Tennessee Value-Added Assessment System (TVAAS)

State of Tennessee

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Introduction

Twenty years ago, the State of Tennessee led the nation in providing measures of student progress to individual districts, schools and teachers. Known as the Tennessee Value-Added Assessment System (TVAAS), this reporting focused on the *progress* of students over time, rather than their *achievement level*. TVAAS represented a paradigm shift for educators and policymakers and, in identifying the more effective practices and less effective practices, educators receive personalized feedback, which they could then leverage to improve the academic experiences of their students.

Since then, other states have followed Tennessee in measuring student progress for their K-12 educators. However, *Tennessee continues to lead the nation*; this time in connecting the teacher-specific TVAAS reporting to teacher training programs. Since 2009, the state's teacher training programs have also received personalized feedback through the annual Report Card on the Effectiveness of Teaching Training Programs. The annual report card presents summative metrics on recent program completers, such as whether they tend to be more or less effective than other beginning teachers or the veteran teachers. This information completed the feedback loop between one measure of effective teaching and the teacher training programs. The subsequent adoption of similar analysis among other states and even national organizations has since validated the importance of such data.

This report, ***Advanced Analytics for Tennessee's Teacher Training Programs***, builds on the report card to provide more specific information to teacher training programs. Its goal is to identify best practices and design elements within each teacher training program as well as across all teacher training programs. This reports gets at the *why* behind the report card's results and whether there are patterns in experiences that are associated with more effective teaching among beginning teachers.

In a collaboration with the Tennessee Higher Education Commission (THEC) and SAS Institute Inc. (the TVAAS provider), the teacher training programs identified the critical areas of exploration for this report after a series of meetings across the state where the programs identified common data and priority topics. As a result of these discussions, this report analyzes the effectiveness of recent program completers in terms of their *endorsement area, degree type, mentorships, clinical/credit hours, transfer status, K-12 school placement and traditional academic markers (like GPA and Praxis)*. As this report is the first of its kind for the state, there were some challenges with data collection, and it is expected that this process would improve over time. For that reason, there is caution about drawing any firm conclusions about the report's findings.

However, despite these data challenges, this report represents an important first step towards a closer look at the relationship of teaching effectiveness data and characteristics of teacher training programs in the state of Tennessee. Perhaps these analytics will spark additional data collection and areas of exploration going forward. As Dr. Richard Rhoda, Executive Director of THEC, said:

"THEC is very pleased to be a part of this exciting research. The report allows our teacher preparation programs to use data in a more meaningful way for program improvement. This research will help shape teacher preparation to meet the goal of training the most effective teachers."

Unlike the annual report card, the Advanced Analytics report is not publicly available for individual programs. Provided by THEC, this report is an informational resource for each institution so that its administration, professors and teachers can assess the findings and identify whether any changes should be made to the program, which could in turn improve the effectiveness of its completers. In the same way that value-added data changed the educational conversation among teachers and their administrators so many years ago, the Advanced Analytics report can change the conversation among recent program completers and their programs to improve the teacher training program for all teachers.

Data and Methods

The Advanced Analytics report uses data from a variety of sources, which are described briefly below.

TVAAS Teacher Value-Added Data

The Tennessee Department of Education (TDE) provides TVAAS teacher-specific data to educators. TVAAS is "a statistical system for educational outcome assessment which uses measures of student learning to enable the estimation of teacher, school, and school district statistical distributions" (TCA 49-1-603). TVAAS has been a part of state statute since 1992, and its use results in an extensive and useful statewide database on educational attainment of Tennessee students.

The TVAAS teacher-specific data are not public record, and access is protected by state statute. TCA 49-1-606 states that these data "…will be made available only to the specific teacher, the teacher's appropriate administrators as designated by the local board of education and school board members… The estimates of specific teacher effects may also be made available to the state board approved teacher preparation programs of individual teachers. The estimates made available to the preparation programs shall not be a public record and shall be used only in evaluation of the respective teacher preparation programs." The Advanced Analytics report is available as part of program evaluation, although it does not report individual teacher estimates, identify teacher estimates, or report institution-specific summative data when there are fewer than five teachers included in the result.

TVAAS uses available data from the Tennessee Comprehensive Assessment Program (TCAP). More specifically, that includes the Achievement Tests, End-of-Course (EOC) exams and, for the first time in 2013, the K-2 Assessment Tests listed below:

- Achievement Test for mathematics, reading, science and social studies in grades three through eight (to report value-added measures in grades four through eight).
- End-of-Course for Algebra I and II; Biology I; English I, II, and III; and U.S. History in all grades.
- K-2 Assessment Tests for language, math, and reading in grades one and two.

Each teacher value-added report includes an estimated growth measure and its associated standard error, which create a teacher growth index. The teacher growth index is similar in concept to a t-value and can be used to determine whether there is moderate or significant evidence that students made more than, less than or about the expected progress. The t-values can be interpreted as described in Table 1.

Table 1: Interpretation of T-values

Level	T-value for Each Level	Interpretation
1	Teacher's t-value is less than-2.	Least effective: significant evidence that students linked to this teacher made less progress than the state average.
2	Teacher's t-value is equal to or greater than-2 but less than-1.	Approaching average effectiveness: moderate evidence that students linked to this teacher made less progress than the state average.
3	Teacher's t-value is equal to or greater than-1 but less than 1.	Average effectiveness: evidence that students linked to this teacher made progress similar to the state average.
4	Teacher's t-value is equal to or greater than 1 but less than 2.	Above average effectiveness: moderate evidence that students linked to this teacher made more progress than the state average.
5	Teacher's t-value is 2 or greater.	Most effective: significant evidence that students linked to this teacher made more progress than the state average.

For the purposes of this analysis, the teacher growth index has the advantage of putting value-added reports from different subjects, grades and tests into a common scale with similar meaning. The teacher growth indices can be combined across tests, subjects and grades to create a composite value that incorporates all of a teacher's data.

This is particularly important because the growth measure itself is calculated differently for the Achievement Tests as compared to the End-of-Course exams and K-2 Assessment Tests. Because the tests themselves are different, the growth models are different. For growth measures based on Achievement Tests, the growth model is a gain-based approach, which measures the change in achievement as students move from one grade to the next. This is possible because the Achievement Tests' subjects are given in every grade between third and eighth grades. For growth measures based on End-of-Course exams and K-2 Assessment Tests, the growth model is a regression-based approach, which compares the average predicted score with the average observed score for the teacher's students. This approach is necessary because grade enrollment can vary with the End-of-Course exams and because the K-2 Assessment Tests are not taken statewide. Regardless of the test type, the teacher growth measure uses the same general concept for the expectation of growth, which is the average progress made across the state. In other words, a teacher's value-added measure is related to the average teacher across the state for a given subject and grade. While the K-2 Assessment Tests are not administered statewide, a good majority of the state participates, which emulates the state population. More statistical details about the general statistical approaches used in TVAAS at http://www.sas.com/resources/asset/SAS-EVAAS-Statistical-Models.pdf.

Regardless of the modeling approach, the growth measures may use all years of a student's assessment data. Because the teacher training programs are interested in recent program completers, this report focuses on one-year estimates for teachers who have been identified as recent program completers by the teacher training programs. The timeframe was selected based on the study's focus: the effectiveness of teacher training programs in preparing beginning teachers, with the implicit assumption that other factors beyond the licensing institution could become quite influential in later years. At the request of the state of Tennessee, the definition of *beginning* teacher is those with one to three years of experience.

As a final note about the calculation of TVAAS teacher reports, it is important to have accurate student-teacher linkages. In Tennessee, teachers and administrators have the opportunity to review and modify classroom rosters. SAS receives the verified linkages from TDE, and these are used in the TVAAS teacher reports.

Teacher Training Program Data

Thirty-two (32) teacher training programs from the state of Tennessee sent program completer data for this project, and these programs are listed in Appendix A: Additional Information. While this report provides summative data based on all 32 teacher training programs, individual teacher training programs will receive a private report that adds, where available, data specific to their program.

SAS received data directly from the individual teacher training programs according to the data dictionary created by THEC. The data dictionary was based on the areas of exploration identified by the teacher training programs, and it detailed the types of fields and coding to ensure that data were transferred to SAS in a common format. More specifically, the data related to recent completers' endorsement area, degree type, mentorships, clinical/credit hours, transfers, school placement and scores for traditional academic markers.

Approximately 12,000 records containing program completer data were received for this project. For the purposes of this analysis, these data were subset to include only program completers who had 2012-2013 value-added data and who met the years of experience requirements. As a result, the number of program completers in this analysis is approximately 2,400.

The records based on these 2,400 program completers varied in their completeness across all areas of exploration. Missing data were common in all records, and this is not particularly surprising since this report is the first of its kind for the training programs and since some of the data may be difficult to capture. For example, less than half of the 2,400 program completers have an associated ACT, SAT or Praxis score or a mentor teacher. These missing data do present challenges in drawing any *firm* conclusions about the report's findings.

However, despite these data challenges, this report represents an important first step towards a closer look at the relationship of teaching effectiveness data and characteristics of teacher training programs in the state of Tennessee.

Methods

In this report, the method of analysis varies by the exact question posed. However, there are commonalities across the areas of exploration, and the primary methods used throughout the report are described below.

Test of Means

This approach takes into account the difference between means of two groups of data as well as the number of entities in each group to assess whether the difference is statistically significant. Along with the individual means, or potentially the difference of means, the *p-value* is given to show what level of significance, if any, is observed. The assumption (known as the null hypothesis) is that the two groups are not different from one another. The p-value gives the probability of obtaining the observed difference, assuming that the null hypothesis is true. In other words, if the p-value is sufficiently small, then there is enough statistical evidence to conclude that the two means are, in fact, different from each other. Typical p-values of statistical significance are less than 0.10 and, as an even more stringent standard, less than 0.05.

Correlations

This reports the strength of the relationship between variables, with +1 indicating a perfect positive relationship (meaning, when one variable changes, the other variable changes in a similar way) and -1 indicating a perfect negative relationship (meaning, when one variable changes, the other variable changes in an opposite way). While a precise definition varies, a typical interpretation of a correlation is that a weak relationship is about 0.10, a moderate relationship is about 0.30, and a strong relationship is about 0.50.[1] Comparing the report's findings to these interpretations assists with their context and significance. The statistical significance of the correlation between two different variables can also be reported as a p-value as discussed above. Visually, the correlations can be presented as a scatterplot graph, and this may display any non-linear relationships that exist.

[1] Cohen, Jacob (1988). Statistical Power Analysis for the Behavioral Sciences. Hillsdale, NJ: Lawrence Erlbaum Associates.

Definition of Subject Areas

Unless otherwise specified, within each subject area (defined below), teachers are only counted once, so teachers who teach in multiple grades within a subject area receive a subject-specific growth index. The subject areas are defined as follows:

- **Composite** includes all applicable subjects and grades listed below.
- **English/Language Arts** includes K-2 Assessment Test in language and reading for grades one and two, Achievement Tests in reading for grades three through eight, and EOC English I, II and III.
- **Math** includes K-2 Assessment Test in math for grades one and two, Achievement Tests in math for grades three through eight, and EOC Algebra I and II.
- **Science** includes Achievement Tests in science for grades four through eight and EOC Biology I.
- **Social Studies** includes Achievement Tests in social studies for grades four through eight and EOC US History.

Endorsement

Key Question

Are completers whose initial endorsement is in a certain area more effective than those whose initial endorsement is not in that area across Tennessee's teacher training programs?

Data and Analysis

To ascertain whether completers whose initial endorsement is in a certain area are more effective than those whose initial endorsement is not in that area, the analysis considered teacher value-added data from the endorsements areas with sufficient data to be included, which included the following:

- Biology 7-12
- Chemistry 7-12
- Economics 7-12
- Elementary Education K-6
- English 7-12
- Geography 7-12
- Government 7-12
- History 7-12
- Mathematics 7-12
- Middle Grades Education 4-8
- Pre-K-3

To answer this question, a test of means was used to assess whether there was, on average, any difference in the completers' teaching effectiveness between having a particular initial endorsement area or not.

Table 2-Table 6 show the difference in effectiveness by endorsement area for each subject area. The *Estimate* and *Number* columns in the *Yes* section provide the average subject-specific growth index for completers who have a particular initial endorsement area and the number of teachers included in that average, respectively. This is compared to the average subject-specific growth index for completers who do not have that endorsement area initially and the number of teachers included in that average, which are reported in the *No* section. The *P-value* column provides the p-value for the test of means between the Yes and No section estimates to assess whether these differences are statistically significant. Only the endorsements areas with at least five completers were reported for each subject area. In other words, Table 3 includes completers who have a subject-specific growth index in the English/Language Arts subject area, and the *Estimate* data for each initial endorsement are based on the subject-specific growth index for English/Language Arts.

Results

In each table, a * in the P-value column denotes statistical significance at the 0.10 level.

Table 2: Effectiveness by Endorsement Area (Composite)

Endorsement Area	Yes		No		P-value
	Estimate	Number	Estimate	Number	
Biology 7-12	0.65	129	0.03	2263	0.0520*
Chemistry 7-12	1.19	16	0.06	2376	0.1249
Economics 7-12	-0.86	5	0.07	2387	0.5613
Elementary Education K-6	-0.24	1048	0.30	1344	0.0002*
English 7-12	0.53	336	-0.01	2056	0.0002*
Geography 7-12	0.16	30	0.06	2362	0.8727
Government 7-12	0.80	31	0.06	2361	0.1595
History 7-12	0.33	182	0.04	2210	0.2914
Mathematics 7-12	0.01	219	0.07	2173	0.8288
Middle Grades Education 4-8	0.35	521	-0.01	1871	0.0563*
Pre-K-3	0.59	23	0.06	2369	0.3564

Table 3: Effectiveness by Endorsement Area (English/Language Arts)

Endorsement Area	Yes		No		P-value
	Estimate	Number	Estimate	Number	
Elementary Education K-6	-0.08	644	0.13	511	0.0400*
English 7-12	0.40	322	-0.14	833	<.0001*
History 7-12	-0.11	28	0.02	1127	0.6501
Middle Grades Education 4-8	-0.24	169	0.06	986	0.0353*
Pre-K-3	0.41	14	0.01	1141	0.3029

Table 4: Effectiveness by Endorsement Area (Math)

Endorsement Area	Yes		No		P-value
	Estimate	Number	Estimate	Number	
Biology 7-12	4.35	5	-0.37	1048	0.0510*
Elementary Education K-6	-0.51	583	-0.15	470	0.1131
English 7-12	1.35	7	-0.36	1046	0.4249
History 7-12	-1.33	14	-0.34	1039	0.4354
Mathematics 7-12	-0.05	212	-0.42	841	0.2231
Middle Grades Education 4-8	-0.32	236	-0.36	817	0.9003
Pre-K-3	0.86	10	-0.36	1043	0.2797

Table 5: Effectiveness by Endorsement Area (Science)

Endorsement Area	Yes		No		P-value
	Estimate	Number	Estimate	Number	
Biology 7-12	0.51	120	0.23	668	0.4125
Chemistry 7-12	1.53	14	0.25	774	0.0812*
Elementary Education K-6	-0.03	499	0.79	289	0.0020*
English 7-12	7.59	5	0.22	783	0.0070*
History 7-12	-0.82	11	0.28	777	0.3791
Middle Grades Education 4-8	1.34	163	-0.01	625	0.0002*
Pre-K-3	-0.34	11	0.28	777	0.4358

Table 6: Effectiveness by Endorsement Area (Social Studies)

Endorsement Area	Yes		No		P-value
	Estimate	Number	Estimate	Number	
Biology 7-12	0.73	5	0.03	777	0.4867
Elementary Education K-6	-0.24	487	0.48	295	0.0014*
English 7-12	0.40	14	0.02	768	0.5947
Geography 7-12	0.56	25	0.01	757	0.3661
Government 7-12	0.92	27	-0.00	755	0.0829*
History 7-12	0.52	151	-0.09	631	0.0439*
Middle Grades Education 4-8	0.33	131	-0.03	651	0.2340
Pre-K-3	-0.02	10	0.03	772	0.8988

Preliminary Findings

In each subject area, there is at least one initial endorsement areas whose completers' effectiveness is different compared to completers without that initial endorsement area from a statistically significant perspective. These findings should be considered in context with the number of completers included in each analysis. In general, Elementary Education K-6 tends to be less effective, Middle Grades Education 4-8 is mixed, and the 7-12 endorsement areas tend to be more effective. The statistically significant preliminary findings by subject area are described below.

- For the Composite across subjects, this includes Biology 7-12 (more effective), Elementary Education K-6 (less effective), English 7-12 (more effective) and Middle Grades Education 4-8 (more effective).
- For English/Language Arts, this includes Elementary Education K-6 (less effective), English 7-12 (more effective) and Middle Grades Education 4-8 (less effective).
- For Math, this includes Biology 7-12 (more effective).
- For Science, this includes Chemistry 7-12 (more effective), Elementary Education K-6 (less effective), English 7-12 (more effective) and Middle Grades Education 4-8 (more effective).
- For Social Studies, this includes Elementary Education K-6 (less effective), Government 7-12 (more effective) and History 7-12 (more effective).

Key Question

Are completers teaching outside of their initial endorsement area more or less effective than those teaching within their initial endorsement area across Tennessee's teacher training programs?

Data and Analysis

The analysis considered all of the endorsement and subject areas listed in the previous question, and Table 7 lists the tested subjects and grades associated with each endorsement area.

Table 7: Subjects and Grades by Endorsement Area

Endorsement Area	Tested Subjects and Grades
Biology 7-12	Achievement Test in science for grades 7-8 and EOC Biology I
Chemistry 7-12	Achievement Test in science for grades 7-8
Economics 7-12	Achievement Test in social studies for grades 7-8
Elementary Education K-6	Achievement Tests in math, reading, science and social studies for grades 3-6
English 7-12	Achievement Test in reading and EOC English I, II and III
Geography 7-12	Achievement Test in social studies for grades 7-8
Government 7-12	Achievement Test in social studies for grades 7-8
History 7-12	Achievement Test in social studies for grades 7-8 and EOC US History
Mathematics 7-12	Achievement Test in math for grades 7-8 and EOC Algebra I and II
Middle Grades Education 4-8	Achievement Tests in math, reading, science and social studies for grades 4-8 and EOC Algebra I
Pre-K-3	K-2 Assessment Tests for language, math and reading in grades 1-2

To answer this question, a test of means was used to assess whether, on average, there was any difference in the completers' teaching effectiveness between teaching within their endorsement area and teaching outside their endorsement area. In contrast to the previous question, this analysis was based on individual subject-grade or subject-only teacher value-added estimates (rather than the subject-specific growth index) since a teacher may have more than one value-added estimate, some of which may be considered within the endorsement area and some of which may be considered outside the endorsement area.

Table 8 shows the difference in effectiveness by subject area and can be interpreted as follows. The *Estimate* and *Number* columns in the *In* section provide the average growth index for completers who have a particular endorsement area and the number of teachers included in that average, respectively. This is compared to the average growth index for completers who do not have that endorsement area and the number of teachers included in that average, which are reported in the *Out* section. The *P-value* column provides the p-value for the test of means between the In and Out section estimates to assess whether these differences are statistically significant. Each row is based on the value-added measures in the specific subject area for the completers who have a value-added measure in that subject area.

Results

In the table below, a * in the *P-value* column denotes statistical significance at the 0.10 level.

Table 8: Teaching Within or Outside of Teachers' Endorsement Area by Subject Area

Subject Area	In		Out		P-value
	Estimate	Number	Estimate	Number	
Composite	-0.02	3701	-0.20	471	0.2470
English/Language Arts	0.05	1157	-0.23	157	0.0539*
Math	-0.29	1022	-0.79	152	0.1230
Science	0.23	764	0.33	84	0.8346
Social Studies	-0.02	758	0.43	78	0.1678

Preliminary Findings

English/Language Arts is the only subject area to find a statistically significant difference between completers teaching in or outside their initial endorsement area, with completers teaching in their initial endorsement area slightly more effective than those teaching outside their initial endorsement area.

Degree Type / Program of Study

Key Question

Are completers who have certain degrees more effective than completers who have other degrees across Tennessee's teacher training programs?

Data and Analysis

To ascertain whether completers who earn certain degrees at the time of initial licensure are more effective than completers who have other degrees, the analysis considered teacher value-added data from three different degree types. The degree types include:

- Bachelor
- Master
- Non-degree seeking at time of licensure (indicating completers who are alternatively certified)

To answer this question, the test of means was used to assess whether, on average, there was any difference in the completer's teaching effectiveness among degree types. In Tennessee, all candidates for licensure may hold at least a bachelor's degree.

Table 9-Table 11 show the difference in effectiveness by degree and subject area and can be interpreted as follows. In Table 9, the *Estimate* and *Number* columns in the *Bachelor Degree* section provide the average growth index for completers who receive a Bachelor degree and the number of teachers included in that average, respectively. This is compared to the average growth index for completers who have a Master degree and the number of teachers included in that average, which are reported in the *Master Degree* section. The *P-value* column provides the p-value for the test of means between the Bachelor Degree and Master Degree section estimates to assess whether these differences are statistically significant. Each row is based on the value-added measures in the specific subject area for the completers who have a value-added measure in that subject area. Table 10 and Table 11 show the results for bachelor degree and non-degree comparison and the master degree and non-degree comparison, respectively, and are interpreted like Table 9.

Results

In each table, a * in the *P-value* column denotes statistical significance at the 0.10 level.

Table 9: Effectiveness for Bachelor and Master Degree Completers by Subject Area

Subject Area	Bachelor Degree		Master Degree		P-value
	Estimate	Number	Estimate	Number	
Composite	-0.17	1216	0.28	535	0.0094*
English/Language Arts	0.06	598	0.10	283	0.7472
Math	-0.51	566	-0.07	241	0.1105
Science	-0.12	417	0.20	173	0.2416
Social Studies	-0.18	417	0.19	197	0.1567

Table 10: Effectiveness for Bachelor Degree and Non-Degree Completers by Subject Area

Subject Area	Bachelor Degree		Non-Degree		P-value
	Estimate	Number	Estimate	Number	
Composite	-0.17	1216	0.34	639	0.0033*
English/Language Arts	0.06	598	-0.19	273	0.0433*
Math	-0.51	566	-0.25	246	0.3607
Science	-0.12	417	1.17	197	<.0001*
Social Studies	-0.18	417	0.36	168	0.0436*

Table 11: Effectiveness for Master Degree and Non-Degree Completers by Subject Area

Subject Area	Master Degree		Non-Degree		P-value
	Estimate	Number	Estimate	Number	
Composite	0.28	535	0.34	639	0.7806
English/Language Arts	0.10	283	-0.19	273	0.0378*
Math	-0.07	241	-0.25	246	0.5950
Science	0.20	173	1.17	197	0.0065*
Social Studies	0.19	197	0.36	168	0.5950

Preliminary Findings

Completers who receive a Bachelor degree tend to be less effective than those who receive a Master degree; however, this difference is statistically significant only for the Composite across subjects.

