Course of Study for K-12
Students With Disabilities in New York State

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Abstract

Keywords:
New York DOE, students with disabilities (SWD), K-12 education, course of study

In this paper, we looked at Students with Disabilities (SWD) and how they compare with General Education Students from New York State in K through 12. For this analysis, we used data from the New York State Department of Education (DOE) Data Dashboard. The specific data set we are using is called Pathways. The status and breakdown of this dataset sorts students of different demographics by school and course of study for all K through 12 schools in the state of New York.

We used SAS and Excel to analyze the Pathways database and examine how course of study changes in different types of New York State schools for students with disabilities when compared to general education students. The data showed that for both students with disabilities and those in general education, "Humanities" was the most popular course of study. Once we removed humanities, we could see a difference between general education and students with disabilities. For students with disabilities, the most popular choices were "Career Development" and "Occupational Studies and Career and Technical Education," whereas for general education students the most popular choices were "STEM Mathematics" and "STEM Science."

We believe these differences could come from choices students make because of their disabilities, however further testing is needed. Future work to expand on this project could include analysis with further breakdown of the type of disability. We recommend further breakdown of the types of disabilities tracked in such datasets, which could shed light on why the distribution of students' course of study is different for students with disabilities.

Introduction

We chose to explore the 2020-2021 Career Pathways database on course of study in New York's K-12 system because we were concerned that students with disabilities could be limited in their course of study, whether it be due to self-limitations or lack of services. This concern was largely informed by previous research which has shown that students with disabilities are more often put on course of study plans that focus on high school graduation, rather than college preparation (Shrifer et al., 2013), and that there are many actors besides the students themselves who make course of study decisions for students with disabilities during the IEP development process (Mies, 2019). Issues surrounding the appropriate education of students with disabilities have even made their way to the Supreme Court recently (Turnbull, 2018), and so we found it compelling to explore them here, using the data available.

We believe that all students should have access to career pathways that may work for them, regardless of disability. We have looked at course of study data for students with disabilities and those without disabilities. What we found was that students with disabilities in the state of New York were not necessarily limited in their course of study, but were more often enrolled in programs related to Career Development, Occupational Studies, and Technical Education than their non-disabled peers. We also found that an overwhelming majority of students in both categories are enrolled in Humanities as a course of study. We also identified a few possible areas of improvement for the Pathways database, which will be covered in the final section.

Data Source

The data source we used is maintained by the New York Department of Education. It is called the Pathways database and it includes information on the course of study chosen by high school students in the different districts of New York, as well as whether they are rural, suburban or urban, the type of school, and it also delineates students into groups such as gender, race, course type, ELL, homeless, socio-economic level, migrant, disability, and military family. We have chosen to focus on students with disabilities and compare them with their non-disabled peers across the various districts of New York State.

The Pathways database provided us with both quantitative and qualitative variables:

- The ***qualitative categorical variables*** included type of school/district, course of study, and disability status
- The ***quantitative variable*** was student count in the different cohorts.

Out of around 30 variables, we chose the following and found their SAS codes: course of study [COURSE_OF_STUDY_CODE], the ratio of needs to resources for different school districts [NRC_CODE], and whether students were classified as having a disability or not, which we did by separating them by subgroup. There are many subgroups to choose from on the Pathways database, but we only compared the subgroup of students with disabilities against the subgroup of students in general education using [SUBGROUP_CODE]. The values for the course of study variable were "Arts," "Career Development and Occupational Studies," "Career and Technical Education," "Humanities," "Humanities Alternatives," and "Languages other than English." A table showing the categories for course of study is included in the Appendix. Similarly, the school districts of New York State were separated into the following categories by type, based on size, location, and ratio of needs to resources (N/RC): (1) New York City schools (by far the largest category), (2) Large city school with high N/RC, (3) Urban-suburban schools with high N/RC, (4) Rural schools with high N/RC, (5) Schools with average N/RC, (6) Schools with low N/RC, and

(7) Charter schools. A table with school types and their code is included in the Appendix. We then aggregated these school types into groups using the code [AGGREGATION_TYPE]. Finally, we counted the number of graduates who were reported with each career path type, as defined by their course of study [COURSE_OF_STUDY_CODE], using the code [STUDENT_COUNT] to get quantitative data. The following graphs (Fig. 1 and 2) illustrate the contents of the data set:

Figure 1:

Frequency of districts by type in New York State

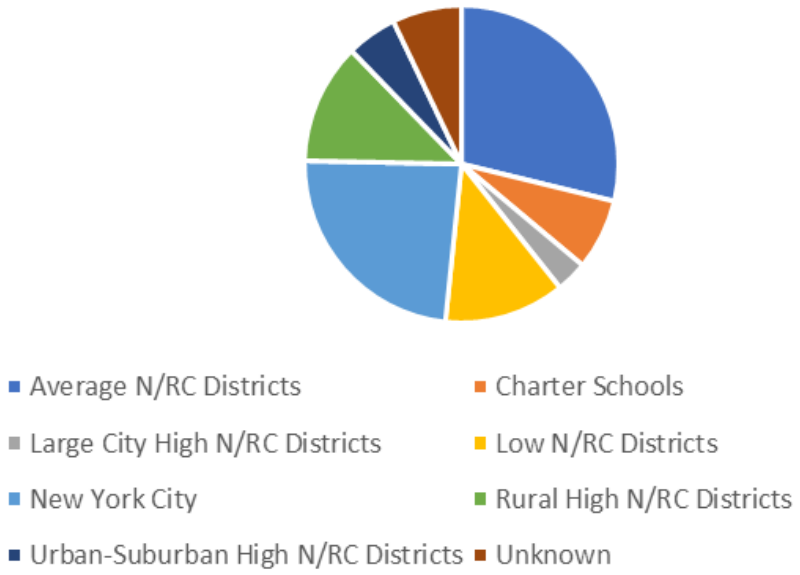
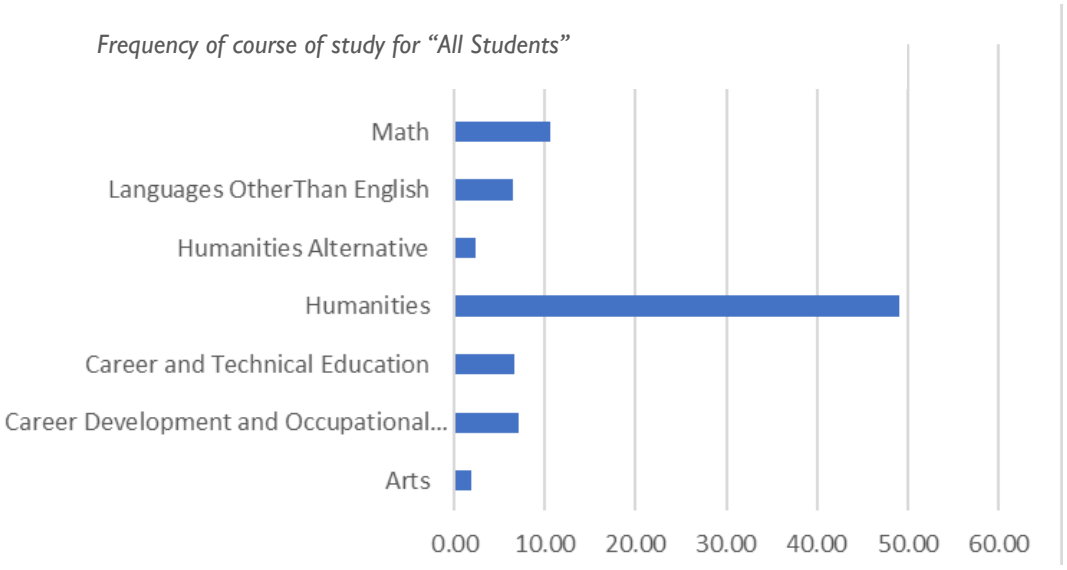


Figure 2:

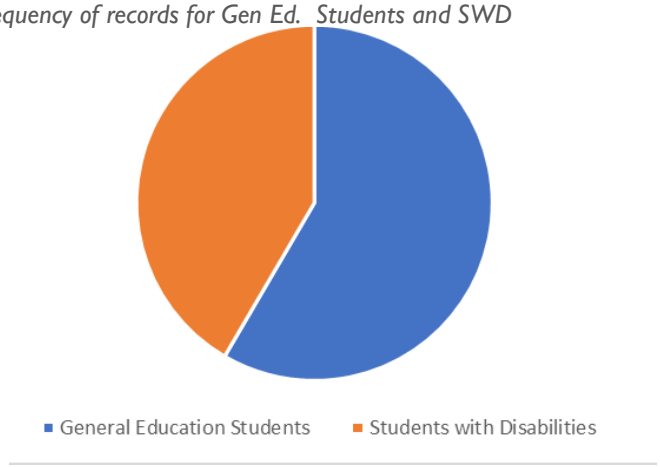
Frequency of course of study for "All Students"



The pie chart to the right (Fig. 3) shows the number of records that we were able to find in the database that contain student counts for both students with disabilities and general education students.

Figure 3:

Frequency of records for Gen Ed. Students and SWD



As you can see, there are slightly more records available on general education students than students with disabilities.

Methods

Now that we understand what is in the dataset, let's look at how we used the data to explore the question of how students with disabilities compare to general education students with respect to career pathways. For this, we used box plots, because they can share a wide range of data in a small area. Box plots have the advantage of being able to show how the data clusters around the mean and the mode, as well as what outliers there are. We will now explain how we used SAS to process the Pathways database. To read the full SAS code we used, see Appendix.

The first thing we did was to import the Pathways data into SAS using the PROC_IMPORT statement. After we got the data into SAS, we started to explore the data. We ran PROC_CONTENT to see what was in the Excel Spreadsheet. The key thing that we learned from this process was the list of variables and their attributes (as demonstrated in the previous section). The number of observations in the original data set was 491,786 before removing anything. After we removed everything besides our chosen variables of school type and student subgroup (SWD or Gen. Ed.), we had 30,194 observations

Before getting started, we pulled the aggregated data on schools and the subgroups of students with disabilities (SWD) or general education students (Gen. Ed.). This way we could avoid repeating the same data as the aggregate level adds together as they move through to the school

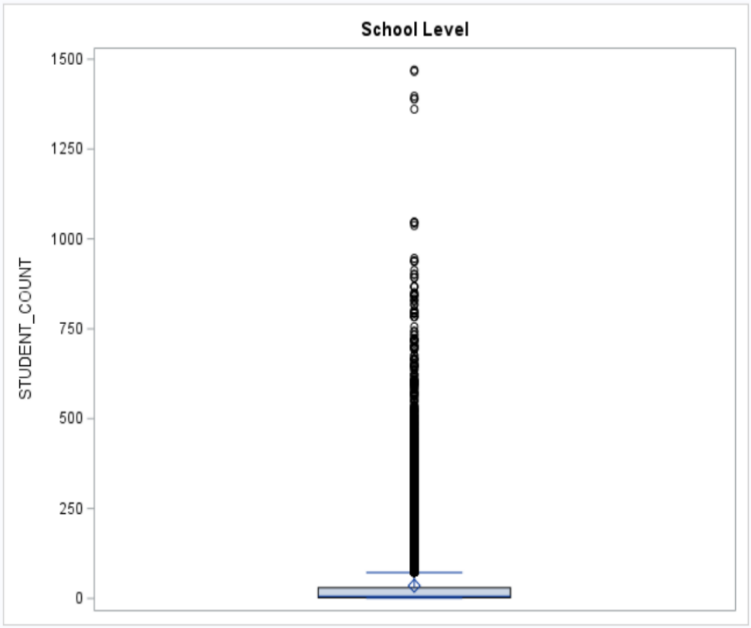
level. After that, we could see what data was left. It's important to note that each school had different membership cohorts, and each cohort was kept as a separate record, depending on whether the students were on a 4-, 5-, or 6-year plan, and whether they graduated in June and August. For the purposes of this test, we treated each cohort separately as if it were a different school.

