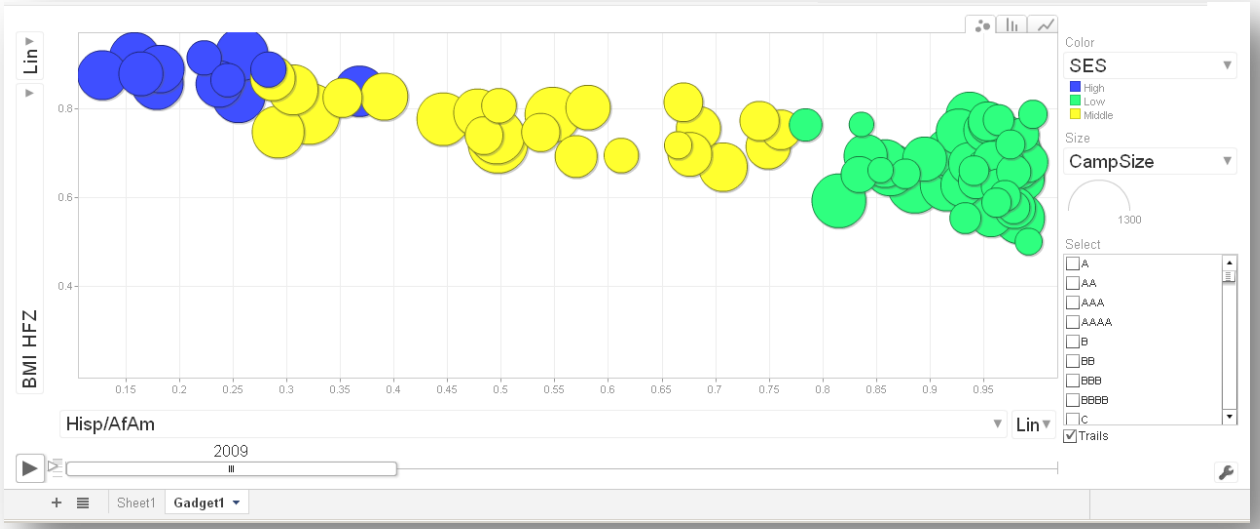
Presenting Data Using Motion Chart Visualization



Brian Dauenhauer & Dolly Lambdin

The University of Texas at Austin

AAHPERD 2013 National Conference & Exposition

Charlotte, NC

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Driving Questions

Teachers

1. Are students achieving my intended learning objectives?
2. How effective is my program?
3. Which students could use some additional attention?

Administrators

1. What types of professional development do my teachers need?
2. Which schools are showing improvement (or not)?
3. What factors influence the effectiveness of a program?

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Audience Poll

What made you come to this presentation?

What do you want to get out of this presentation?

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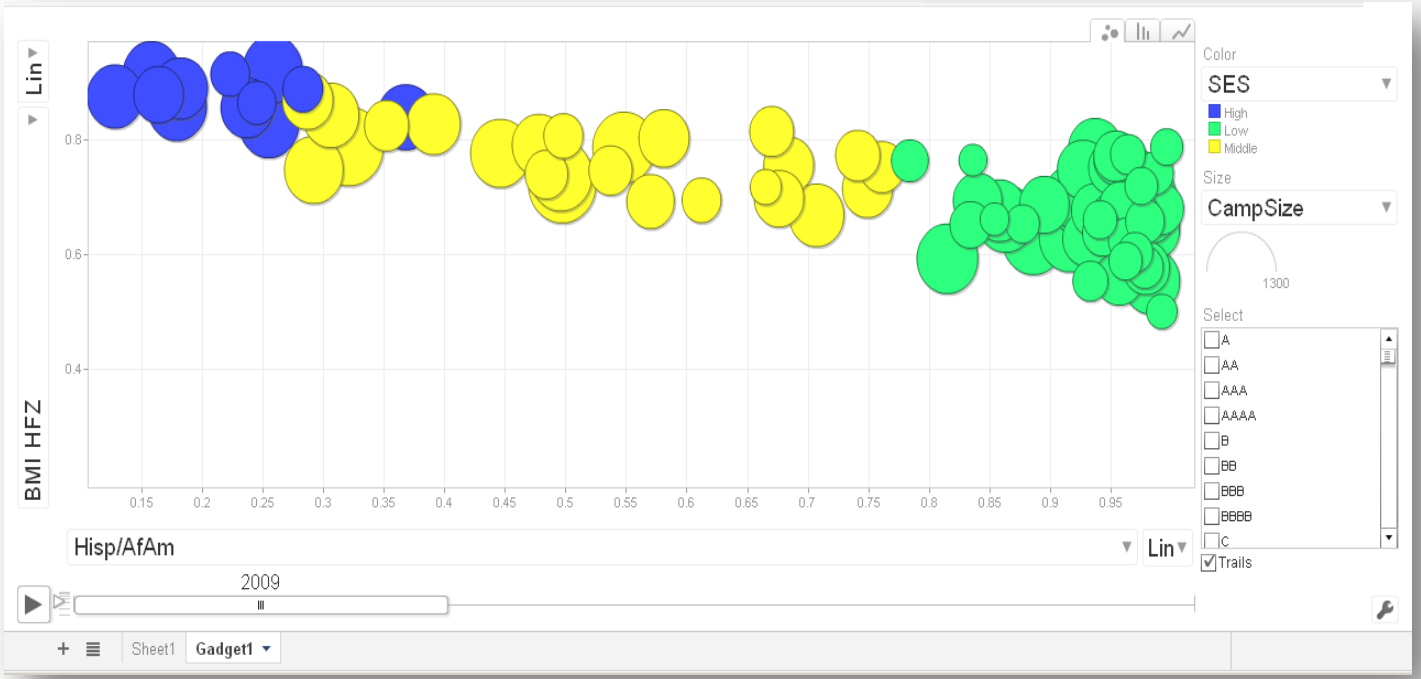
Sample Motion Chart Visualization



What does this motion chart tell you?

What kinds of questions could you ask of this data?

What are the benefits of using this kind of technology?

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Presentation Outline

1. Our future depends on effective data-use
2. Create a motion chart (its easy)
3. Interpret a motion chart (you can do it)
   a) Sample visualizations
      I. School level data
      II. Student level data
4. Share it with others

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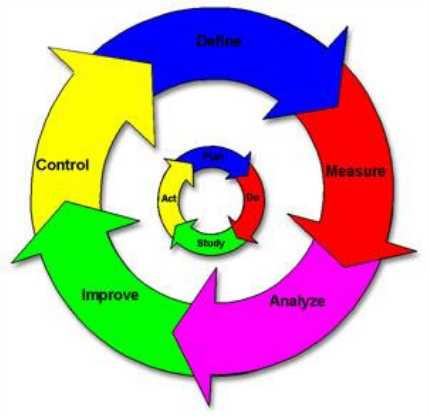
Driving Forces Behind Data-Use in Education



Models from Business/Industry

Educational Policy

Technology

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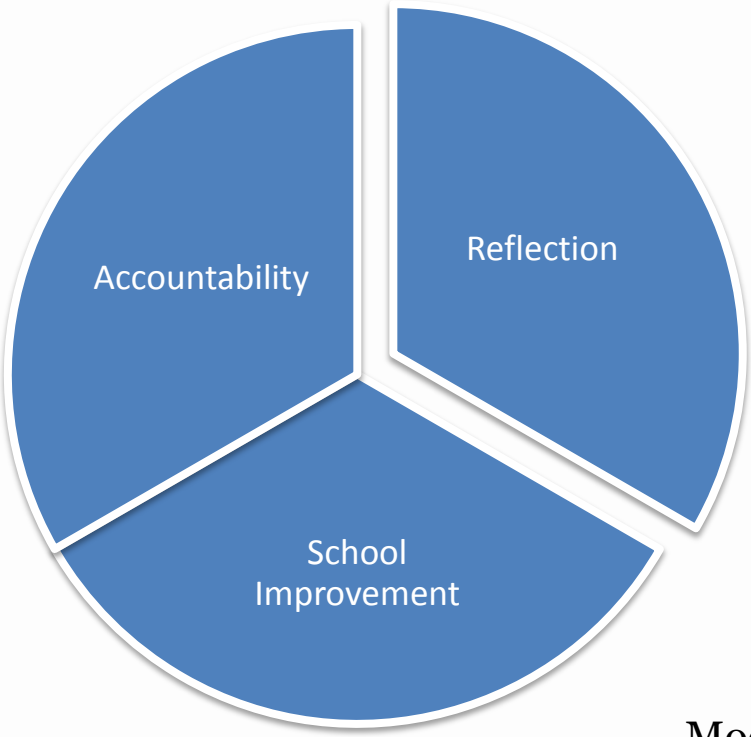
Common Uses of Data in Education



Moody & Dede (2008)

+ ADVOCACY

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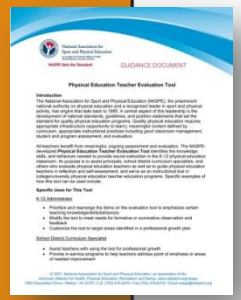
Data Use in Physical Education

NASPE Guidance Documents

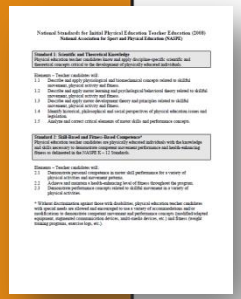


GUIDANCE DOCUMENT

Physical Education Teacher Evaluation Tool

"Student performance is continually evaluated to guide instruction."