Completers who receive a Bachelor degree tend to be less effective than those who are non-degree seeking at time of licensure (with the exception of English/Language Arts). This difference is statistically significant for all subject areas except for Math.

Completers who receive a Master degree tend to be more effective than those who are non-degree seeking at the time of licensure in English/Language Arts and Math, but these differences are only statistically significant in English/Language Arts. Completers who receive a Master degree tend to be less effective than those who are non-degree seeking at the time of licensure in the Composite across subjects, Science and Social Studies, but these differences are only statistically significant in Science.

Mentor Teacher

Key Question

Does the effectiveness of the completer's mentor teacher have a relationship with the completer's future effectiveness as measured by TVAAS?

Data and Analysis

This analysis made several assumptions regarding the completer's mentorship. First, the data received for this question connected completers to mentor teachers but did not specify the exact subjects or grades for the mentorship. As a result, there could be cases where completers are connected to mentor teachers outside the actual subjects and grades of the mentorship. Also, the analysis used the mentor's one-year value-added data from the completer's award year. Having the mentorship during the completer's award year is common but not always the case. In order to validate these assumptions, more data would be required.

This question used correlations to assess whether there was a relationship between the effectiveness of the completers' mentor teacher and the completers' teaching effectiveness as a new teacher.

Table 12 reports the correlations, number of teachers and p-value by subject area.

Figure 1-Figure 5 show the relationship in a different way. They plot the subject-specific growth index of a completer's mentor teacher with the completer's subject-specific growth index as a beginning teacher.

Results

In the table below, a * in the *P-value* column denotes statistical significance at the 0.10 level.

Table 12: Mentor and Completer Teaching Effectiveness by Subject Area

Subject Area	Correlation	Number of Teachers	P-value
Composite	0.06	518	0.1446
English/Language Arts	0.04	196	0.5589
Math	0.15	175	0.0548*
Science	-0.06	117	0.5326
Social Studies	-0.03	111	0.7856

Preliminary Findings

Although the relationship between mentor teaching effectiveness and completer teaching effectiveness tends to be slightly positive, Math is the only subject area to find a statistically significant relationship. As mentioned above, more detailed data connecting completers to mentors would offer more insight to this area of exploration.

Number of Clinical Hours

Key Question

Does the number of clinical hours completed *prior to the student-teaching, residency or internship* have a relationship with the future effectiveness of program completers as measured by TVAAS?

Data and Analysis

This report considers two kinds of clinical hours: those that are completed prior to the student-teaching, residency or internship and those that are part of the intense clinical student-teaching, internship or residency-based experience. This question focuses on the former, the clinical hours completed prior to the more intense teaching experience, and it used correlations to assess whether there was a relationship between the number of clinical hours completed and the completers' teaching effectiveness as a new teacher. Table 13 reports the correlations, number of teachers and p-value by subject area.

Figure 6-Figure 10 show the relationship in a different way. They plot the completer's growth index as a beginning teacher with the number of clinical hours completed.

Results

In the table below, a * in the *P-value* column denotes statistical significance at the 0.10 level.

Table 13: Number of Clinical Hours Completed Prior to Student-Teaching by Subject Area

Subject Area	Correlation	Number of Teachers	P-value
Composite	-0.07	1478	0.0072*
English/Language Arts	-0.03	713	0.3946
Math	-0.08	651	0.0431*
Science	-0.09	485	0.0514*
Social Studies	0.02	495	0.6753

Preliminary Findings

With the exception of Social Studies, all subject areas report a slightly negative relationship between completer teaching effectiveness and the number of clinical hours completed prior to student-teaching. While the relationship is statistically significant in the Composite across subjects, Math and Science, the correlations are very close to zero and considered to be weak.

Key Question

Does the total number of hours spent student-teaching, in a residency or in an internship in an LEA have a relationship with the future effectiveness of completers as measured by TVAAS?

Data and Analysis

The previous question focused on the number of clinical hours completed prior to the intense clinical experience. This question focuses on the number of clinical hours that are part of an intense clinical experience, such as student-teaching, residency or internship. This question used correlations to assess whether there was a relationship between the number of student-teaching hours completed and the completers' teaching effectiveness as a new teacher. Table 14 reports the correlations, number of teachers and p-value by subject area.

Figure 11-Figure 15 show the relationship in a different way. They plot the completer's subject-specific growth index as a beginning teacher with the number of student-teaching hours completed.

Results

In the table below, a * in the *P-value* column denotes statistical significance at the 0.10 level.

Table 14: Number of Student-Teaching Hours Completed by Subject Area

Subject	Correlation	Number of Teachers	P-value
Composite	0.07	1389	0.0153*
English/Language Arts	0.02	713	0.5216
Math	0.10	625	0.0141*
Science	0.05	473	0.2810
Social Studies	-0.01	492	0.8849

Preliminary Findings

With the exception of Social Studies, the subject areas report a slightly positive relationship between completer teaching effectiveness and the number of student-teaching hours completed, although only the Composite across subjects and Math are statistically significant. Note that the correlations are very close to zero and considered to be weak.

Number of Credit Hours

Key Question

Does the number of credit hours completed in the content area in which the completer is teaching have a relationship with the future effectiveness of the completer as measured by TVAAS?

Data and Analysis

In the discussions with the teacher training programs, this question was focused on completers who received an initial endorsement in a 7-12 endorsement area. Therefore, the analysis only included completers who had an initial endorsement area for grades 7-12 and who were teaching in their initial endorsement area. As a result, the subject-specific growth index was re-calculated based on these conditions. This question used correlations to assess whether there was a relationship between the number of credit hours completed in the content area and the completers' teaching effectiveness as a new teacher. Table 15 reports the correlations, number of teachers and p-value by subject area.

Figure 16-Figure 20 show the relationship in a different way. They plot the completer's subject-specific growth index as a beginning teacher with the number of credit hours completed in the content area.

Results

In the table below, a * in the *P-value* column denotes statistical significance at the 0.10 level.

Table 15: Number of Credit Hours Completed in the Content Area by Subject Area

Subject Area	Correlation	Number of Teachers	P-value
Composite	-0.18	297	0.0015*
English/Language Arts	0.07	109	0.4790
Math	-0.22	88	0.0383*
Science	-0.43	51	0.0016*
Social Studies	-0.24	57	0.0764*

Preliminary Findings

With the exception of English/Language Arts, all subject areas report a negative relationship between completer teaching effectiveness and the number of credit hours completed in the content area. The Composite across subjects, Math, Science and Social Studies are statistically significant. Note that these preliminary findings are based on relatively small number counts, particularly in Math, Science and Social Studies.

Key Question

Does the number of general education credit hours completed have a relationship with future effectiveness as measured by TVAAS?

Data and Analysis

This question used correlations to assess whether there was a relationship between the number of general education credit hours completed and the completers' teaching effectiveness as a new teacher. Table 16 reports the correlations, number of teachers and p-value by subject area.

Figure 21-Figure 25 show the relationship in a different way. They plot the completer's subject-specific growth index as a beginning teacher with the number of general education credit hours completed.

Results

Table 16: Number of General Education Credit Hours Completed by Subject Area

Subject Area	Correlation	Number of Teachers	P-value
Composite	-0.04	774	0.2783
English/Language Arts	-0.02	379	0.6717
Math	-0.02	357	0.7627
Science	-0.07	260	0.2387
Social Studies	0.00	263	0.9534

Preliminary Findings

All subject areas report correlations near zero, and none of the subject areas is statistically significant.

Transfer Students from Other Programs

Key Question

Do transfer students perform differently from non-transfer students in terms of their future effectiveness as measured by TVAAS?

Data and Analysis

To answer this question, a test of means was used to assess whether there was, on average, any difference in the completers' teaching effectiveness between transfer students and non-transfer students. Transfer students were identified by each institution. Table 17 shows the difference in effectiveness by subject area. The table can be interpreted as follows. The *Estimate* and *Number* columns in the *Transfer* section provide the average subject-specific growth index for completers who were transfer students and the number of teachers included in that average, respectively. This is compared to the average subject-specific growth index for completers who were not transfer students and the number of teachers included in that average, which are reported in the *Non-Transfer* section. The *P-value* column provides the p-value for the test of means between the Transfer and Non-Transfer section estimates to assess whether these differences are statistically significant.

Results

In the table below, a * in the *P-value* column denotes statistical significance at the 0.10 level.

Table 17: Transfer and Non-Transfer Completers by Subject Area

Subject Area	Transfer		Non-Transfer		P-value
	Estimate	Number	Estimate	Number	
Composite	-0.20	920	0.23	1472	0.0026*
English/Language Arts	-0.01	494	0.03	661	0.7139
Math	-0.38	442	-0.32	611	0.7891
Science	-0.26	322	0.63	466	0.0002*
Social Studies	-0.39	334	0.34	448	0.0005*

Preliminary Findings

In all subject areas, non-transfer students tend to be more effective than transfer students, but this difference is statistically significant only for the Composite across subjects, Science and Social Studies.

Key Question

Do community college transfer students perform differently from non-community college transfer students in terms of their future effectiveness as measured by TVAAS?

Data and Analysis

To answer this question, a test of means was used to assess whether there was, on average, any difference in the completers' teaching effectiveness between community college transfer students and non-community college transfer students. Community college transfer students were defined as students for whom at least half their transfer hours were from a community college. Table 18 shows the difference in effectiveness by subject area. The table can be interpreted as follows. The *Estimate* and *Number* columns in the *Community College Transfer* section provide the average subject-specific growth index for completers who were community college transfer students and the number of teachers included in that average, respectively. This is compared to the average subject-specific growth index for completers who were not community college transfer students and the number of teachers included in that average, which are reported in the *Non-Community College Transfer* section. The *P-value* column provides the p-value for the test of means between the Community College Transfer and Non-Community College Transfer section estimates to assess whether these differences are statistically significant.

Results

Table 18: Transfer and Non-Transfer Completers by Subject Area

Subject Area	Community College Transfer		Non-Community College Transfer		P-value
	Estimate	Number	Estimate	Number	
Composite	-0.13	621	-0.33	245	0.4162
English/Language Arts	0.03	344	-0.07	130	0.5722
Math	-0.20	303	-0.84	111	0.1058
Science	-0.18	228	-0.54	79	0.2903
Social Studies	-0.49	242	0.01	83	0.1800

Preliminary Findings

In all subject areas, except for Social Studies, community college transfer students tend to be more effective than non-community college transfer students, but none of these differences is statistically significant.

Key Question

How does the transfer students' future effectiveness relate to the number of credit hours transferred to the teacher training program?

Data and Analysis

The data received included the number of transfer hours for program completers who were transfer students but did not include the total number of credit hours received for the teacher training program. As a result, the analysis for this question is slightly different from what was originally asked, which focused on the number of hours completed at the teacher training program. This analysis considers the relationship between the number of total transfer hours and the completers' teaching effectiveness as a new teacher using correlations.

Table 19 reports the correlations, number of teachers and p-value by subject area.

Figure 26-Figure 30 show the relationship in a different way. They plot the completer's subject-specific growth index as a beginning teacher with the number of total transfer hours.

Results

Table 19: Total Transfer Hours by Subject Area

Subject Area	Correlation	Number of Teachers	P-value
Composite	-0.05	631	0.2523
English/Language Arts	-0.01	340	0.8884
Math	-0.09	305	0.1206
Science	0.02	220	0.7445
Social Studies	0.01	240	0.8286

Preliminary Findings

All subject areas report correlations near zero, and none of the subject areas is statistically significant.

Historical School Effectiveness of First Job

Key Question

Does the effectiveness, as measured by TVAAS, of the school in which the completer was placed for the first teaching job have a relationship with the completer's effectiveness as measured by TVAAS?

Data and Analysis

The completer's first school was defined as the first school of record for that completer in the TVAAS student-teacher linkage database. The analysis used the one-year school value-added data from the year before the completer was first associated with the school.

This question used correlations to assess whether there was a relationship between the completer's first school's effectiveness and the completer's teaching effectiveness as a new teacher. Table 20 reports the correlations, number of teachers and p-value by subject area.

Figure 31-Figure 35 show the relationship in a different way. They plot the completer's subject-specific growth index as a beginning teacher with the first school's subject-specific growth index.

Results

In the table below, a * in the *P-value* column denotes statistical significance at the 0.10 level.

Table 20: First Schools' Effectiveness

Subject Area	Correlation	Number of Teachers	P-Value
Composite	0.13	2361	<.0001*
English/Language Arts	0.07	1140	0.0220*
Math	0.11	1043	0.0006*
Science	0.14	779	0.0001*
Social Studies	0.07	766	0.0610*

Preliminary Findings

There is a slightly positive relationship between first schools' effectiveness and completer teaching effectiveness, and this weak-to-moderate relationship is statistically significant for all subject areas.

Traditional Academic Markers for Completers

Key Question

Is completer achievement on traditional academic markers (such as GPA, ACT, GRE, MAT, Praxis PLT and Praxis Area content tests) indicative of future effectiveness as measured by TVAAS?

Data and Analysis

To ascertain whether completers' performance on traditional academic markers is related to their teaching effectiveness, the analysis considered the following data:

- GPA for overall program/college, college major and high school
- ACT score for Composite, Reading, Science, English and Math
- SAT score for Cumulative, Math and Verbal
- GRE score for Composite, Verbal and Quantitative
- Miller Analogies Test
- Praxis and Praxis I for various assessments

This question used correlations to assess whether there was a relationship between the completers' teaching effectiveness and their scores for various assessments.

Table 21-Table 25 report the correlations, number of teachers and p-value by standardized test and subject area.

Results

In the table below, a * in the *P-value* column denotes statistical significance at the 0.10 level.

Table 21: Traditional Academic Markers (Composite)

Variable	Correlation	Number of Observations	P-Value
GPA Overall at IHE	0.10	2102	<.0001*
GPA Major at IHE	0.04	556	0.3275
GPA High School	0.12	848	0.0003*
ACT Composite	0.09	1042	0.0060*
ACT Reading	0.06	978	0.0754*
ACT Science	0.05	975	0.1245
ACT English	0.09	987	0.0067*
ACT Math	0.09	986	0.0073*
SAT Cumulative	0.11	99	0.2944
SAT Math	0.11	96	0.2689
SAT Verbal	0.02	95	0.8360
GRE Composite	0.09	53	0.5046
GRE Verbal	-0.06	48	0.7033
GRE Quantitative	0.20	48	0.1659
Miller Analogies Test	-0.13	79	0.2529
Praxis Elementary Education: Curriculum, Instruction and Assessment	0.12	473	0.0095*
Praxis Elementary Education: Content Knowledge	0.06	474	0.2211
Praxis Mathematics: Content Knowledge	0.12	94	0.2549
Praxis Mathematics: Pedagogy	-0.06	85	0.5896
Praxis Middle School: Content Knowledge	0.08	102	0.4084
Praxis Reading Across the Curriculum: Elementary	0.12	591	0.0025*
Praxis Principles of Learning and Teaching: K-6	0.07	396	0.1395
Praxis Principles of Learning and Teaching: 7-12	0.17	275	0.0056*
Praxis I Reading	0.07	122	0.4536
Praxis I Writing	-0.04	122	0.7007
Praxis I Math	0.15	120	0.1006

Table 22: Traditional Academic Markers (English/Language Arts)

Variable	Correlation	Number of Observations	P-Value
GPA Overall at IHE	0.05	1058	0.1336
GPA Major at IHE	0.07	294	0.2214
GPA High School	0.17	411	0.0004*
ACT Composite	0.07	512	0.1145
ACT Reading	0.09	484	0.0579*
ACT Science	0.01	483	0.8404
ACT English	0.06	489	0.2169
ACT Math	0.11	488	0.0153*
SAT Cumulative	-0.02	60	0.8677
SAT Math	-0.06	58	0.6782
SAT Verbal	-0.01	57	0.9686
GRE Composite	-0.16	16	0.5644
GRE Verbal	-0.13	15	0.6433
GRE Quantitative	-0.13	15	0.6371
Miller Analogies Test	0.12	35	0.4879
Praxis Elementary Education: Curriculum, Instruction and Assessment	0.04	304	0.4647
Praxis Elementary Education: Content Knowledge	0.01	309	0.8794
Praxis Middle School: Content Knowledge	-0.07	40	0.6744
Praxis Reading Across the Curriculum: Elementary	0.07	358	0.2175
Praxis Principles of Learning and Teaching: K-6	0.03	258	0.6263
Praxis Principles of Learning and Teaching: 7-12	0.24	109	0.0118*
Praxis I Reading	-0.21	68	0.0921*
Praxis I Writing	-0.15	68	0.2214
Praxis I Math	-0.15	67	0.2158

Table 23: Traditional Academic Markers (Math)

Variable	Correlation	Number of Observations	P-Value
GPA Overall at IHE	0.10	949	0.0024*
GPA Major at IHE	0.04	276	0.5498
GPA High School	0.15	376	0.0035*
ACT Composite	0.05	467	0.2917
ACT Reading	-0.05	433	0.3235
ACT Science	0.03	433	0.5164
ACT English	0.04	435	0.3666
ACT Math	0.09	435	0.0525*
SAT Cumulative	0.18	46	0.2310
SAT Math	0.24	46	0.1037
SAT Verbal	-0.01	45	0.9462
GRE Composite	0.09	28	0.6378
GRE Verbal	-0.24	26	0.2302
GRE Quantitative	0.23	26	0.2691
Miller Analogies Test	-0.22	43	0.1471
Praxis Elementary Education: Curriculum, Instruction and Assessment	0.14	307	0.0115*
Praxis Elementary Education: Content Knowledge	0.06	306	0.2833
Praxis Mathematics: Content Knowledge	0.12	93	0.2475
Praxis Mathematics: Pedagogy	-0.06	85	0.5896
Praxis Middle School: Content Knowledge	0.02	39	0.9188
Praxis Reading Across the Curriculum: Elementary	0.06	352	0.2937
Praxis Principles of Learning and Teaching: K-6	0.11	250	0.0877*
Praxis Principles of Learning and Teaching: 7-12	0.25	69	0.0352*
Praxis I Reading	0.14	51	0.3362
Praxis I Writing	-0.05	53	0.7337
Praxis I Math	0.44	51	0.0013*

Table 24: Traditional Academic Markers (Science)

Variable	Correlation	Number of Observations	P-Value
GPA Overall at IHE	0.08	701	0.0441*
GPA Major at IHE	-0.04	199	0.5320
GPA High School	0.06	281	0.3384
ACT Composite	0.07	350	0.1618
ACT Reading	0.06	328	0.2858
ACT Science	0.04	327	0.5020
ACT English	0.11	332	0.0474*
ACT Math	0.09	332	0.0985*
SAT Cumulative	0.13	35	0.4440
SAT Math	0.10	33	0.5692
SAT Verbal	0.14	32	0.4417
GRE Composite	0.44	21	0.0472*
GRE Verbal	0.28	19	0.2449
GRE Quantitative	0.49	19	0.0315*
Miller Analogies Test	0.24	19	0.3226
Praxis Elementary Education: Curriculum, Instruction and Assessment	0.09	250	0.1462
Praxis Elementary Education: Content Knowledge	0.06	250	0.3632
Praxis Middle School: Content Knowledge	0.09	35	0.6179
Praxis Reading Across the Curriculum: Elementary	0.14	281	0.0236*
Praxis Principles of Learning and Teaching: K-6	0.01	201	0.9255
Praxis Principles of Learning and Teaching: 7-12	0.22	47	0.1457
Praxis I Reading	0.13	52	0.3625
Praxis I Writing	-0.03	54	0.8070
Praxis I Math	0.19	52	0.1672

Table 25: Traditional Academic Markers (Social Studies)

Variable	Correlation	Number of Observations	P-Value
GPA Overall at IHE	0.12	721	0.0013*
GPA Major at IHE	0.11	201	0.1342
GPA High School	0.12	275	0.0449*
ACT Composite	0.12	355	0.0221*
ACT Reading	0.08	334	0.1438
ACT Science	0.08	333	0.1641
ACT English	0.10	336	0.0571*
ACT Math	0.08	336	0.1681
SAT Cumulative	0.18	31	0.3385
SAT Math	0.33	29	0.0778*
SAT Verbal	-0.15	28	0.4530
GRE Composite	0.18	17	0.5011
GRE Verbal	0.01	15	0.9625
GRE Quantitative	0.31	15	0.2547
Miller Analogies Test	-0.34	23	0.1109
Praxis Elementary Education: Curriculum, Instruction and Assessment	0.04	226	0.5114
Praxis Elementary Education: Content Knowledge	0.03	228	0.6967
Praxis Middle School: Content Knowledge	0.16	36	0.3516
Praxis Reading Across the Curriculum: Elementary	0.11	266	0.0646*
Praxis Principles of Learning and Teaching: K-6	0.07	179	0.3330
Praxis Principles of Learning and Teaching: 7-12	-0.00	65	0.9896
Praxis I Reading	0.10	56	0.4681
Praxis I Writing	0.02	59	0.8967
Praxis I Math	0.02	57	0.8914

Preliminary Findings

Across all subject areas, there tends to be a positive relationship between completers teaching effectiveness and performance on traditional academic markers. With some comparisons there is enough of a relationship to be statistically significant, although the correlation tends to be weak for many of these markers.

- For the Composite across subjects, this includes Overall IHE GPA; High School GPA; ACT Composite; ACT Reading; ACT English; ACT Math; Praxis Elementary Education: Curriculum, Instruction and Assessment; Praxis Reading Across the Curriculum: Elementary; and Praxis Principles of Learning and Teaching: 7-12.
- For English/Language Arts, this includes High School GPA; ACT Reading; ACT Math; Praxis Principles of Learning and Teaching: 7-12; and Praxis I Reading.
- For Math, this includes Overall IHE GPA; High School GPA; ACT Math; Praxis Elementary Education: Curriculum, Instruction and Assessment; Praxis Principles of Learning and Teaching: K-6; Praxis Principles of Learning and Teaching: 7-12; and Praxis I Math.
- For Science, this includes Overall IHE GPA; ACT English; ACT Math; GRE Composite; GRE Quantitative; and Praxis Reading Across the Curriculum: Elementary.
- For Social Studies, this includes Overall IHE GPA; High School GPA; ACT Composite; ACT English; SAT Math; and Praxis Reading Across the Curriculum: Elementary.

