Impacts of Edmentum's Exact Path on Student Mathematics Achievement

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Executive Summary

Century Analytics, Inc. conducted a rigorous evaluation of Edmentum's Exact Path to estimate the impact of Exact Path use on student achievement in mathematics in kindergarten through Grade 8. Exact Path is an online educational tool designed to support individualized student instruction. This study's quasi-experimental design (QED), analyses, and measures meet the What Works Clearinghouse (WWC) 4.0 standards needed to achieve a rating of *Meets WWC Group Design Standards with Reservations (*WWC, 2017). This study also meets the Every Student Succeeds Act (ESSA) guidance for *Moderate Evidence* (U.S. Department of Education, 2016).

Two groups of students were compared in this study. Students in the Exact Path intervention group completed at least eight Exact Path lessons between the fall administration and the winter administration of the Exact Path diagnostic assessment. Students in the comparison group completed zero lessons between the two test administrations.

The study established baseline equivalence of the Exact Path group and the comparison group. Both the baseline measure and outcome meet WWC standards for educational outcomes. Data were analyzed using a WWC acceptable analytic approach, and no confounds were present between the intervention and comparison groups.

Analyses revealed statistically significant positive impacts for student usage of Exact Path on mathematics achievement in kindergarten through Grade 8. Impacts had effects sizes ranging from 0.06 for Grade 3 to 0.40 for kindergarten and improvement indexes ranging from 2.39 to 15.54. Improvement indexes show the expected change in percentile rank for an average comparison student if he or she had been in the intervention group. For example, an improvement index of 15.54 is equivalent to a comparison group student improving from the 50th percentile to better than the 65th percentile.

Results of this study suggest that students who use Exact Path and complete at least eight lessons as assigned by Exact Path will make statistically significant gains in achievement relative to students who do not complete any Exact Path lessons. These results also suggest that Exact Path is targeting the skills that students need to develop in order to improve their mathematics achievement.

This study is not without limitations. The definition for the Exact Path intervention group focused solely on lesson completion. The study does not shed any light on the potential impact of any other of Exact Path's student resources (e.g., practice tasks, mastery quizzes, progress checks, worksheets) or the impact of Exact Path when integrated into classroom instruction. The narrow definition for the Exact Path intervention group and the lack of any student demographic variables limits the generalizability of the study's findings.

Future research on Exact Path should incorporate a broader definition of student usage in order to estimate the impact of the many student resources available beyond assigned lessons. This research also should include student demographic characteristics to help understand which groups of students may benefit most from Exact Path and to support generalizing study findings.

Future research also should examine the impacts of Exact Path usage at the classroom level. Exact Path is designed to supplement classroom instruction and has many resources available to teachers. The full potential impact of Exact Path cannot be estimated without examining its effects at the classroom level.

Introduction

Edmentum's Exact Path is an online educational tool designed to support individualized student instruction. Exact Path includes a diagnostic assessment, individualized instruction and skill practice, progress checks, and additional supporting resources for students. Exact Path provides students with immediate feedback and adjusts in real time to student progress. Exact Path incorporates a formative assessment approach to monitoring student progress and adjusting instruction.

Exact Path usage begins with an adaptive diagnostic assessment. The diagnostic can be administered in either mathematics, reading, and/or language arts. The diagnostic assessment is typically administered at least three time per school year (fall, winter, & spring), and results provide each student with an individualized placement on the Exact Path learning progression.

Within each subject area, the learning progression is a continuous sequence of lessons and skills from kindergarten to high school. The learning sequences are based on national and state content standards in each subject area. Each subject area's learning sequence includes lessons and skills from a number of sub-domains. The number of lessons per subject area and grade level varies but typically range from 20 to 30 per grade.