- NASPE, 2007, p. 11



National Standards for Initial Physical Education Teacher Education (2008)
National Association for Sport and Physical Education (NASPE)

"…use assessments and reflection to foster student learning and inform decisions about instruction."

- NASPE, 2008, p. 3

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Technology in Physical Education

Data Management Systems

IHT HERO SYSTEM

PE MANAGER

FG FITNESSGRAM®

Activity Monitors

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The Problem

D.R.I.P. Syndrome

We have become ***data rich***,

but ***information poor.***

Data-to-Knowledge Continuum

(Light, Wexler, & Heinze, 2005)

How can we turn all of this data into some form of actionable knowledge?

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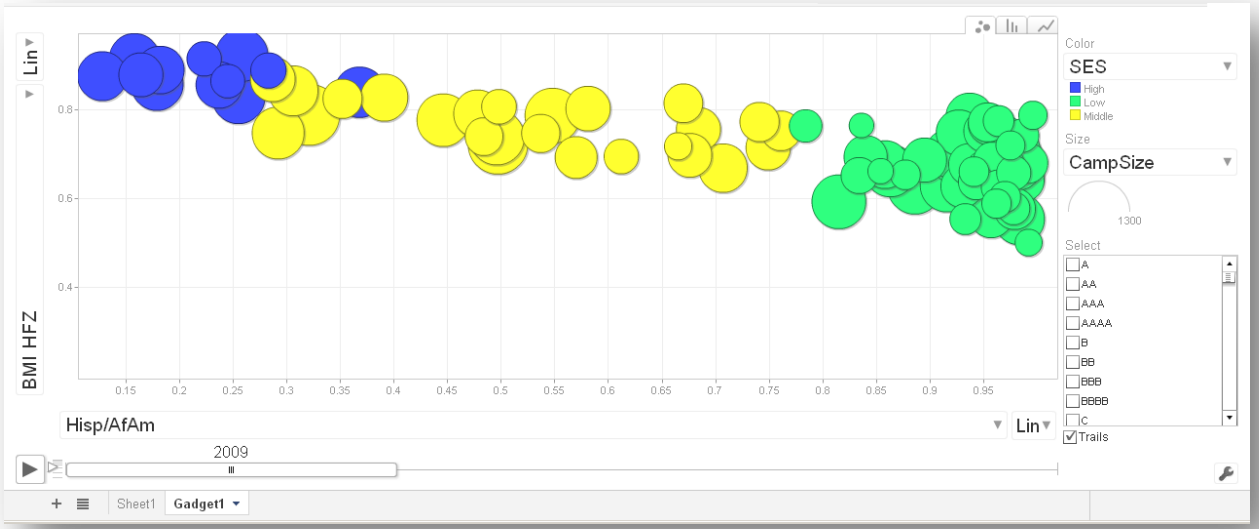
One Solution

Motion Chart Visualization



A dynamic graphing tool that can be used to analyze, interpret and present data

(without any statistical analysis)

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Creating a Motion Chart

Step 1	Sign in to Google
Step 2	Access Google Drive
Step 3	Create a new spreadsheet
Step 4	Name your spreadsheet
Step 5	Add case names
Step 6	Freeze row with headings
Step 7	Add time values
Step 8	Add other variables of interest
Step 9	Add data from subsequent time points
Step 10	Highlight the data
Step 11	Insert a motion chart gadget
Step 12	Move chart to a new sheet

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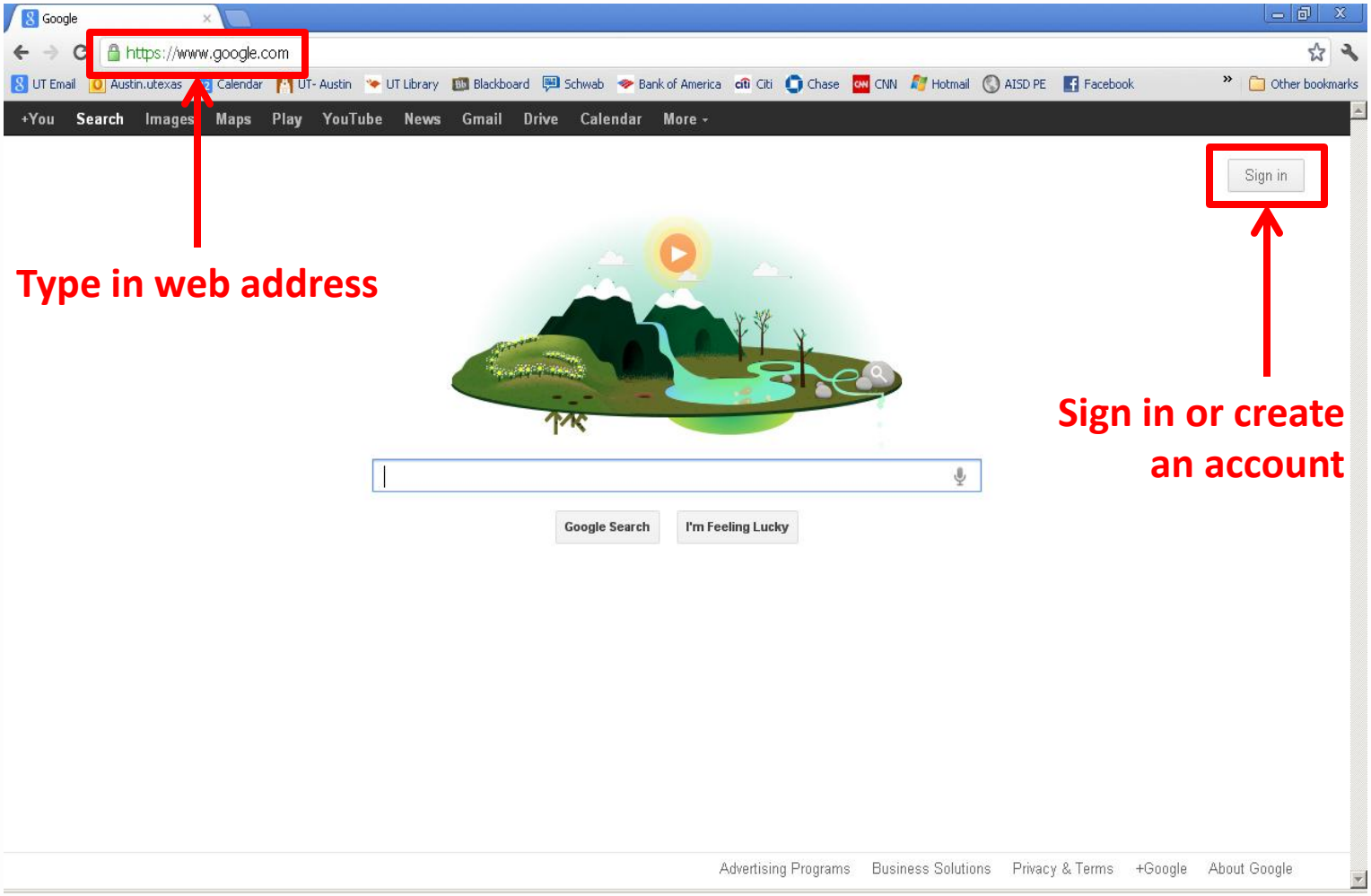
Step 1- Sign in to Google