As many of the same academic markers were statistically significant across subject areas, these relationships are also summarized in Table 26 below, where the X notes statistical significance but not the strength of the relationship:

Table 26: Summary of Statistically Significant Academic Markers by Subject Area

Variable	Composite	English/ Language Arts	Math	Science	Social Studies
GPA Overall at IHE	X		X	X	X
GPA High School	X	X	X		X
ACT Composite	X				X
ACT Reading	X	X			
ACT English	X			X	X
ACT Math	X	X	X	X	
SAT Math					X
GRE Composite				X	
GRE Quantitate				X	
Praxis Elementary Education: Curriculum and Instruction	X		X		X
Praxis Reading Across the Curriculum: Elementary	X			X	
Praxis Principles of Learning and Teaching: K-6			X		
Praxis Principles of Learning and Teaching: 7-12	X	X	X		
Praxis I Reading		X			
Praxis I Math			X		
Praxis PLT K-6			X		

Appendix A: Additional Information

Table 27: List of Participating Institutions

Institution
Aquinas College
Austin Peay State University
Belmont University
Carson-Newman University
Christian Brothers University
Cumberland University
East Tennessee State University
Freed-Hardeman University
Johnson University
King College
Lemoyne-Owen College
Lincoln Memorial University
Lipscomb University
Martin Methodist College
Maryville College
Middle Tennessee State University
Milligan College
South College
Teach for America – Memphis
Tennessee State University
Tennessee Technological University
Tennessee Wesleyan College
TNTP Memphis Teaching Fellows
TNTP Nashville Teaching Fellows
Trevecca Nazarene University
Tusculum College
Union University
University of Tennessee – Chattanooga
University of Tennessee – Knoxville
University of Tennessee – Martin
Vanderbilt University – Peabody College
Welch College

Appendix B: Figures

Statewide Completer Teaching versus Mentor Teaching Effectiveness

Figure 1: Mentor Teaching Effectiveness (Composite)

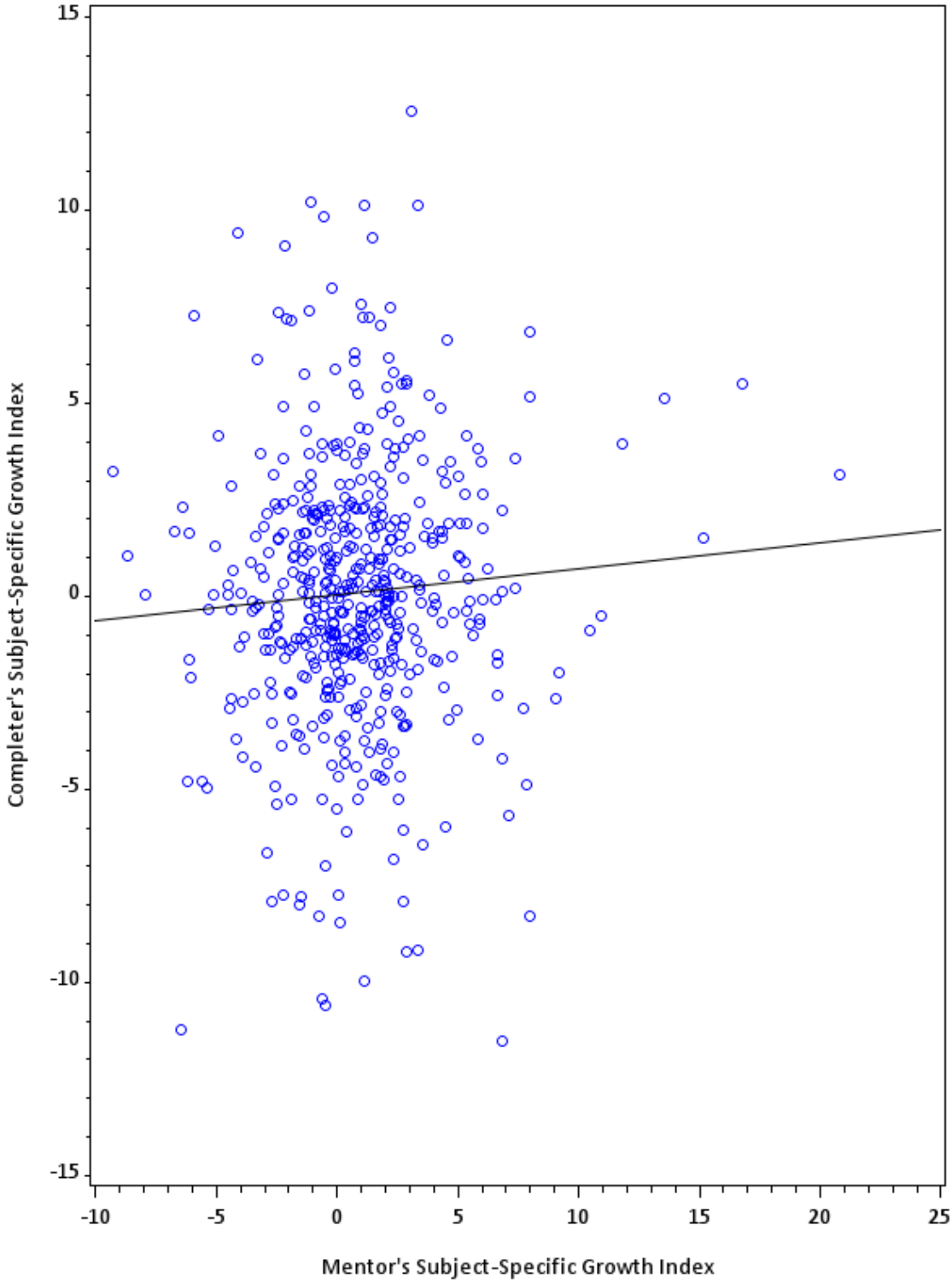


Figure 2: Mentor Teaching Effectiveness (English/Language Arts)

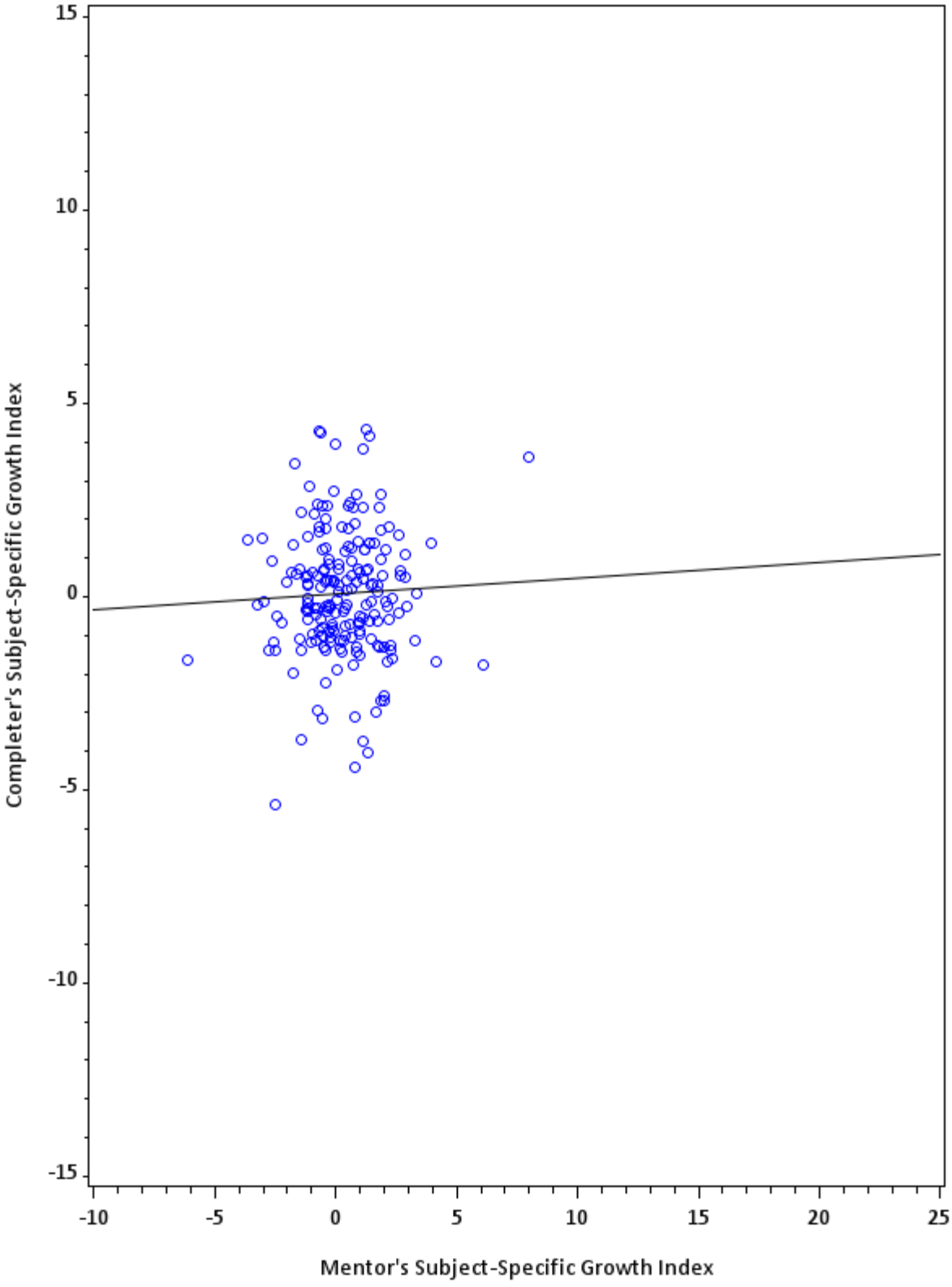


Figure 3: Mentor Teaching Effectiveness (Math)

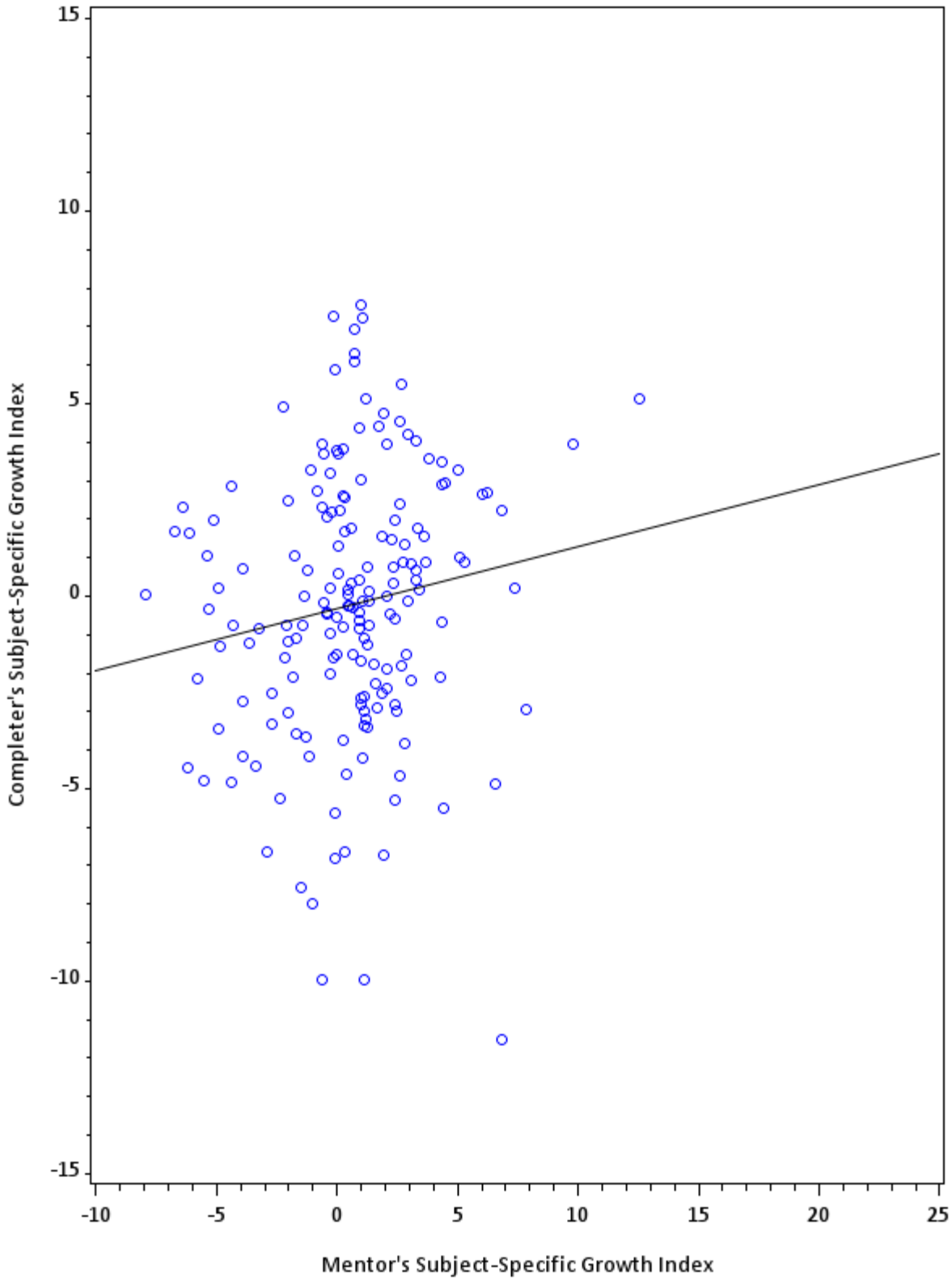


Figure 4: Mentor Teaching Effectiveness (Science)

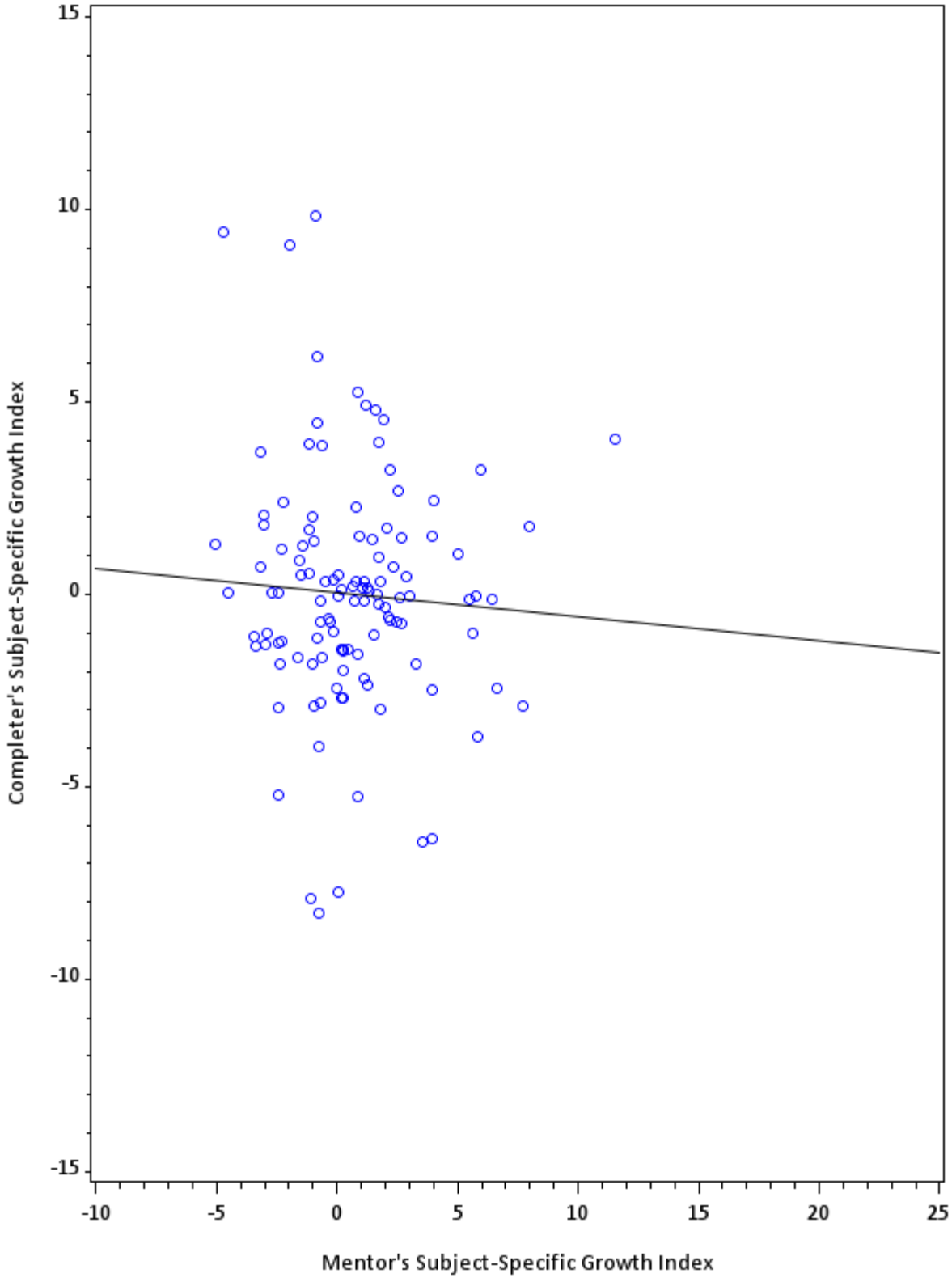
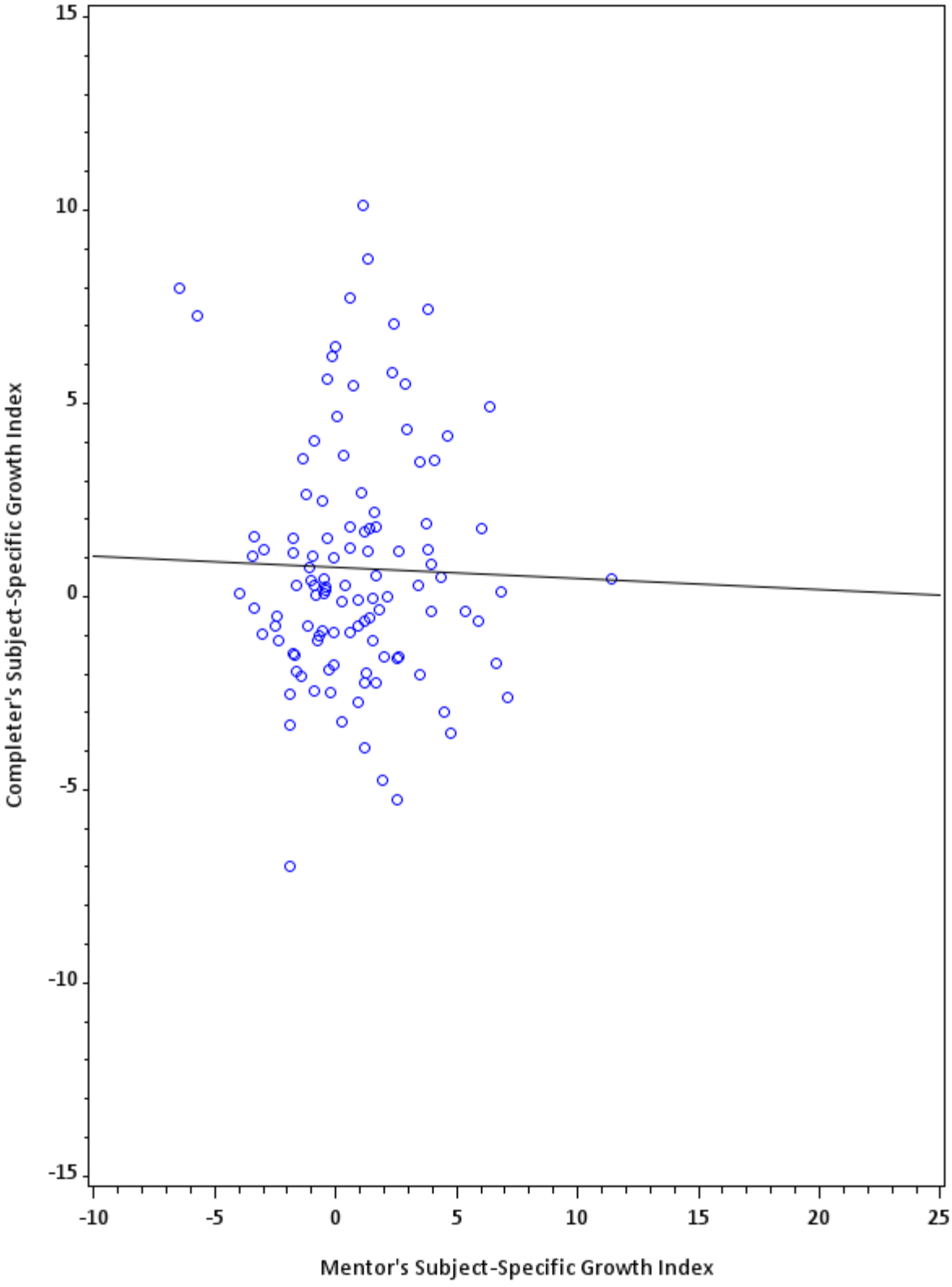


Figure 5: Mentor Teaching Effectiveness (Social Studies)



Number of Clinical Hours Completed Prior to Student Teaching

Figure 6: Clinical Hours Completed Prior to Student-Teaching (Composite)