Students are placed on the learning progression in a subject area in order to address their most significant weakness. Lessons are assigned to students in groups of three or four, with each lesson targeting a specific skill or set of skills. Once placed on the learning path, students work on completing lessons targeted to their achievement level as indicated by their diagnostic results. Each lesson is typically followed by a short quiz to check the student's understanding of the lesson. After completing the lessons for the group of 3-4 skills, students take a progress check to assess their understanding of all the skills in the group. When progress checks are passed (80% correct), students receive a new set of lessons. If progress checks are not passed, students are assigned lessons to support development in needed skills. As students pass the sequential progress checks, they advance to skills and concepts further along the learning progression.

Students typically retake the diagnostic assessment in the winter of each school year. Students receive an updated diagnostic score reflecting their learning growth since the previous diagnostic score. Students are then placed on the learning progression again based on the latest diagnostic score. Depending on the score, students may repeat lessons not yet passed or progress to new lessons and skills further along the learning progression. Students may also be administered the diagnostic assessment in the spring.

Study Purpose

The purpose of this study was to provide a rigorous estimate of the impact of Exact Path use on student achievement in mathematics. Rigorous studies of educational interventions and estimates of impacts are needed by state and local education agencies to select and implement interventions that improve academic outcomes for students (U.S. Department of Education, 2016).

The study was designed to meet the What Works Clearinghouse (WWC) 4.0 standards for quasi-experimental designs (QED) necessary to achieve a rating of *Meets WWC Group Design Standards with Reservations* (WWC, 2017). In meeting WWC standards, the study also was designed to meet the

requirements of the Every Student Succeeds Act (ESSA) guidance for *Moderate Evidence* (U.S. Department of Education, 2016).

The study aimed to estimate the effects of student usage of Exact Path. Usage included administration of the diagnostic assessment, placement of students to the learning progression, and completion of lessons according to the learning progression placement.

Research Questions

The following research question guided the design and analyses used in this study.

> What is the impact of Exact Path usage between the Fall diagnostic and Winter diagnostic assessment on student mathematics achievement in kindergarten through 8th grade relative to students who do not use Exact Path?

Methods

Data

Century Analytics obtained student data from Edmentum to conduct the study. These data included unique student identifiers, student grade level, identifiers for subject area, Exact Path diagnostic scores from the fall and winter in each subject area, and detailed information on the Exact Path skills completed, progress checks, and time spent on lesson activities for all subject areas and domains within subject area. The study used data on the Fall diagnostic score as the baseline measure and scores on the Winter diagnostic as the outcome measure. Students were identified for the intervention and comparison groups based on lesson completion between the fall and winter administrations of the diagnostic assessment. No student demographic variables were available for analysis.

Design

This study used a quasi-experimental design in order to meet WWC (4.0) standards with reservations. According to the WWC, a quasi-experimental design (QED) uses a non-random process to form the intervention and comparison conditions (WWC, 2017). The WWC allows groups to be formed using a variety of methods as long as the groups are mutually exclusive. That is, units (e.g., students or schools) can only be analyzed as a member of a single group. Further, in a QED, the WWC accepts assignment to the intervention based on observed characteristics. Assignment to study conditions for this study was conducted at the student level.

The intervention group was defined as students who had both Fall and Winter Exact Path diagnostic assessment scores and who also completed at least eight lessons within the mathematics subject area. That is, for mathematics, students needed to complete at least eight lessons within the seven sub-domains of mathematics (Algebra & Expressions, Counting & Cardinality, Fractions & Ratios, Functions, Geometry, Measurement, Data & Statistics, and Numbers & Operations). A minimum of eight lessons was chosen as the definition for Exact Path implementation after discussion between Century Analytics and Edmentum staff for the following reasons.

First, lessons are assigned in groups of three to four. Using eight lessons helps ensure that students are working their way through the learning progression and are using Exact Path as intended. That is, completing a set of lessons, taking a progress check, and moving further along the learning progression.

Second, between 10-28 skills per grade are provided for the mathematics subject area in kindergarten to Grade 8. This means 12 lessons represent approximately one semester's worth of learning on the learning progression. Given the study examined student achievement from the Fall diagnostic to the Winter diagnostic, a minimum of eight lessons was deemed to be a reasonable amount of Exact Path use. Fewer lessons being available in kindergarten and Grade 1 mean that the treatment definition of eight lessons completed results in a relatively more intense intervention than in 4th grade where 28 skills are available.

