

Year-to-Date Budget and Compensation Analysis

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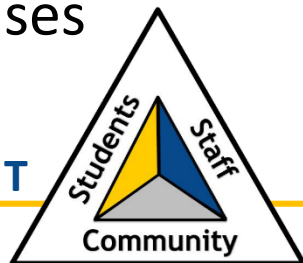
MUKWONAGO AREA SCHOOL DISTRICT

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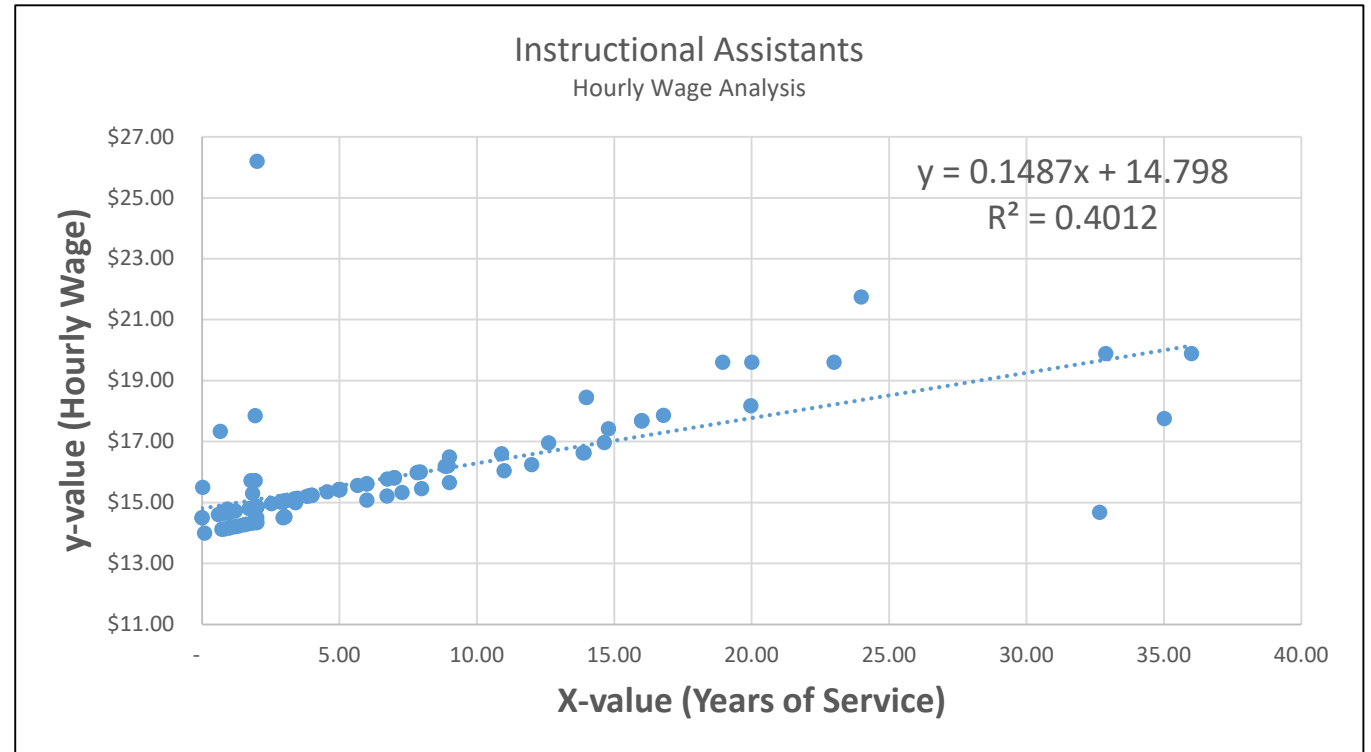
Year-to-Date Budget

- A periodic budget review can help reveal if your budget is on track, over-, or under-budget
- Many tools and products are available from third party vendors
- **Regression analysis in Microsoft Excel can provide the same information**
 - For those unfamiliar with regression analysis, it's easier than it sounds
- This presentation will focus on examples of how a regression analysis can be used
 - This will lead to actionable data that will uncover potential budget surpluses or deficits before the end of the year



What is a regression analysis?

- A statistical process to estimate the relationship between an x-variable and a y-variable
 - Assumption: x can predict y
- This graph is a regression analysis which plots years of service for instructional assistants against their hourly wage
 - x -value: *Years of Service*
 - y -value: *Hourly Wage*



Practical Example of a Regression Analysis

- In Mukwonago, we administer payroll every two weeks
 - 26 payrolls each fiscal year
- **Example:** consider our data following the 20th payroll of 2019-20
 - We will answer: are we on track to be over- or under-budget, and if so, by how much?
 - To do this, assume we have already exported our data into Excel from our payroll software and labeled all rows of data with a value of 1 through 26 (see next slide); this value is known as the “Pay Control #”
 - Our analysis will tell us what percentage of our budget we’ve spent cumulatively through the 20th payroll



Snapshot of Data

- Added Column X to the exported data
- This data denotes a value of 1 through 26
- This value is dependent on the Journal Date in Column M

A	I	J	K	L	M	X	Y	Z
ACCOUNT NO	JOURNAL DESCRIPTION	BUDGET	ENCUMBRANCE	EXPENDITURES	JOURNAL DATE	Pay Control #		
0-10-105-110-110000-000	19/20 Fd 10 27 Sal/Ben Budgets	\$ 1,242,312.00	\$ -	\$ -	1-Jul-19	1		
0-10-105-110-110000-000	Payroll 07-19-2019	\$ -	\$ -	\$ 240.00	19-Jul-19	2		
0-10-105-110-110000-000	Payroll 08-02-2019	\$ -	\$ -	\$ 195.00	2-Aug-19	3		
0-10-105-110-110000-000	Payroll 08-23-2019	\$ -	\$ -	\$ 44,023.36	23-Aug-19	4		
0-10-105-110-110000-000	Payroll 08-30-2019	\$ -	\$ -	\$ 50,100.30	30-Aug-19	5		
0-10-105-110-110000-000	Payroll 08-30-2019	\$ -	\$ -	\$ 80.00	30-Aug-19	5		
0-10-105-110-110000-000	Payroll 09-13-2019	\$ -	\$ -	\$ 886.47	13-Sep-19	6		
0-10-105-110-110000-000	Payroll 09-13-2019	\$ -	\$ -	\$ 47,061.83	13-Sep-19	6		
0-10-105-110-110000-000	Payroll 09-27-2019	\$ -	\$ -	\$ 47,061.83	27-Sep-19	7		
0-10-105-110-110000-000	Payroll 09-27-2019	\$ -	\$ -	\$ 1,996.38	27-Sep-19	7		
0-10-105-110-110000-000	Payroll 10-11-2019	\$ -	\$ -	\$ 1,639.48	11-Oct-19	8		
0-10-105-110-110000-000	Payroll 10-11-2019	\$ -	\$ -	\$ 48,040.19	11-Oct-19	8		
0-10-105-110-110000-000	Payroll 10-25-2019	\$ -	\$ -	\$ 48,287.78	25-Oct-19	9		
0-10-105-110-110000-000	Payroll 10-25-2019	\$ -	\$ -	\$ 1,469.25	25-Oct-19	9		
0-10-105-110-110000-000	Payroll 11-08-2019	\$ -	\$ -	\$ 48,674.46	8-Nov-19	10		
0-10-105-110-110000-000	Payroll 11-08-2019	\$ -	\$ -	\$ 1,468.48	8-Nov-19	10		
0-10-105-110-110000-000	Payroll 11-22-2019	\$ -	\$ -	\$ 48,273.53	22-Nov-19	11		
0-10-105-110-110000-000	Payroll 11-22-2019	\$ -	\$ -	\$ 1,830.42	22-Nov-19	11		
0-10-105-110-110000-000	Payroll 12-06-2019 Quarterlies	\$ -	\$ -	\$ 500.00	6-Dec-19	12		
0-10-105-110-110000-000	Payroll 12-06-2019	\$ -	\$ -	\$ 48,273.53	6-Dec-19	12		
0-10-105-110-110000-000	Payroll 12-06-2019	\$ -	\$ -	\$ 2,143.32	6-Dec-19	12		
0-10-105-110-110000-000	Payroll 12-20-2019	\$ -	\$ -	\$ 2,645.58	20-Dec-19	13		



Pivot Table: Summary of the Data Export

- This is our data summarized in a Pivot Table
- A Pivot Table is one of Excel's most powerful features
- The Pivot Table on the left is our **budgeted** amounts
- The right Pivot Table is our **actual** expenditures by Fund, Object, and Payroll Control #

Sum of BUDGET		Sum of EXPENDITURES									
Row Labels		Row Labels	1	2	3	4	5	6	7		
110	\$ 24,229,519	110	\$ (60,627)	\$ 299,255	\$ 232,808	\$ 837,906	\$ 844,149	\$ 921,806	\$ 900,404		
130	\$ 60,000	130	\$ (2,070)	\$ 1,360	\$ 2,751	\$ 2,134	\$ 1,814	\$ 1,403	\$ 4,233		
131	\$ 175,000	131	\$ -				\$ 1,509	\$ 8,295			
212	\$ 1,668,798	212	\$ 2,627	\$ 17,192	\$ 13,743	\$ 53,660	\$ 53,456	\$ 57,870	\$ 57,506		
218	\$ 250,000	218	\$ -								
219	\$ 129,750	219	\$ -								
222	\$ 1,853,558	222	\$ (4,637)	\$ 22,893	\$ 17,884	\$ 63,260	\$ 63,696	\$ 69,057	\$ 67,913		
231	\$ 39,140	231	\$ 392	\$ 239	\$ 386	\$ 1,340	\$ (2,168)	\$ 1,391	\$ 3,131		
241	\$ 5,473,151	241	\$ 29,757	\$ 126,653	\$ 29,426	\$ 168,558	\$ 24,509	\$ 177,975	\$ 262,498		
243	\$ 516,436	243	\$ 3,301	\$ 3,301	\$ 4,895	\$ 17,784	\$ 19,744	\$ 18,772	\$ 21,606		
251	\$ 68,408	251	\$ 464	\$ 464	\$ 454	\$ 2,316	\$ 2,312	\$ 2,417	\$ 2,423		
291	\$ 32,500	291	\$ -	\$ 500					\$ 8,152		
296	\$ 238,530	296	\$ 1,696	\$ 1,696	\$ 1,581	\$ 8,827	\$ 9,057	\$ 8,942	\$ 9,084		
258	\$ -	258	\$ -	\$ 31			\$ (369)		\$ 199		
249	\$ -	249	\$ 2,000	\$ 1,000					\$ 34,800		
10 Total	\$ 34,734,790	10 Total	\$ (27,098)	\$ 474,584	\$ 303,928	\$ 1,155,785	\$ 1,016,198	\$ 1,261,142	\$ 1,380,244		
27		27		110	\$ 6,790	\$ 9,708	\$ 19,014	\$ 159,581	\$ 158,257	\$ 180,552	\$ 232,910
				130	\$ -						\$ 918
				212	\$ (1,674)	\$ 675	\$ 1,232	\$ 10,450	\$ 10,258	\$ 11,654	\$ 14,748
				218	\$ -						
				219	\$ -						