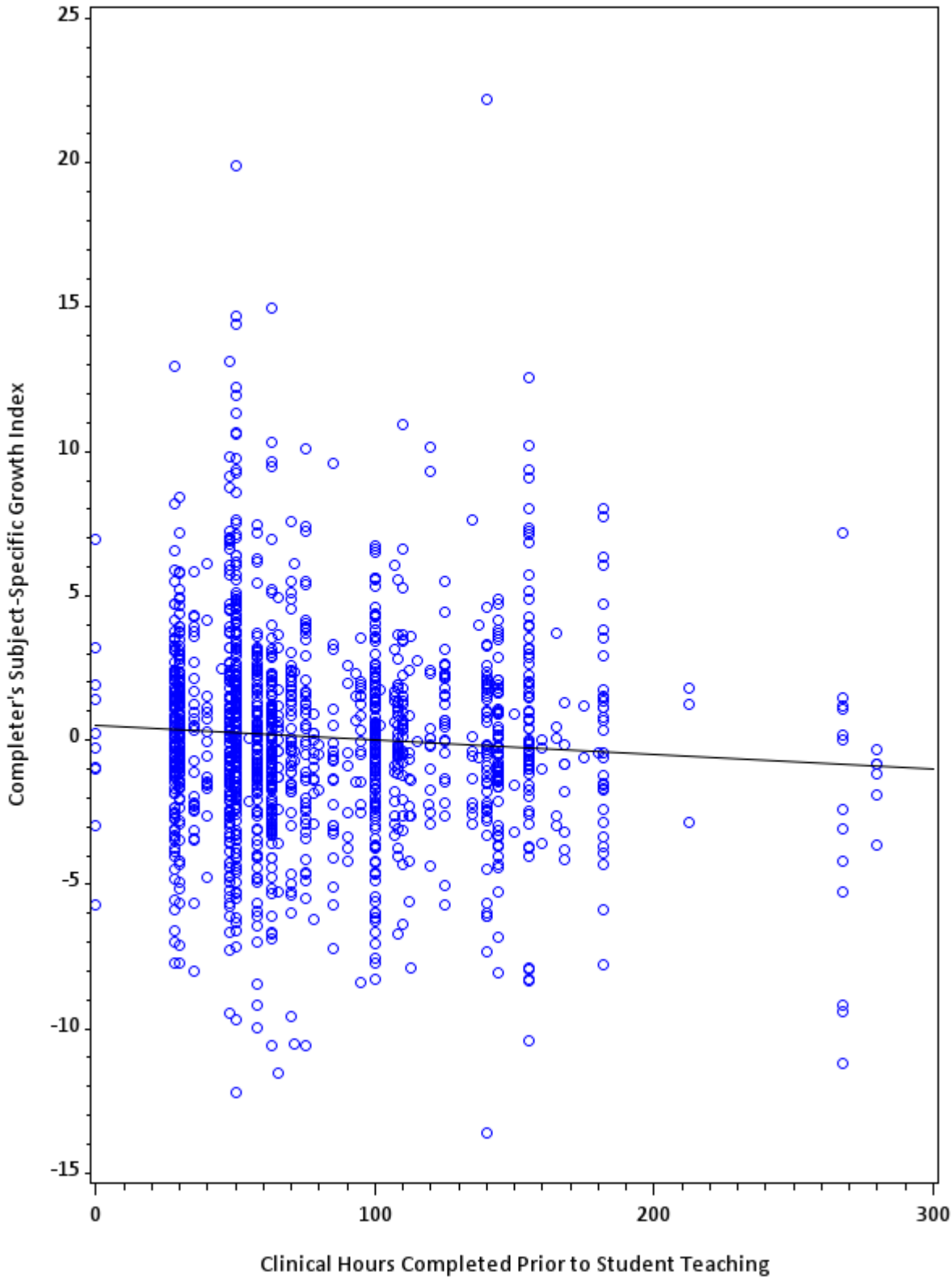


Figure 7: Clinical Hours Completed Prior to Student-Teaching (English/Language Arts)

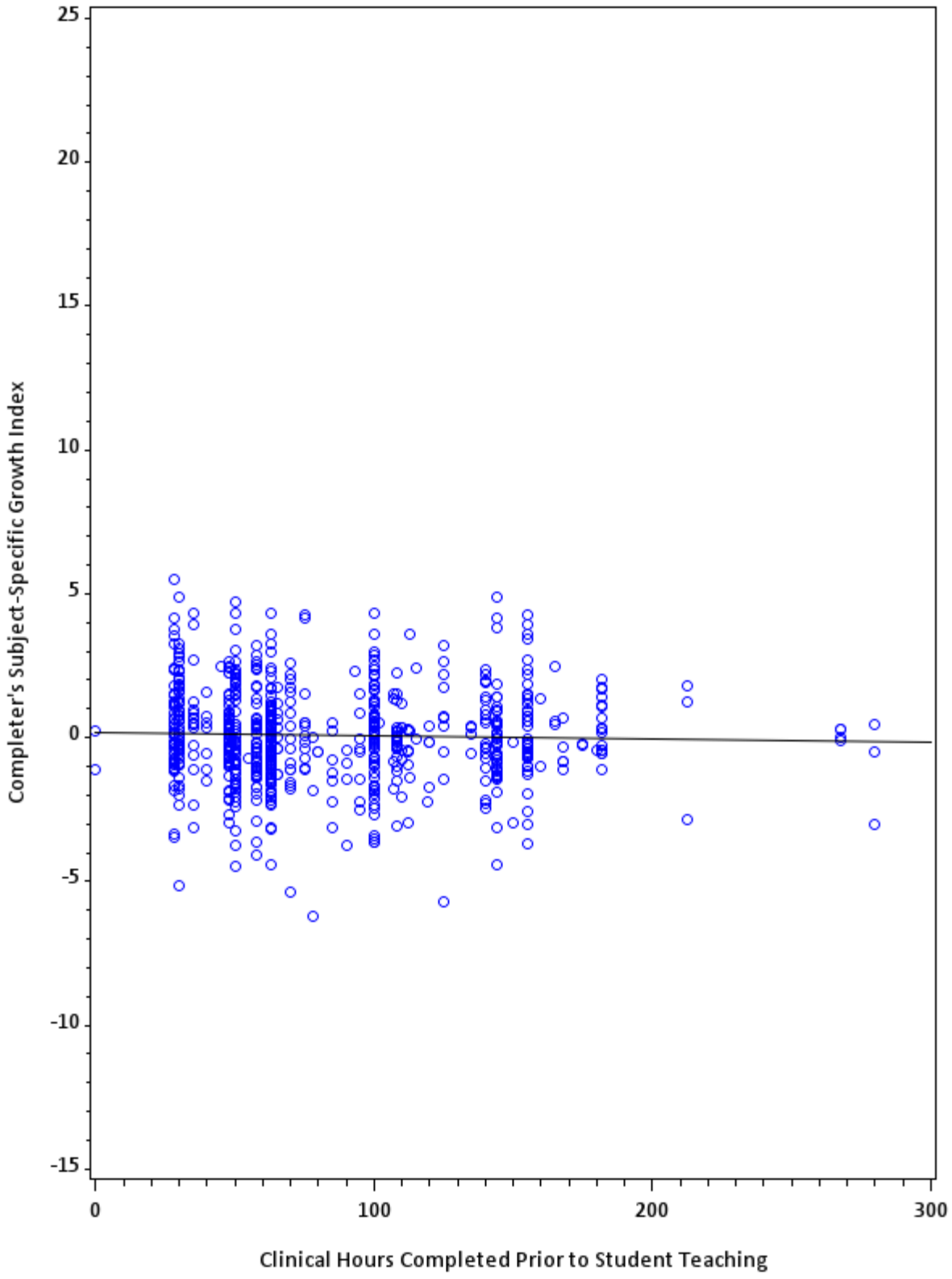


Figure 8: Clinical Hours Completed Prior to Student-Teaching (Math)

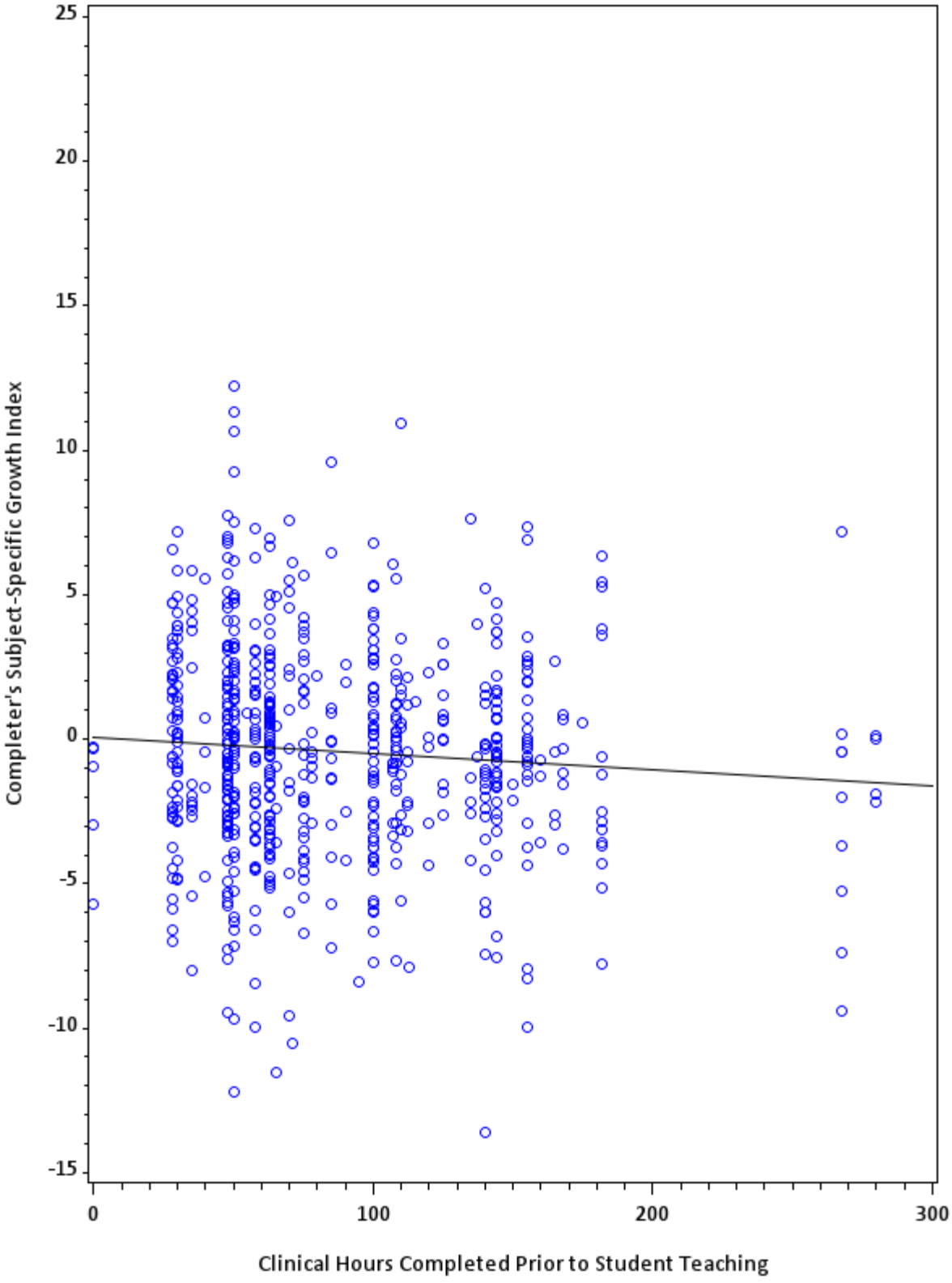


Figure 9: Clinical Hours Completed Prior to Student-Teaching (Science)

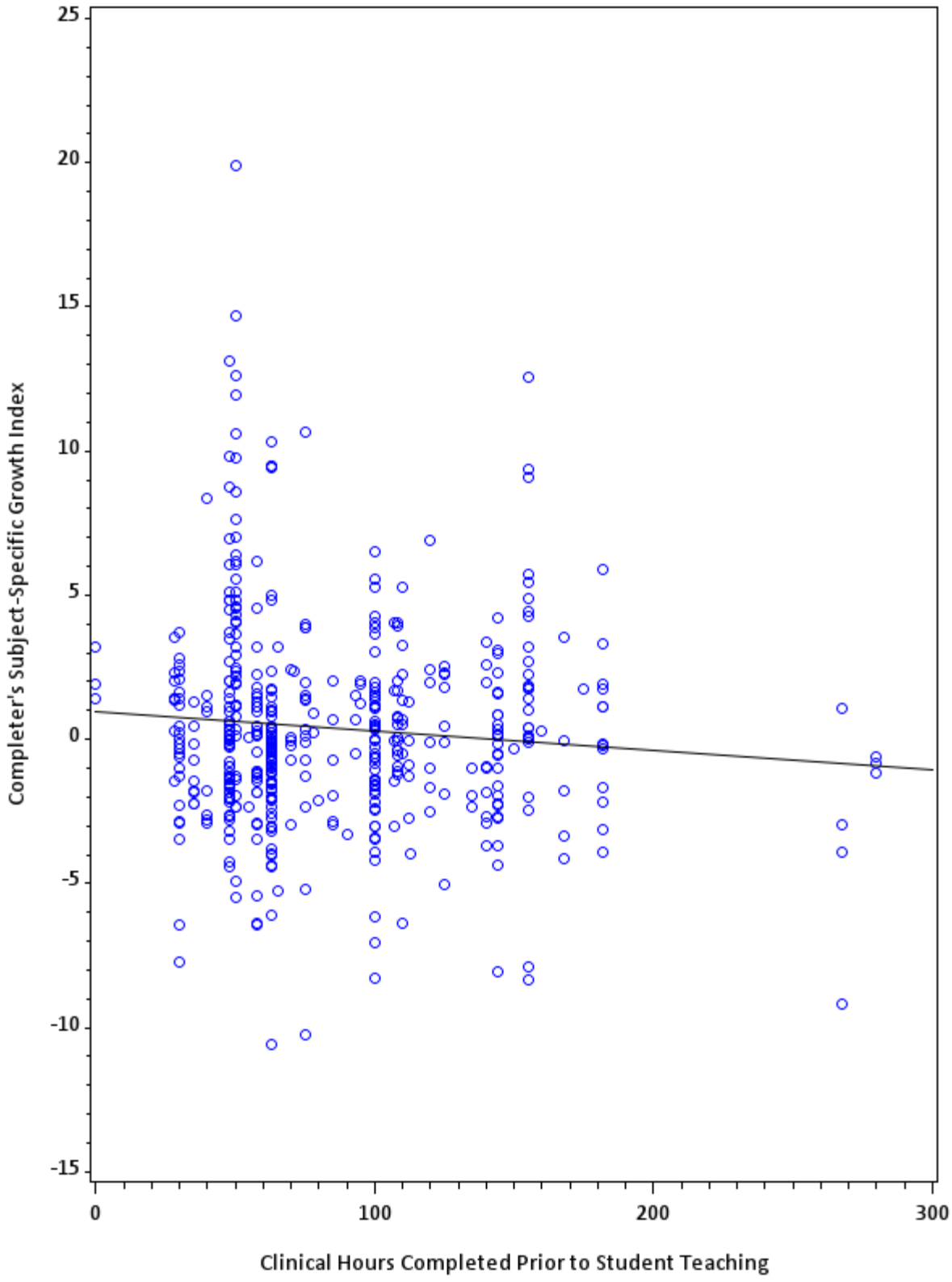
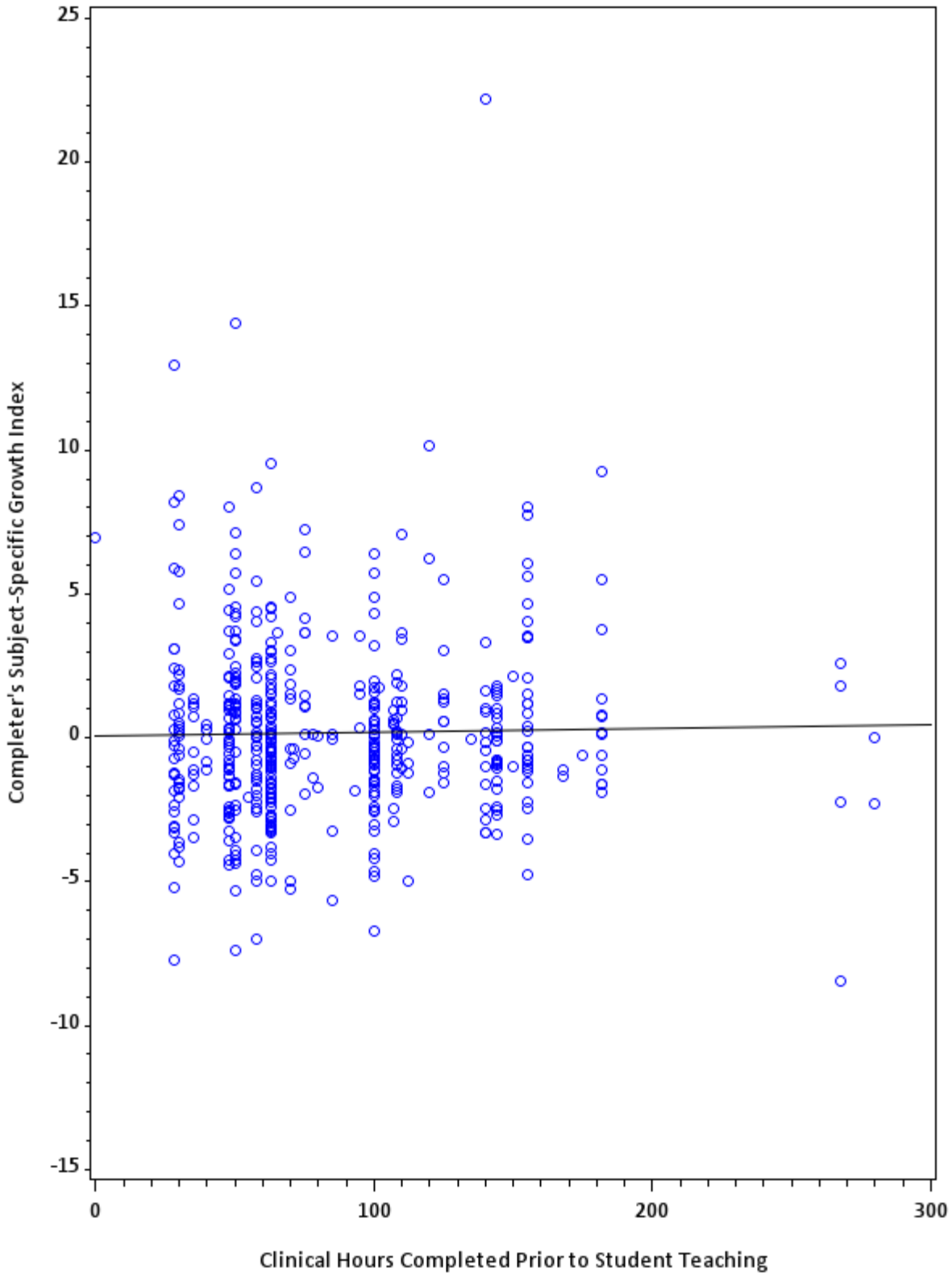


Figure 10: Clinical Hours Completed Prior to Student-Teaching (Social Studies)



Number of Student-Teaching Hours Completed

Figure 11: Student-Teaching Hours Completed (Composite)

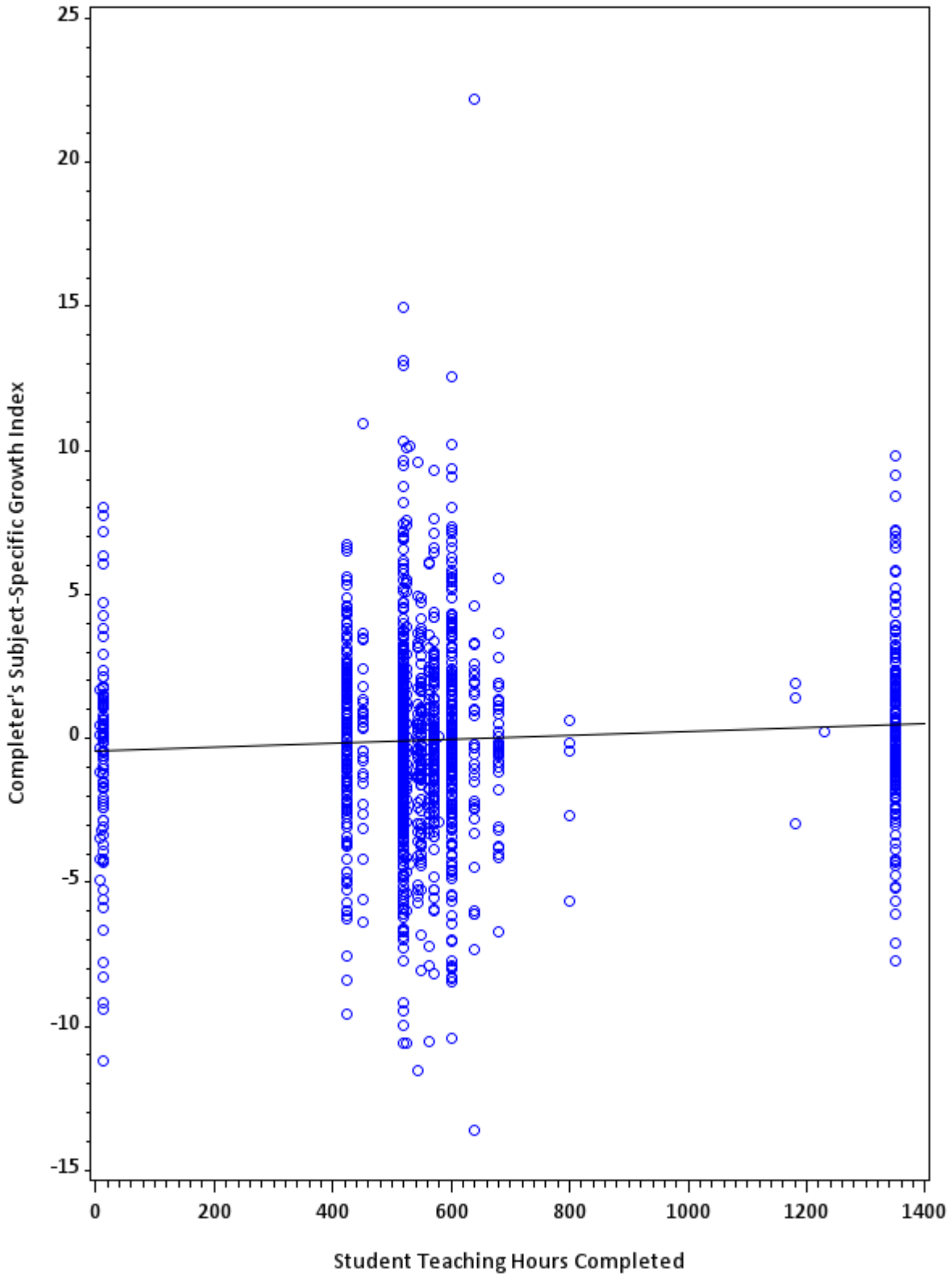


Figure 12: Student-Teaching Hours Completed (English/Language Arts)

