

# Exam Scores Project

## Step 1: Define Objectives

- Import Data into Database
- Showcase SQL abilities and techniques to analyze data
- Explore Patterns in Dataset
- Use SQL for data cleaning, summarizing, and querying
- Create visuals to showcase insights

## Step 2 : Objective Questions Answered

- What type of impact is there for test preparation on exam scores?
- What are the correlations between a parent's education and a student's performance?
- What are some general statistics that can be displayed?

## Step 3 : Perform Data Exploration

### 1. Viewing Basic Table Information

SQL 1\*

1

SELECT \*

2

FROM StudentsExamScores\_New

3

LIMIT 20;

4

	id	Gender	EthnicGroup	ParentEduc	LunchType	TestPrep	MathScore	ReadingScore	WritingScore
1	1	female	group B	bachelor's degree	standard	none	72.0	72.0	74.0
2	2	female	group C	some college	standard	completed	69.0	90.0	88.0
3	3	female	group B	master's degree	standard	none	90.0	95.0	93.0
4	4	male	group A	associate's degree	free/reduced	none	47.0	57.0	44.0
5	5	male	group C	some college	standard	none	76.0	78.0	75.0
6	6	female	group B	associate's degree	standard	none	71.0	83.0	78.0
7	7	female	group B	some college	standard	completed	88.0	95.0	92.0
8	8	male	group B	some college	free/reduced	none	40.0	43.0	39.0
9	9	male	group D	high school	free/reduced	completed	64.0	64.0	67.0
10	10	female	group B	high school	free/reduced	none	38.0	60.0	50.0
11	11	male	group C	associate's degree	standard	none	58.0	54.0	52.0
12	12	male	group D	associate's degree	standard	none	40.0	52.0	43.0
13	13	female	group B	high school	standard	none	65.0	81.0	73.0
14	14	male	group A	some college	standard	completed	78.0	72.0	70.0
15	15	female	group A	master's degree	standard	none	50.0	53.0	58.0
16	16	female	group C	some high school	standard	none	69.0	75.0	78.0
17	17	male	group C	high school	standard	none	88.0	89.0	86.0
18	18	female	group B	some high school	free/reduced	none	18.0	32.0	28.0
19	19	male	group C	master's degree	free/reduced	completed	46.0	42.0	46.0
20	20	female	group C	associate's degree	free/reduced	none	54.0	58.0	61.0

### 2. Checking for Null or missing values in Exam Scores

SQL 1\*

```

1  SELECT
2      COUNT(*) AS TotalRecords,
3      SUM(CASE WHEN MathScore IS NULL THEN 1 ELSE 0 END) AS MissingMathScores,
4      SUM(CASE WHEN ReadingScore IS NULL THEN 1 ELSE 0 END) AS MissingReadingScores,
5      SUM(CASE WHEN WritingScore IS NULL THEN 1 ELSE 0 END) AS MissingWritingScores
6  FROM StudentsExamScores_New;
7

```

	TotalRecords	MissingMathScores	MissingReadingScores	MissingWritingScores
1	30641	0	0	0

Execution finished without errors.  
 Result: 1 rows returned in 14ms  
 At line 1:  
 SELECT  
     COUNT(\*) AS TotalRecords,  
     SUM(CASE WHEN MathScore IS NULL THEN 1 ELSE 0 END) AS MissingMathScores,  
     SUM(CASE WHEN ReadingScore IS NULL THEN 1 ELSE 0 END) AS MissingReadingScores,  
     SUM(CASE WHEN WritingScore IS NULL THEN 1 ELSE 0 END) AS MissingWritingScores  
 FROM StudentsExamScores\_New;

### 3. Summarize Data

Database Structure | Browse Data | Edit Pragmas | Execute SQL

SQL 1\*

```

1  SELECT
2      ROUND(AVG(MathScore), 2) as AvgMathScore,
3      ROUND(AVG(ReadingScore), 2) as AvgReadingScore,
4      ROUND(AVG(WritingScore), 2) as AvgWritingScore
5  FROM StudentsExamScores_New
6

```

	AvgMathScore	AvgReadingScore	AvgWritingScore
1	66.75	69.62	68.47

**Avg score of each exam rounded to second decimal**

New Database

Open Database

Write Changes

Revert Changes

Database Structure

Browse Data

Edit Pragmas

Execute SQL

SQL 1\*

1

2

3

4


```
SELECT TestPrep, count(*) As CountOfEach
from StudentsExamScores_New
group by TestPrep;
```

	TestPrep	CountOfEach
1	completed	10573
2	none	20068

How many completed test prep and didn't.  $\frac{1}{3}$  of students completed.