Some of the Data Queries we ran were to calculate the mean number of students, using [PROC MEANS] on [STUDENT_COUNT] and calculating the frequency of course of study for students and the N/RC ratio for school type, using [PROC FREQ] on [COURSE_OF_STUDY_CODE] and [NRC_CODE]. The full SAS code is available in the Appendix.

Using these procedures, we were able to begin making box plots to reflect various aspects of the data that we found relevant to our research. The box plot at right (Fig. 4) shows all the data points of student count at the school level for Students with Disabilities and General Education Students. The first pattern we looked at was the Needs to Resource Capacity (N/RC) code for both subgroups combined.

Figure 4:

Student Count by School Level

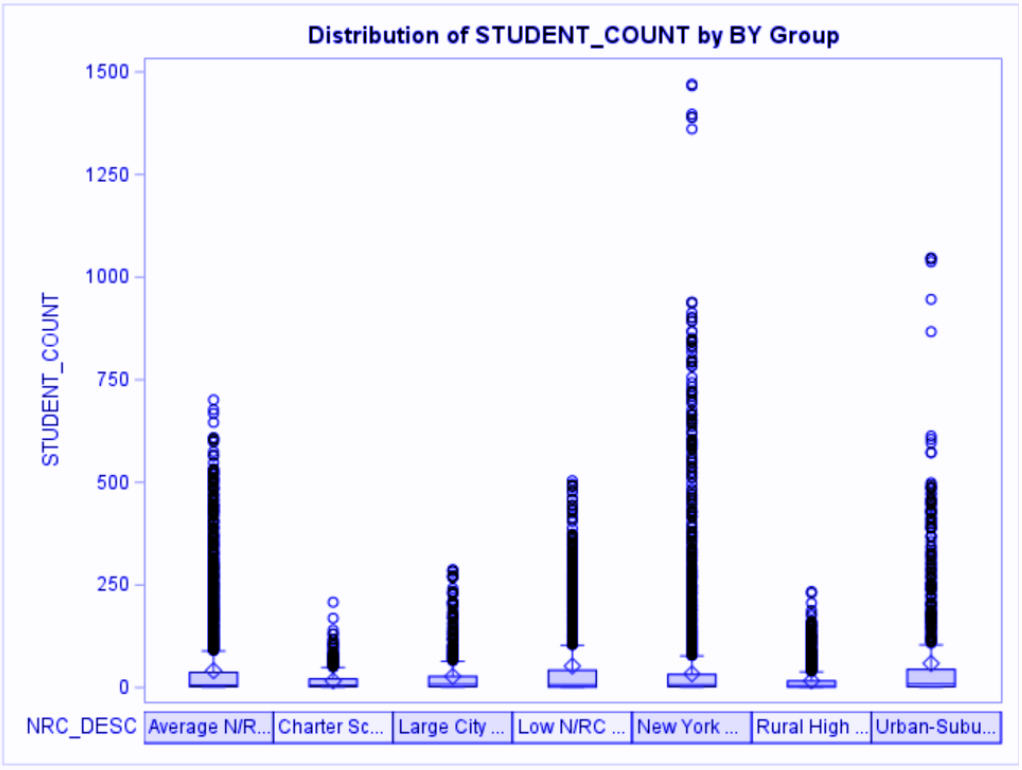


The following box plots show the total student count for each group of schools (Fig. 5), including both students with disabilities and general education students within those different school groups. Tables that show the data used to make each graph are included in the

Appendix. As might be expected, the highest student counts can be seen in New York City school districts, and the smallest student count is in charter schools.

Figure 5:

Distribution of All Students by School Type



Next, we broke the data down by subgroup, providing a boxplot for Students with Disabilities (Fig. 6) and General Education Students (Fig. 7), which can be seen on the following page. Based on these graphs, we could see that the distribution of students with disabilities follows mostly the same patterns as general education students, with the highest concentration in New York City schools and the lowest concentrations in charter and rural schools.

Figure 6:

Distribution of Students with Disabilities (SWD) across School Type

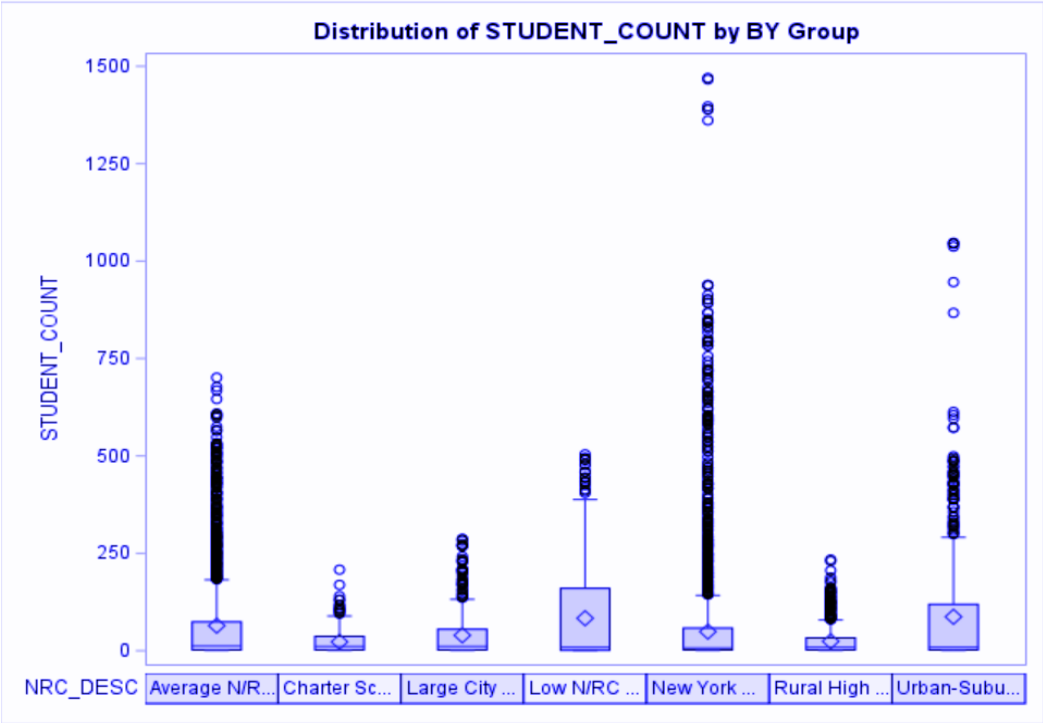
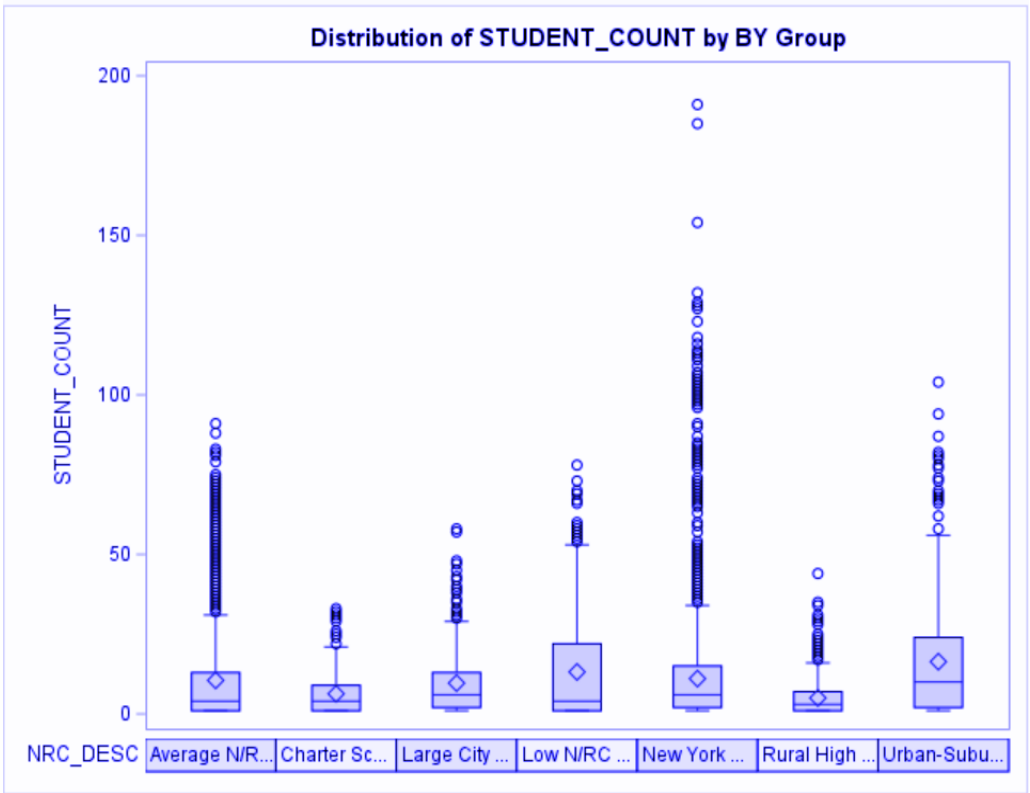


Figure 7:

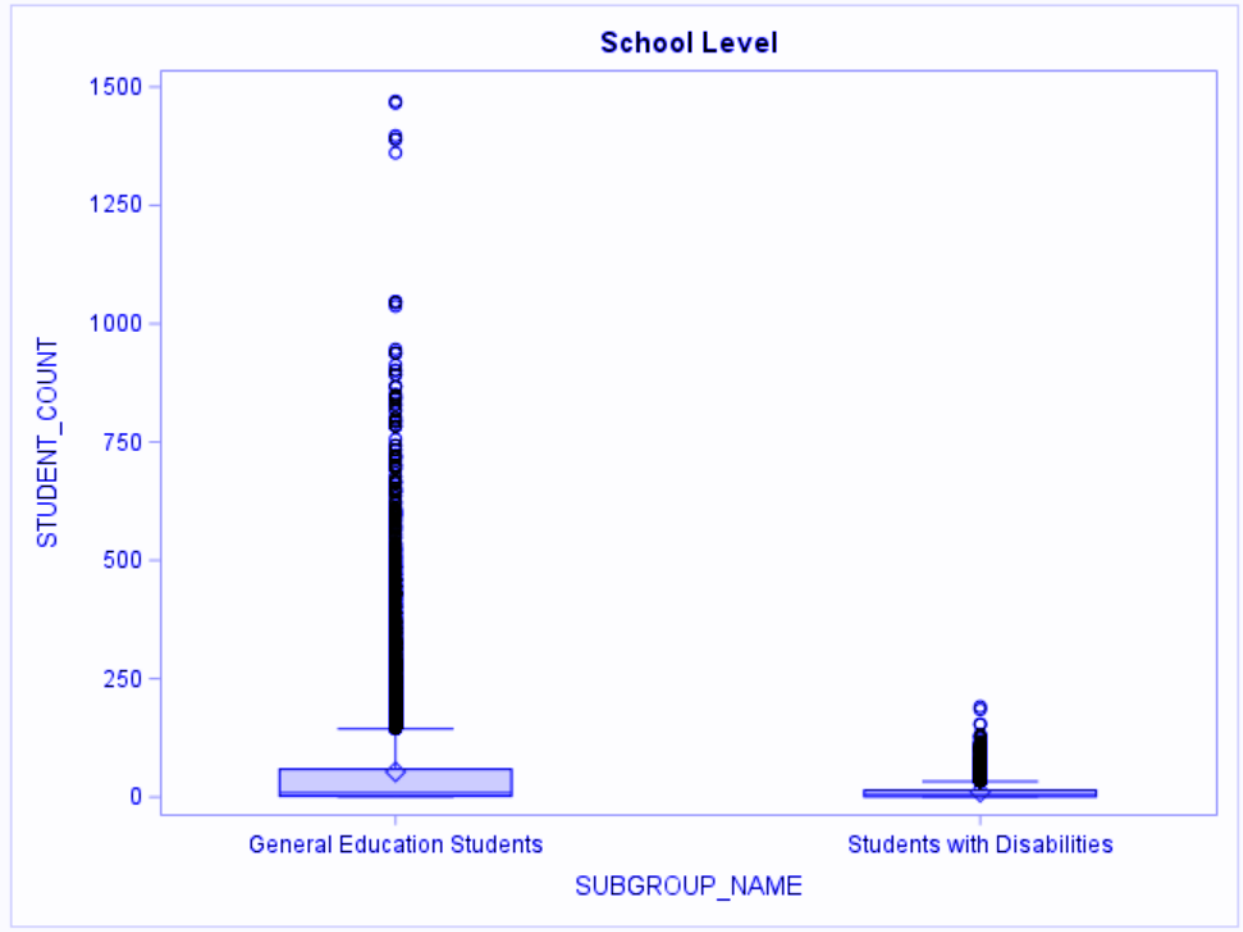
Distribution of General Ed Students across School Type



Next, we broke the data down by subgroup, providing a boxplot which separates the two subgroups of students with disabilities and general education students, to show the difference in student count between the two groups (Fig. 8).

Figure 7:

Comparing Student Count for Gen Ed Students with SWD



As you can see, the student counts for the different programs are much higher for General Education students than Students with Disabilities. This would be for the obvious reason that there are many more students in the general population than students that are classified as having a disability.

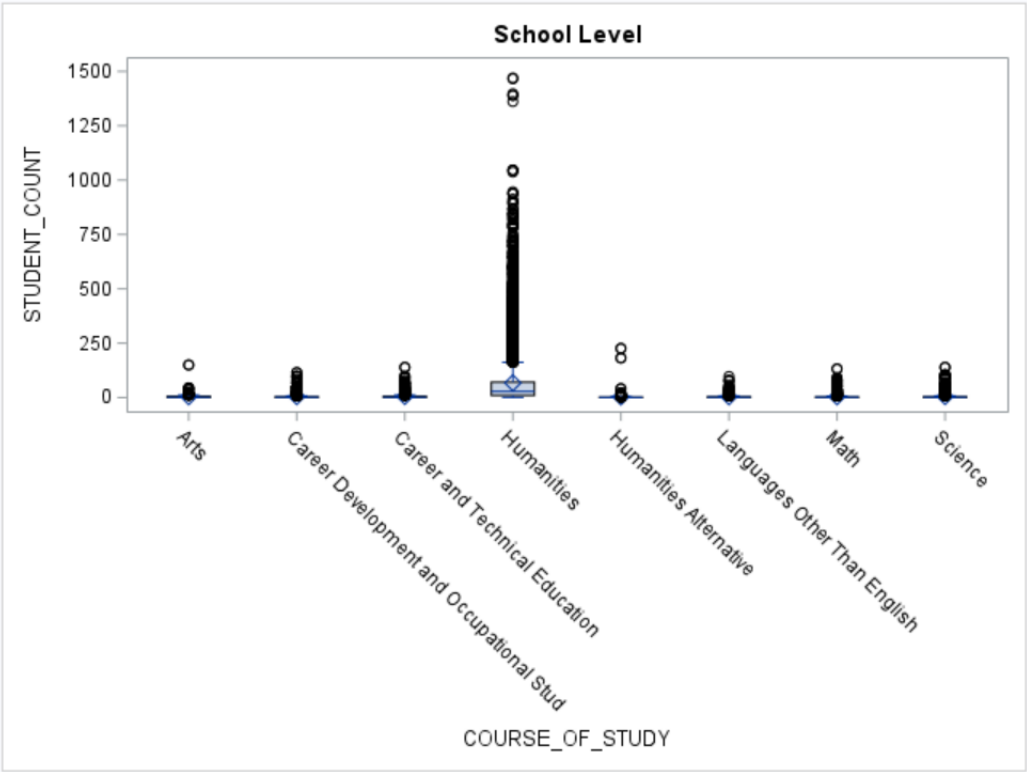
These graphs show how students with disabilities are distributed throughout New York's school districts and the methods used, but in the next section we will analyze our main area of focus:

course of study for students with disabilities, and how it compares to students in the general population. Since the size difference in the overall number of students in the two groups was so great, we wanted to compare the pattern of distribution for course of study in both groups, not the size of the groups themselves.

Next, we broke them down by course of study for students in both groups (Fig. 10).

Figure 8:

Course of Study for All Students



As you can see, the vast majority of students are enrolled in a course of study that focuses on "Humanities." This is true for both Students with Disabilities (Fig. 11) and General Education Students (Fig. 12), as illustrated by the graphs on the following page. We can see from these graphs that the patterns of higher numbers of students in "Humanities" held true for both Students with Disabilities and General Education Students.