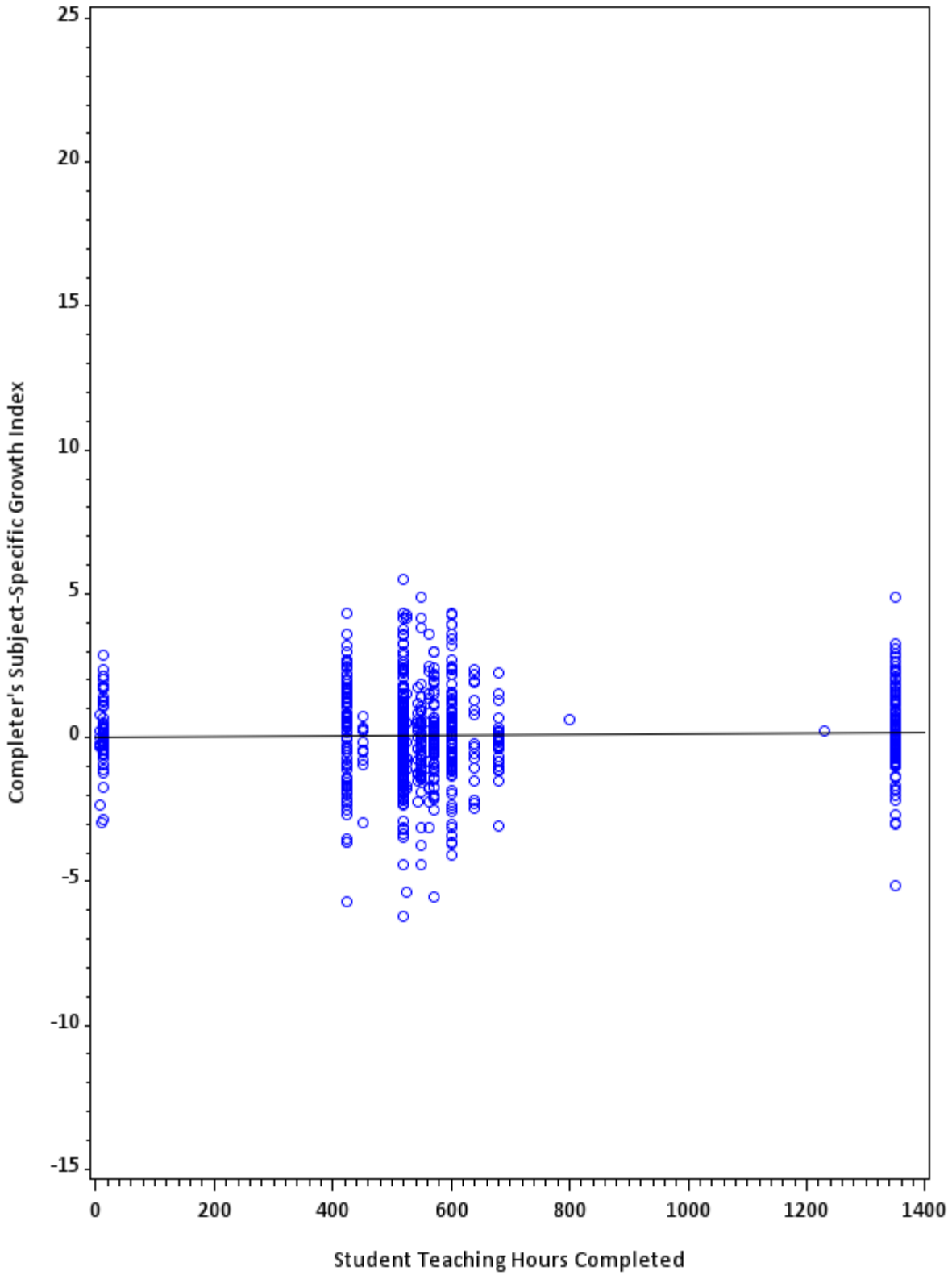


Figure 13: Student-Teaching Hours Completed (Math)

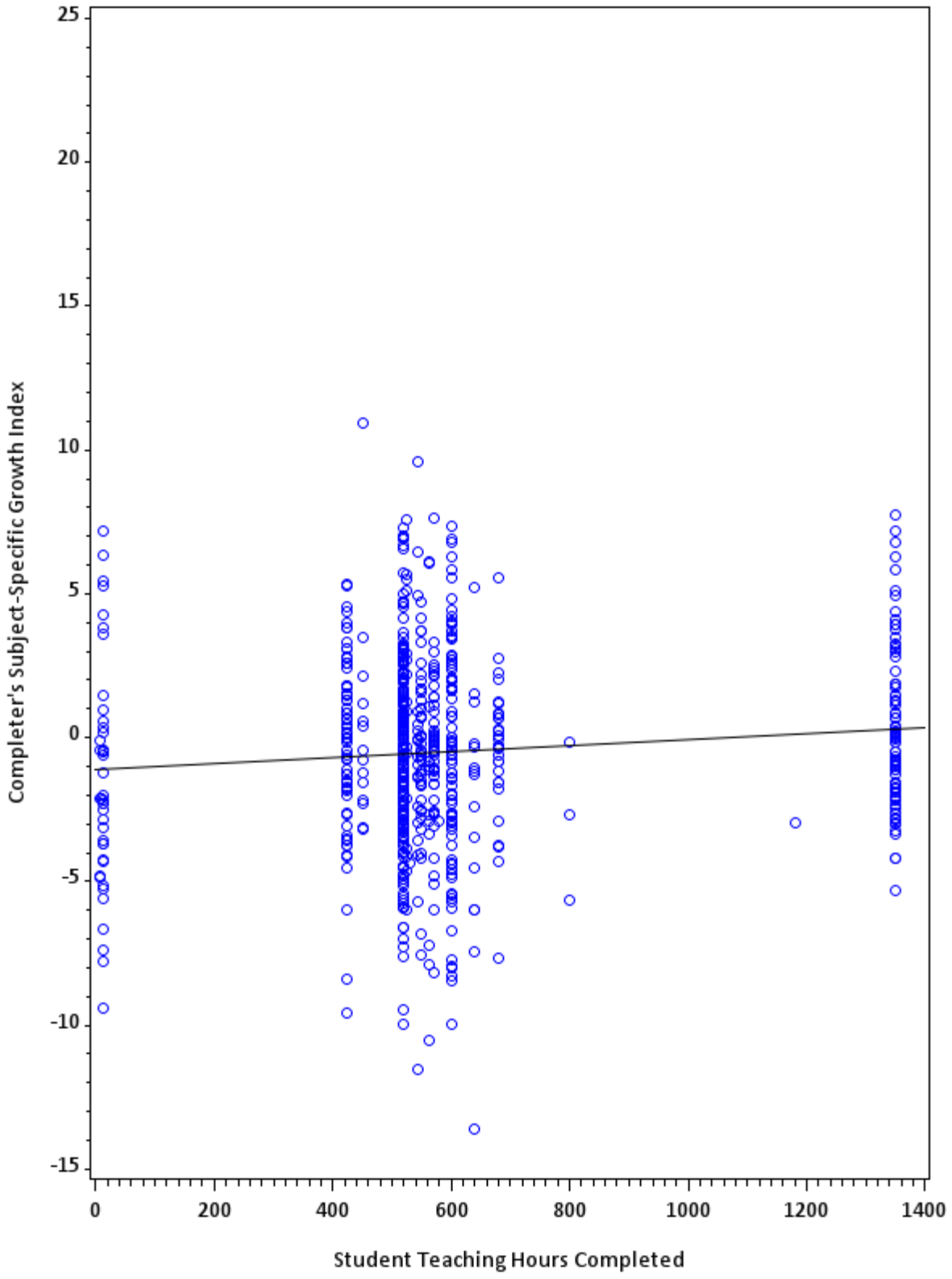


Figure 14: Student-Teaching Hours Completed (Science)

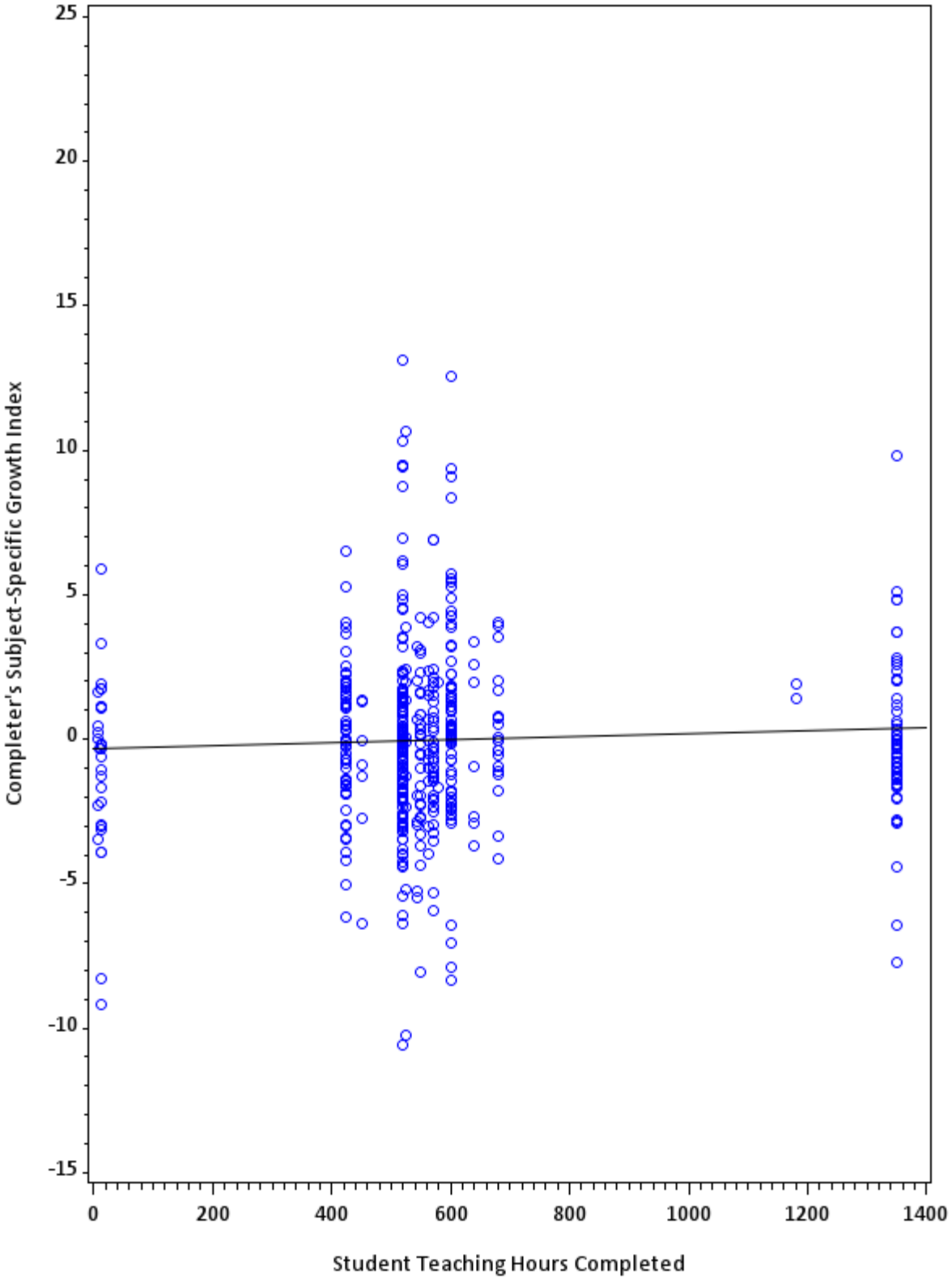
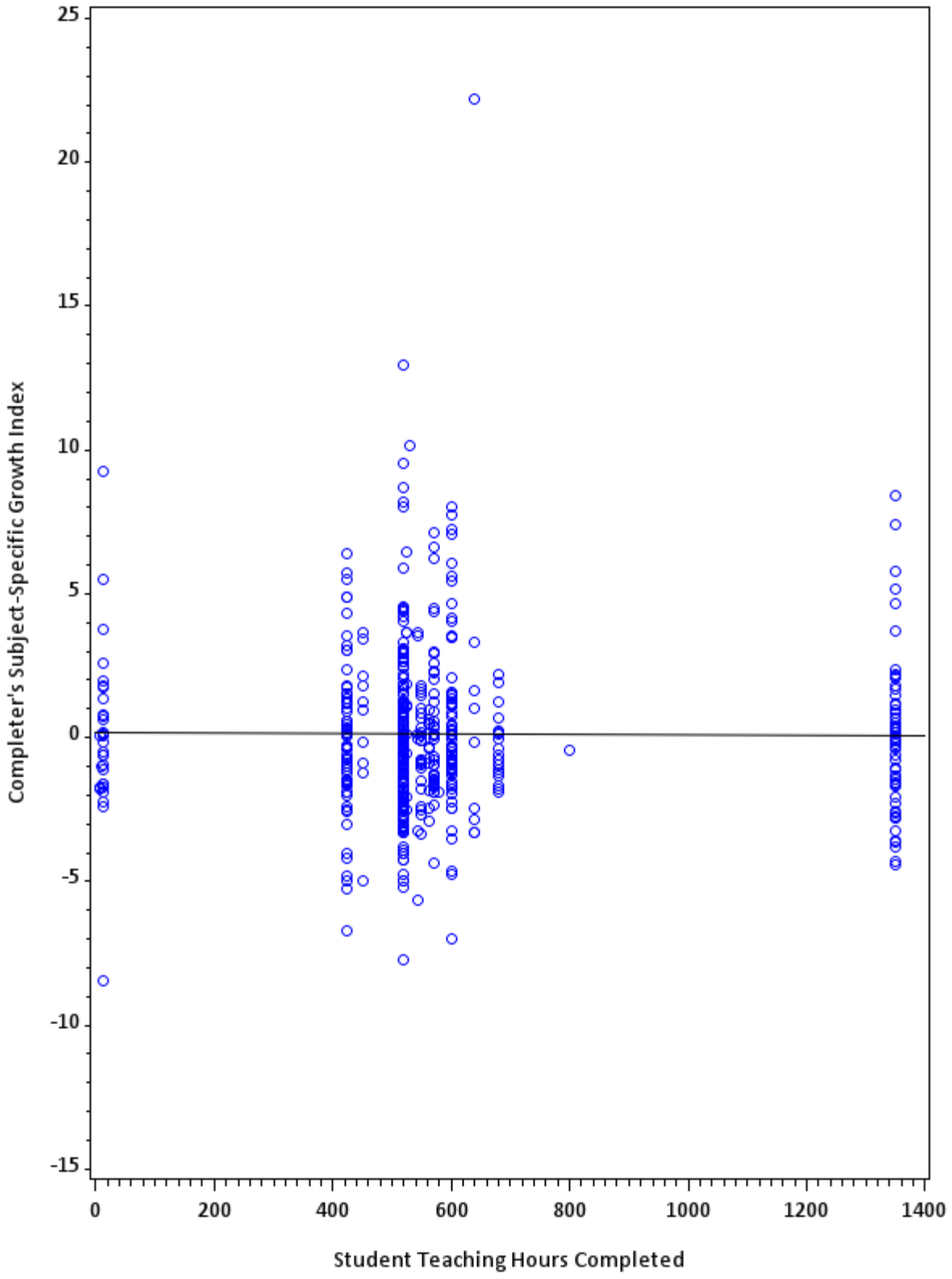


Figure 15: Student-Teaching Hours Completed (Social Studies)



Number of Credit Hours Completed in the Content Area

Figure 16: Credit Hours Completed in the Content Area (Composite)

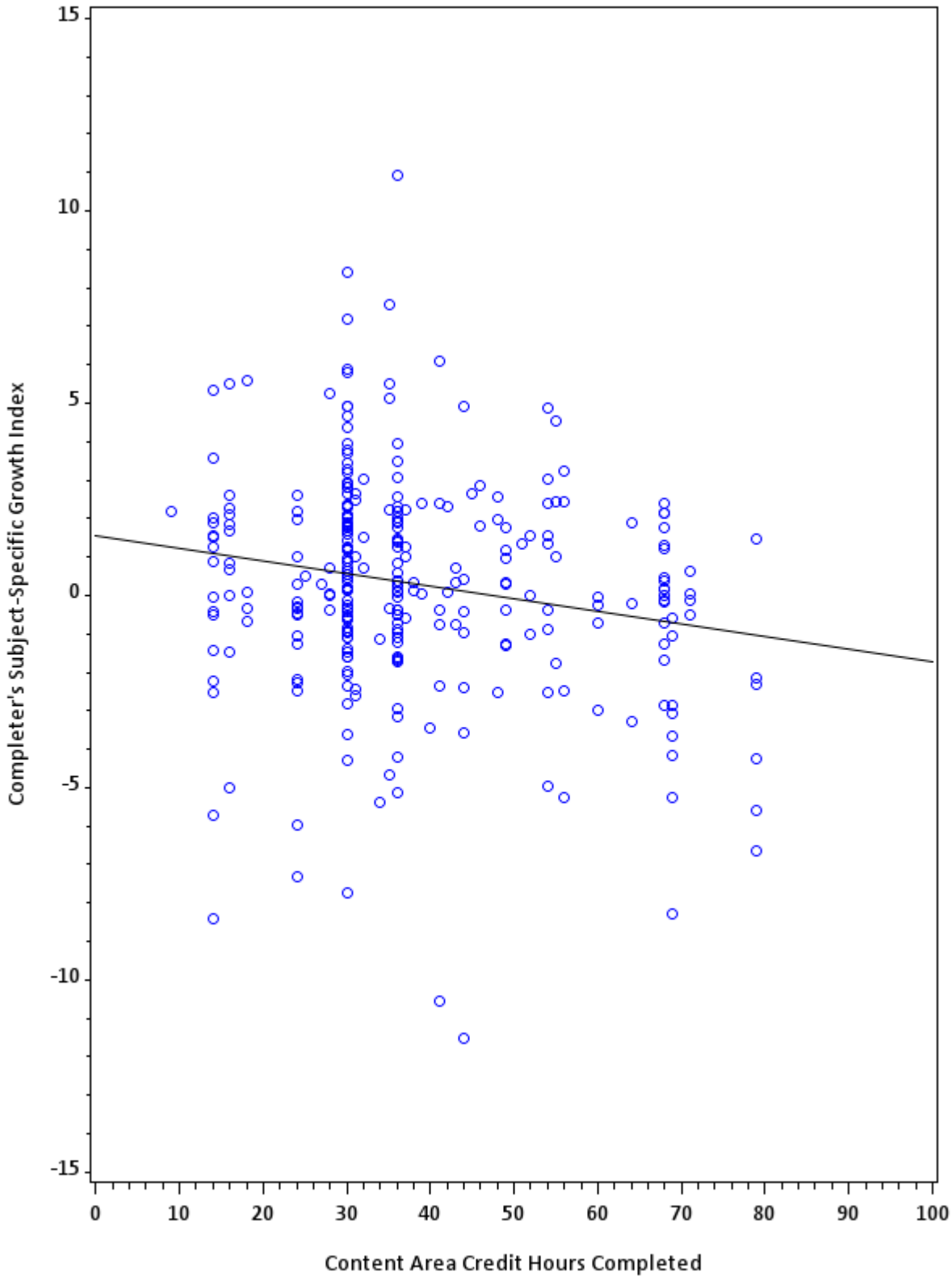


Figure 17: Credit Hours Completed in the Content Area (English/Language Arts)

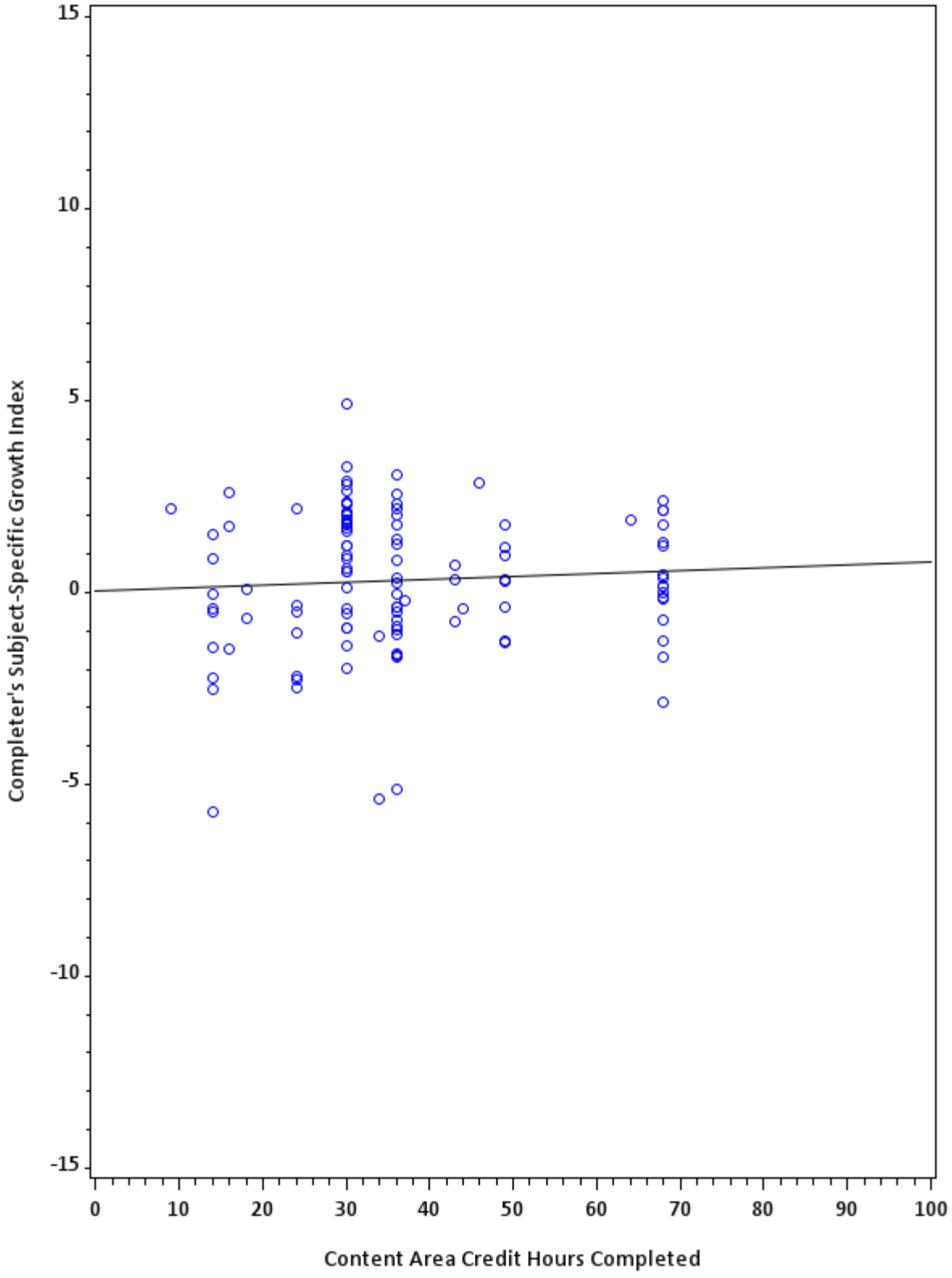


Figure 18: Credit Hours Completed in the Content Area Completed (Math)