Type in web address

Sign in or create an account

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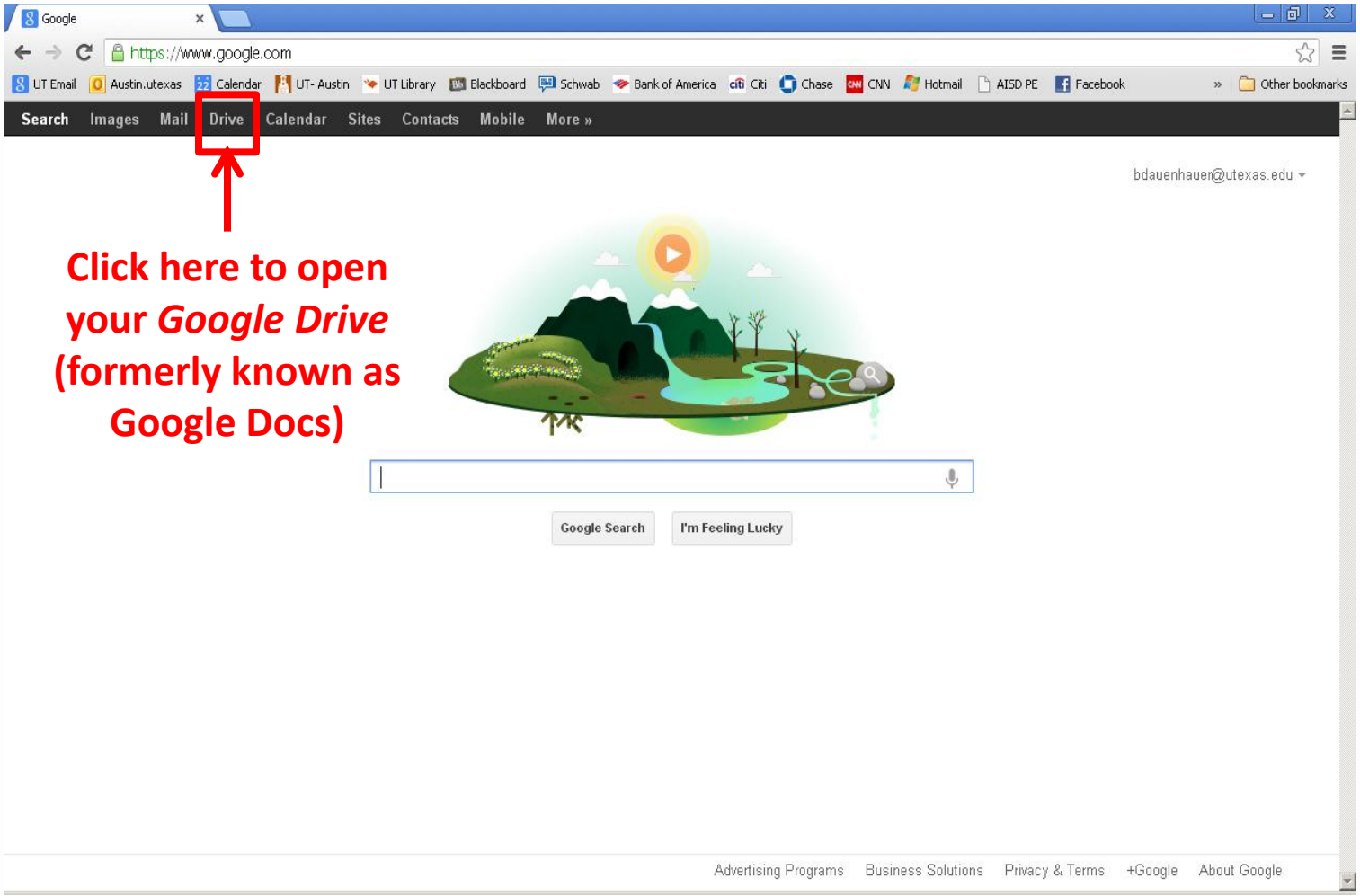
Step 2- Access Google Drive



Click here to open your *Google Drive* (formerly known as Google Docs)

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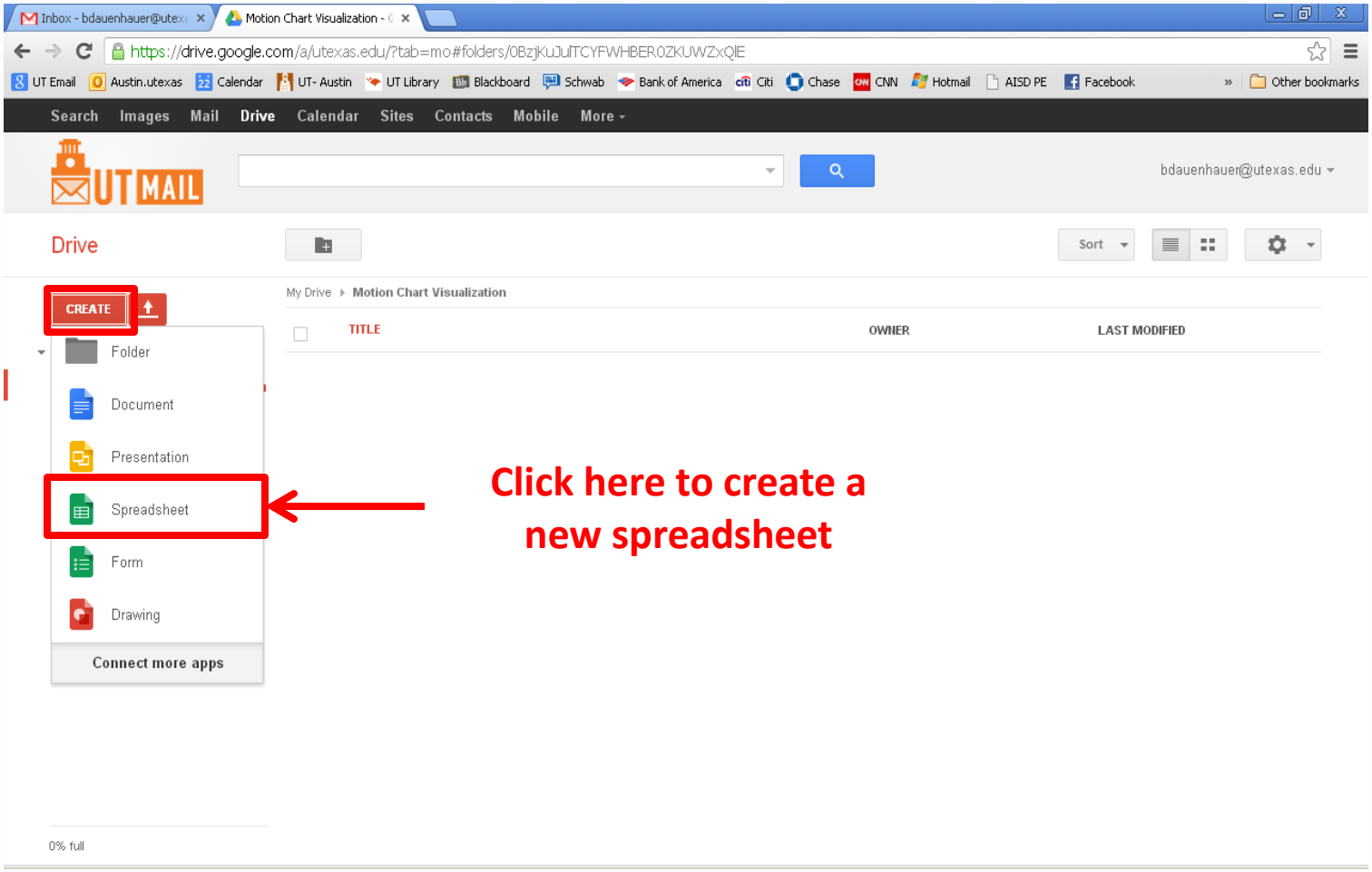
Step 3- Create a New Spreadsheet