Progression of Fund 10 Salary Budget

- In Mukwonago, we budget for three types of salary objects
 - 110 – Salaries
 - This accounts for most employees primary forms of pay
 - 130 – Substitutes
 - This accounts for when teachers give up their prep periods and cover for other teachers who are out
 - 131 – Supervision
 - This accounts for when teacher give up their prep periods and supervise students at lunch, recess; also includes recess monitors & other supervision-like duties
- **We will ultimately place all three objects together in one big bucket**



Progression of Fund 10 Salary Budget

- Note the data below
 - This is the same data from our Pivot Tables, summarized slightly differently
- Following 3rd payroll of 2019-20, we spent 1.9% of the salary budget
 - Note: the negative values in the first payroll represents journal entries

Mukwonago Area School District					
2019-20 Salary Projection					
<i>Fund 10</i>					
Salary	Final Budget	1	2	3	Total
110 - Salaries	\$ 24,229,519	(60,627)	299,255	232,808	471,436
130 - Substitutes	\$ 60,000	(2,070)	1,360	2,751	2,040
131 - Supervision	\$ 175,000	-	-	-	-
Total Salaries	24,464,519	(62,698)	300,614	235,559	473,475
<i>Cumulative</i>		-0.3%	1.0%	1.9%	1.9%



Progression of Fund 10 Salary Budget

- Following 4th payroll of 2019-20, we spent 5.4% of the salary budget

Mukwonago Area School District						
2019-20 Salary Projection						
<i>Fund 10</i>						
Salary	Final Budget	1	2	3	4	Total
110 - Salaries	\$ 24,229,519	(60,627)	299,255	232,808	837,906	1,309,342
130 - Substitutes	\$ 60,000	(2,070)	1,360	2,751	2,134	4,173
131 - Supervision	\$ 175,000	-	-	-	-	-
Total Salaries	24,464,519	(62,698)	300,614	235,559	840,040	1,313,515
<i>Cumulative</i>		<i>-0.3%</i>	<i>1.0%</i>	<i>1.9%</i>	<i>5.4%</i>	<i>5.4%</i>



Progression of Fund 10 Salary Budget






- Following 5th payroll of 2019-20, we spent 8.8% of the salary budget

Mukwonago Area School District							
2019-20 Salary Projection							
<i>Fund 10</i>							
Salary	Final Budget	1	2	3	4	5	Total
110 - Salaries	\$ 24,229,519	(60,627)	299,255	232,808	837,906	844,149	2,153,490
130 - Substitutes	\$ 60,000	(2,070)	1,360	2,751	2,134	1,814	5,987
131 - Supervision	\$ 175,000	-	-	-	-	-	-
Total Salaries	24,464,519	(62,698)	300,614	235,559	840,040	845,963	2,159,478
<i>Cumulative</i>		-0.3%	1.0%	1.9%	5.4%	8.8%	8.8%



Progression of Fund 10 Salary Budget

- Continue the progression every two-weeks
- Following each payroll, analyze and monitor your data
- Save each Excel file to keep track of the progression

 2019-20 Salary Projection - 18.xlsx	3/10/2020 1:59 PM	Microsoft Excel W...	3,099 KB
 2019-20 Salary Projection - 19.xlsx	3/24/2020 12:10 PM	Microsoft Excel W...	3,467 KB
 2019-20 Salary Projection - 20.xlsx	3/24/2020 12:22 PM	Microsoft Excel W...	3,468 KB
 2019-20 Salary Projection - 21.xlsx	4/9/2020 3:55 PM	Microsoft Excel W...	3,619 KB
 2019-20 Salary Projection - 22.xlsx	5/6/2020 6:11 PM	Microsoft Excel W...	3,815 KB



Progression of Fund 10 Salary Budget

- *Fast forward....*
- Following 20th payroll of 2019-20, 66.6% of the salary budget is spent

Mukwonago Area School District							
2019-20 Salary Projection							
<i>Fund 10</i>							
Salary	Final Budget	16	17	18	19	20	Total
110 - Salaries	\$ 24,229,519	945,217	913,064	905,430	996,185	901,290	16,123,934
130 - Substitutes	\$ 60,000	2,735	1,872	3,350	2,574	2,782	46,634
131 - Supervision	\$ 175,000	8,715	7,528	9,310	8,718	7,561	112,682
Total Salaries	24,464,519	956,666	922,463	918,090	1,007,477	911,632	16,283,250
<i>Cumulative</i>		51.2%	55.0%	58.7%	62.8%	66.6%	66.6%



What can we learn from our data?

- Consider the 20th payroll data point into a historical context
- Look back at prior years' data

Mukwonago Area School District												
2019-20 Salary Projection												
Fund 10 - Salary												
Year	15	16	17	18	19	20	21	22	23	24	25	26
2014-15	48.3%	52.2%	56.0%	59.9%	64.0%	67.7%	71.5%	75.2%	79.0%	83.0%	98.7%	100.1%
2015-16	47.9%	51.8%	55.7%	59.6%	63.5%	67.3%	70.9%	74.7%	78.5%	82.4%	97.8%	99.1%
2016-17	47.1%	50.8%	54.5%	58.4%	62.4%	66.2%	70.0%	73.7%	77.2%	81.0%	96.2%	98.6%
2017-18	48.3%	52.0%	55.9%	59.8%	63.6%	67.5%	71.2%	75.0%	78.8%	82.6%	98.2%	100.6%
2018-19	46.8%	50.6%	54.3%	58.1%	62.0%	65.7%	69.4%	73.1%	76.8%	80.5%	95.7%	98.2%
2019-20	47.3%	51.2%	55.0%	58.7%	62.8%	66.6%						



Regression Analysis

- Working with historical data, use the 20th payroll as independent variable and the 26th payroll as dependent variable
 - In other words: the 26th payroll depends on the cumulative activity through the first 20 payrolls
 - The 20th payroll can predict the 26th payroll
- x -value: 20th payroll
- y -value: 26th payroll



Regression Analysis

Mukwonago Area School District												
2019-20 Salary Projection												
Fund 10 - Salary						x						y
Year	15	16	17	18	19	20	21	22	23	24	25	26
2014-15	48.3%	52.2%	56.0%	59.9%	64.0%	67.7%	71.5%	75.2%	79.0%	83.0%	98.7%	100.1%
2015-16	47.9%	51.8%	55.7%	59.6%	63.5%	67.3%	70.9%	74.7%	78.5%	82.4%	97.8%	99.1%
2016-17	47.1%	50.8%	54.5%	58.4%	62.4%	66.2%	70.0%	73.7%	77.2%	81.0%	96.2%	98.6%
2017-18	48.3%	52.0%	55.9%	59.8%	63.6%	67.5%	71.2%	75.0%	78.8%	82.6%	98.2%	100.6%
2018-19	46.8%	50.6%	54.3%	58.1%	62.0%	65.7%	69.4%	73.1%	76.8%	80.5%	95.7%	98.2%
2019-20	47.3%	51.2%	55.0%	58.7%	62.8%	66.6%						?

- We can use the 20th payroll in 2019-20 to predict the final value

Regression Analysis

Mukwonago Area School District												
2019-20 Salary Projection												
Fund 10 - Salary						x						y
Year	15	16	17	18	19	20	21	22	23	24	25	26
2014-15	48.3%	52.2%	56.0%	59.9%	64.0%	67.7%	71.5%	75.2%	79.0%	83.0%	98.7%	100.1%
2015-16	47.9%	51.8%	55.7%	59.6%	63.5%	67.3%	70.9%	74.7%	78.5%	82.4%	97.8%	99.1%
2016-17	47.1%	50.8%	54.5%	58.4%	62.4%	66.2%	70.0%	73.7%	77.2%	81.0%	96.2%	98.6%
2017-18	48.3%	52.0%	55.9%	59.8%	63.6%	67.5%	71.2%	75.0%	78.8%	82.6%	98.2%	100.6%
2018-19	46.8%	50.6%	54.3%	58.1%	62.0%	65.7%	69.4%	73.1%	76.8%	80.5%	95.7%	98.2%
2019-20	47.3%	51.2%	55.0%	58.7%	62.8%	66.6%						

- The five (x, y) data points are: $(67.7\%, 100.1\%)$ $(67.3\%, 99.1\%)$ $(66.2\%, 98.6\%)$ $(67.5, \% 100.6\%)$ $(65.7\%, 98.2\%)$
- Let's plot these values in a graph