The number of lessons completed by students in the Exact Path intervention group varied (see Appendix A for details). No maximum number of lessons completed was set for inclusion into the intervention group. Except for kindergarten where 80% of students in the invention group completed between 8 and 12 lessons, between 50-60% of students completed 8 to 12 lessons. Although data were available for students in Grades 9 through 12, Exact Path usage was not sufficient among students at these grade levels to form intervention groups; only eight students across Grades 9 through 12 met the intervention group definition.

Comparison group students were those who had both Fall and Winter Exact Path diagnostic assessment scores and who completed 0 lessons within the mathematics subject area during the study period. This definition helps ensure that students in the comparison group were not using Exact Path as intended: to address weaknesses in their mathematics achievement as identified by the diagnostic assessment. This definition of the comparison group also insures that no students were included in both groups for the analyses. In other words, the study groups were mutually exclusive.

Outcomes

Student achievement, both at baseline (fall) and follow-up (winter) was measured using Exact Path's diagnostic assessment. The mathematics diagnostic is an adaptive assessment of varying length depending on student performance and assesses mathematics achievement in seven domains (Counting and Cardinality, Numbers and Operations, Measurement and Data, Algebra, Fractions and Ratios, Functions, Geometry). The diagnostic has an average of 48 items per grade level—with fewer items at kindergarten and Grade 1—and typically requires between 15 to 60 minutes to complete (Edmentum, 2017). Scores from the assessment are on a vertical scale that runs from kindergarten to high school. Scores are provided for the entire subject area and for each domain within subject area. Internal reliabilities for the winter administration of the diagnostic in mathematics range from .76 for kindergarten to .95 for Grades 7 and 8.

The diagnostic assessment meets the WWC standards for outcomes in terms of validity and reliability. Because the diagnostic assessment measures content aligned to national and state standards it is not over-aligned to the Exact Path intervention.

Baseline Equivalence

In order to meet WWC standards with reservation for a QED, baseline equivalence must be established for the analytic samples of the intervention (Exact Path) and comparison groups. In addition, baseline

equivalence needs to be established separately for each grade level included in the analyses. Finally, baseline equivalence must be established using a measure that meets WWC standards.

Baseline equivalence was established using the Exact Path Fall diagnostic scores. As described above in the Outcomes section, the Exact Path diagnostic assessment meets WWC standards for baseline and outcome measures.

To establish the study groups, students were first identified who met the definitions of the intervention and comparison groups described above. Once these samples were identified, descriptive statistics on the baseline measure (Fall diagnostic scores) were produced for each group by grade level (see Appendix B). Using these descriptive statistics, each grade level was checked for baseline equivalence of the originally identified samples. All these samples had baseline differences that were under the WWC threshold for baseline equivalence (i.e., ≤ 0.25 standard deviation) using the WWC method for calculating baseline differences (WWC, 2017). These samples of students were the same as those used in the impact analyses described below.

Analyses and Results

Data were analyzed to estimate differences between intervention and comparison groups on the outcome (i.e., Winter diagnostic score). Impact analyses were conducted using the following linear regression model fit to the data separately for each grade level.

$$Y_i = \beta_0 + \beta_1(\text{TREAT})_i + \beta_2(\text{BASE})_i + e_i$$

Where: Y_i is student *i*'s Winter mathematics diagnostic score. β_0 is the regression adjusted comparison group mean. β_1 is the adjusted mean difference between the intervention and comparison groups, and TREAT represents the group status of student *i* coded as 0 = comparison and 1 = intervention. β_2 is the regression slope for the baseline (fall) diagnostic score. BASE is student *i*'s baseline diagnostic score in mathematics, and e_i is the residual for student *i*.

Impact analyses yielded statistically significant positive impacts for all grade levels in mathematics (Table 1). Detailed output from the regression analyses are provided in Appendix C. Adjusted mean differences between the intervention and comparison groups ranged from 5.55 for Grade 3 to 32.27 for kindergarten. These differences translate into effect sizes ranging from 0.06 for Grade 3 to 0.40 for kindergarten.