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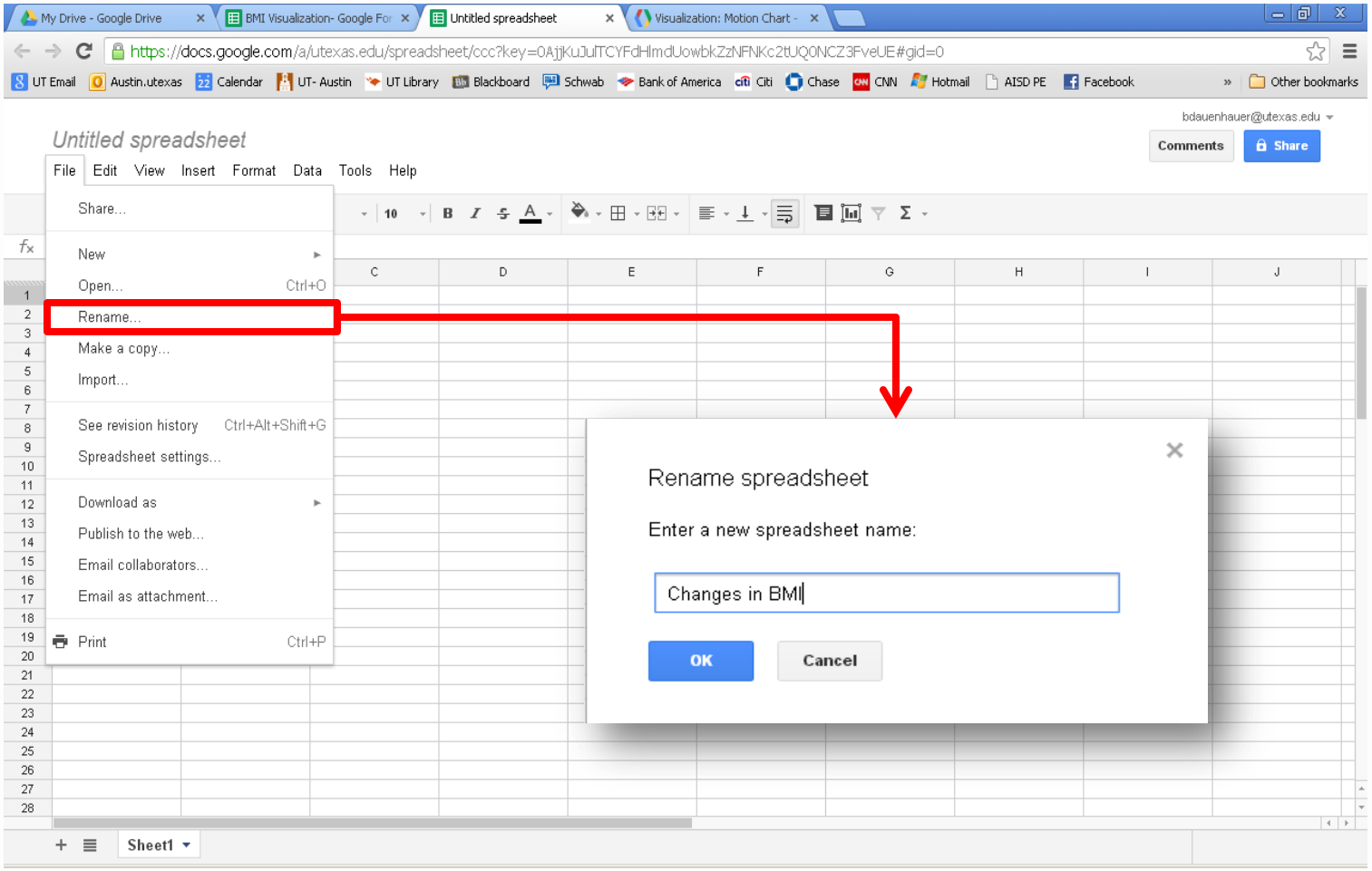
Step 4- Name Your Spreadsheet



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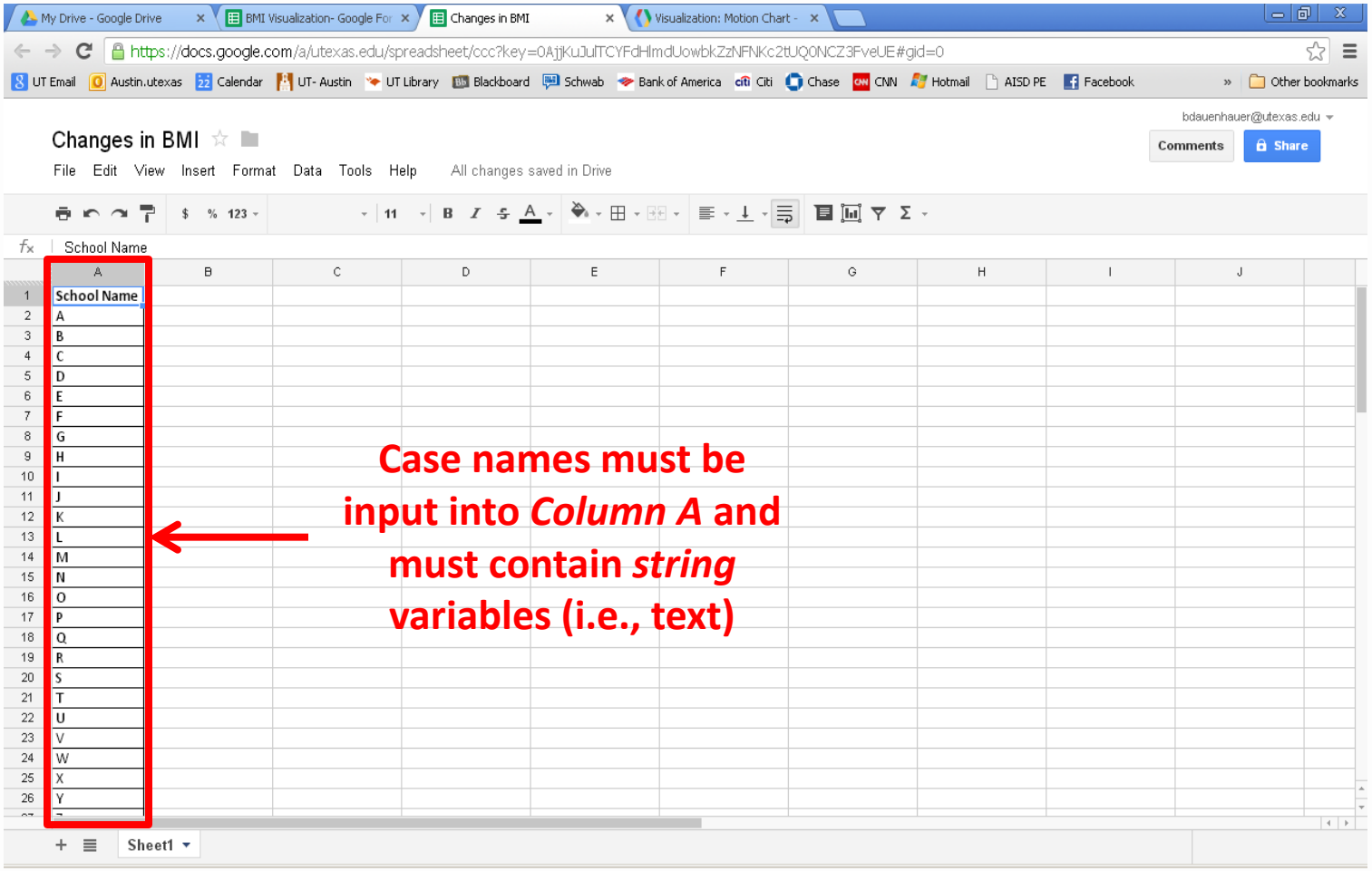
Step 5- Add Case Names



Case names must be input into *Column A* and must contain *string* variables (i.e., text)

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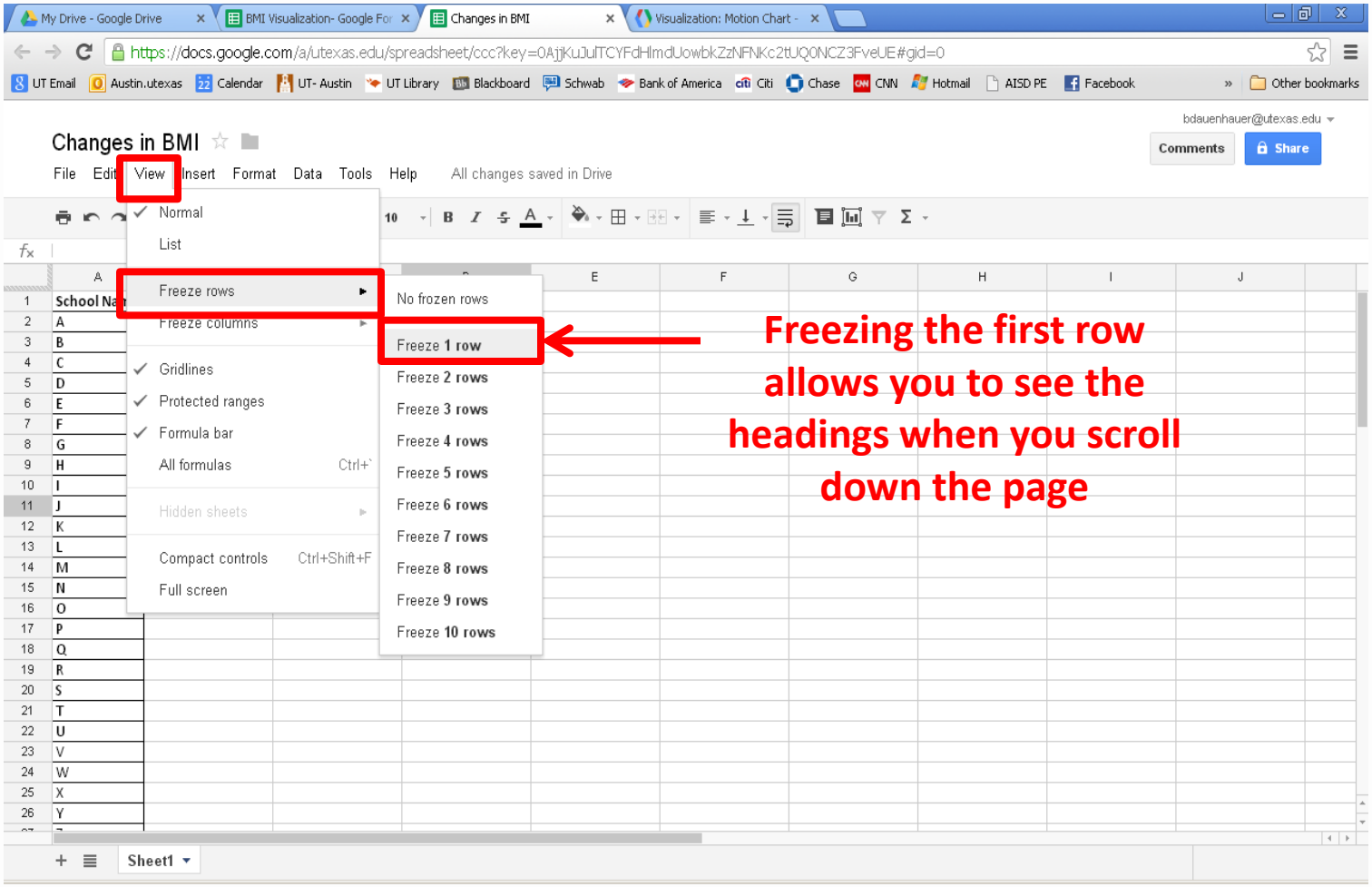
Step 6- Freeze Row with Headings