Make Scatter Graph

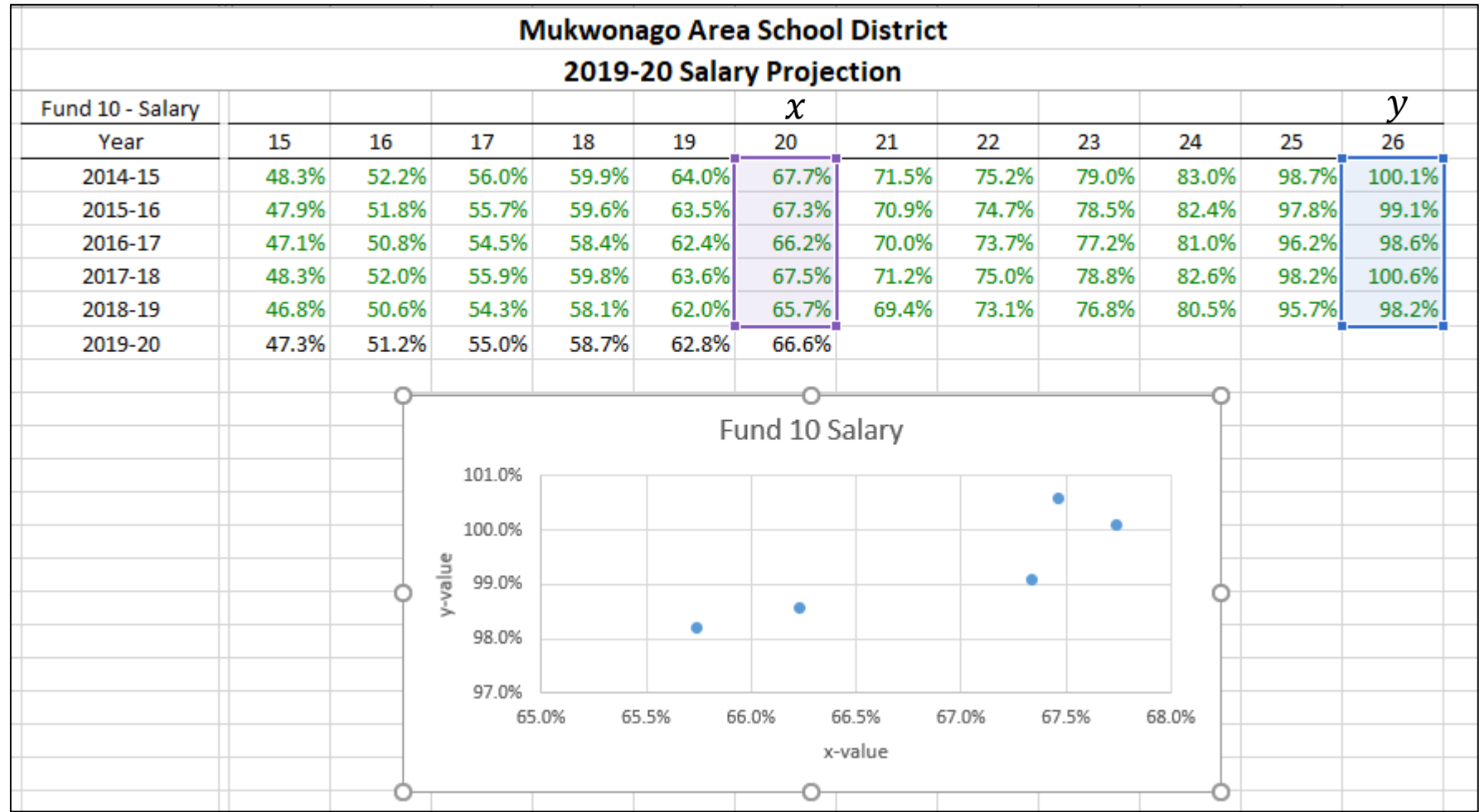
- A graph can be created by going to “Insert”
- Then, click on the Scatter graph within the Charts area

Mukwonago Area School District												
2019-20 Salary Projection												
Fund 10 - Salary												
Year	15	16	17	18	19	20	21	22	23	24	25	26
2014-15	48.3%	52.2%	56.0%	59.9%	64.0%	67.7%	71.5%	75.2%	79.0%	83.0%	98.7%	100.1%



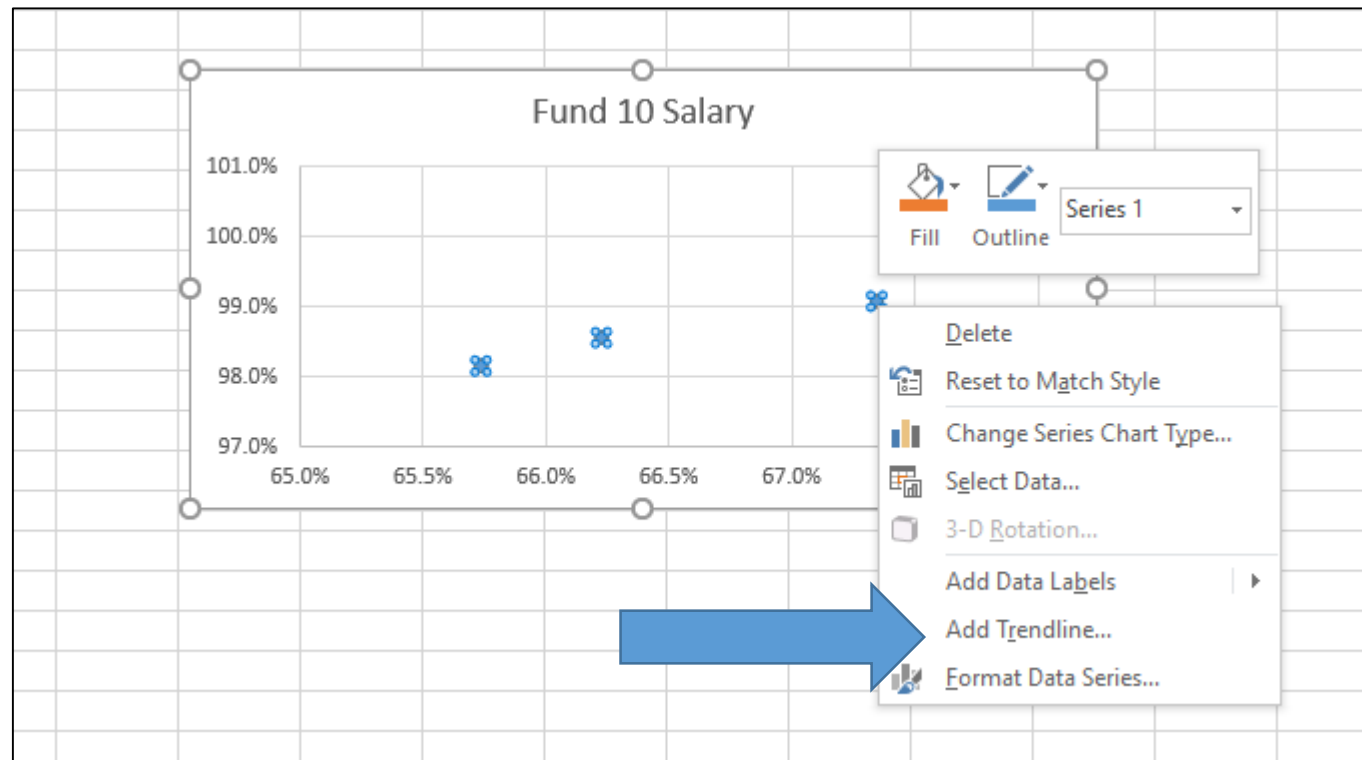
Regression Analysis

- The following graph will appear
- The x-values are in the purple box
- The y-values are in the blue box

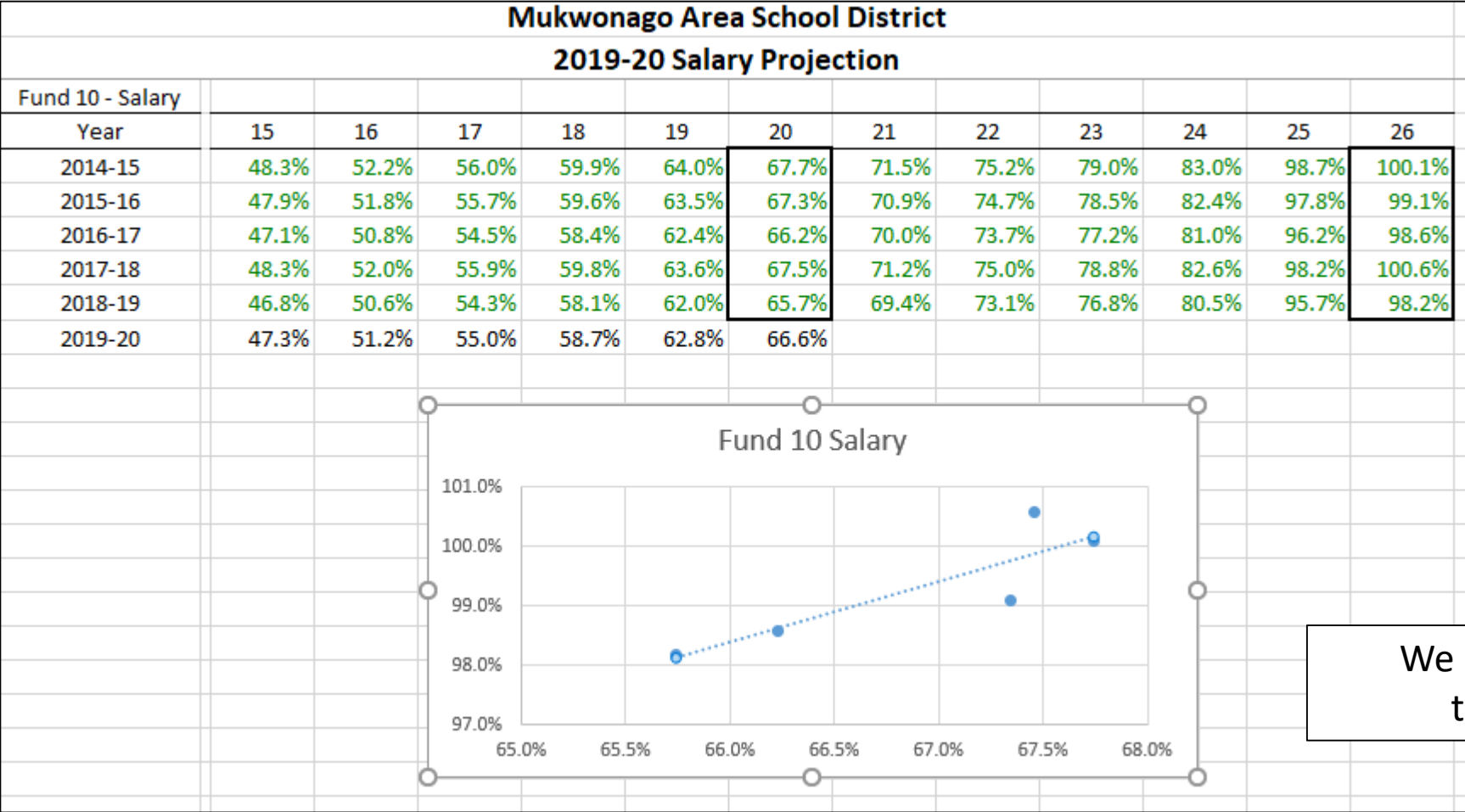


Regression Analysis

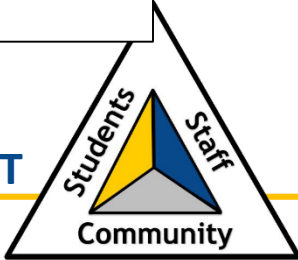
- Once a graph is created, we can add a trendline
- To do so, right-click inside of the graph and choose “Add Trendline”