In addition to translating the impacts of Exact Path into effect sizes, the improvement index is another useful method to aid in the interpretation of the practical importance of impacts. The improvement index represents the difference in percentile rank at the mean (i.e., the 50th percentile) between the intervention group and the comparison group (WWC, 2017). The improvement index shows the expected change in percentile rank for an average comparison student if he or she had received the intervention.

Percentile improvements for Exact Path usage in math ranged from 2.39 for Grade 3 to 15.54 for kindergarten. Most improvement indexes were greater than 5. This is equivalent to a comparison student improving from the 50th percentile to the 55th percentile. An improvement index of 15.54 is

equivalent to a comparison student improving from the 50th percentile to better than the 65th percentile.

Table 1. Impacts on Mathematics.

	N	Mean	SD	Adjusted Mean Difference (SE)	Pooled Standard Deviation	Effect Size	Improve Index
Kindergarten							
Comparison	921	687.84	79.72	32.27***	80.32	0.40	15.54
Intervention	127	720.11	84.56	(6.45)			
Grade 1							
Comparison	656	767.53	88.14	17.71***	82.44	0.21	8.32
Intervention	718	785.24	76.86	(3.43)			
Grade 2							
Comparison	620	837.39	83.84	8.47***	73.98	0.11	4.38
Intervention	1420	845.86	69.23	(2.39)			
Grade 3							
Comparison	579	906.61	99.81	5.55*	90.51	0.06	2.39
Intervention	2397	912.17	88.12	(2.63)			
Grade 4							
Comparison	530	944.26	96.57	20.06***	99.79	0.20	7.93
Intervention	2179	964.32	100.56	(2.89)			
Grade 5							
Comparison	624	1020.68	122.20	14.35***	112.75	0.13	5.17
Intervention	2038	1035.03	109.70	(2.87)			
Grade 6							
Comparison	991	1044.22	113.81	14.74***	111.90	0.13	5.17
Intervention	1294	1058.96	110.41	(2.75)			
Grade 7							
Comparison	803	1054.30	132.61	13.96***	125.64	0.11	4.38
Intervention	1007	1068.26	119.79	(3.57)			
Grade 8							
Comparison	976	1085.37	141.31	14.02***	133.27	0.11	4.38
Intervention	814	1099.38	122.93	(3.91)			

SE = Standard error
Improve Index = Improvement index
* = *p*-value < .05
*** = *p*-value < .001

Summary

This study was conducted at the level of rigor needed to meet WWC standards with reservations (WWC, 2017). Baseline equivalence was established between the Exact Path intervention group and the comparison group. The measure used to establish baseline equivalence and as the mathematics achievement outcome meet WWC standards for validity and reliability. The baseline and outcome

measures are aligned to national and state academic content standards and so are not over-aligned to the Exact Path intervention. The study had no confounds.

The study also meets criteria set forth by the Every Students Succeeds Act (U.S. Department of Education, 2016). The Department of Education considers a quasi-experimental study to be "well-designed and well-implemented" if it receives a *Meets WWC Design Standards with Reservations* rating or is of equal quality (U.S. Department of Education, 2016). The study also meets the ESSA criteria for statistically significant positive effects. These two aspects of the study mean it qualifies as providing Moderate evidence (Level 2) of Exact Path's effectiveness.

Exact Path had a statistically significant impact on student mathematics achievement at every grade level analyzed. These impacts occurred between the fall and winter administrations of the diagnostic assessment. Students who met the definition for the Exact Path intervention—completion of at least eight lessons between the Fall and Winter diagnostic assessments—showed greater gains in mathematics achievement than students who completed zero Exact Path lessons. Additional lesson completion over the entire school year would likely result in a greater impact on student mathematics achievement.