Freezing the first row allows you to see the headings when you scroll down the page

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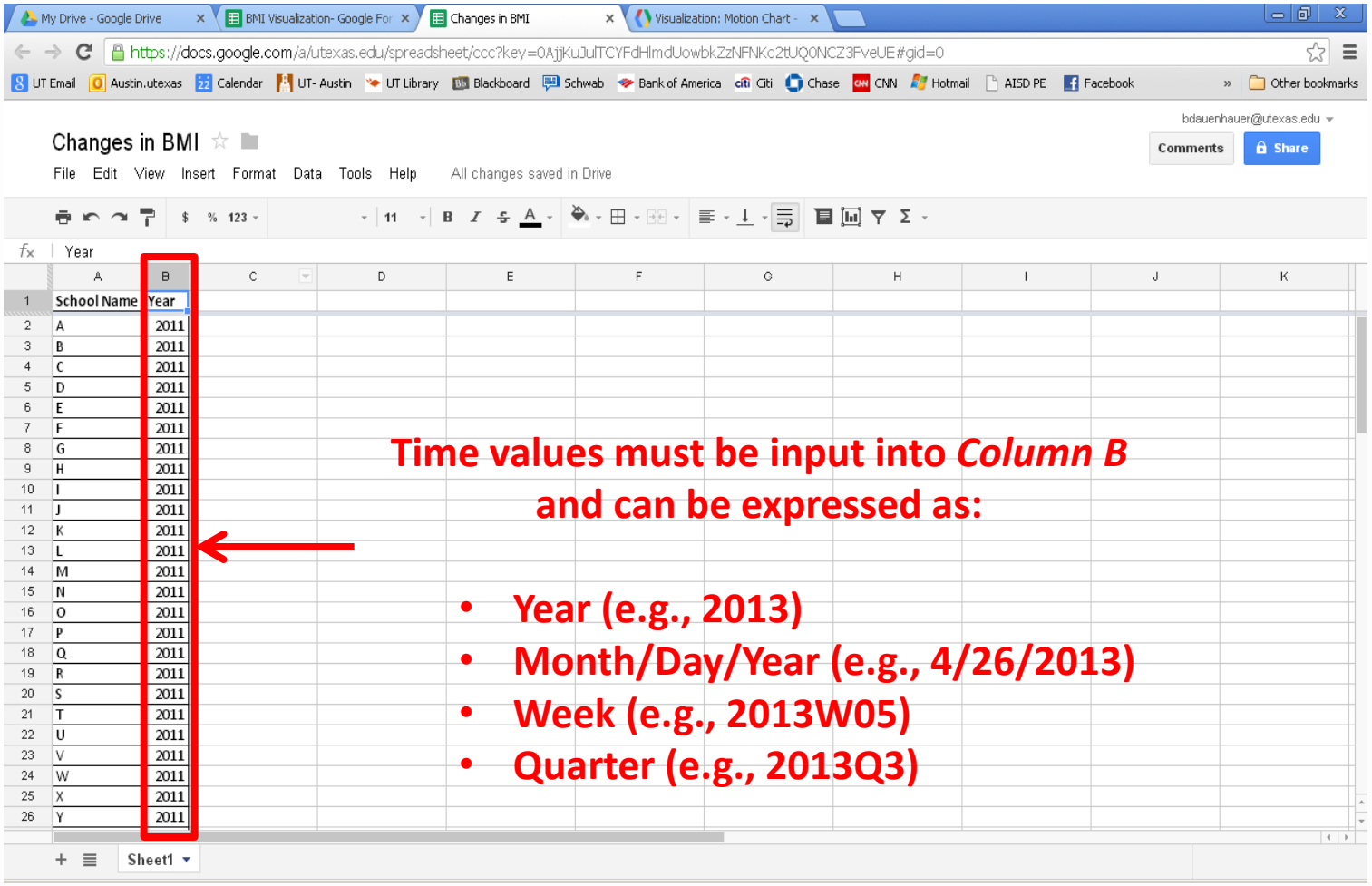
Step 7- Add Time Values



School Name	Year
A	2011
B	2011
C	2011
D	2011
E	2011
F	2011
G	2011
H	2011
I	2011
J	2011
K	2011
L	2011
M	2011
N	2011
O	2011
P	2011
Q	2011
R	2011
S	2011
T	2011
U	2011
V	2011
W	2011
X	2011
Y	2011

Time values must be input into *Column B* and can be expressed as:

- **Year (e.g., 2013)**
- **Month/Day/Year (e.g., 4/26/2013)**
- **Week (e.g., 2013W05)**
- **Quarter (e.g., 2013Q3)**

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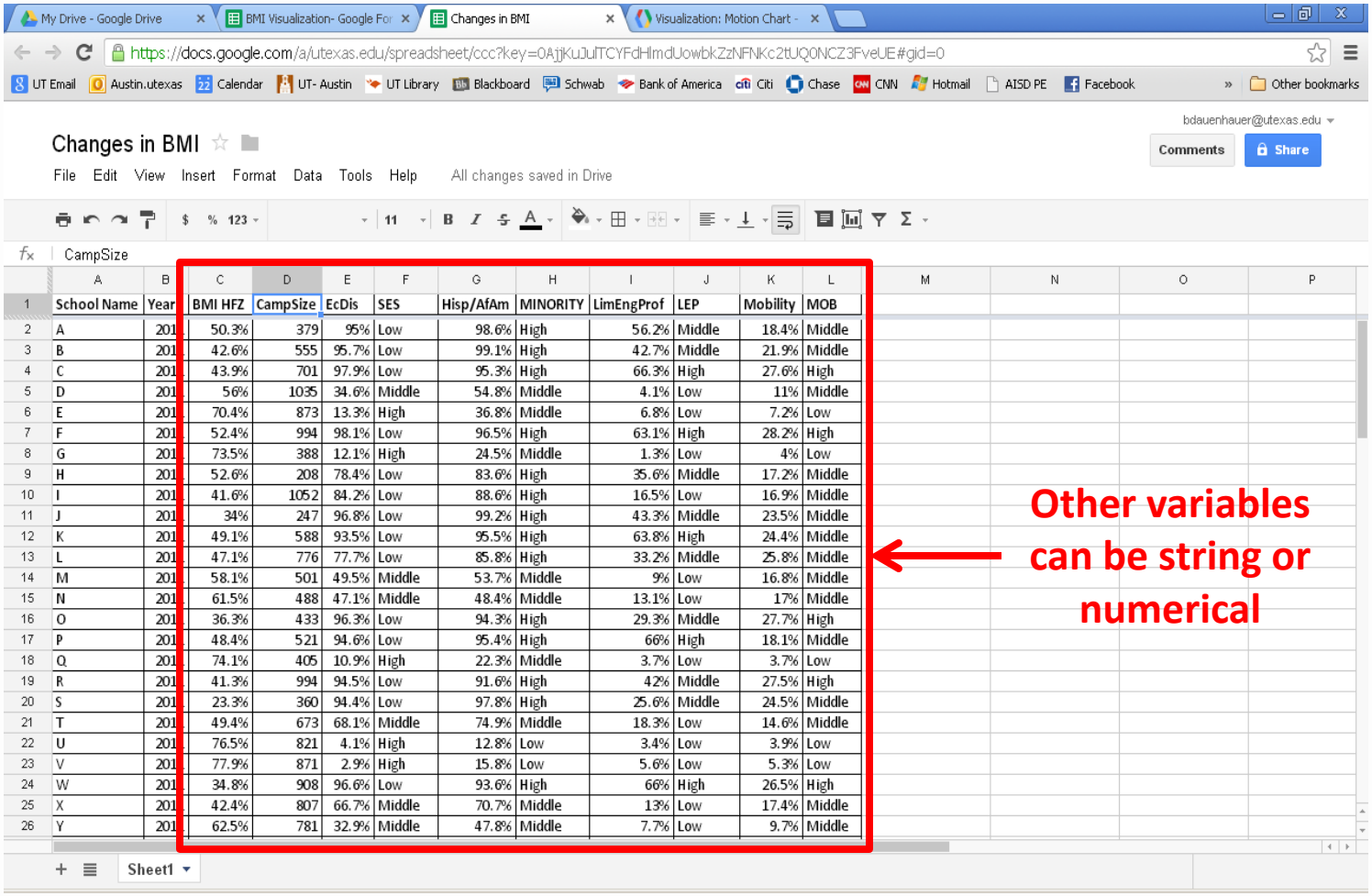
Step 8- Add Other Variables of Interest



