	Percent of Total ARD≥ .01*
3	1	.01
2	6	.03
1	7	.01
3	8	.05
4	9	.08
7	10	.15
2	11	.05
5	12	.13
5	13	.14
7	14	.21
2	15	.06
1	17	.04
2	20	.08
1	22	.05
Total: 45		

*** Full residual difference matrix**

Discussion

The confirmatory analyses were run to evaluate the relative fit of P/P versus online data to the same imposed factor model. The results were mixed. For English II and Algebra I, the fit to the four-factor model was good, and slight better globally for the P/P data. At the item level, most residual covariances as well as differences in residuals were very small. For both tests there were one or two items that accounted for a disproportionate amount of the differences in item misfit.

For Biology, the model fit was weaker in general but still good, and in contrast to that for Algebra I and English II, slightly better for the on-line data. Differences in item misfit were rather widely dispersed.

These results indicate that there may be a mode effect for Biology, but there are little or no indications of a general effect between the online and P/P data for English II and Algebra I. There may be two or three items in each of those tests that behave somewhat differently, in terms of not fitting the factor model identically, but for most of the items in both datasets the fit was very good. Also, it is important to emphasize that the global fit indices indicated good and nearly comparable fit for all three tests in both modes.

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Summary and Conclusions

If the results of the confirmatory factor analysis tend to support an assumption that the factor structures of the two administration modes are comparable, what does that mean for an overall decision of comparability? This result seems suggestive, but given the apparent differences in the P/P and online samples, it does not seem sufficient for a determination that there is no mode effect. Clearly the P/P and the voluntary online samples were not comparable, and this result confounds our ability to interpret differences in student performance across the modes. Efforts were made, both by building matched samples and by applying analysis of covariance, to remove some of the demographic differences between the samples post hoc, and the performance of the two groups did seem to move closer together. However, there still were small differences for English II and Algebra. For these samples, the P/P group tended to perform slightly better than the online group. Sufficient information may still not exist to completely disentangle the effects of mode and the non-random effects of sample selection. However, the evidence that has been obtained suggest that 1) there is little appreciable difference in the factor structures of the tests delivered by the different modes; 2) there is little evidence of DIF to indicate that certain types of items function differently by mode; and 3) there *do* seem to be differences in mean performance by mode for the Algebra and English II tests, but the differences seem to be practically small.

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