The results of this study suggest that students who use Exact Path and complete lessons on the learning progression assigned to them by Exact Path will make gains in achievement relative to students who do not complete any lessons. The statistically significant gains made by students in the Exact Path intervention group over those students in the comparison group also suggest that Exact Path lessons are targeting skills students need to develop in order to improve their achievement. Had Exact Path targeted skills students already had mastered, it is likely students wouldn't have seen the same gains in achievement between administrations of the diagnostic assessment. These results suggest a practical impact and importance of Exact Path usage and completion of at least eight lessons.

The data on lesson completion in Appendix A show that many students in the Exact Path intervention group completed more than eight lessons. In every grade except Grade 4, the majority of students completed between 8 and 12 lessons. As prior research has shown, Exact Path usage is positively correlated with achievement as measured by the diagnostic assessment (Edmentum, 2018). Although not addressed in this study, an increase in the number of Exact Path lessons completed likely results in increases in scores on the diagnostic assessment.

Limitations

This study is not without limitations. This study used a focused definition for the intervention group: students who had completed at least eight lessons on the Exact Path learning progression. But Exact Path is much more than lessons, and Exact Path usage involves much more than lesson completion. Once placed on the learning progression, Exact Path provides students with a variety of resources to support their learning. These resources include practice tasks, mastery quizzes, progress checks, worksheets, videos, etc. Although the students included in the Exact Path intervention group for this study likely used these resources, this study did not estimate the impact of using these resources on student mathematics achievement.

This study used a design sufficient to meet WWC standards with reservations. The Exact Path intervention students and comparison students were equivalent at baseline (Fall diagnostic administration) on mathematics achievement. Students' fall math scores were used as a statistical

adjustment for estimating impacts on math. No other student characteristics, however, were included in the study. The lack of student demographic characteristics limits the generalizability of the study results. It is unclear from this study what types of student were included in the intervention group or if students of differing backgrounds experienced differing impacts from Exact Path usage.

This study assigned students to the intervention and comparison groups. Exact Path usage typically differs by students, so using students as the unit of assignment is appropriate. Exact Path, however, also has many resources available to teachers and is designed to supplement and be integrated into regular classroom instruction. Teachers can use Exact Path to assign students lessons in areas of need, group students by ability—even by domains within a subject area—for focused instruction, and view multiple reports on student progress and achievement. All of these Exact Path teacher and classroom resources are likely to affect classroom practice and instruction, and therefore likely to affect student achievement. This study, however, was unable to estimate the impacts of teacher use of Exact Path on classroom level student achievement.

This study used a rigorous quasi-experimental design (QED) that is acceptable to meet WWC standards with reservations. Along with the statistically significant positive impacts, this study meets ESSA Level 2 standards. That said, this study was unable to control for student characteristics other than baseline (fall) achievement. It is possible that other student or classroom characteristics are responsible for the difference in achievement between the Exact Path intervention and comparison groups.

This study is also limited by the lack of any implementation fidelity data. Other than the completion of eight or more lessons, no information on Exact Path usage was included in this study. Although this study shows statistically significant positive impacts on student achievement from the completion of eight or more lessons, this study was unable to estimate the impact of any other aspects of student usage of Exact Path.

Further Research

This study provides a rigorous estimate of the impact of student completion of Exact Path lessons on student achievement in mathematics. Additional research is needed to understand how other aspects of Exact Path usage impact student achievement. This future research also should consider addressing the limitations of this study. In addition to including student demographic characteristic as part of future analyses, further research also should examine other aspects of student usage and how these might impact student achievement. These could include student use of worksheets, additional lessons, practice tasks, and videos.

Perhaps the greatest opportunity for better understanding the impacts of Exact Path usage are at the classroom level. Exact Path provides many resources to support classroom instruction. The current study did not examine the impact of any of these. This means Exact Path's full impact might be underestimated in this study. A study at the classroom level would likely provide a much more complete estimate of the impact of Exact Path usage on student achievement. Any study conducted at the classroom level also should use demographic data on classrooms and schools included in the study.

Although the baseline and outcome measures used in this study meet WWC standards, a future study that examines the impact of Exact Path on broader and policy relevant outcomes would provide potential users with important information as they consider which educational intervention to adopt and as they prepare their students for high-stakes testing and, more importantly, college and career.