	School Name	Year	BMI HFZ	CampSize	EcDis	SES	Hisp/AfAm	MINORITY	LimEngProf	LEP	Mobility	MOB
2	A	201	50.3%	379	95%	Low	98.6%	High	56.2%	Middle	18.4%	Middle
3	B	201	42.6%	555	95.7%	Low	99.1%	High	42.7%	Middle	21.9%	Middle
4	C	201	43.9%	701	97.9%	Low	95.3%	High	66.3%	High	27.6%	High
5	D	201	56%	1035	34.6%	Middle	54.8%	Middle	4.1%	Low	11%	Middle
6	E	201	70.4%	873	13.3%	High	36.8%	Middle	6.8%	Low	7.2%	Low
7	F	201	52.4%	994	98.1%	Low	96.5%	High	63.1%	High	28.2%	High
8	G	201	73.5%	388	12.1%	High	24.5%	Middle	1.3%	Low	4%	Low
9	H	201	52.6%	208	78.4%	Low	83.6%	High	35.6%	Middle	17.2%	Middle
10	I	201	41.6%	1052	84.2%	Low	88.6%	High	16.5%	Low	16.9%	Middle
11	J	201	34%	247	96.8%	Low	99.2%	High	43.3%	Middle	23.5%	Middle
12	K	201	49.1%	588	93.5%	Low	95.5%	High	63.8%	High	24.4%	Middle
13	L	201	47.1%	776	77.7%	Low	85.8%	High	33.2%	Middle	25.8%	Middle
14	M	201	58.1%	501	49.5%	Middle	53.7%	Middle	9%	Low	16.8%	Middle
15	N	201	61.5%	488	47.1%	Middle	48.4%	Middle	13.1%	Low	17%	Middle
16	O	201	36.3%	433	96.3%	Low	94.3%	High	29.3%	Middle	27.7%	High
17	P	201	48.4%	521	94.6%	Low	95.4%	High	66%	High	18.1%	Middle
18	Q	201	74.1%	405	10.9%	High	22.3%	Middle	3.7%	Low	3.7%	Low
19	R	201	41.3%	994	94.5%	Low	91.6%	High	42%	Middle	27.5%	High
20	S	201	23.3%	360	94.4%	Low	97.8%	High	25.6%	Middle	24.5%	Middle
21	T	201	49.4%	673	68.1%	Middle	74.9%	Middle	18.3%	Low	14.6%	Middle
22	U	201	76.5%	821	4.1%	High	12.8%	Low	3.4%	Low	3.9%	Low
23	V	201	77.9%	871	2.9%	High	15.8%	Low	5.6%	Low	5.3%	Low
24	W	201	34.8%	908	96.6%	Low	93.6%	High	66%	High	26.5%	High
25	X	201	42.4%	807	66.7%	Middle	70.7%	Middle	13%	Low	17.4%	Middle
26	Y	201	62.5%	781	32.9%	Middle	47.8%	Middle	7.7%	Low	9.7%	Middle

Other variables can be string or numerical

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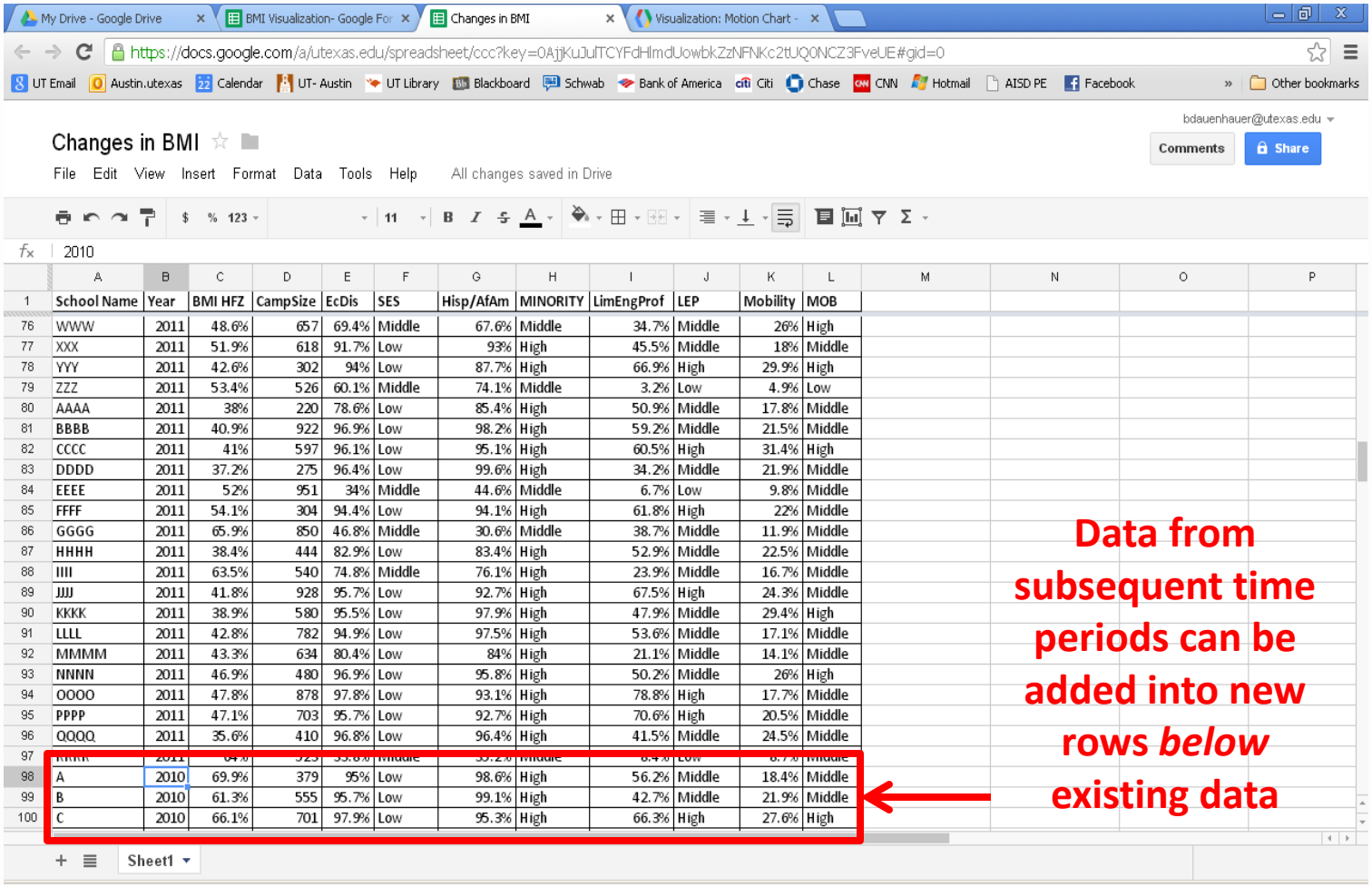
Step 9- Add Data From Subsequent Time Points