#### 4. Analyze Data

Database Structure Browse Data Edit Pragmas Execute SQL



SQL 1\*

```
3      COUNT(*) AS CountOfStudents,
4      ROUND (AVG (MathScore), 2) AS AvgMathScore,
5      ROUND (AVG (ReadingScore), 2) AS AvgReadingScore,
6      ROUND (AVG (WritingScore), 2) AS AvgWritingScore,
7      ROUND (AVG ((MathScore + ReadingScore + WritingScore) / 3), 2) AS AvgOverallScore
8  FROM StudentsExamScores_New
9  GROUP BY TestPrep;
```

	TestPrep	CountOfStudents	AvgMathScore	AvgReadingScore	AvgWritingScore	AvgOverallScore
1	completed	10573	69.76	73.97	74.74	72.82
2	none	20068	65.16	67.34	65.17	65.89

Query showing avg scores for those completed and did not(rounded). Also showing average exam scores for both completed and none.

Database Structure

Browse Data

Edit Pragmas

Execute SQL

SQL 1\*

```
1 SELECT
2     Gender,
3     ROUND (Avg (MathScore), 2) AS AvgMathScore,
4     ROUND (Avg (ReadingScore), 2) AS AvgReadingScore,
5     ROUND (Avg (ReadingScore), 2) AS AvgReadingScore,
6     ROUND (Avg (MathScore + ReadingScore + WritingScore) / 3) AS AvgOverall
7 FROM StudentsExamScores_New
8 GROUP BY Gender;
9
```


	Gender	AvgMathScore	AvgReadingScore	AvgReadingScore	AvgOverall
1	female	64.26	73.09	73.09	70.0
2	male	69.27	66.11	66.11	66.0


Analyzing Gender performance per exam and overall.

New Database	Open Database	Write Changes	Revert Changes	Undo	Open Project
Database Structure	Browse Data	Edit Pragmas	Execute SQL		
SQL 1*					
<pre> 1 SELECT 2     TestPrep, 3     ROUND (Avg (MathScore), 2) AS AvgMathScore, 4     ROUND (Avg (ReadingScore), 2) AS AvgReadingScore, 5     ROUND (Avg (ReadingScore), 2) AS AvgReadingScore, 6     ROUND (Avg (MathScore + ReadingScore + WritingScore) / 3) AS AvgOverall 7 FROM StudentsExamScores_New 8 GROUP BY TestPrep; 9 </pre>					
	TestPrep	AvgMathScore	AvgReadingScore	AvgReadingScore	AvgOverall
1	completed	69.76	73.97	73.97	73.0
2	none	65.16	67.34	67.34	66.0

Analyzing the impact of test prep, test prep seemed to help

Database Structure Browse Data Edit Pragmas Execute SQL



SQL 1\* 

```
1  SELECT
2      LunchType,
3      ROUND (Avg (MathScore), 2) AS AvgMathScore,
4      ROUND (Avg (ReadingScore), 2) AS AvgReadingScore,
5      ROUND (Avg (ReadingScore), 2) AS AvgReadingScore,
6      ROUND (Avg (MathScore + ReadingScore + WritingScore) / 3) AS AvgOverall
7  FROM StudentsExamScores_New
8  GROUP BY LunchType;
9
```


	LunchType	AvgMathScore	AvgReadingScore	AvgReadingScore	AvgOverall
1	free/reduced	59.06	64.44	64.44	62.0
2	standard	70.9	72.42	72.42	72.0

Database Structure

Browse Data

Edit Pragmas

Execute SQL



SQL 1\*

```
1  SELECT
2      LunchType, Gender,
3      ROUND(Avg(MathScore), 2) AS AvgMathScore,
4      ROUND(Avg(ReadingScore), 2) AS AvgReadingScore,
5      ROUND(Avg(ReadingScore), 2) AS AvgReadingScore,
6      ROUND(Avg(MathScore + ReadingScore + WritingScore) / 3) AS AvgOverall
7  FROM StudentsExamScores_New
8  GROUP BY LunchType, Gender;
9
```