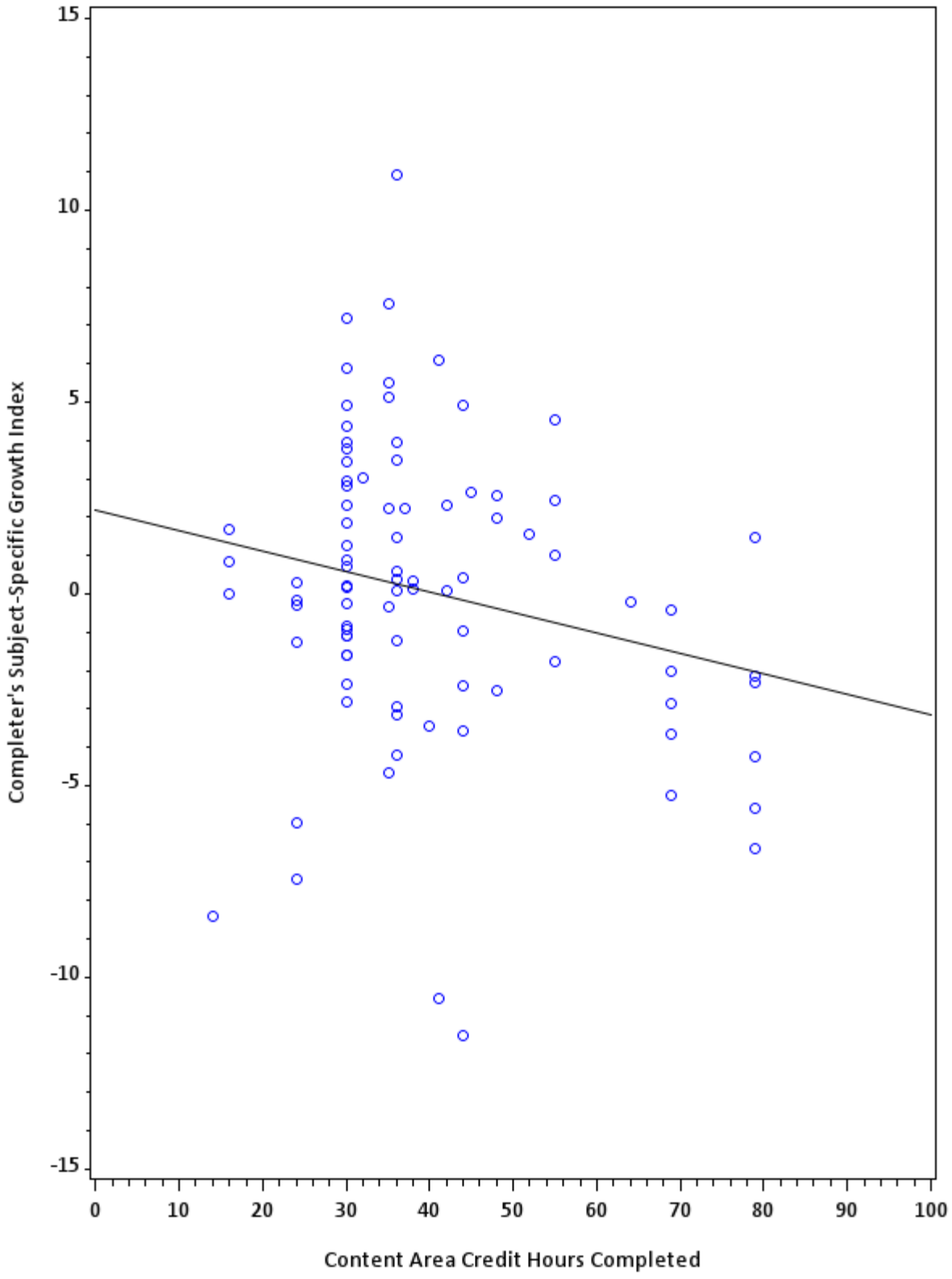


Figure 19: Credit Hours Completed in the Content Area (Science)

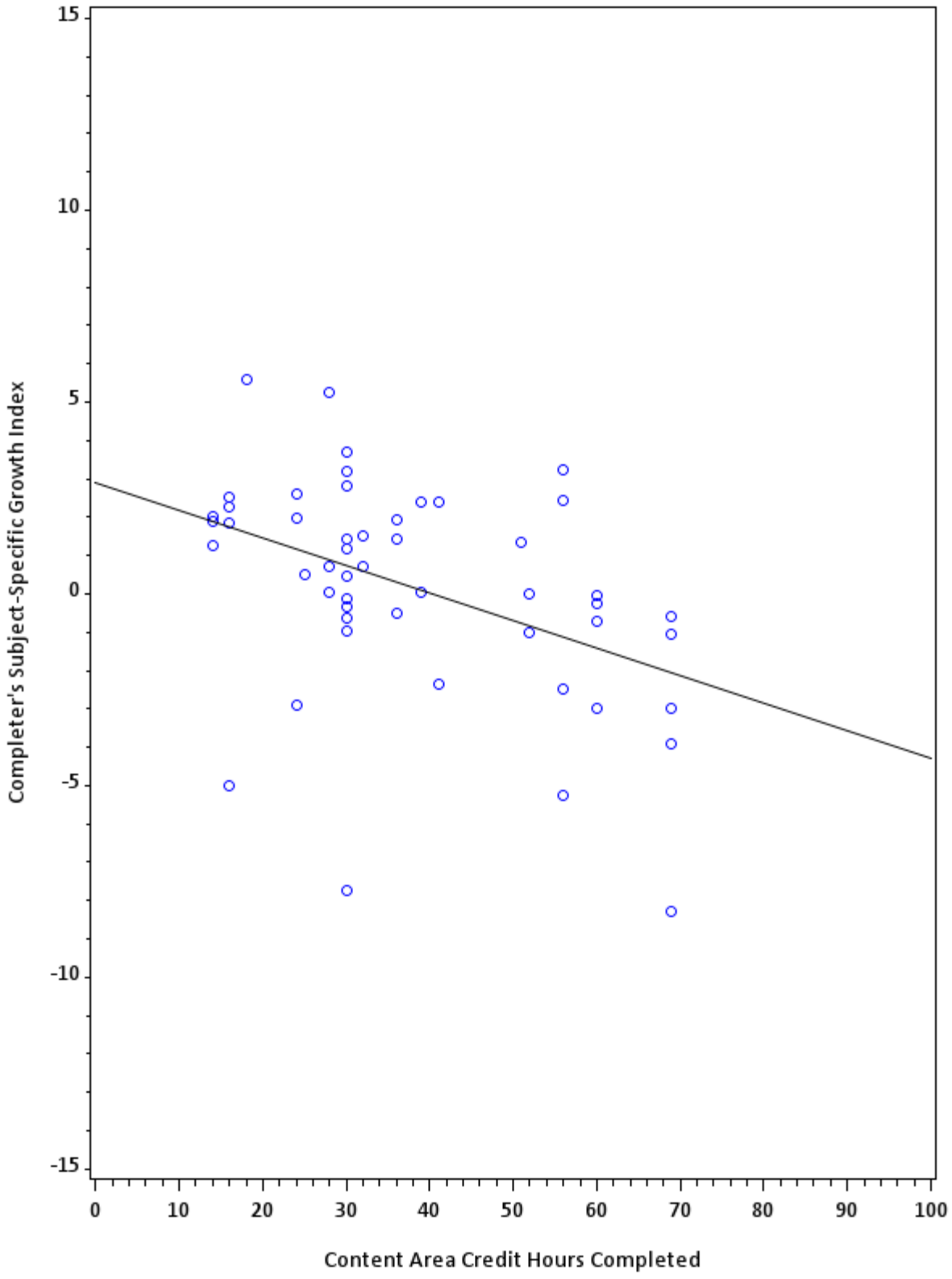
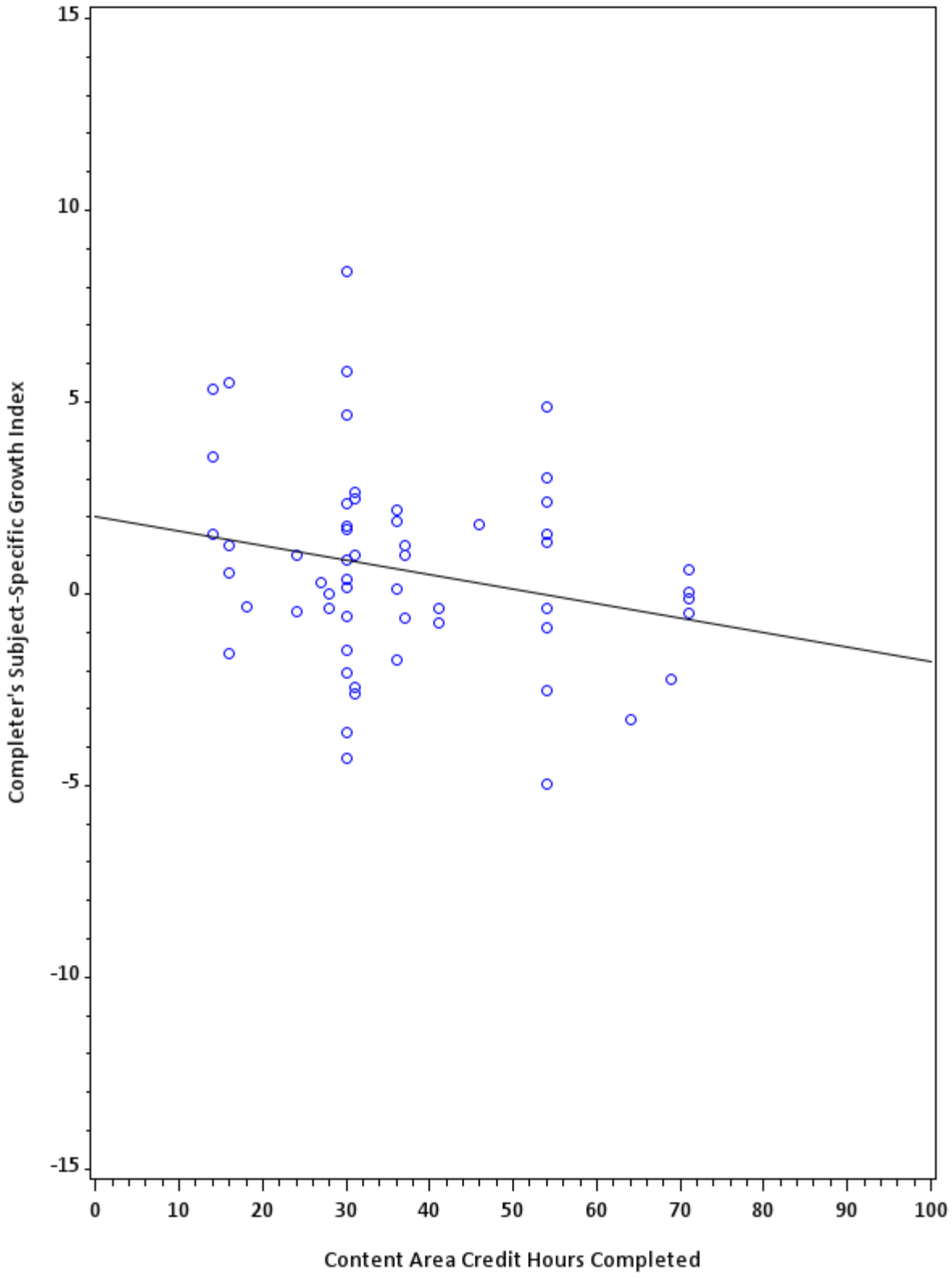


Figure 20: Credit Hours Completed in the Content Area (Social Studies)



Number of General Education Credit Hours Completed

Figure 21: General Education Credit Hours Completed (Composite)

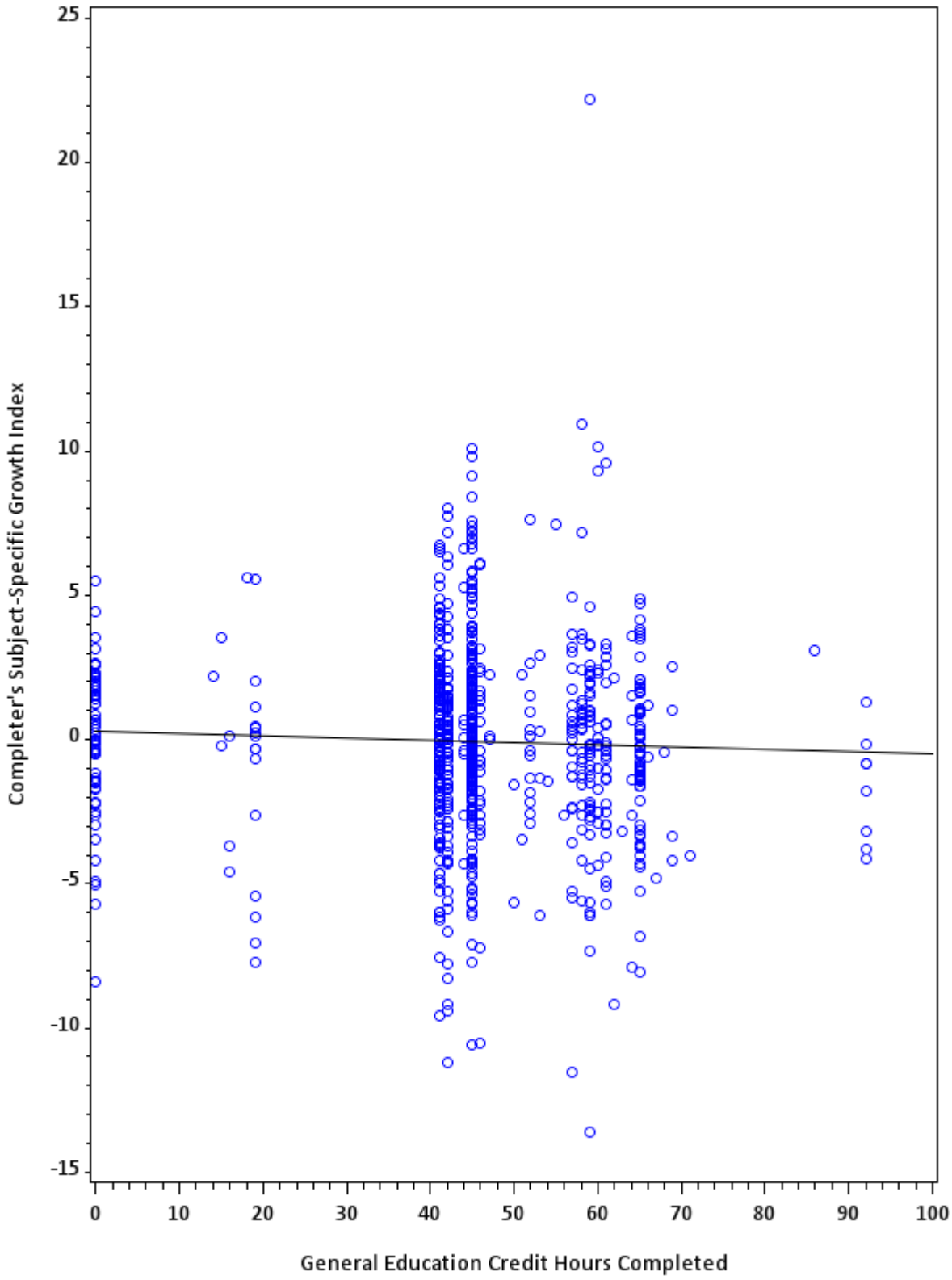


Figure 22: General Education Credit Hours Completed (English/Language Arts)

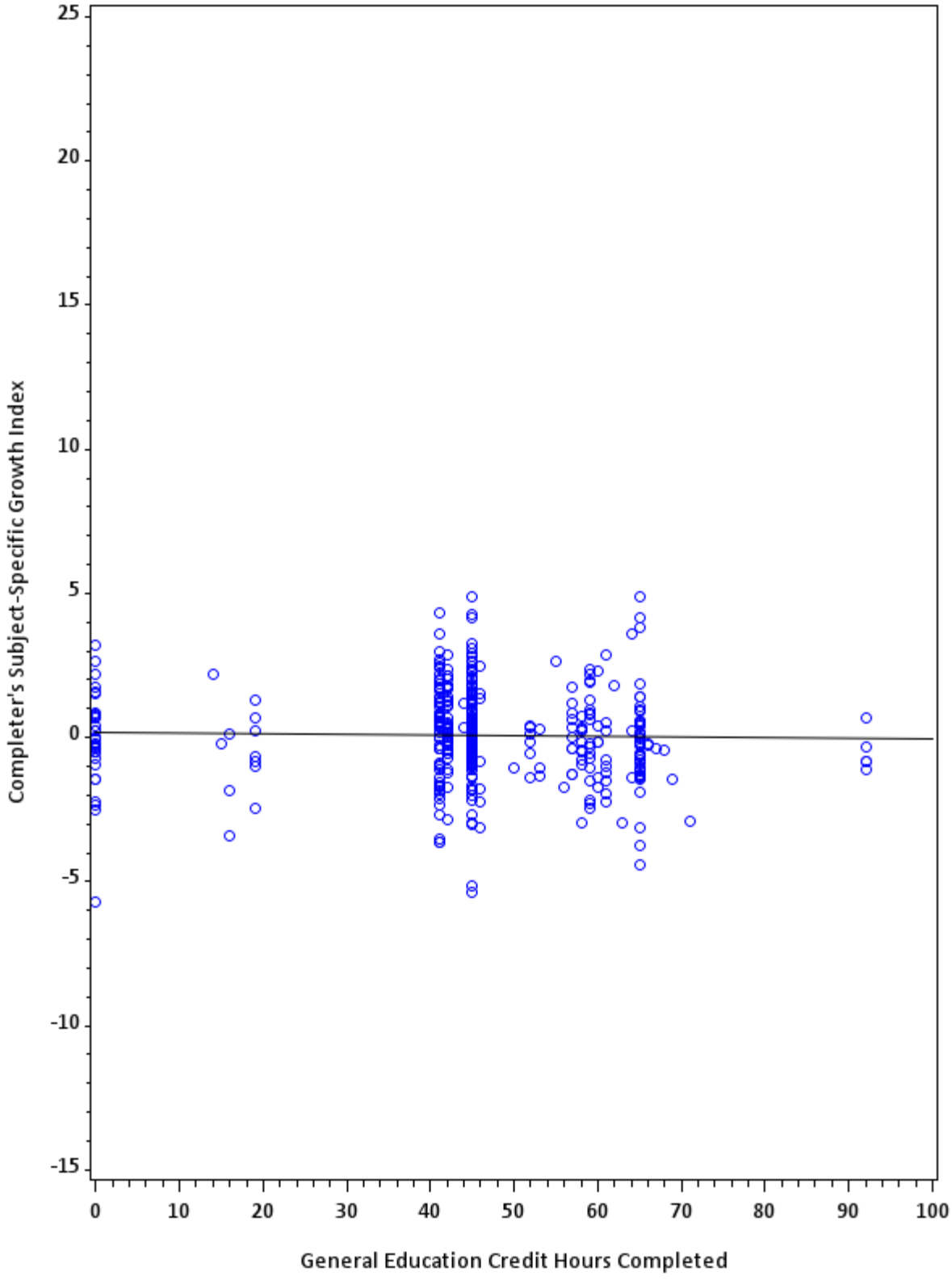


Figure 23: General Education Credit Hours Completed (Math)