	School Name	Year	BMI HFZ	CampSize	EcDis	SES	Hisp/AfAm	MINORITY	LimEngProf	LEP	Mobility	MOB
76	WWW	2011	48.6%	657	69.4%	Middle	67.6%	Middle	34.7%	Middle	26%	High
77	XXX	2011	51.9%	618	91.7%	Low	93%	High	45.5%	Middle	18%	Middle
78	YYY	2011	42.6%	302	94%	Low	87.7%	High	66.9%	High	29.9%	High
79	ZZZ	2011	53.4%	526	60.1%	Middle	74.1%	Middle	3.2%	Low	4.9%	Low
80	AAAA	2011	38%	220	78.6%	Low	85.4%	High	50.9%	Middle	17.8%	Middle
81	BBBB	2011	40.9%	922	96.9%	Low	98.2%	High	59.2%	Middle	21.5%	Middle
82	CCCC	2011	41%	597	96.1%	Low	95.1%	High	60.5%	High	31.4%	High
83	DDDD	2011	37.2%	275	96.4%	Low	99.6%	High	34.2%	Middle	21.9%	Middle
84	EEEE	2011	52%	951	34%	Middle	44.6%	Middle	6.7%	Low	9.8%	Middle
85	FFFF	2011	54.1%	304	94.4%	Low	94.1%	High	61.8%	High	22%	Middle
86	GGGG	2011	65.9%	850	46.8%	Middle	30.6%	Middle	38.7%	Middle	11.9%	Middle
87	HHHH	2011	38.4%	444	82.9%	Low	83.4%	High	52.9%	Middle	22.5%	Middle
88	IIII	2011	63.5%	540	74.8%	Middle	76.1%	High	23.9%	Middle	16.7%	Middle
89	JJJJ	2011	41.8%	928	95.7%	Low	92.7%	High	67.5%	High	24.3%	Middle
90	KKKK	2011	38.9%	580	95.5%	Low	97.9%	High	47.9%	Middle	29.4%	High
91	LLLL	2011	42.8%	782	94.9%	Low	97.5%	High	53.6%	Middle	17.1%	Middle
92	MMMM	2011	43.3%	634	80.4%	Low	84%	High	21.1%	Middle	14.1%	Middle
93	NNNN	2011	46.9%	480	96.9%	Low	95.8%	High	50.2%	Middle	26%	High
94	OOOO	2011	47.8%	878	97.8%	Low	93.1%	High	78.8%	High	17.7%	Middle
95	PPPP	2011	47.1%	703	95.7%	Low	92.7%	High	70.6%	High	20.5%	Middle
96	QQQQ	2011	35.6%	410	96.8%	Low	96.4%	High	41.5%	Middle	24.5%	Middle
97	RRRR	2011	64%	923	53.8%	Middle	55.2%	Middle	8.4%	Low	8.7%	Middle
98	A	2010	69.9%	379	95%	Low	98.6%	High	56.2%	Middle	18.4%	Middle
99	B	2010	61.3%	555	95.7%	Low	99.1%	High	42.7%	Middle	21.9%	Middle
100	C	2010	66.1%	701	97.9%	Low	95.3%	High	66.3%	High	27.6%	High

Data from subsequent time periods can be added into new rows *below* existing data

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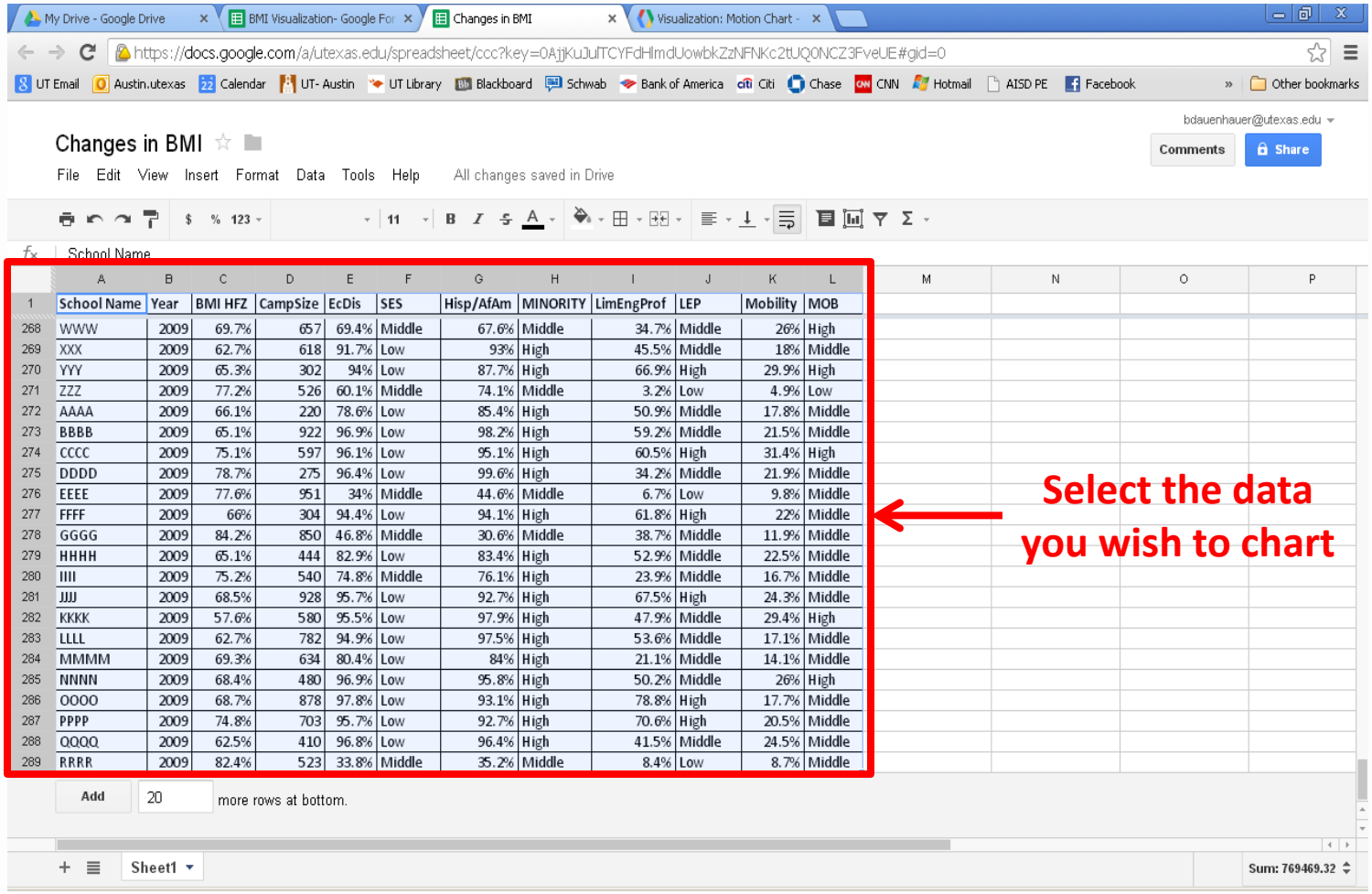
Step 10- Highlight the Data



	School Name	Year	BMI HFZ	CampSize	EcDis	SES	Hisp/AfAm	MINORITY	LimEngProf	LEP	Mobility	MOB
268	WWW	2009	69.7%	657	69.4%	Middle	67.6%	Middle	34.7%	Middle	26%	High
269	XXX	2009	62.7%	618	91.7%	Low	93%	High	45.5%	Middle	18%	Middle
270	YYY	2009	65.3%	302	94%	Low	87.7%	High	66.9%	High	29.9%	High
271	ZZZ	2009	77.2%	526	60.1%	Middle	74.1%	Middle	3.2%	Low	4.9%	Low
272	AAAA	2009	66.1%	220	78.6%	Low	85.4%	High	50.9%	Middle	17.8%	Middle
273	BBBB	2009	65.1%	922	96.9%	Low	98.2%	High	59.2%	Middle	21.5%	Middle
274	CCCC	2009	75.1%	597	96.1%	Low	95.1%	High	60.5%	High	31.4%	High
275	DDDD	2009	78.7%	275	96.4%	Low	99.6%	High	34.2%	Middle	21.9%	Middle
276	EEEE	2009	77.6%	951	34%	Middle	44.6%	Middle	6.7%	Low	9.8%	Middle
277	FFFF	2009	66%	304	94.4%	Low	94.1%	High	61.8%	High	22%	Middle
278	GGGG	2009	84.2%	850	46.8%	Middle	30.6%	Middle	38.7%	Middle	11.9%	Middle
279	HHHH	2009	65.1%	444	82.9%	Low	83.4%	High	52.9%	Middle	22.5%	Middle
280	IIII	2009	75.2%	540	74.8%	Middle	76.1%	High	23.9%	Middle	16.7%	Middle
281	JJJJ	2009	68.5%	928	95.7%	Low	92.7%	High	67.5%	High	24.3%	Middle
282	KKKK	2009	57.6%	580	95.5%	Low	97.9%	High	47.9%	Middle	29.4%	High
283	LLLL	2009	62.7%	782	94.9%	Low	97.5%	High	53.6%	Middle	17.1%	Middle
284	MMMM	2009	69.3%	634	80.4%	Low	84%	High	21.1%	Middle	14.1%	Middle
285	NNNN	2009	68.4%	480	96.9%	Low	95.8%	High	50.2%	Middle	26%	High
286	OOOO	2009	68.7%	878	97.8%	Low	93.1%	High	78.8%	High	17.7%	Middle
287	PPPP	2009	74.8%	703	95.7%	Low	92.7%	High	70.6%	High	20.5%	Middle
288	QQQQ	2009	62.5%	410	96.8%	Low	96.4%	High	41.5%	Middle	24.5%	Middle
289	RRRR	2009	82.4%	523	33.8%	Middle	35.2%	Middle	8.4%	Low	8.7%	Middle