	LunchType	Gender	AvgMathScore	AvgReadingScore	AvgReadingScore	AvgOverall
1	free/reduced	female	56.59	67.97	67.97	64.0
2	free/reduced	male	61.54	60.88	60.88	60.0
3	standard	female	68.38	75.84	75.84	73.0
4	standard	male	73.46	68.94	68.94	70.0

Analyzed impact of lunchtype, free/reduced performed lower for both male and female

Database Structure    Browse Data    Edit Pragmas    Execute SQL					
SQL 1*					
1	SELECT				
2	ParentEduc,				
3	ROUND (Avg (MathScore), 2) AS AvgMathScore,				
4	ROUND (Avg (ReadingScore), 2) AS AvgReadingScore,				
5	ROUND (Avg (ReadingScore), 2) AS AvgReadingScore,				
6	ROUND (Avg (MathScore + ReadingScore + WritingScore) / 3) AS AvgOverall				
7	FROM StudentsExamScores_New				
8	GROUP BY ParentEduc				
9	ORDER BY AvgOverall;				
10					
11					
	ParentEduc	AvgMathScore	AvgReadingScore	AvgReadingScore	AvgOverall
1	some high school	62.93	65.83	65.83	64.0
2	high school	64.67	67.52	67.52	66.0
3	some college	66.6	69.53	69.53	68.0
4	associate's degree	68.53	71.37	71.37	70.0
5	bachelor's degree	70.64	73.38	73.38	72.0
6	master's degree	72.17	75.2	75.2	74.0

SQL 1*						
1	SELECT					
2	ParentEduc, TestPrep,					
3	ROUND (Avg (MathScore), 2) AS AvgMathScore,					
4	ROUND (Avg (ReadingScore), 2) AS AvgReadingScore,					
5	ROUND (Avg (ReadingScore), 2) AS AvgReadingScore,					
6	ROUND (Avg (MathScore + ReadingScore + WritingScore) / 3) AS AvgOverall					
7	FROM StudentsExamScores_New					
8	GROUP BY ParentEduc, TestPrep					
9	ORDER BY AvgOverall DESC, ParentEduc;					
10						
11						
	ParentEduc	TestPrep	AvgMathScore	AvgReadingScore	AvgReadingScore	AvgOverall
1	bachelor's degree	completed	74.3	78.31	78.31	78.0
2	master's degree	completed	74.48	79.42	79.42	78.0
3	associate's degree	completed	71.26	75.58	75.58	74.0
4	master's degree	none	70.99	73.06	73.06	72.0
5	some college	completed	69.51	73.33	73.33	72.0
6	bachelor's degree	none	68.69	70.76	70.76	70.0
7	high school	completed	67.59	71.89	71.89	70.0
8	some high school	completed	66.32	70.64	70.64	69.0
9	associate's degree	none	67.1	69.16	69.16	68.0
10	some college	none	65.03	67.46	67.46	66.0
11	high school	none	63.17	65.28	65.28	64.0
12	some high school	none	61.13	63.28	63.28	62.0

Parent education and student performance, higher ed for parents looks like high overall exam scores in those categories

## 5. Advanced/Additional Queries

1	SELECT									
2	*									
3	FROM StudentsExamScores New									
4	WHERE MathScore > 90 AND ReadingScore > 90 AND WritingScore > 90									
5	LIMIT 10;									
6										
7										
8										

	id	Gender	EthnicGroup	ParentEduc	LunchType	TestPrep	MathScore	ReadingScore	WritingScore
1	115	female	group E	bachelor's degree	standard	completed	99.0	100.0	100.0
2	150	male	group E	associate's degree	free/reduced	completed	100.0	100.0	93.0
3	166	female	group C	bachelor's degree	standard	completed	96.0	100.0	100.0
4	180	female	group D	some high school	standard	completed	97.0	100.0	100.0
5	452	female	group E	some college	standard	none	100.0	92.0	97.0
6	459	female	group E	bachelor's degree	standard	none	100.0	100.0	100.0
7	547	female	group A	some high school	standard	completed	92.0	100.0	97.0
8	567	female	group E	bachelor's degree	free/reduced	completed	92.0	100.0	100.0
9	572	male	group A	bachelor's degree	standard	none	91.0	96.0	92.0
10	595	female	group C	bachelor's degree	standard	completed	92.0	100.0	99.0