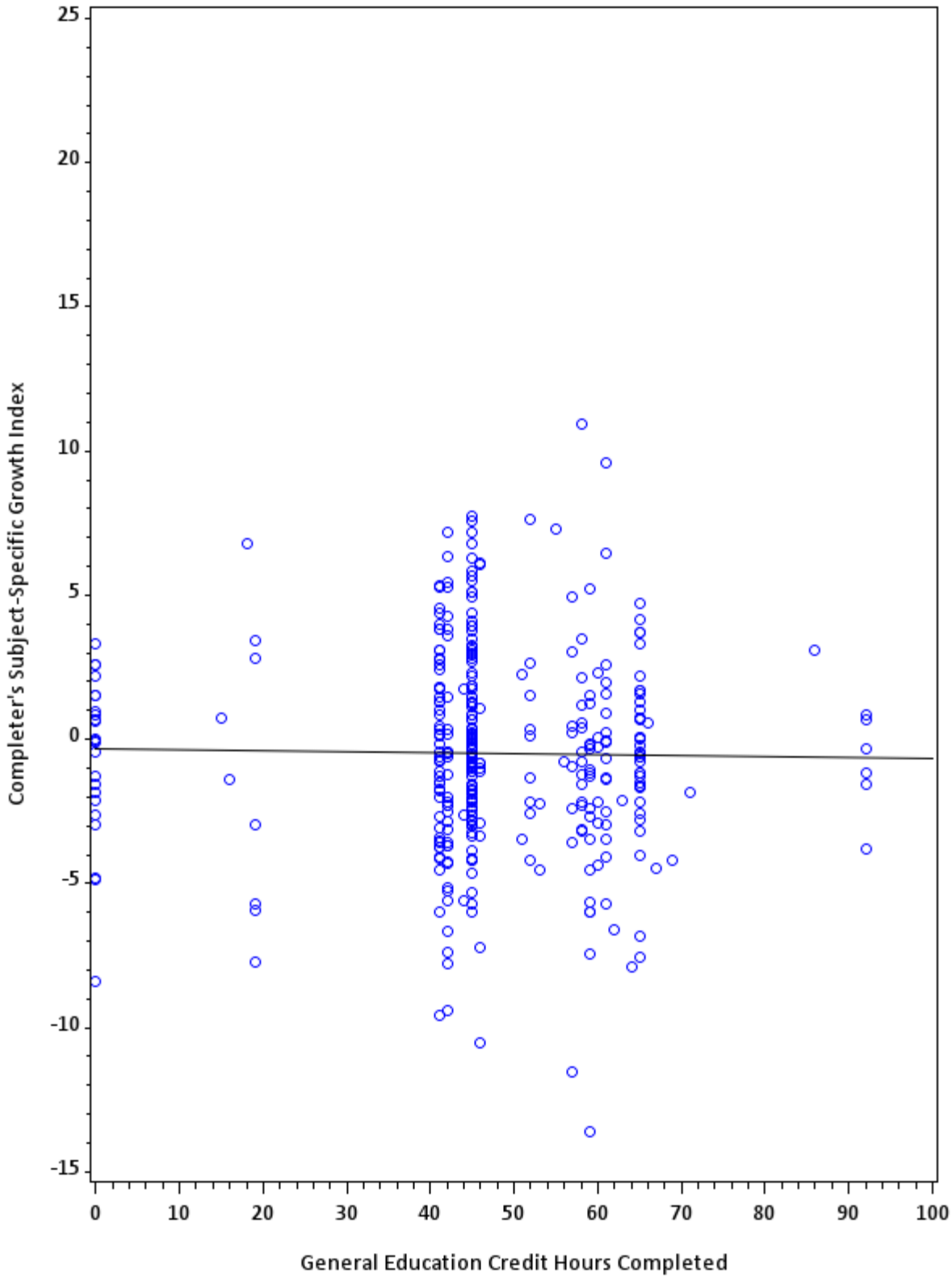


Figure 24: General Education Credit Hours Completed (Science)

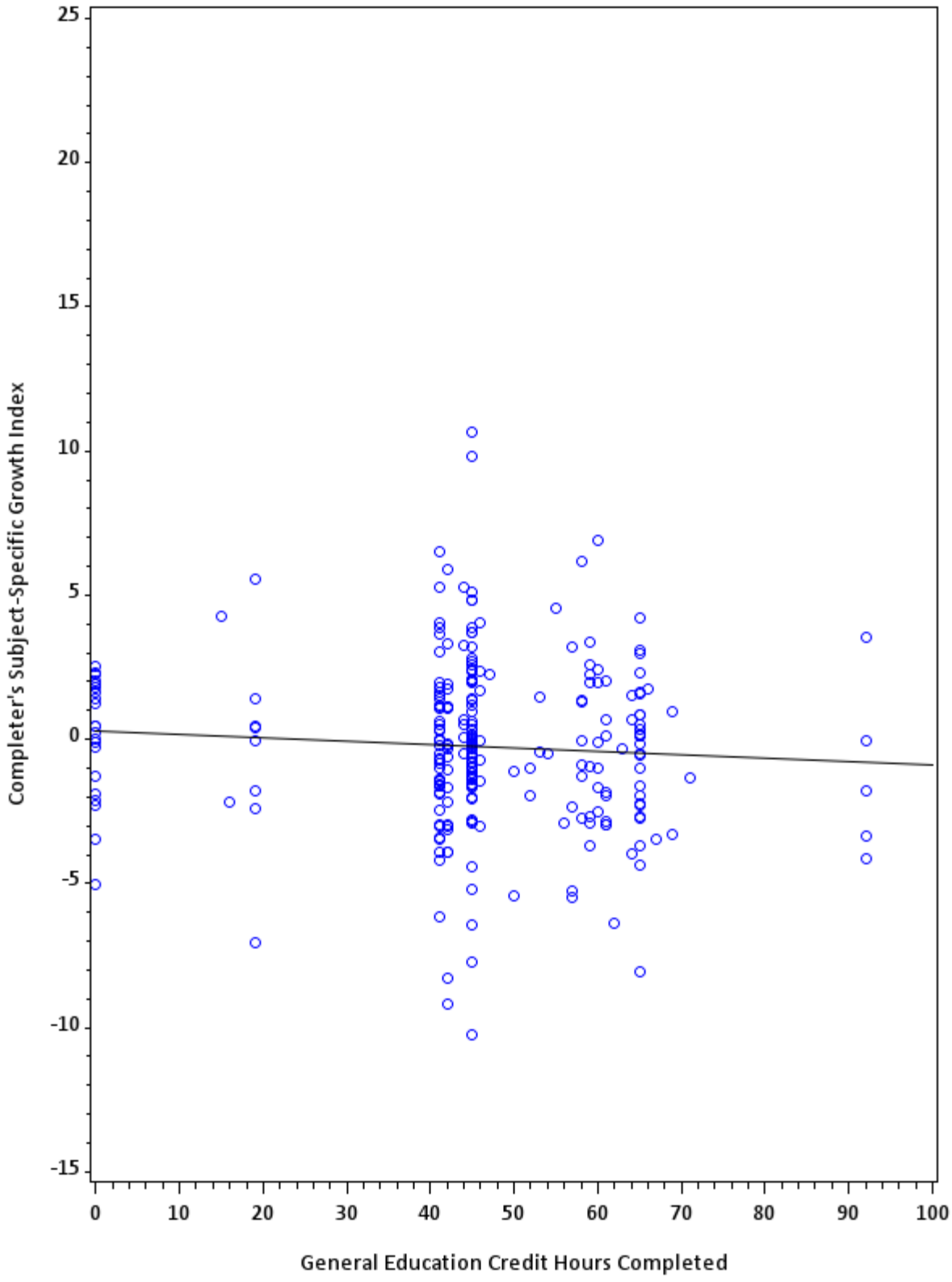
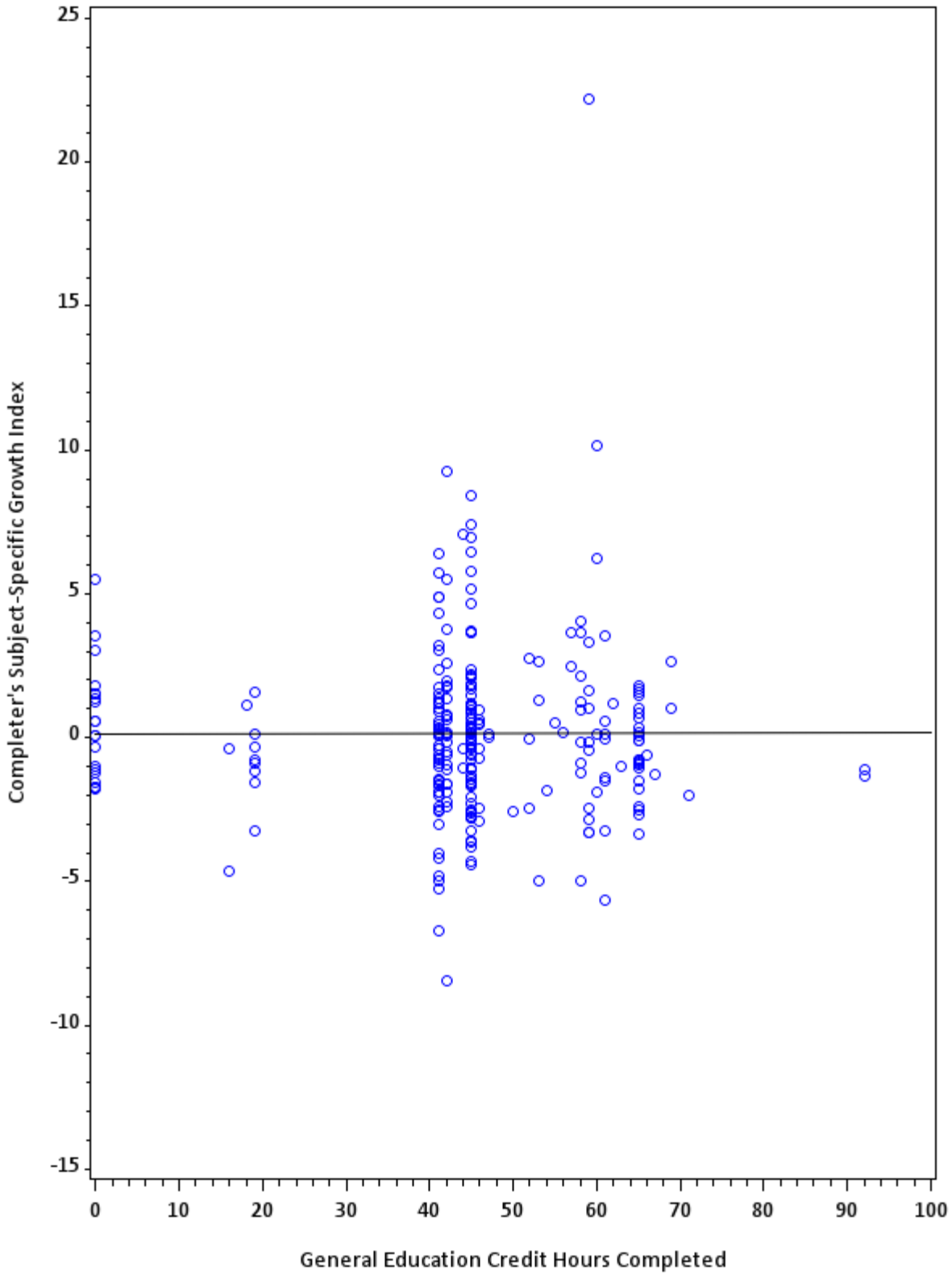


Figure 25: General Education Credit Hours Completed (Social Studies)



Number of Total Transfer Hours

Figure 26: Total Transfer Hours (Composite)

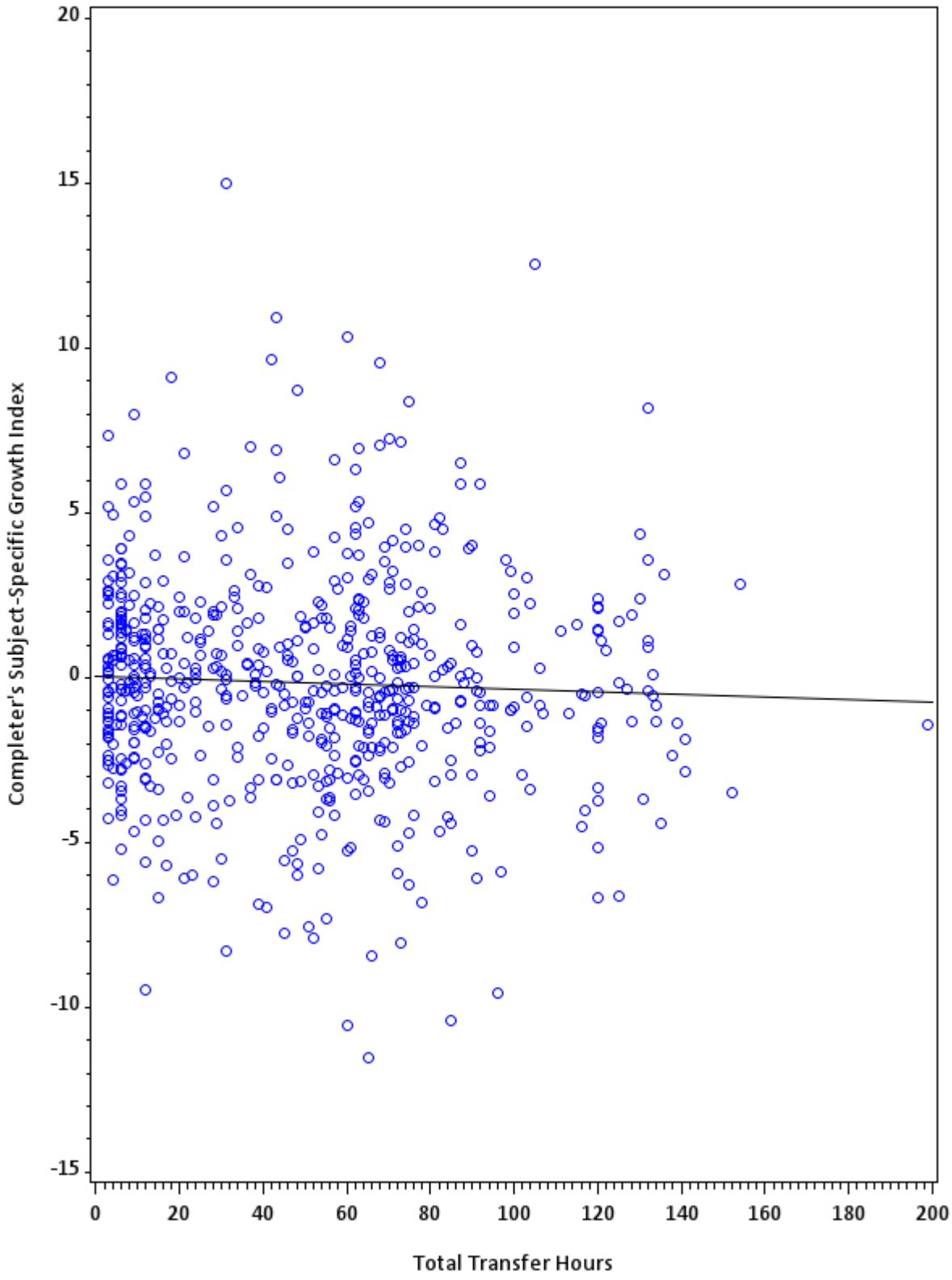


Figure 27: Total Transfer Hours (English/Language Arts)

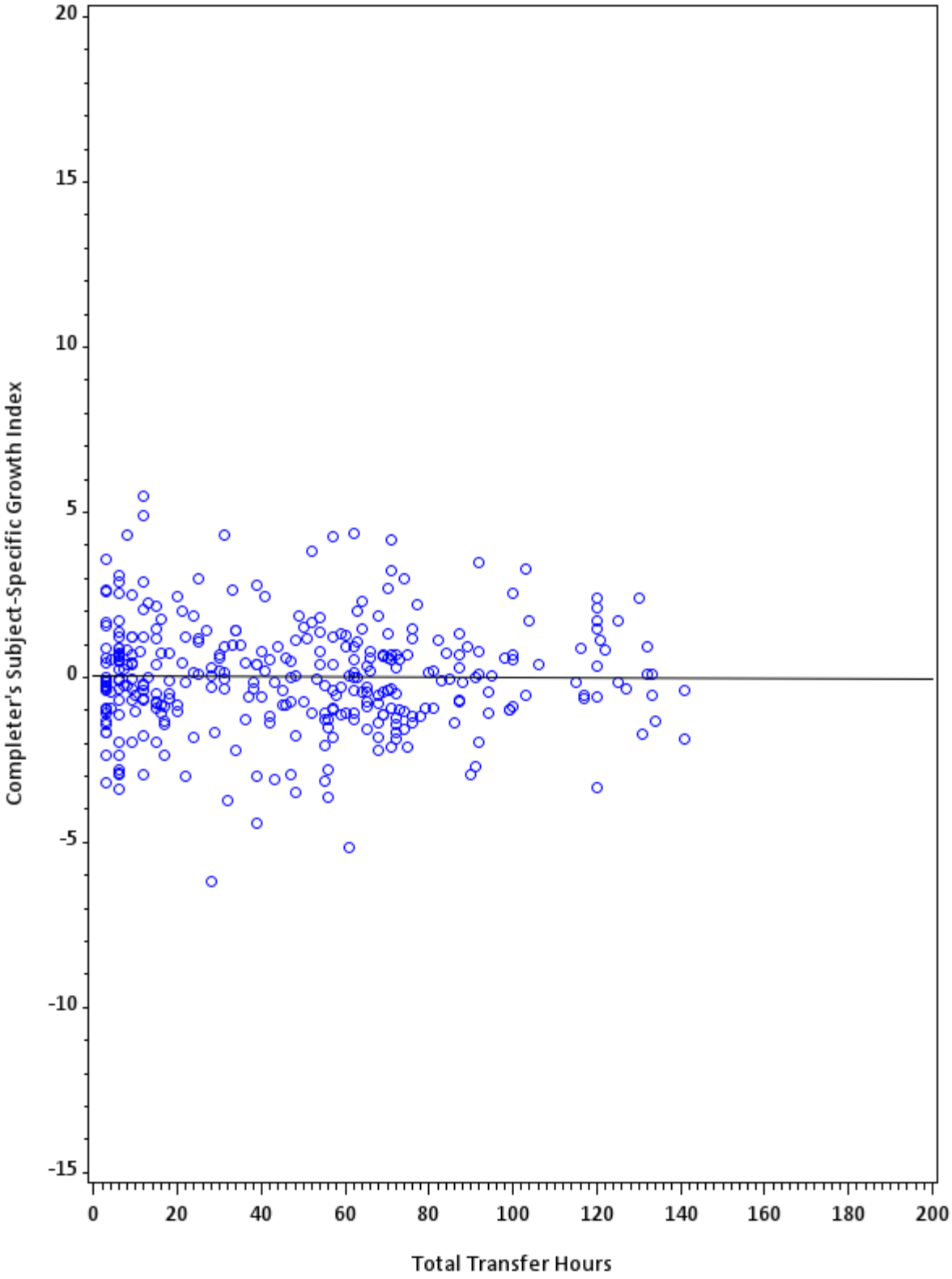


Figure 28: Total Transfer Hours (Math)

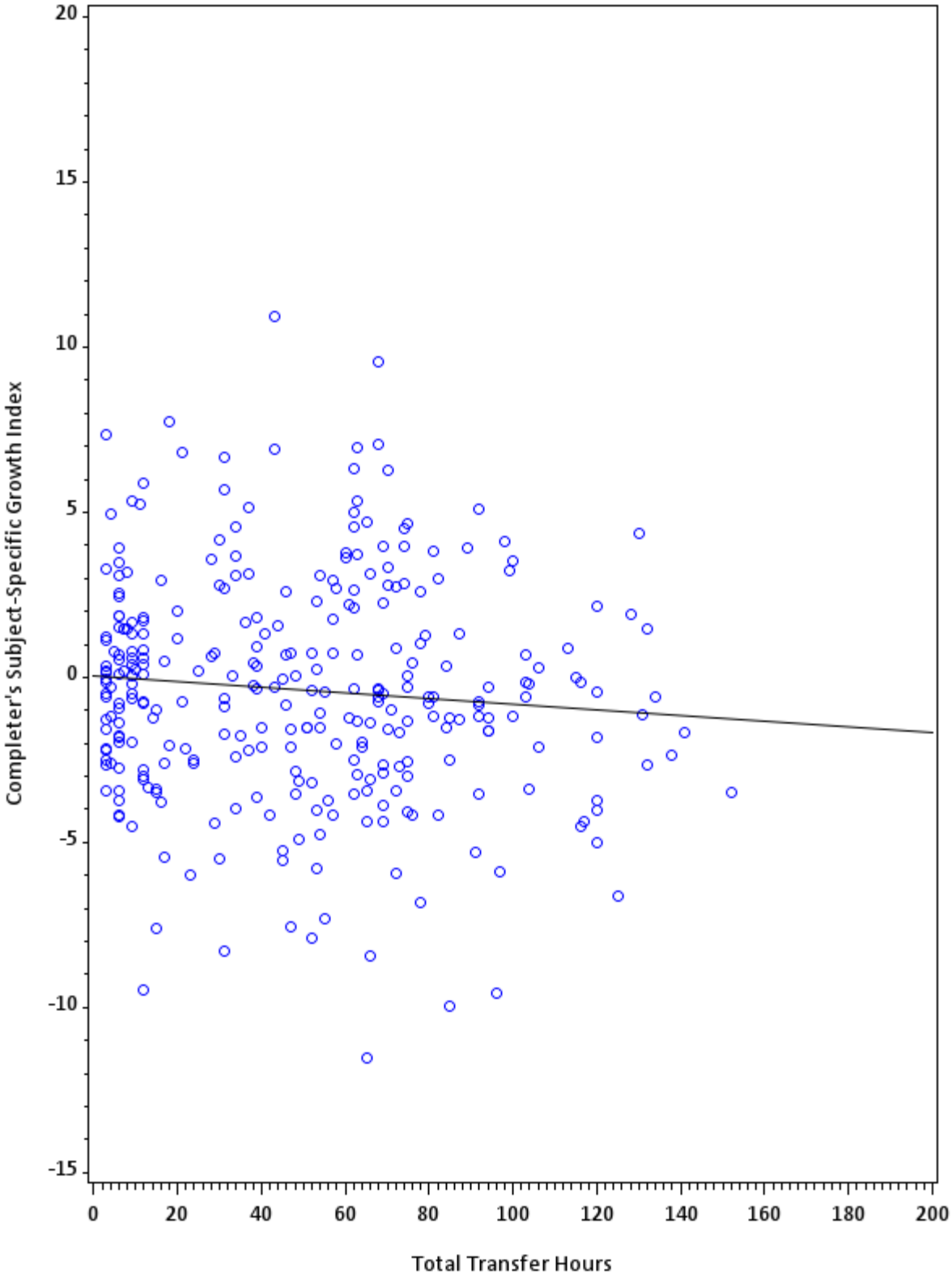


Figure 29: Total Transfer Hours (Science)