Figure 9:

Course of Study for SWD

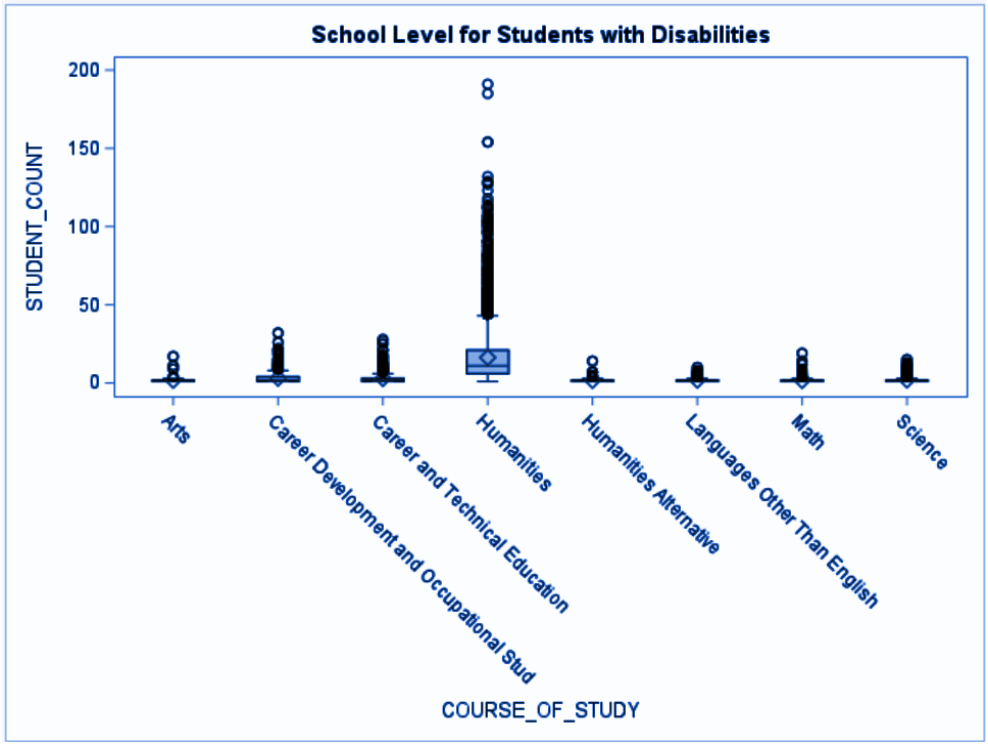


Figure 10:

Course of Study for Gen Ed Students

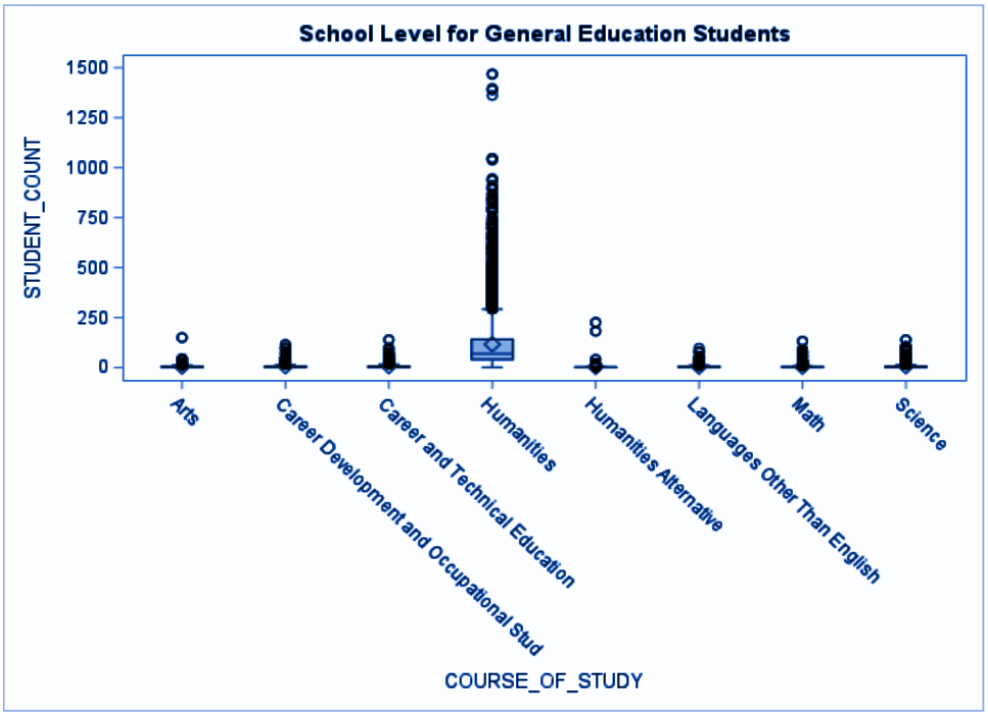
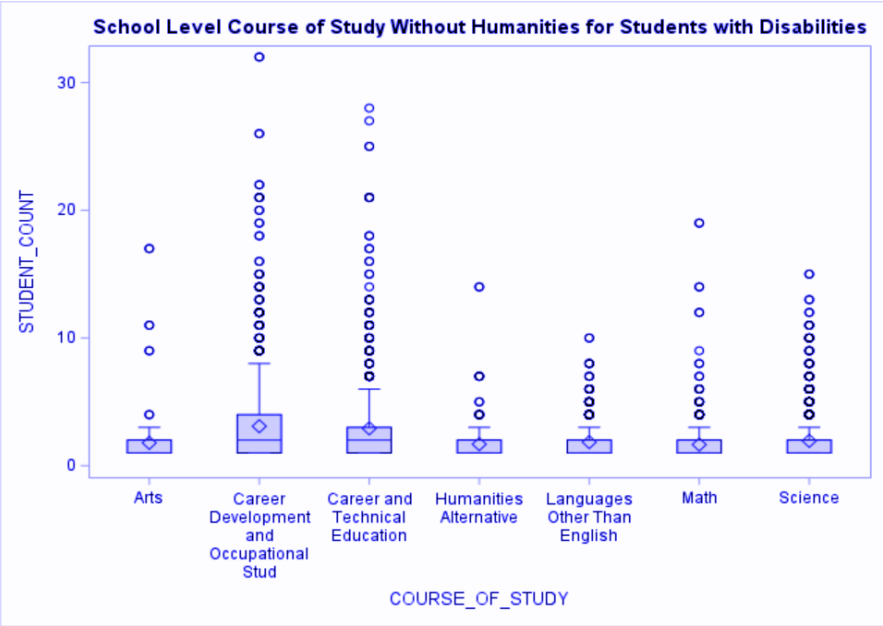