Regression Analysis



We now have a trendline



Regression Analysis

- When adding the “Trendline”, the following menu will appear on righthand side
- Choose “Trendline Options” on top
- Then, select “Display Equation on chart” and “Display R-squared value on chart”

Format Trendline

Trendline Options

Trendline Options

Exponential

Linear

Logarithmic

Polynomial Order 2

Power

Moving Average Period 2

Trendline Name

Automatic Linear (Series1)

Custom

Forecast

Forward 0.0 period

Backward 0.0 period

Set Intercept 0.0

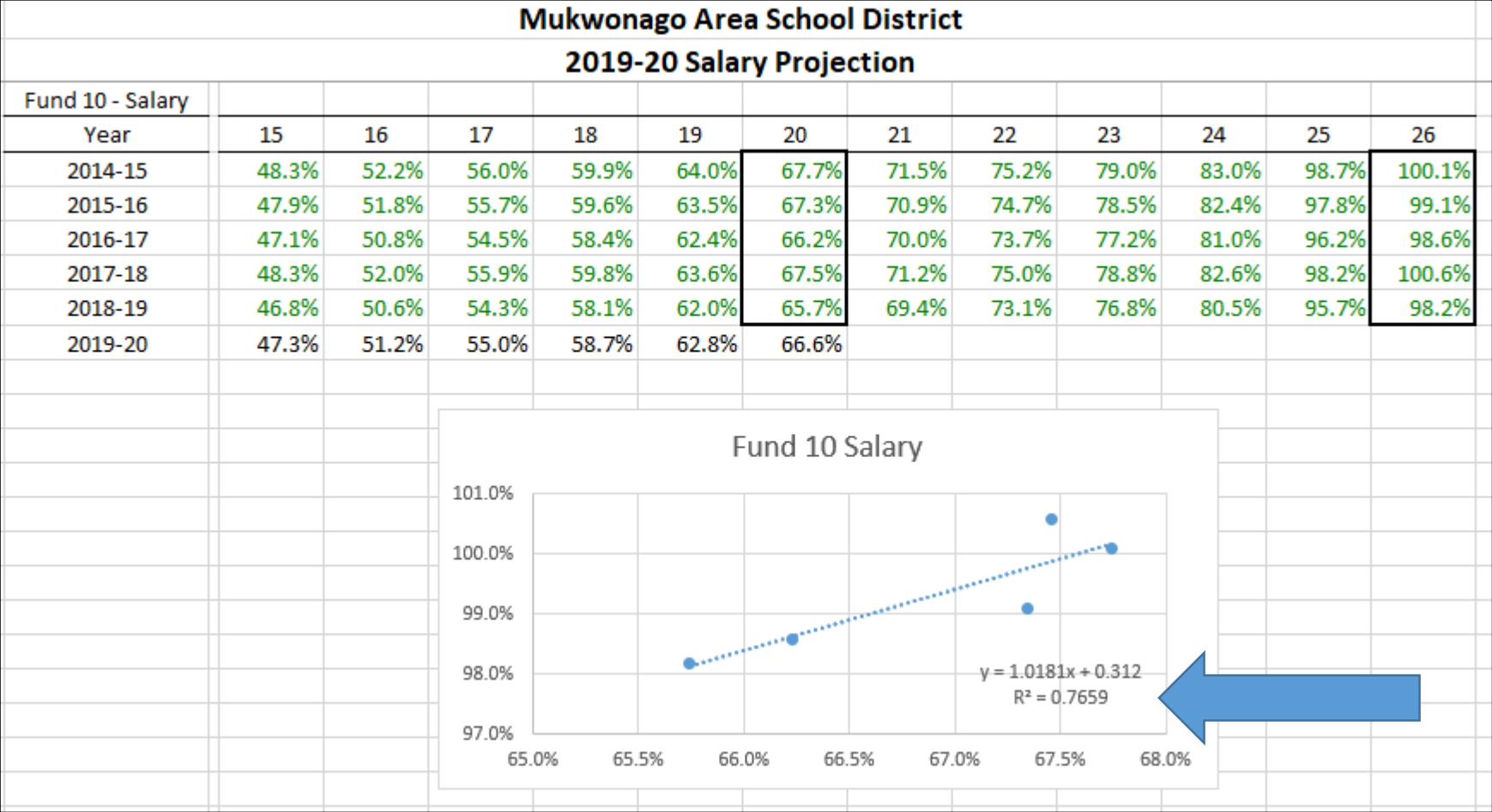
Display Equation on chart

Display R-squared value on chart



Regression Analysis

- After doing so, the following equation and R-squared value will appear in your graph
- **WE CAN NOW MAKE PREDICTIONS!!**
- R^2 will be further defined in a few moments



Regression Analysis

- The previous five years of data suggests the following equation will “predict” the final data value as follows:

$$y = 1.0181x + 0.312$$

- In 2019-20, the 20th payroll data indicates we have spent 66.6% of our budgeted amount. We can plug this value into our equation and predict our final position as follows:

$$y = 1.0181 * (.666) + 0.312 = 0.99$$

- Note: 66.6% is 0.666 in decimal form



Regression Analysis

$$y = 1.0181x + 0.312$$

$$y = 1.0181(.666) + 0.312 = 0.99$$

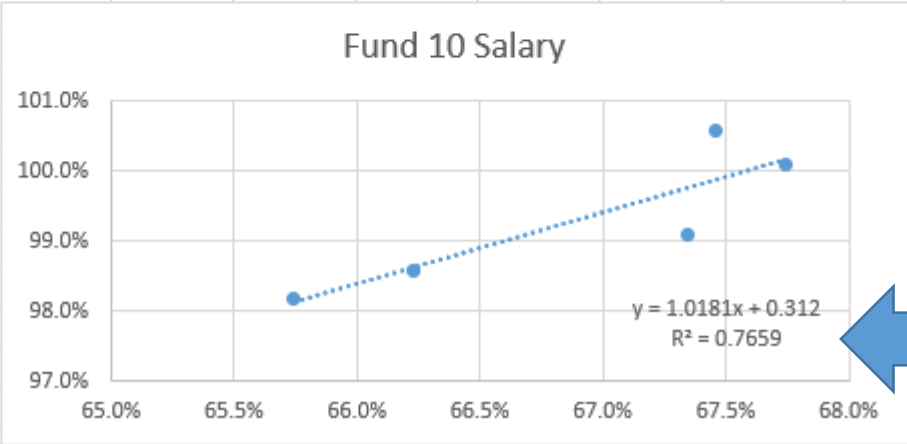
- This tells us that following the 20th payroll, we can expect that we will spend 99% of our Fund 10 salary budget
- **In other words, we can expect to be 1% under budget**
 - Note: this assumes that the current year salary expenditures are developing and will continue to develop as did the previous five years



Regression Analysis

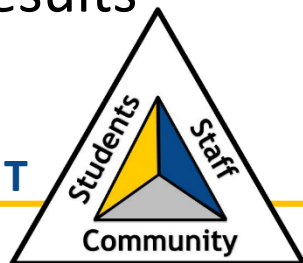
- Let's backup for a moment...
- What is the R² value and what does it represent?

Mukwonago Area School District												
2019-20 Salary Projection												
Fund 10 - Salary												
Year	15	16	17	18	19	20	21	22	23	24	25	26
2014-15	48.3%	52.2%	56.0%	59.9%	64.0%	67.7%	71.5%	75.2%	79.0%	83.0%	98.7%	100.1%
2015-16	47.9%	51.8%	55.7%	59.6%	63.5%	67.3%	70.9%	74.7%	78.5%	82.4%	97.8%	99.1%
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2017-18	48.3%	52.0%	55.9%	59.8%	63.6%	67.5%	71.2%	75.0%	78.8%	82.6%	98.2%	100.6%
2018-19	46.8%	50.6%	54.3%	58.1%	62.0%	65.7%	69.4%	73.1%	76.8%	80.5%	95.7%	98.2%
2019-20	47.3%	51.2%	55.0%	58.7%	62.8%	66.6%						