## Showing top 10 performers in all exam categories

1	SELECT			
2	AVG((MathScore + ReadingScore + WritingScore)/3) AS AvgOverallScore,			
3	EthnicGroup,			
4	TestPrep			
5	FROM StudentsExamScores New			
6	GROUP BY EthnicGroup, TestPrep			
7	ORDER BY AvgOverallScore DESC;			
8				

	AvgOverallScore	EthnicGroup	TestPrep
1	78.3479828713094	group E	completed
2	74.2938935987222	group D	completed
3	72.065147739409	group E	none
4	71.4213780918728	group C	completed
5	70.4174242424242	group B	completed
6	70.1082802547771	group A	completed
7	67.3967380997535	group D	none
8	64.4395638629284	group C	none
9	63.1796927187709	group B	none
10	62.5978398983482	group A	none

## Finding Correlations between ethnic groups and test prep

### 6. Visualize Data

Database Structure    Browse Data    Edit Pragmas    Execute SQL						
SQL 1*						
1	SELECT					
2	ParentEduc AS "Parental Education",					
3	TestPrep AS "Test Preparation Status",					
4	ROUND (AVG (MathScore), 2) AS "Avg Math Score",					
5	ROUND (AVG (ReadingScore), 2) AS "Avg Reading Score",					
6	ROUND (AVG (WritingScore), 2) AS "Avg Writing Score",					
7	ROUND (AVG (MathScore + ReadingScore + WritingScore) / 3, 2) AS "Avg Overall Score"					
8	FROM StudentsExamScores_New					
9	GROUP BY ParentEduc, TestPrep					
10	ORDER BY "Avg Overall Score" DESC, "Parental Education";					
11						

	Parental Education	Test Preparation Status	Avg Math Score	Avg Reading Score	Avg Writing Score	Avg Overall Score
1	master's degree	completed	74.48	79.42	81.18	78.36
2	bachelor's degree	completed	74.3	78.31	80.27	77.63
3	associate's degree	completed	71.26	75.58	76.39	74.41
4	some college	completed	69.51	73.33	74.52	72.46
5	master's degree	none	70.99	73.06	72.24	72.1
6	high school	completed	67.59	71.89	71.81	70.43
7	bachelor's degree	none	68.69	70.76	69.8	69.75
8	some high school	completed	66.32	70.64	70.62	69.19
9	associate's degree	none	67.1	69.16	67.22	67.83
10	some college	none	65.03	67.46	65.46	65.98
11	high school	none	63.17	65.28	62.36	63.6
12	some high school	none	61.13	63.28	60.21	61.54

Will export this queried tabled as csv into excel

parentEd&TestPrep 1						
File    Home    Insert    Share    Page Layout    Formulas    Data    Review    View    Automate    Help    Draw						
fx Insert Function    Σ    \$    %    <    >    A    B    C    D    E    F    G    H    I    J    K    L    M    N    O    P    Q    R    S    T    U    V    W    X    Y    Z    Name Manager    Show Formulas    Calculation Options    Automatic						
F20						
	A	B	C	D	E	F
1	Parental Education	Test Preparation Status	Avg Math Score	Avg Reading Score	Avg Writing Score	Avg Overall Score
2	master's degree	completed	74.48	79.42	81.18	78.36
3	bachelor's degree	completed	74.3	78.31	80.27	77.63
4	associate's degree	completed	71.26	75.58	76.39	74.41
5	some college	completed	69.51	73.33	74.52	72.46
6	master's degree	none	70.99	73.06	72.24	72.1
7	high school	completed	67.59	71.89	71.81	70.43
8	bachelor's degree	none	68.69	70.76	69.8	69.75
9	some high school	completed	66.32	70.64	70.62	69.19
10	associate's degree	none	67.1	69.16	67.22	67.83
11	some college	none	65.03	67.46	65.46	65.98
12	high school	none	63.17	65.28	62.36	63.6
13	some high school	none	61.13	63.28	60.21	61.54
14						
15						
16						
17						

### Impact of Test Prep on Average Scores by Parental Education