Figure 13:

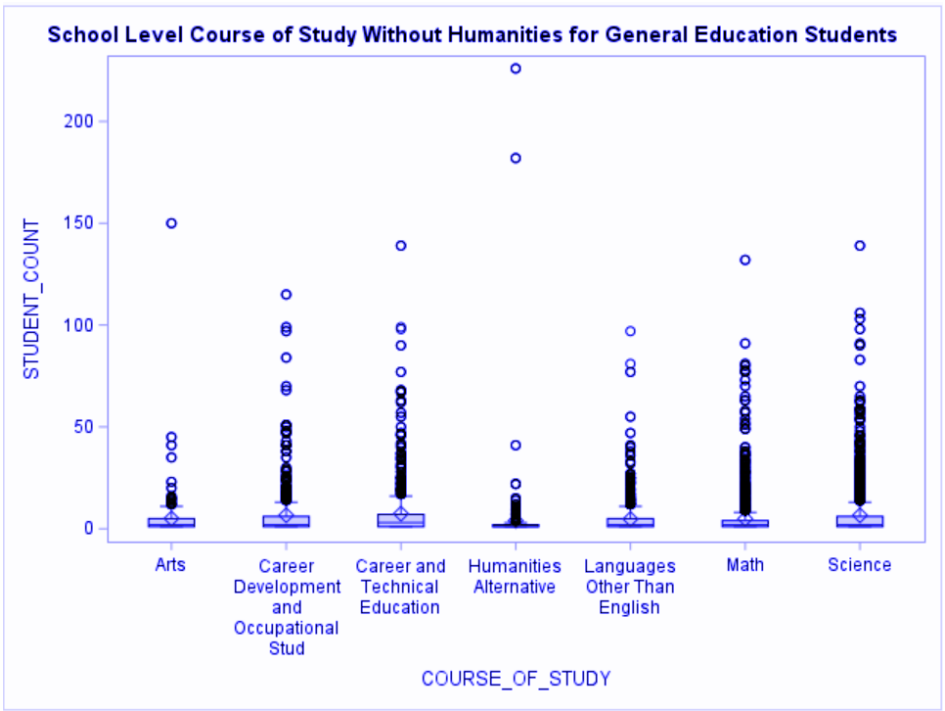
Course of Study without Humanities for SWD at the school level



Because "Humanities" trumped all other courses of study, we decided to remove it from the data so we could get a clearer picture of what was going on with the other courses of study.

Figure 11:

Course of Study without Humanities for Gen Ed students at the school level



By doing this, we were able to get a clearer picture of how course of study was distributed for both students with disabilities (Fig. 13) and general education students (Fig. 14).

Analysis & Interpretation

For the most part, our analysis of the data available in the New York State Department of Education's Pathways didn't tell us anything too surprising. We found that the distribution of students with disabilities across the different groupings of school district type essentially mirrored the distribution of general education students, only the numbers were much smaller for students with disabilities. The largest numbers could be found in New York City schools and the smallest numbers were found in rural and charter schools. We did not observe that students with disabilities were clustered in areas with high or low needs to resources ratios (NR/C), and so we can infer that the districts they are in are as capable of meeting their needs as they are the students in general education.

Similarly, when looking at course of study, we found that the distribution of students with disabilities more or less mirrored that of students in general education. The overwhelming majority of students of both groups are enrolled in Humanities as a course of study. We did find it somewhat concerning that so many students across the state were enrolled in one single course of study, which could lead to issues with employment and college admission in the future, but these issues do not seem to be affected by whether or not the students are classified as having a disability.

However, when we removed the Humanities category, we began to actually see something emerge from the data. While participation in programs other than Humanities is fairly well-distributed amongst general education students, with slightly higher participation in Math and Science programs, students with disabilities are much more likely to be enrolled in programs related to Career Development, Occupational Studies, and Technical Education. What we cannot tell from the data is what was the reason for these Students with Disabilities to enter these programs over others. Did they choose these programs for practical reasons, hoping that they would lead to career opportunities in the future? Or were they discouraged from pursuing other programs by parents/guardians and teachers, or other decision-makers in the schools and districts where they study?

Another thing that we cannot tell from these datasets is how effective these programs are in preparing the students with disabilities for future careers. Finally, it would be interesting to know why more general education students are not participating in career-related course of study programs. These questions would be difficult to answer with data of this kind, and are far beyond the scope of this type of research. However, in the following section we have made some recommendations for improving the dataset, as well as some suggestions for future research in this area.

Implications & Future Research

We believe that students with disabilities should have access to more diverse course of study options. They may be limited due to where they live (rural vs suburban vs urban - lack of services and/or internet) or they may feel like they have limitations due to their disability. We believe that programs can and should tailor options to these individuals depending on whether their disabilities are physical, intellectual, or developmental.