A truly unbiased estimate of Exact Path's impact can only be provided by a random controlled trial (RCT). In this type of study, students or classrooms are randomly assigned to either use Exact Path or conduct business as usual, creating two groups that are equivalent in expectation on all characteristics, known and unknown. This equivalence means any difference in achievement between the study groups can be attributed to Exact Path usage. A well-conducted RCT eliminates the possibility that differences between intervention and comparison groups are caused by differences in characteristics rather than the intervention itself, a limitation of the present study.

Finally, studies of an intervention's impact are best conducted in parallel with studies of implementation fidelity. Findings from the two types of study complement each other and aid in the interpretation of results. Studies of implementation fidelity inform the impact research by aiding in the definition of intervention groups and communicating to the research audience what level of usage resulted in the impacts. Studies of impact inform implementation research by estimating impacts at different levels of implementation and helping to focus on how much usage is needed to produce statistically significant and meaningful increases in student achievement.

References

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Appendix A
Exact Path Lessons Completed

Table A.1. Number of Students in the Intervention Group Completing Mathematics Lessons by Grade Level.

Lessons completed	K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
8 lessons	40	167	350	468	359	296	221	193	168
9 lessons	11	87	142	171	176	164	116	96	97
10 lessons	21	88	159	199	160	178	122	121	82
11 lessons	16	94	130	240	188	229	130	108	94
12 lessons	13	58	121	218	186	163	108	77	63
13 lessons	7	37	58	125	100	99	60	51	33
14 lessons	3	34	59	116	101	118	77	49	40
15 lessons	3	26	68	112	119	103	67	35	34
16 lessons	4	23	61	97	104	85	65	35	34
17 lessons	1	19	33	73	64	59	32	34	25
18 lessons	2	9	41	73	59	80	33	29	22
19 lessons	1	16	28	59	72	60	35	21	18
20 lessons	0	14	28	58	55	50	28	14	15
21 or more lessons	5	46	142	388	436	354	200	144	89
Total	127	718	1,420	2,397	2,179	2,038	1,294	1,007	814

K = kindergarten

Appendix B
Baseline Equivalence

Table B.1. Baseline Equivalence in Mathematics by Grade Level.

Grade Level	N	Mean	SD	Difference	Pooled Standard Deviation	Effect Size
Kindergarten						
Comparison	921	679.33	89.79	14.10	88.21	0.16
Intervention	127	693.45	75.71			
Grade 1						
Comparison	656	748.74	83.38	-0.24	71.60	-0.12
Intervention	718	748.50	58.81			
Grade 2						
Comparison	620	812.20	76.66	-9.94	65.15	-0.15
Intervention	1420	802.25	59.44			
Grade 3						
Comparison	579	871.02	87.07	-1.67	80.43	-0.02
Intervention	2397	869.35	78.75			
Grade 4						
Comparison	530	928.72	90.94	3.43	90.93	0.04
Intervention	2179	932.15	90.93			
Grade 5						
Comparison	624	1000.61	120.54	-19.33	107.67	-0.18
Intervention	2038	981.27	103.42			
Grade 6						
Comparison	991	1027.65	111.07	-17.13	106.67	-0.16
Intervention	1294	1010.52	103.17			
Grade 7						
Comparison	803	1045.42	127.25	-13.97	121.42	-0.11
Intervention	1007	1031.44	116.56			
Grade 8						
Comparison	976	1076.17	133.19	-30.15	125.76	-0.24
Intervention	814	1046.01	116.21			

Appendix C
Regression Analysis Output

Table C.1. Kindergarten Estimates of Regression Coefficients

Parameter	Coefficient	Std. Error	*t* value	*p*-value	95% Conf. Int.	
Exact Path	32.2657	6.4464	5.01	0.000	19.6164	44.9149
Fall diagnostic	0.4849	0.0238	20.34	0.000	0.4382	0.5317
Intercept	358.4107	16.3485	21.92	0.000	326.3311	390.4902