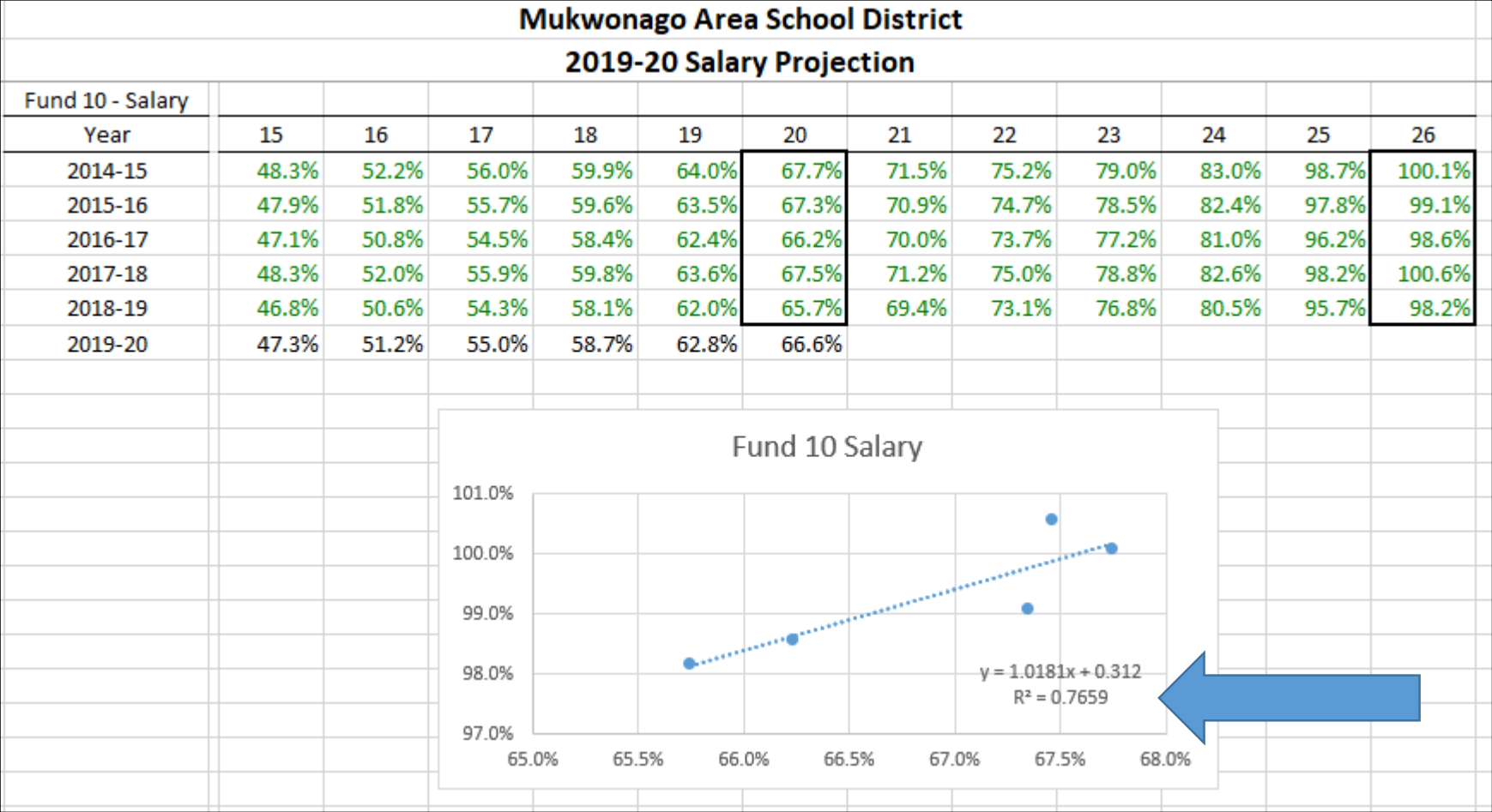
R² Value

- The “r-squared” value of a data set tells us how well our data fits the regression line
- The “r-squared” value is used to measure how accurately the x -value can predict the y -value
- The R² value will always be between 0 and 1
 - The closer to 1, the more dependable your data is (you can trust your data)
 - The closer to 0, the less dependable your data is (you should think twice)
 - From a practicality standpoint, we want the R² value is be 0.6 or higher
 - If the R² value is less than 0.6, we should not put too much stock in the results

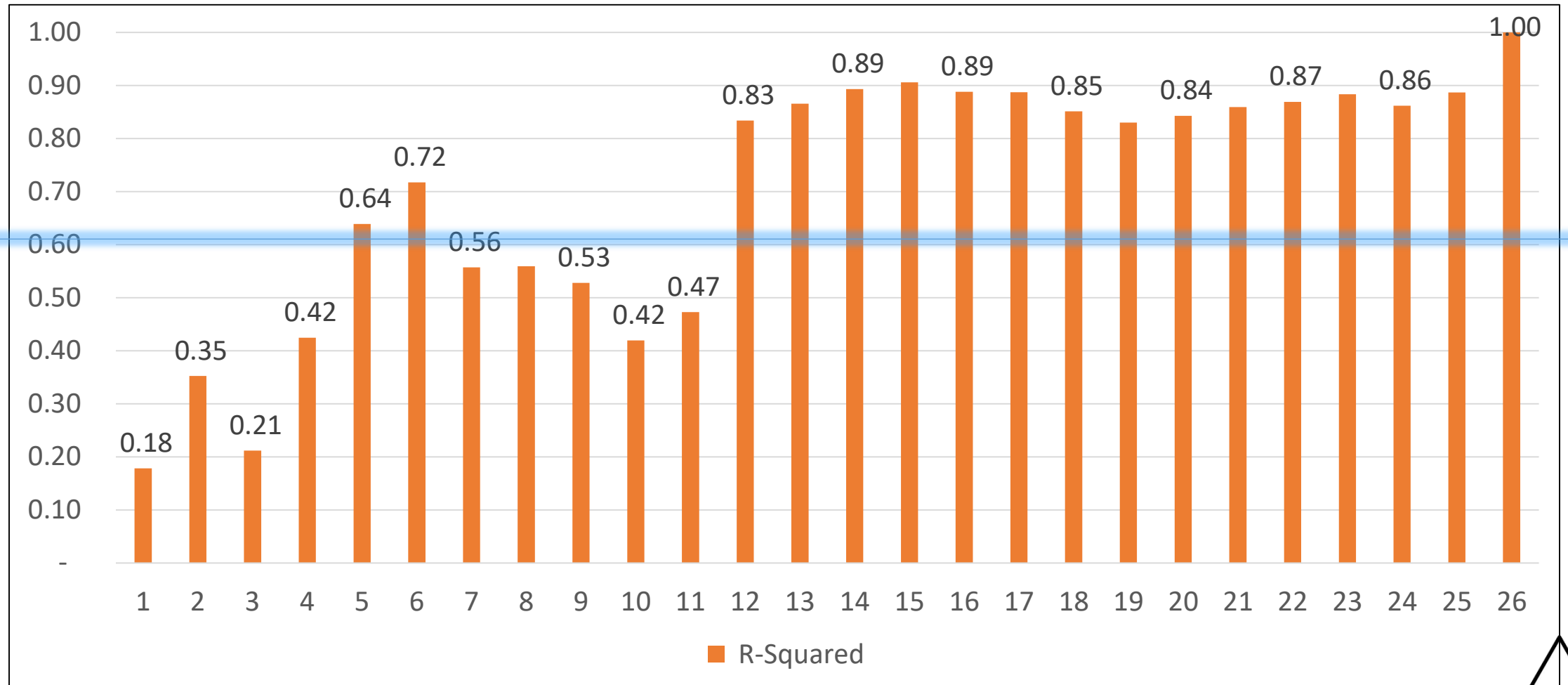


Regression Analysis

- In our case study, with the R^2 value totaling 0.7659, we should be able to trust the results of our analysis



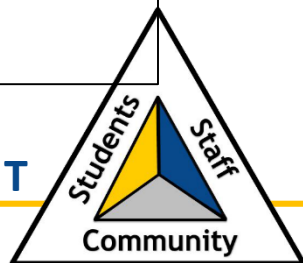
More on R²....



■ R-Squared

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Replicate the analysis....

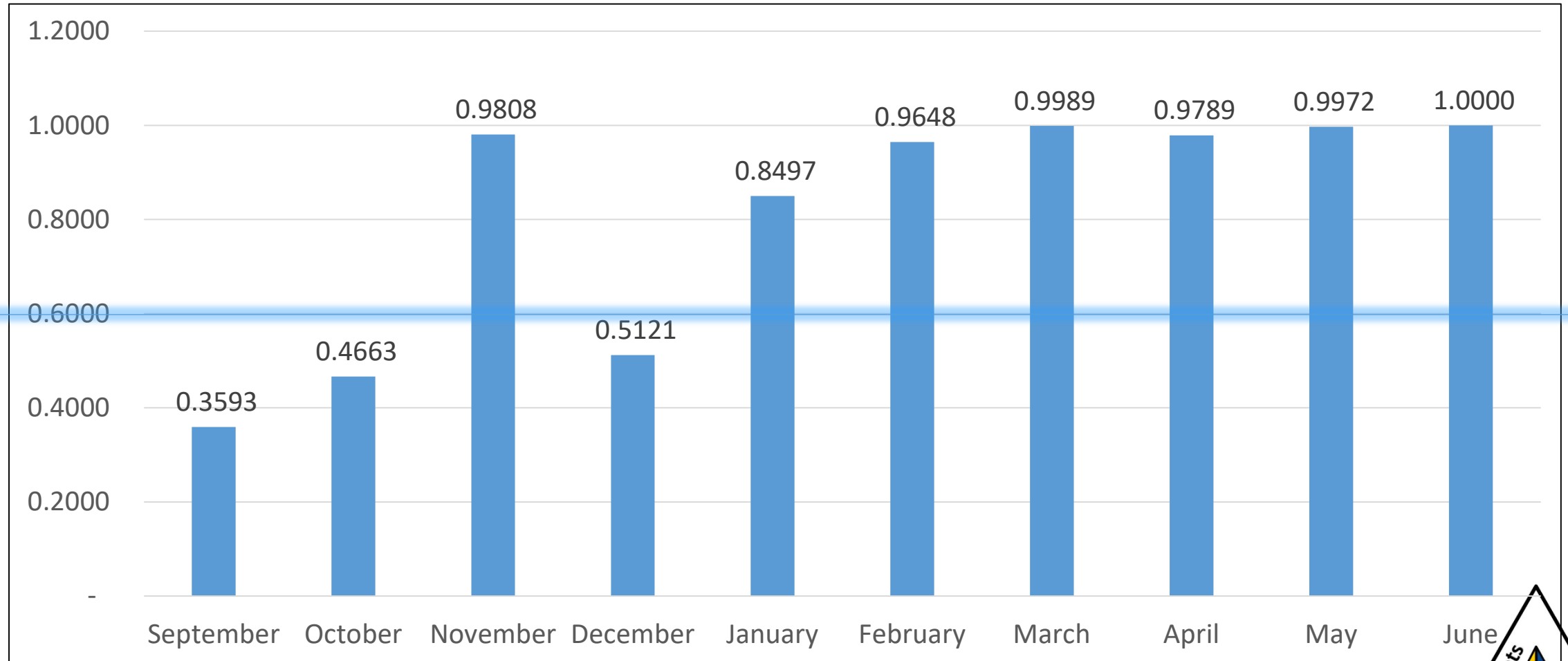
- We can replicate this analysis for any expenditure
 - Perform this analysis on any expenditure that can be tracked on a month to month basis
- Example: substitute teacher costs
 - Since sub costs are not dependent on a payroll cycle, we can track these expenditures in a month-to-month manner
 - The following data set summarizes Mukwonago's substitute teacher costs



Replicate the analysis....