As a result of our research, we would like to see more course of study options become available to students with disabilities. After COVID, many more opportunities have presented themselves online. While the online learning environment has been shown to present novel challenges to students with disabilities (Gin et al., 2021), with the appropriate accommodations it has the potential to allow students with disabilities access to learning opportunities that would have been inaccessible before. For example, many students with disabilities may not have the independence skills or mobility to get places, but with online learning they would not have to. Another thing to consider is that smartphones have opened up a new world of communication to those with disabilities, for example permitting deaf people to work online in capacities not available before. The benefits and challenges of online learning for students with disabilities is an area that merits further research, which means there will be a need for more detailed datasets on the matter.

One shortcoming that we found with the Pathways dataset is that the disabilities are not further broken down into type. The Pathways database does not contain information on the type of disability that students have, although that data is available at the national level from the Institute of Education Sciences (IES)'s National Center for Education Statistics (NCES) (Table 204.50) and is tracked in Higher Education by the New York State Education Department for the year 2020-21. It would be interesting to see how the breakdown of course of study compared for students with different types of disability. The data source does not categorize students with disability by type of disability, and thus it doesn't allow us to explore the intersectionality between different factors which might affect a student's choice of study.

There are those with intellectual disabilities who may be limited to certain career paths, and there are those with a strong intellect who have sensory disabilities such as hearing and visual impairment and they might have more extensive career opportunities. Furthermore, many students might fit in more than one category, however, only their primary disability will show. For example, imagine a student who is visually-impaired, ELL , Hispanic and socioeconomically-disadvantaged.

Some steps that could be taken to improve the database would be to add more categories as indicated above, which indicate the type of disability in another column so that we could extrapolate more detailed data and determine career path trends by type of disability. This would allow us to better explore the intersectionality between different disability types, as well as other significant factors such as language use and socio-economic background, to better interpret data on student course of study and career path choices.

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Appendix

Table 1:

Total Student Count by School Group (Fig. 5)

Level	Average N/RC Districts	Charter Schools	Large City High N/RC Districts	Low N/RC Districts	New York City	Rural High N/RC Districts	Urban-Suburban High N/RC Districts
100% Max	701	208	287	504	1470	234	1047
75% Q3	37	21	27	42	32	16	44
50% Median	6	6	8	7	7	4	9
25% Q1	2	2	2	1	2	1	2
0% Min	1	1	1	1	1	1	1
Mode	1	1	1	1	1	1	1
Mean	41.1	16.49	27.3	52.5	33.4	4	9
N	7919	1931	1324	3426	10854	3445	1295

Table 2:

Student Count for Students with Disabilities (Fig. 6)

Level	Average N/RC Districts	Charter Schools	Large City High N/RC Districts	Low N/RC Districts	New York City	Rural High N/RC Districts	Urban-Suburban High N/RC Districts
100% Max	91	33	58	78	191	44	104
75% Q3	13	9	13	22	15	7	24
50% Median	4	4	6	4	6	3	10
25% Q1	1	1	2	1	2	3	2
0% Min	1	1	1	1	1	1	1
Mode	1	1	1	1	1	1	1
Mean	10.5	5.3	9.7	13.2	11.1	5.0	16.4
N	3418	736	543	1504	4470	1367	518

Table 3:

Student Count for General Education (Fig. 7)

Level	Average N/RC Districts	Charter Schools	Large City High N/RC Districts	Low N/RC Districts	New York City	Rural High N/RC Districts	Urban-Suburban High N/RC Districts
100% Max	702	208	287	504	1470	234	1047
75% Q3	74	37	55	160	58	33	119
50% Median	12	11	11	9	7	9	9
25% Q1	2	2	2	1	2	2	2
0% Min	1	1	1	1	1	1	1
Mode	1	1	1	1	1	1	1
Mean	64.3	22.8	39.6	83.6	49.0	24.1	87.1
N	4501	1195	781	1922	6384	2078	777

Table 4

Total Student Counts for Course of Study (Fig. 8)

Level	Arts	Career Development and Occupational Stud	Career and Technical Education	Humanities	Humanities Alternative	Languages Other Than English	Math	Science
100% Max	150	115	139	1470	226	97	132	139
75% Q3	5	4	5	71	2	4	3	4
50% Median	2	2	2	28	1	2	2	2
25% Q1	1	1	2	10	1	1	1	1
0% Min	1	1	1	1	1	1	1	1
Mode	1	1	1	1	1	1	1	1
Mean	4.2	4.7	5.4	67.3	3.3	3.9	4.1	5.0
N	571	2124	2011	14824	725	1929	3190	4812

Table 5

Student Counts for Course of Study, Students with Disabilities (Fig. 9)

Level	Arts	Career Development and Occupational Studies	Career and Technical Education	Humanities	Humanities Alternative	Languages Other Than English	Math	Science
100% Max	17	32	28	191	14	18	19	15
75% Q3	2	4	3	21	2	2	2	2
50% Median	1	2	2	11	1	2	1	1
25% Q1	1	1	1	6	1	1	1	1
0% Min	1	1	1	1	1	1	1	1
Mode	1	1	1	4	1	1	1	1
Mean	1.7	3.1	2.9	16.3	1.7	1.8	1.7	1.9
N	150	1135	871	7262	187	561	762	1626

Table 6:

Students Counts for Course of Study, General Education Students (Fig. 10)

Level	Arts	Career Development and Occupational Stud	Career and Technical Education	Humanities	Humanities Alternative	Languages Other Than English	Math	Science
100% Max	150	115	139	1470	226	97	32	139
75% Q3	5	6	7	141	2	5	4	5
50% Median	2	2	3	69	1	2	2	2
25% Q1	1	1	1	40	1	1	1	1
0% Min	1	1	3	1	1	7	1	1
Mode	1	1	1	51	1	7	1	1
Mean	5.0	6.6	7.4	116.4	3.9	4.7	4.9	5.6
N	421	989	1140	7562	538	1368	2428	3186