Std. Error = standard error
95% Conf. Int. = 95% confidence interval

Table C.2. Grade 1 Estimates of Regression Coefficients

Parameter	Coefficient	Std. Error	*t* value	*p*-value	95% Conf. Int.	
Exact Path	17.7121	3.4294	5.16	0.000	10.9847	24.4394
Fall diagnostic	0.7347	0.0239	30.69	0.000	0.6878	0.7817
Intercept	217.4092	18.0963	12.01	0.000	181.9098	252.9087

Std. Error = standard error
95% Conf. Int. = 95% confidence interval

Table C.3. Grade 2 Estimates of Regression Coefficients

Parameter	Coefficient	Std. Error	*t* value	*p*-value	95% Conf. Int.	
Exact Path	8.4728	2.3853	3.55	0.000	3.7950	13.1507
Fall diagnostic	0.8449	0.0168	50.27	0.000	0.8119	0.8779
Intercept	151.1633	13.7932	10.96	0.000	124.1130	178.2135

Std. Error = standard error
95% Conf. Int. = 95% confidence interval

Table C.4. Grade 3 Estimates of Regression Coefficients

Parameter	Coefficient	Std. Error	*t* value	*p*-value	95% Conf. Int.	
Exact Path	5.5546	2.6312	2.11	0.035	0.3955	10.7137
Fall diagnostic	0.8761	0.0130	67.63	0.000	0.8507	0.9015
Intercept	143.5378	11.5275	12.45	0.000	120.9350	166.1405

Std. Error = standard error
95% Conf. Int. = 95% confidence interval

Table C.5. Grade 4 Estimates of Regression Coefficients

Parameter	Coefficient	Std. Error	*t* value	*p*-value	95% Conf. Int.	
Exact Path	20.0621	2.8899	6.94	0.000	14.3955	25.7287
Fall diagnostic	0.8798	0.0126	69.77	0.000	0.8551	0.9045
Intercept	127.1587	11.9951	10.60	0.000	103.6382	150.6792

Std. Error = standard error
95% Conf. Int. = 95% confidence interval

Table C.6. Grade 5 Estimates of Regression Coefficients

Parameter	Coefficient	Std. Error	*t* value	*p*-value	95% Conf. Int.	
Exact Path	14.3511	2.8684	5.00	0.000	8.7265	19.9757
Fall diagnostic	0.8716	0.0113	77.42	0.000	0.8495	0.8936
Intercept	148.5802	11.5389	12.88	0.000	125.9542	171.2063

Std. Error = standard error
95% Conf. Int. = 95% confidence interval

Table C.7. Grade 6 Estimates of Regression Coefficients

Parameter	Coefficient	Std. Error	*t* value	*p*-value	95% Conf. Int.	
Exact Path	14.7433	2.7472	5.37	0.000	9.3561	20.1305
Fall diagnostic	0.8548	0.0127	67.16	0.000	0.8299	0.8798
Intercept	165.7651	13.2422	12.52	0.000	139.7971	191.7332

Std. Error = standard error
95% Conf. Int. = 95% confidence interval

Table C.8. Grade 7 Estimates of Regression Coefficients

Parameter	Coefficient	Std. Error	*t* value	*p*-value	95% Conf. Int.	
Exact Path	13.9563	3.5703	3.91	0.000	6.9540	20.9586
Fall diagnostic	0.8282	0.0146	56.75	0.000	0.7996	0.8568
Intercept	188.5063	15.4859	12.17	0.000	158.1341	218.8784

Std. Error = standard error
95% Conf. Int. = 95% confidence interval

Table C.9. Grade 8 Estimates of Regression Coefficients

Parameter	Coefficient	Std. Error	*t* value	*p*-value	95% Conf. Int.	
Exact Path	14.0158	3.9053	3.59	0.000	6.3564	21.6751
Fall diagnostic	0.8374	0.0154	54.51	0.000	0.8073	0.8675
Intercept	184.1657	16.7384	11.00	0.000	151.3368	216.9945

Std. Error = standard error
95% Conf. Int. = 95% confidence interval