Mukwonago Area School District														
Regular Education Substitute Expenditures														
As of October 6, 2020														
Month-to-Month Progression														
Fund 10	Final Budget	July	August	September	October	November	December	January	February	March	April	May	June	Total
2014-15	\$ 284,734	\$ 214	\$ 54	\$ 7,117	\$ 39,209	\$ 30,099	\$ 16,823	\$ 29,089	\$ 35,516	\$ 29,938	\$ 29,924	\$ 40,904	\$ 29,064	\$ 287,951
2015-16	\$ 284,734	\$ -	\$ -	\$ 3,544	\$ 38,518	\$ 34,318	\$ 30,976	\$ 17,512	\$ 35,654	\$ 42,272	\$ 16,233	\$ 56,401	\$ 30,957	\$ 306,385
2016-17	\$ 284,734	\$ -	\$ -	\$ 4,840	\$ 43,215	\$ 44,922	\$ 25,269	\$ 54,687	\$ 46,885	\$ 68,883	\$ 57,028	\$ 48,321	\$ 59,496	\$ 453,547
2017-18	\$ 461,500	\$ -	\$ 1,033	\$ 16,304	\$ 41,104	\$ 60,402	\$ 25,794	\$ 40,447	\$ 37,373	\$ 40,470	\$ 47,899	\$ 68,622	\$ 19,275	\$ 398,722
2018-19	\$ 434,000	\$ -	\$ 102	\$ 11,725	\$ 60,428	\$ 45,879	\$ 62,597	\$ 46,833	\$ 42,735	\$ 42,538	\$ 63,943	\$ 45,243	\$ 54,298	\$ 476,320
2019-20	\$ 480,000	\$ -	\$ -	\$ 14,216	\$ 82,094	\$ 42,599	\$ 47,036	\$ 60,758	\$ 59,133	\$ 57,827	\$ 14,273	\$ 14,248	\$ 12,036	\$ 404,220
2020-21	\$ 480,000	\$ -	\$ -	\$ 24,849										\$ 24,849
Cumulative Progression														
Fund 10	Final Budget	July	August	September	October	November	December	January	February	March	April	May	June	Total
2014-15	\$ 284,734	\$ 214	\$ 268	\$ 7,385	\$ 46,594	\$ 76,693	\$ 93,516	\$ 122,605	\$ 158,121	\$ 188,059	\$ 217,983	\$ 258,887	\$ 287,951	\$ 287,951
2015-16	\$ 284,734	\$ -	\$ -	\$ 3,544	\$ 42,062	\$ 76,380	\$ 107,356	\$ 124,867	\$ 160,521	\$ 202,794	\$ 219,027	\$ 275,428	\$ 306,385	\$ 306,385
2016-17	\$ 284,734	\$ -	\$ -	\$ 4,840	\$ 48,056	\$ 92,978	\$ 118,247	\$ 172,934	\$ 219,819	\$ 288,702	\$ 345,730	\$ 394,051	\$ 453,547	\$ 453,547
2017-18	\$ 461,500	\$ -	\$ 1,033	\$ 17,337	\$ 58,441	\$ 118,843	\$ 144,637	\$ 185,084	\$ 222,457	\$ 262,926	\$ 310,825	\$ 379,448	\$ 398,722	\$ 398,722
2018-19	\$ 434,000	\$ -	\$ 102	\$ 11,827	\$ 72,255	\$ 118,134	\$ 180,731	\$ 227,564	\$ 270,298	\$ 312,836	\$ 376,779	\$ 422,022	\$ 476,320	\$ 476,320
2019-20	\$ 480,000	\$ -	\$ -	\$ 14,216	\$ 96,309	\$ 138,908	\$ 185,945	\$ 246,702	\$ 305,835	\$ 363,663	\$ 377,936	\$ 392,184	\$ 404,220	\$ 404,220
2020-21	\$ 480,000	\$ -	\$ -	\$ 24,849										\$ 24,849
Fund 10		July	August	September	October	November	December	January	February	March	April	May	June	
2014-15		0%	0%	3%	16%	27%	33%	43%	56%	66%	77%	91%	101%	
2015-16		0%	0%	1%	15%	27%	38%	44%	56%	71%	77%	97%	108%	
2016-17		0%	0%	2%	17%	33%	42%	61%	77%	101%	121%	138%	159%	
2017-18		0%	0%	4%	13%	26%	31%	40%	48%	57%	67%	82%	86%	
2018-19		0%	0%	3%	17%	27%	42%	52%	62%	72%	87%	97%	110%	
2019-20		0%	0%	3%	20%	29%	39%	51%	64%	76%	79%	82%	84%	
2020-21		0%	0%	5%										

R² For Substitute Teachers



MUKWONAGO AREA SCHOOL DISTRICT

Students, Staff, Community...Building Better Schools Together



Replicate the analysis...

- Perform this analysis for major districtwide expenditures
 - Salaries
 - Benefits
 - Substitute Teacher Costs
 - Utility Costs
 - Transportation Costs
- By January/February, we can estimate final major expenditures with great accuracy

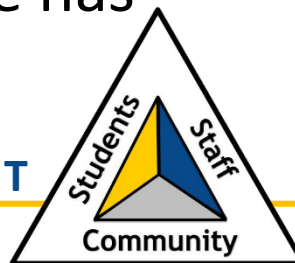


One Last Example: Hourly Wage Review

- The following analysis will consider the compensation for 12-month administrative assistants
- Here is a snapshot of the data:

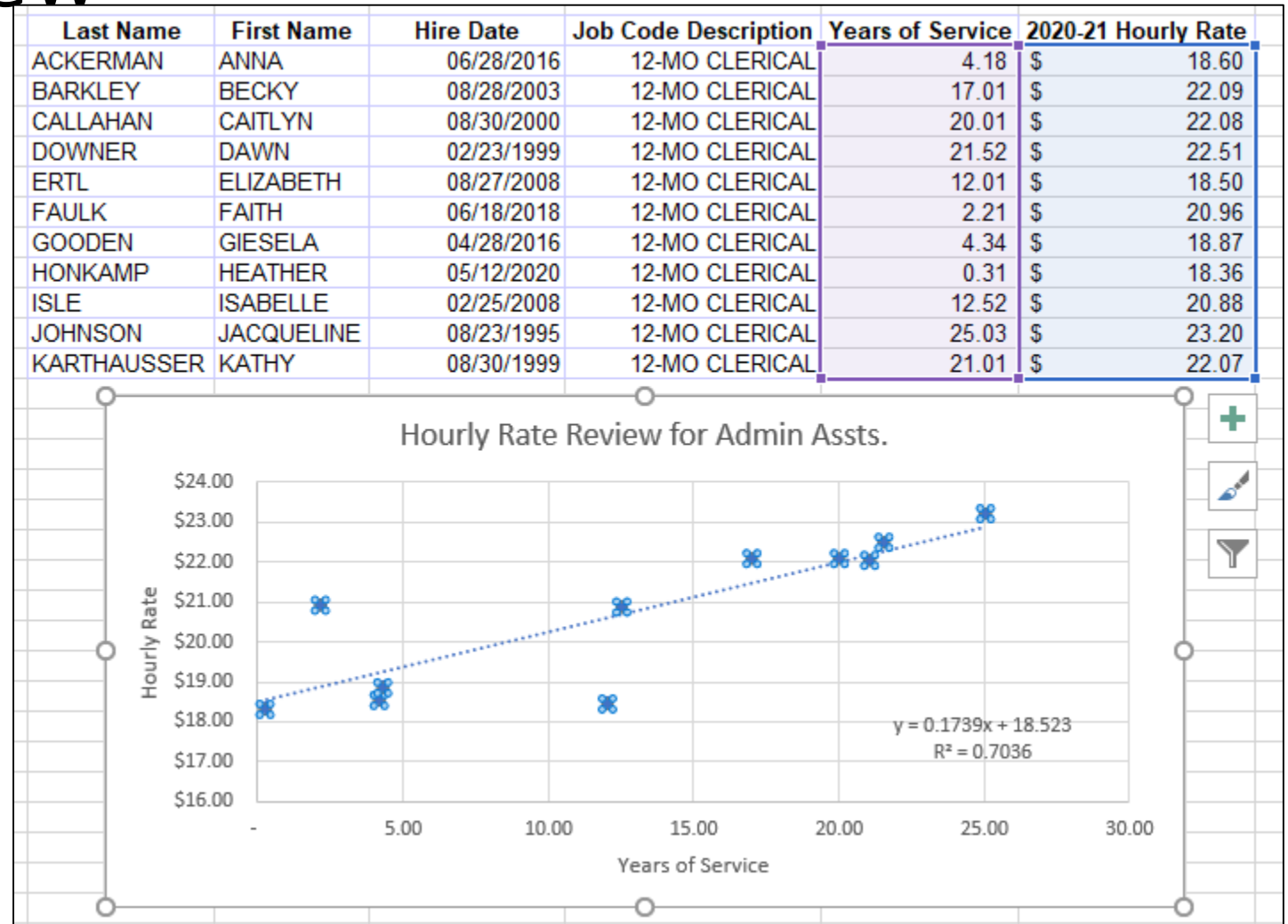
Last Name	First Name	Hire Date	Job Code Description	Years of Service	2020-21 Hourly Rate
ACKERMAN	ANNA	06/28/2016	12-MO CLERICAL	4.18	\$ 18.60
BARKLEY	BECKY	08/28/2003	12-MO CLERICAL	17.01	\$ 22.09
CALLAHAN	CAITLYN	08/30/2000	12-MO CLERICAL	20.01	\$ 22.08
DOWNER	DAWN	02/23/1999	12-MO CLERICAL	21.52	\$ 22.51
ERTL	ELIZABETH	08/27/2008	12-MO CLERICAL	12.01	\$ 18.50
FAULK	FAITH	06/18/2018	12-MO CLERICAL	2.21	\$ 20.96
GOODEN	GIESELA	04/28/2016	12-MO CLERICAL	4.34	\$ 18.87
HONKAMP	HEATHER	05/12/2020	12-MO CLERICAL	0.31	\$ 18.36
ISLE	ISABELLE	02/25/2008	12-MO CLERICAL	12.52	\$ 20.88
JOHNSON	JACQUELINE	08/23/1995	12-MO CLERICAL	25.03	\$ 23.20
KARTHAUSSER	KATHY	08/30/1999	12-MO CLERICAL	21.01	\$ 22.07