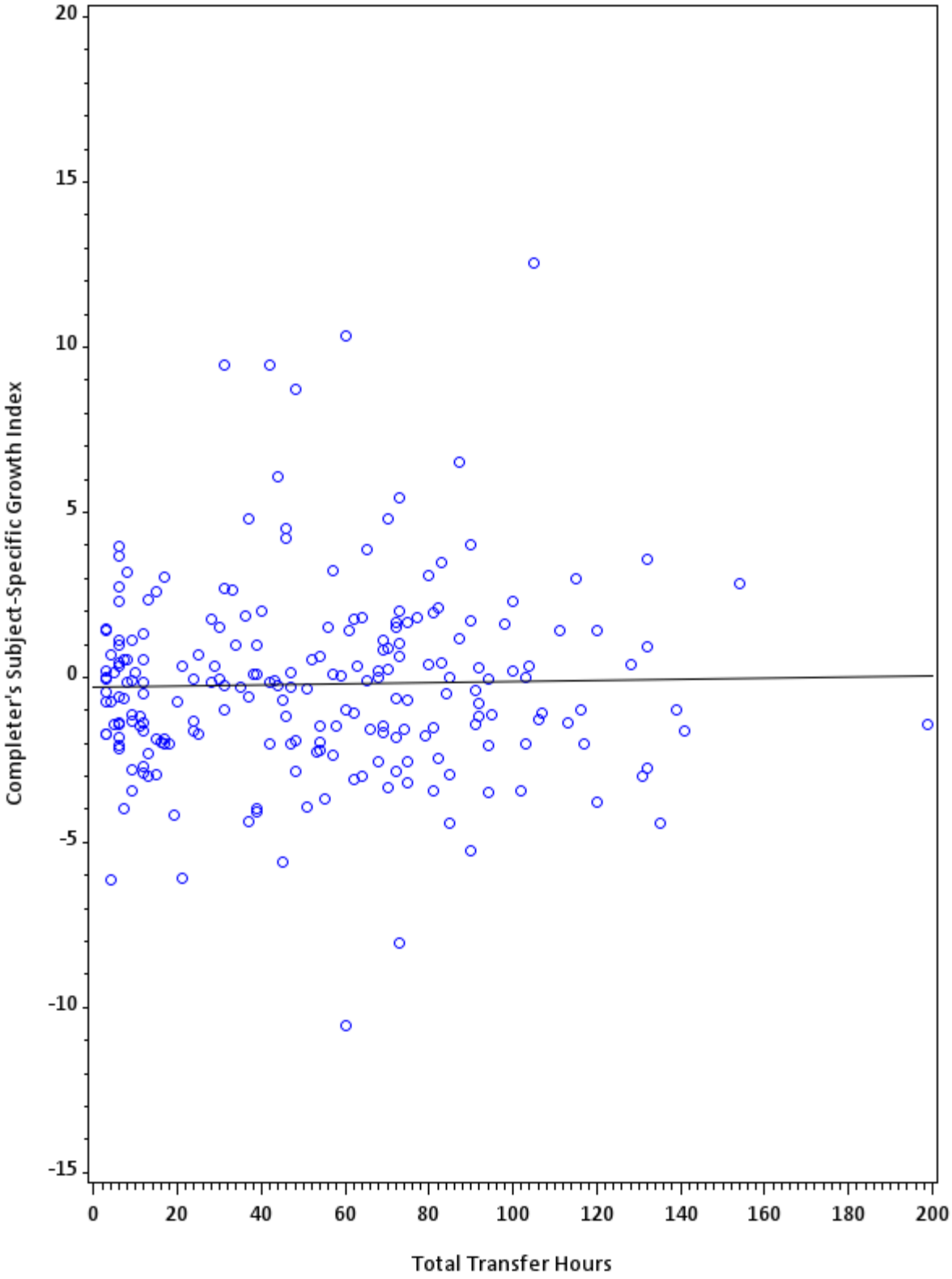
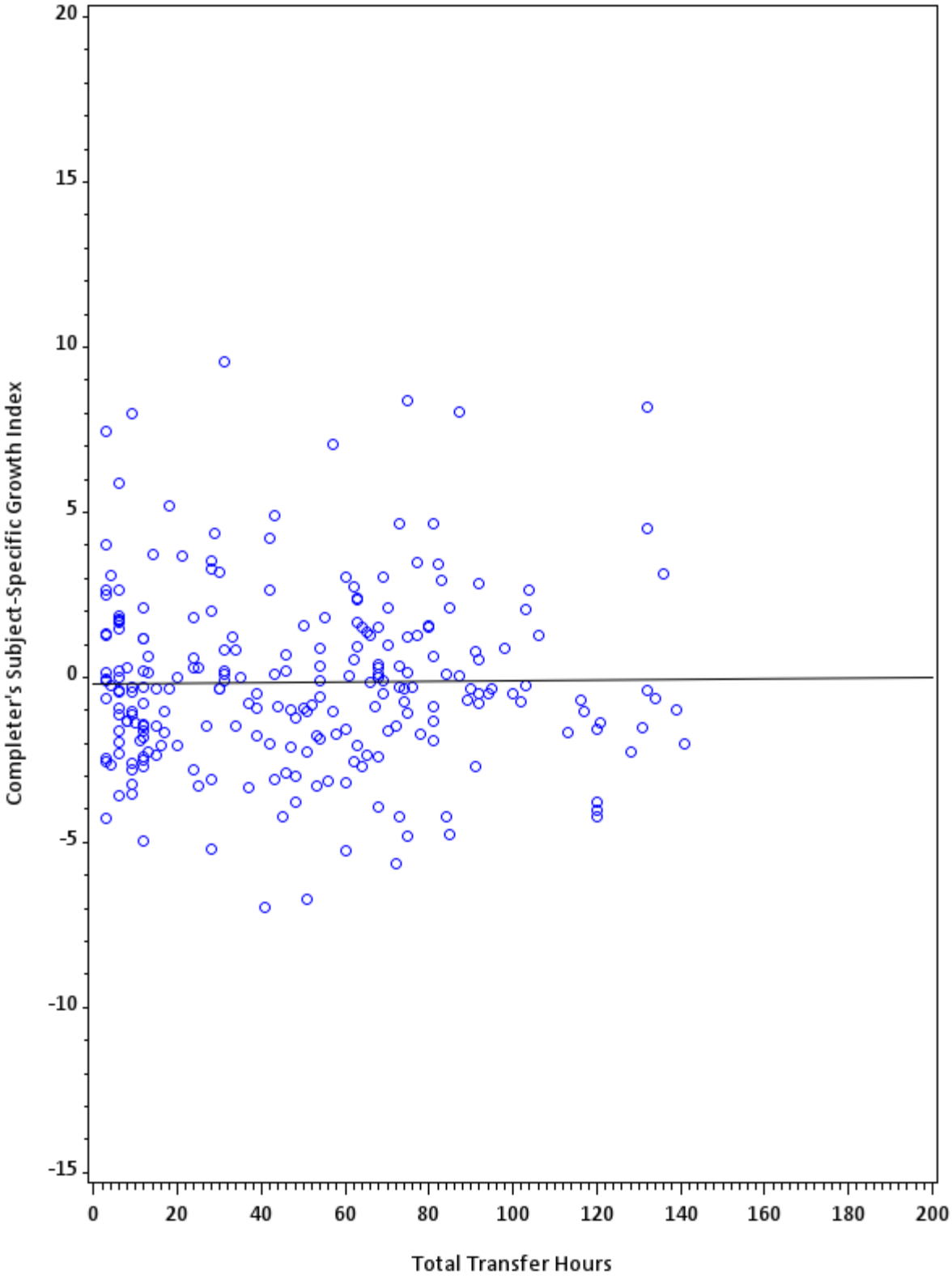


Figure 30: Total Transfer Hours (Social Studies)



First Schools' Effectiveness

Figure 31: First Schools' Effectiveness (Composite)

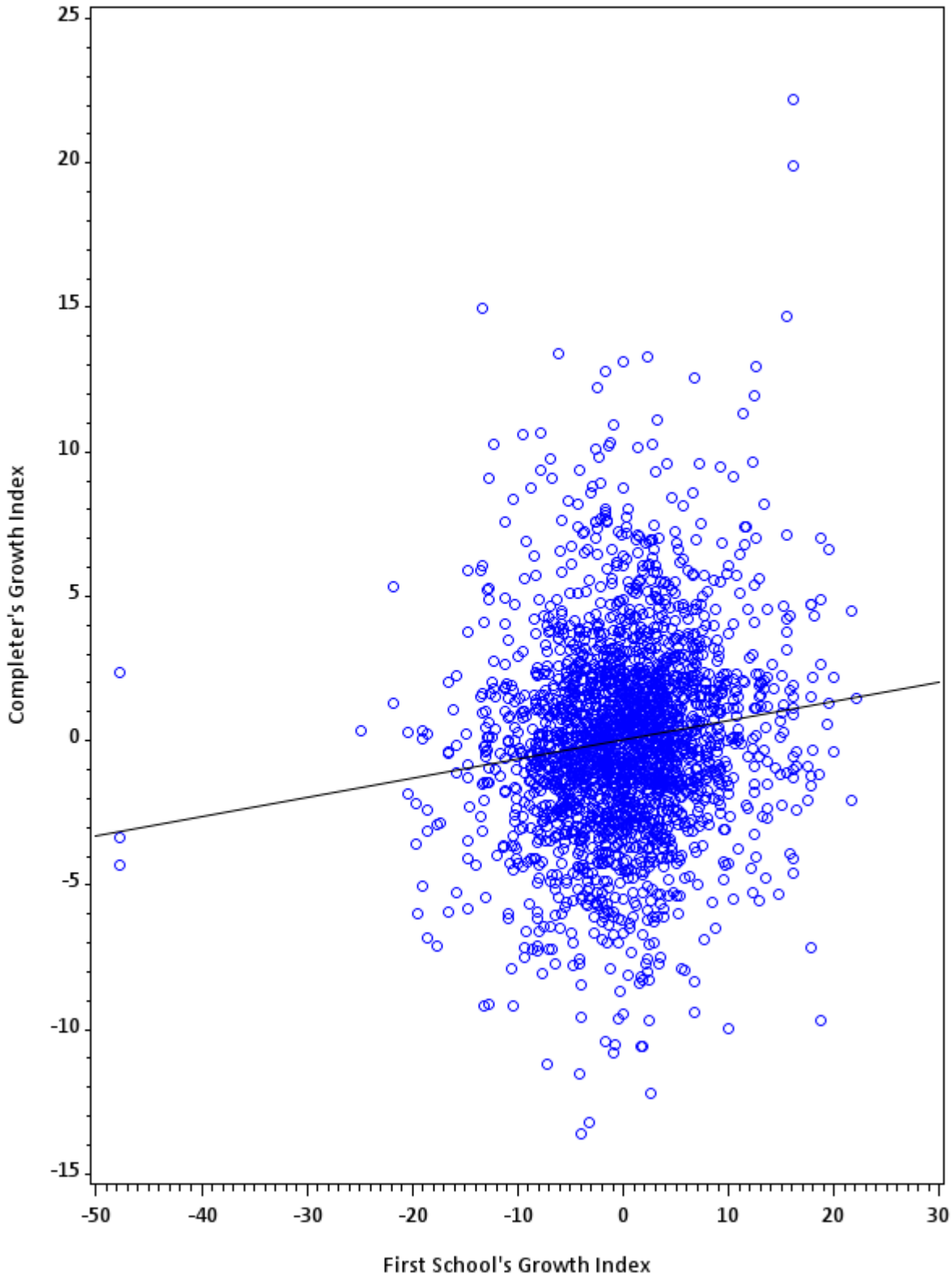


Figure 32: First Schools' Effectiveness (English/Language Arts)

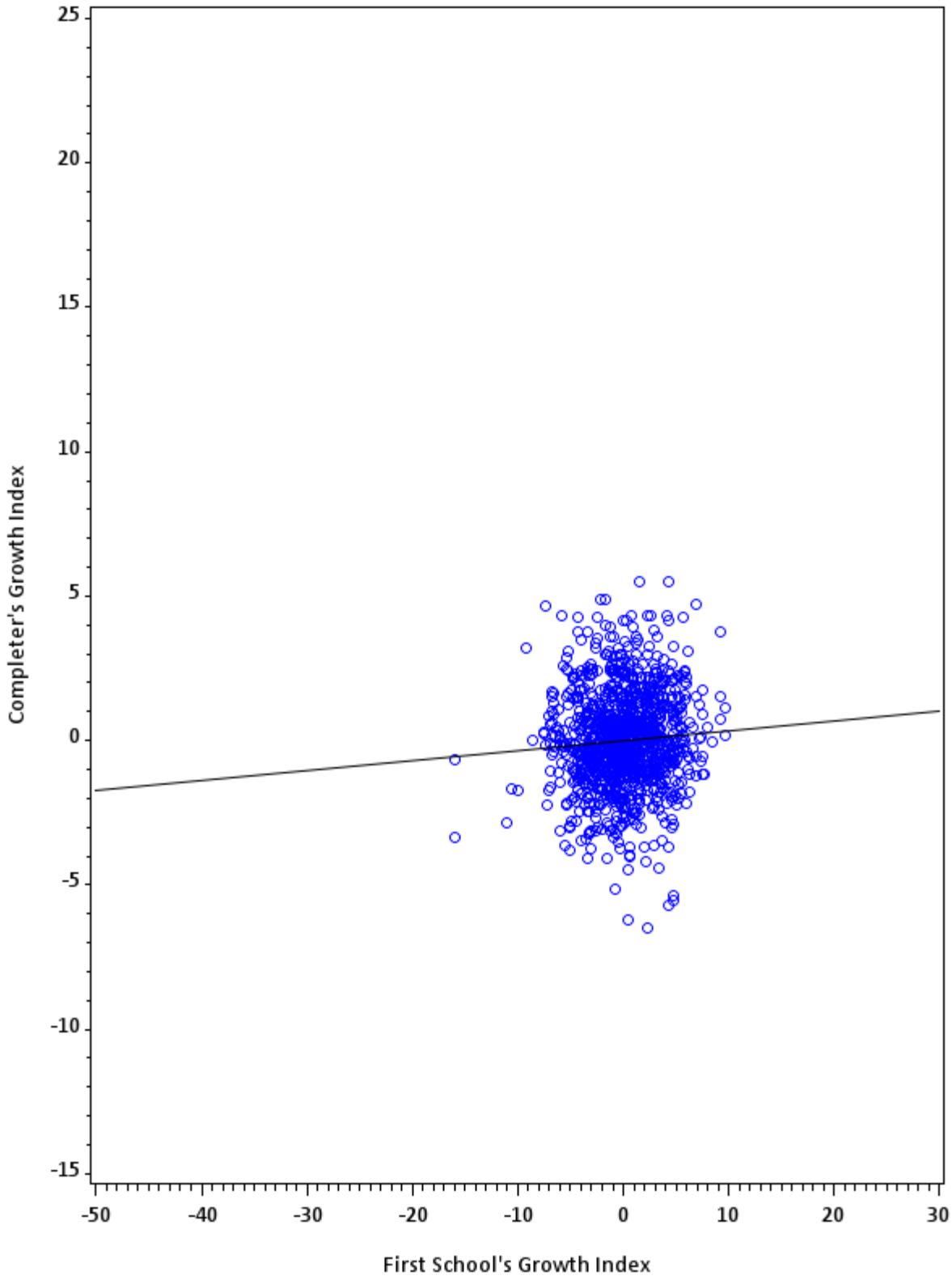


Figure 33: First Schools' Effectiveness (Math)

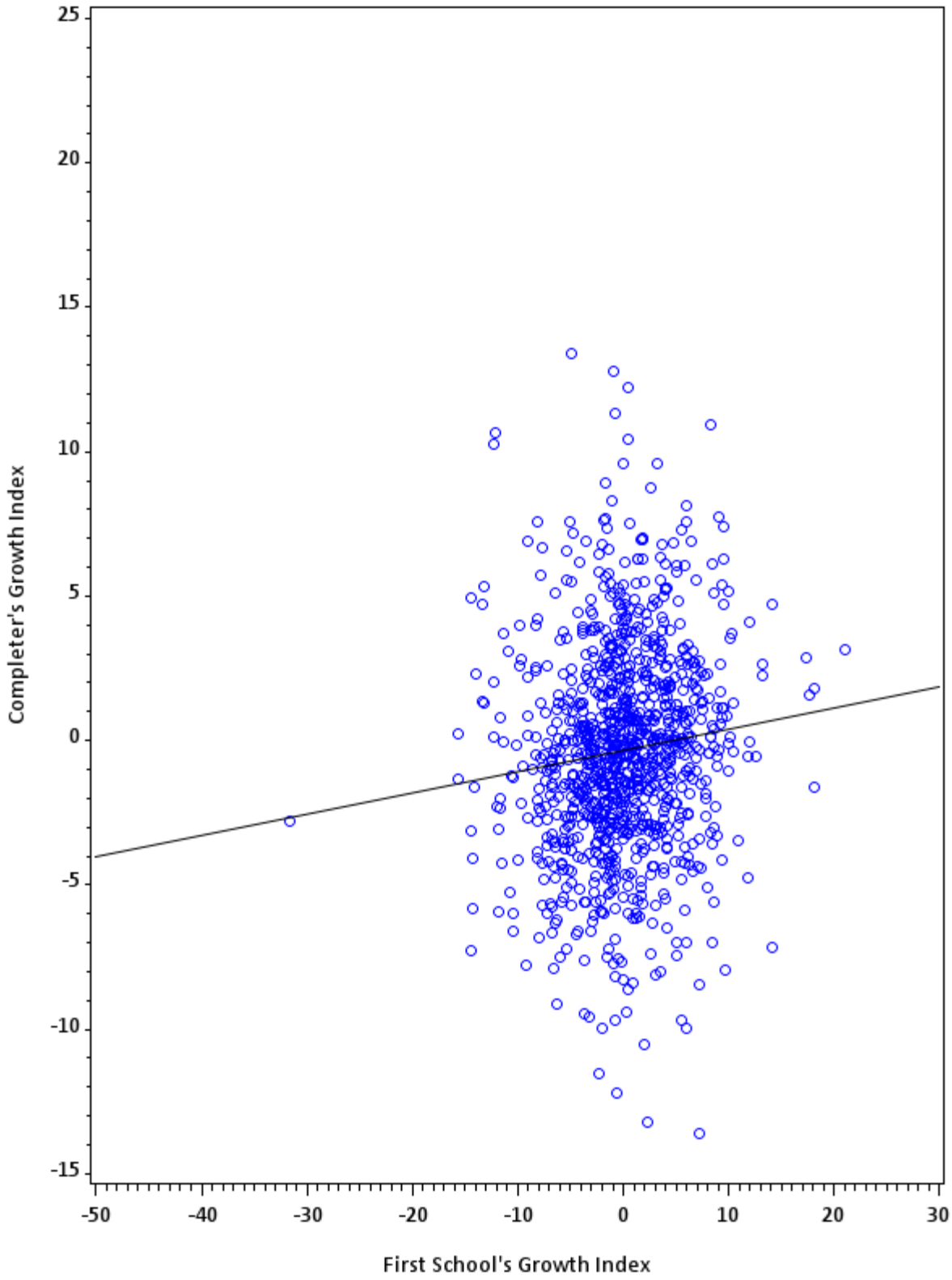


Figure 34: First Schools' Effectiveness (Science)

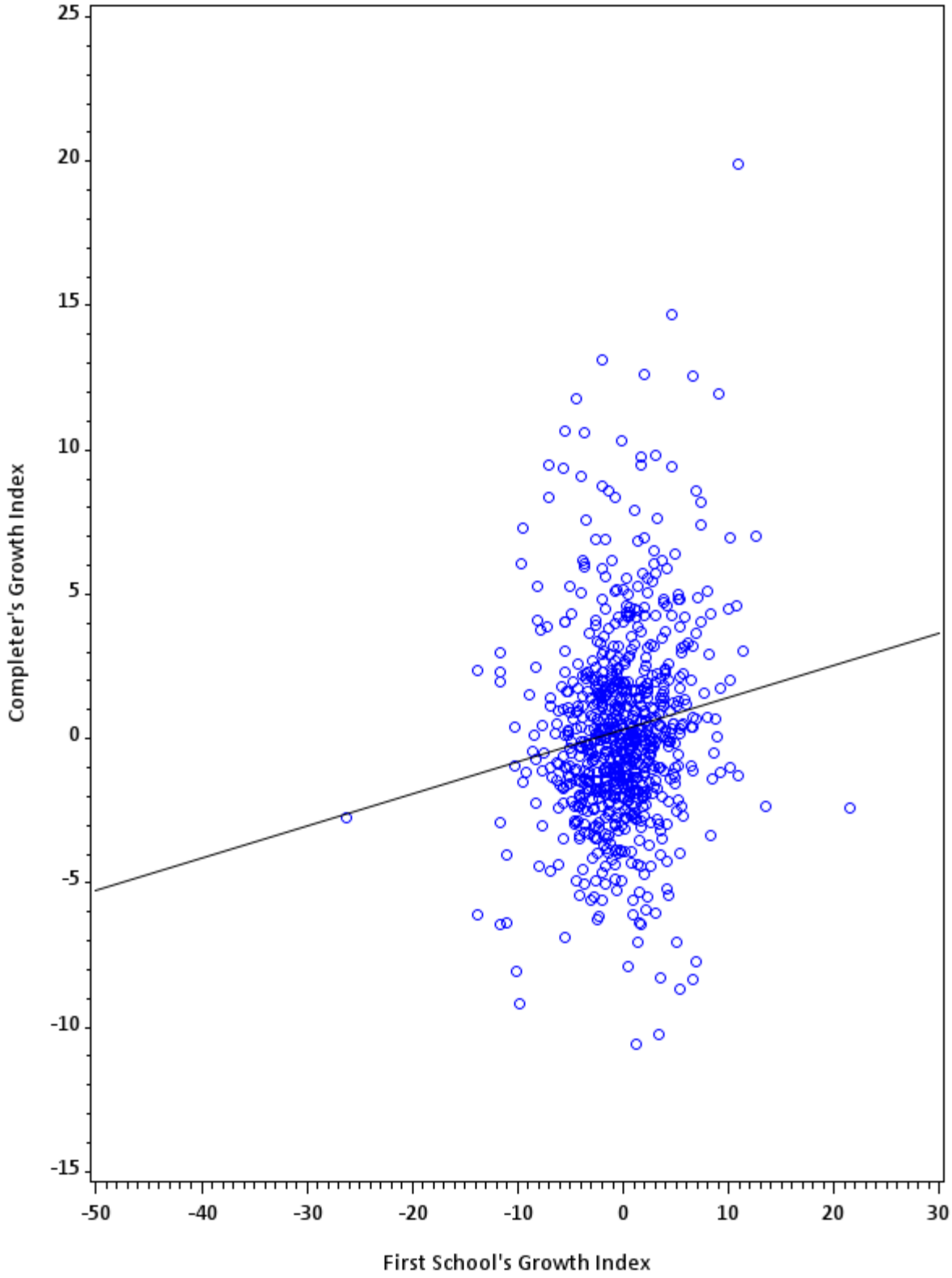


Figure 35: First Schools' Effectiveness (Social Studies)