- The “Years of Service” field is calculated from the “Hire Date” as of 9/1/2020
- The hourly rate can be dependent on the number of years an employee has worked; therefore there is a relationship between the two variables



Hourly Wage Review

- We can create a scatter graph with the x -value being “Years of Service” and the y -value being “Hourly Rate”
- After inserting our equation and R^2 value, we can begin to draw conclusions



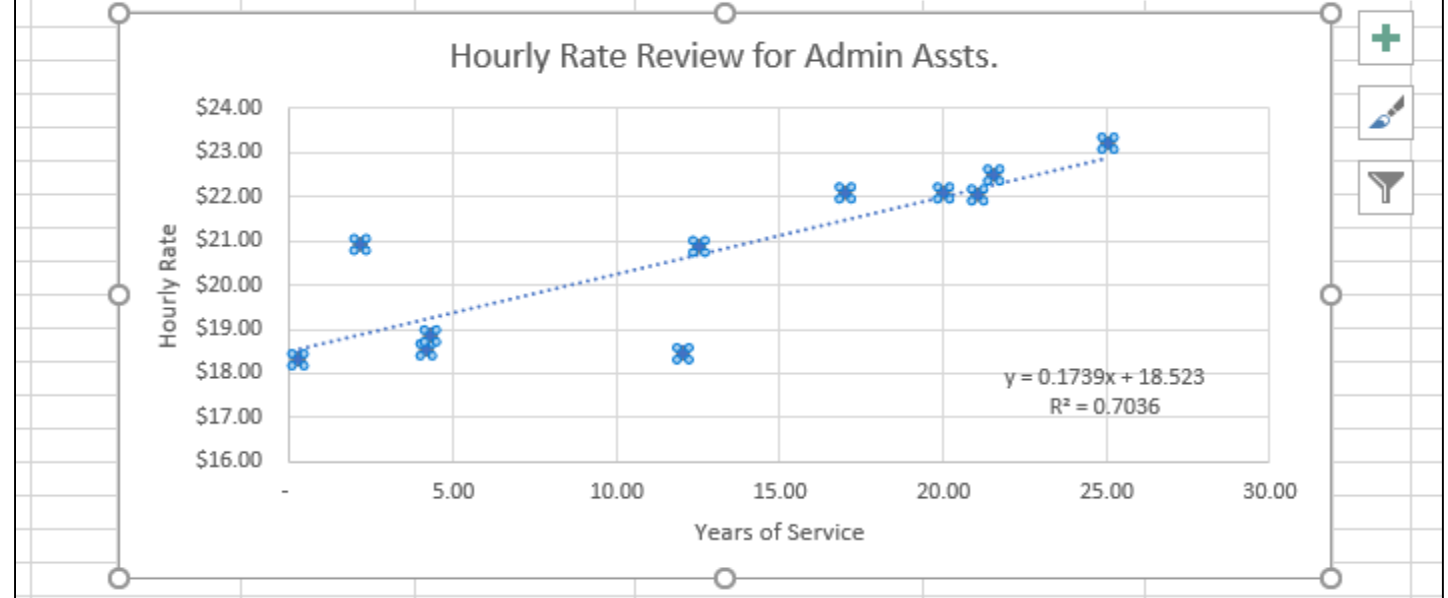
Hourly Wage Review

- The equation from this data set is:

$$y = 0.1739x + 18.523$$

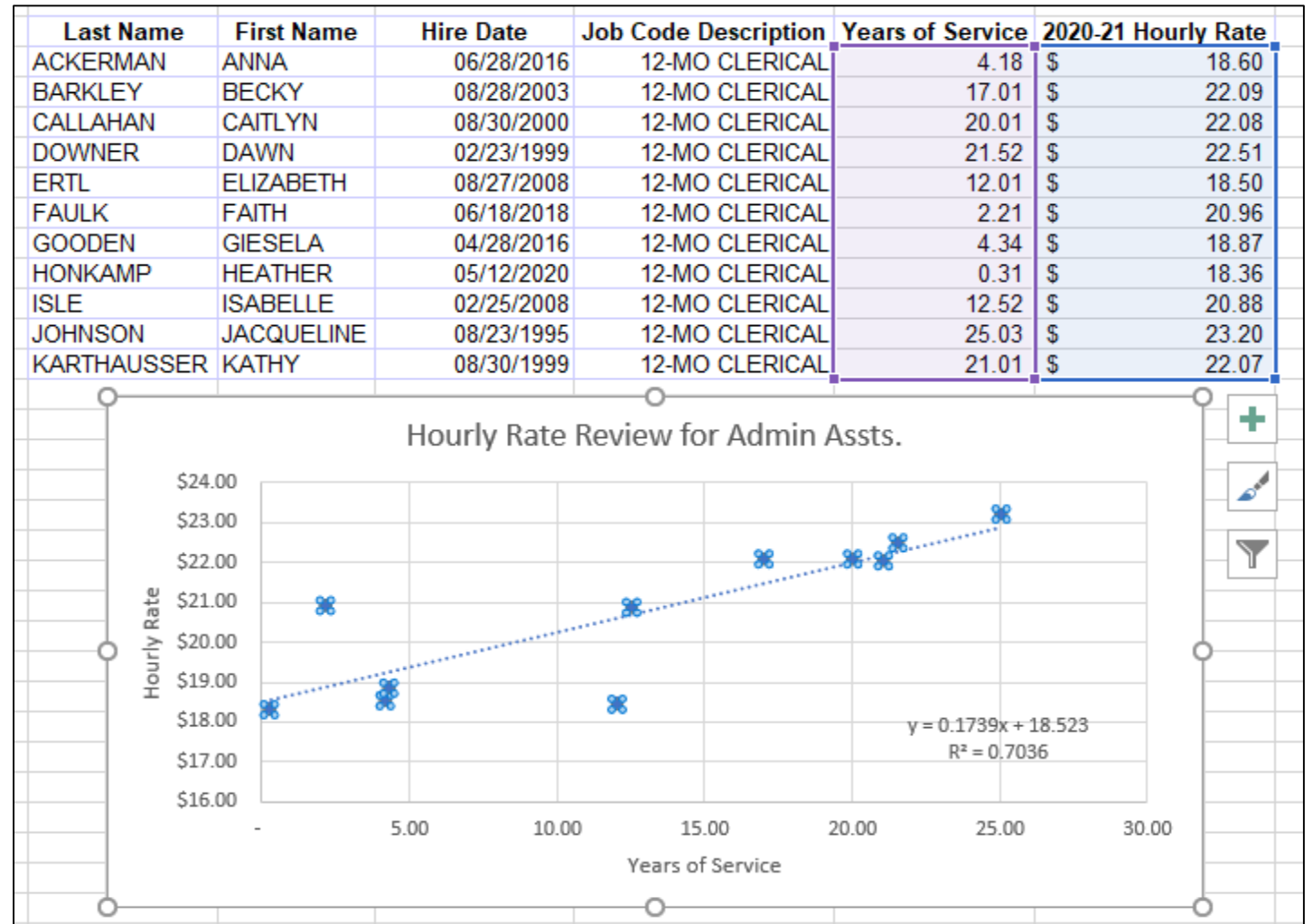
- Based on this subset of employees, the starting wage is \$18.52 per hourly, with an additional \$0.1739 added per year of experience

Last Name	First Name	Hire Date	Job Code Description	Years of Service	2020-21 Hourly Rate
ACKERMAN	ANNA	06/28/2016	12-MO CLERICAL	4.18	\$ 18.60
BARKLEY	BECKY	08/28/2003	12-MO CLERICAL	17.01	\$ 22.09
CALLAHAN	CAITLYN	08/30/2000	12-MO CLERICAL	20.01	\$ 22.08
DOWNER	DAWN	02/23/1999	12-MO CLERICAL	21.52	\$ 22.51
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JOHNSON	JACQUELINE	08/23/1995	12-MO CLERICAL	25.03	\$ 23.20
KARTHAUSSER	KATHY	08/30/1999	12-MO CLERICAL	21.01	\$ 22.07



Hourly Wage Review

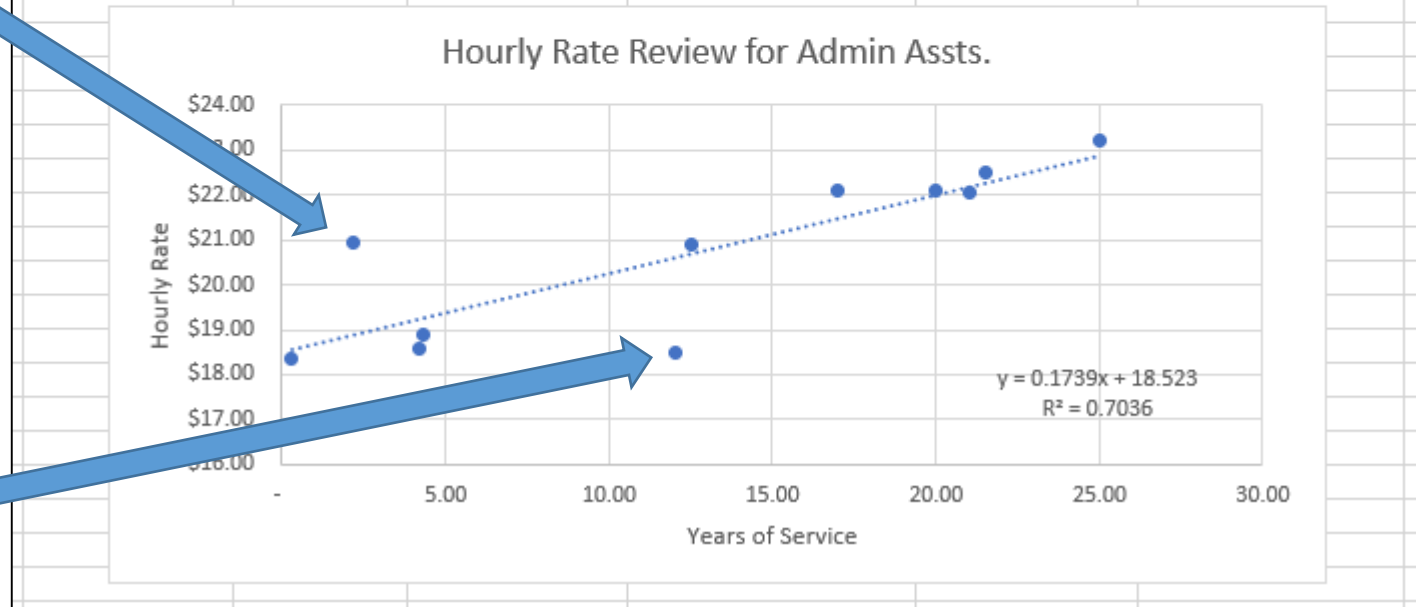
- The R^2 value is 0.7036
- With a value above 0.6, we can conclude the hourly rate is indeed dependent on one's years of service (i.e. years of service is a good predictor of one's hourly wage)



Hourly Wage Review

- Data points above the line are employees who are paid higher than average for similar years of experience
- Data points below the line are employees who are paid less than average for similar years of experience

Last Name	First Name	Hire Date	Job Code Description	Years of Service	2020-21 Hourly Rate
ACKERMAN	ANNA	06/28/2016	12-MO CLERICAL	4.18	\$ 18.60
BARKLEY	BECKY	08/28/2003	12-MO CLERICAL	17.01	\$ 22.09
CALLAHAN	CAITLYN	08/30/2000	12-MO CLERICAL	20.01	\$ 22.08
DOWNER	DAWN	02/23/1999	12-MO CLERICAL	21.52	\$ 22.51
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GOODEN	GIESELA	04/28/2016	12-MO CLERICAL	4.34	\$ 18.87
HONKAMP	HEATHER	05/12/2020	12-MO CLERICAL	0.31	\$ 18.36
ISLE	ISABELLE	02/25/2008	12-MO CLERICAL	12.52	\$ 20.88
JOHNSON	JACQUELINE	08/23/1995	12-MO CLERICAL	25.03	\$ 23.20
KARTHAUSSER	KATHY	08/30/1999	12-MO CLERICAL	21.01	\$ 22.07



Hourly Wage Review

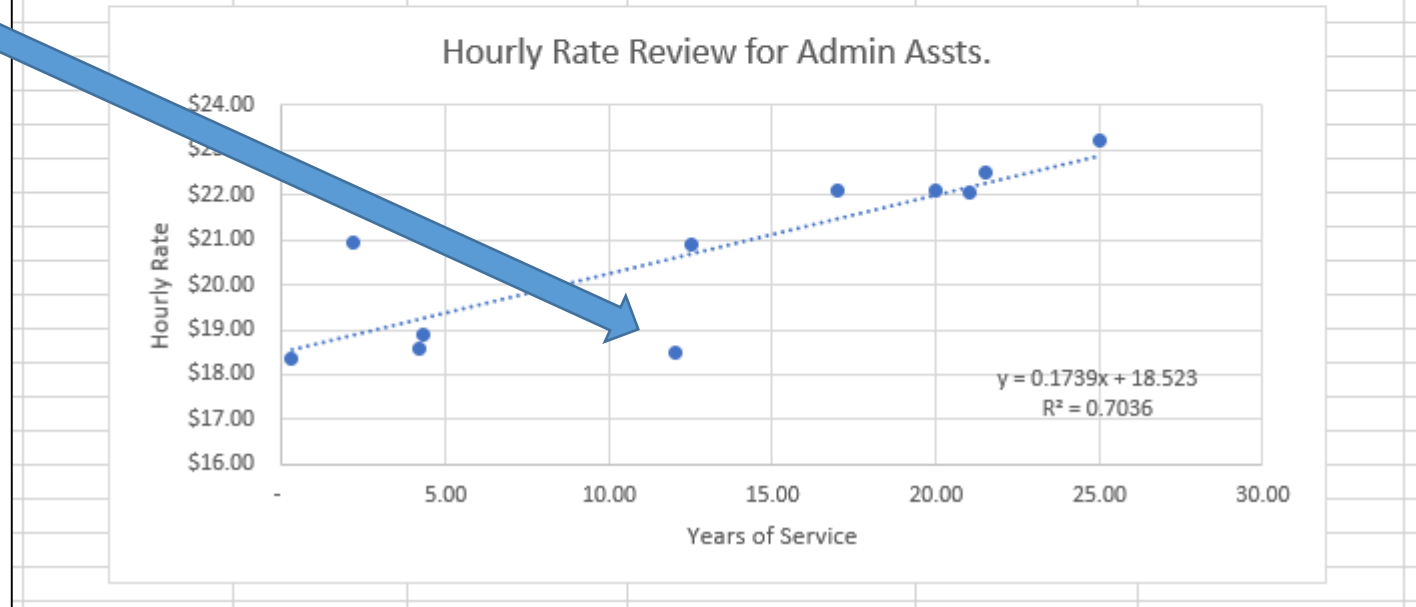
- Hypothetically, if the employee with 12.01 years of service making \$18.50 asked for a raise, a reasonable starting consideration would be:

$$y = 0.1739x + 18.523$$

$$y = 0.1739(12.01) + 18.523$$

$$y = \$20.61$$

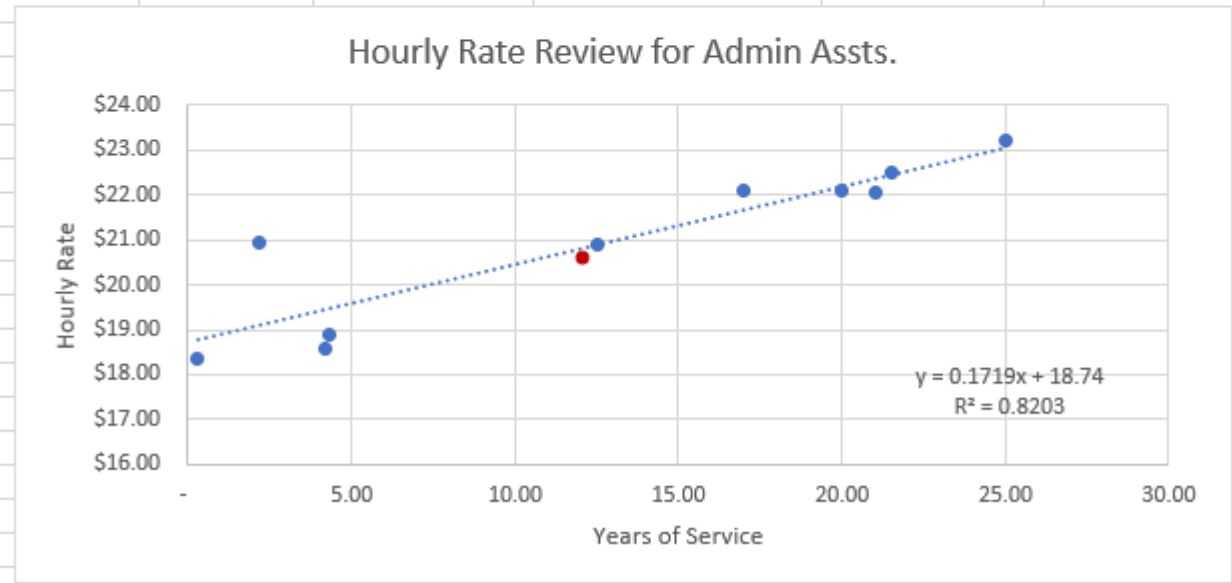
Last Name	First Name	Hire Date	Job Code Description	Years of Service	2020-21 Hourly Rate
ACKERMAN	ANNA	06/28/2016	12-MO CLERICAL	4.18	\$ 18.60
BARKLEY	BECKY	08/28/2003	12-MO CLERICAL	17.01	\$ 22.09
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KARTHAUSSER	KATHY	08/30/1999	12-MO CLERICAL	21.01	\$ 22.07



Hourly Wage Review

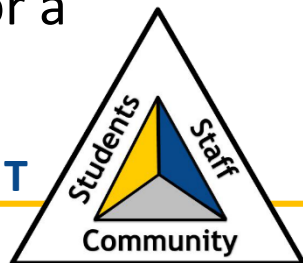
- Per the data, the employee's new rate of pay would be \$20.61
- You can see that the new rate is on par with other administrative assistants
 - This assumes this employee is worth the raise and is as valuable as the others

Last Name	First Name	Hire Date	Job Code Description	Years of Service	2020-21 Hourly Rate
ACKERMAN	ANNA	06/28/2016	12-MO CLERICAL	4.18	\$ 18.60
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KARTHAUSSER	KATHY	08/30/1999	12-MO CLERICAL	21.01	\$ 22.07



Hourly Wage Review

- A regression analysis can compare employees' hourly wages across similar job classifications to ensure equity in wages
- A regression analysis can identify those who are paid more or less than average
 - Can be helpful when compensation increases are being administered
- There are limitations in this type of analysis
 - Employees hired with prior experience and a higher wage will appear to be paid above average
 - Years of service is not the only variable that impact wages - performance matters too!
 - If certain employees are outliers in your data, it may be wise to remove them for a more accurate analysis



In Summary

- A regression analysis can be a very helpful tool to a school business manager
 - You need quality data that has a relationship between one variable and another
- Need help making your scattergraphs and regression lines in Excel??
 - A simple search in YouTube will give you the resources you need to make it happen



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