Select the data you wish to chart

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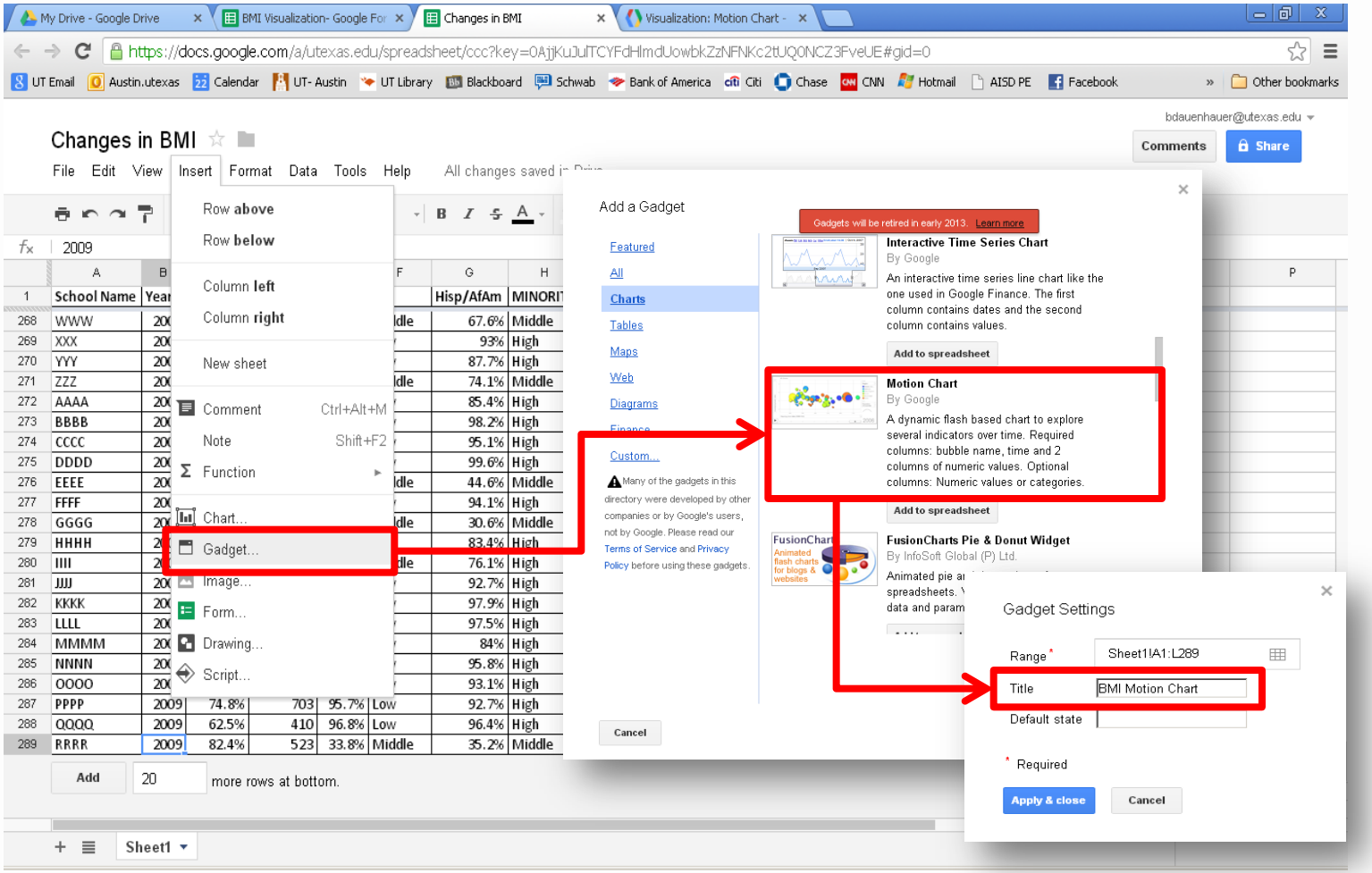
Step 11- Insert a Motion Chart Gadget



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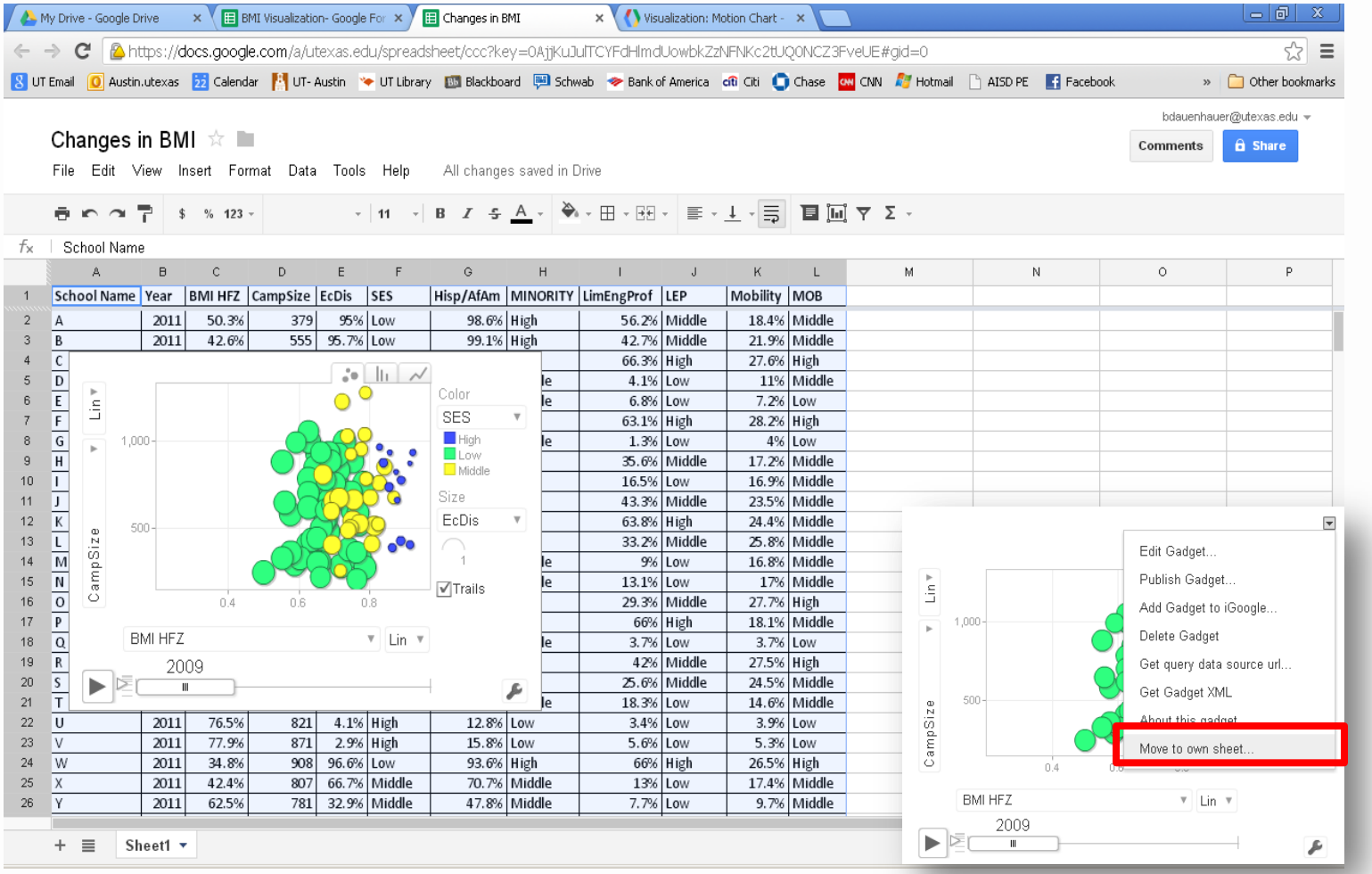
Step 12- Move Chart to New Sheet



School Name	Year	BMI HFZ	CampSize	EcDis	SES	Hisp/AfAm	MINORITY	LimEngProf	LEP	Mobility	MOB
A	2011	50.3%	379	95%	Low	98.6%	High	56.2%	Middle	18.4%	Middle
B	2011	42.6%	555	95.7%	Low	99.1%	High	42.7%	Middle	21.9%	Middle
C								66.3%	High	27.6%	High
D							le	4.1%	Low	11%	Middle
E							le	6.8%	Low	7.2%	Low
F								63.1%	High	28.2%	High
G							le	1.3%	Low	4%	Low
H								35.6%	Middle	17.2%	Middle
I								16.5%	Low	16.9%	Middle
J								43.3%	Middle	23.5%	Middle
K								63.8%	High	24.4%	Middle
L								33.2%	Middle	25.8%	Middle
M							le	9%	Low	16.8%	Middle
N							le	13.1%	Low	17%	Middle
O								29.3%	Middle	27.7%	High
P								66%	High	18.1%	Middle
Q							le	3.7%	Low	3.7%	Low
R								42%	Middle	27.5%	High
S								25.6%	Middle	24.5%	Middle
T							le	18.3%	Low	14.6%	Middle
U	2011	76.5%	821	4.1%	High	12.8%	Low	3.4%	Low	3.9%	Low
V	2011	77.9%	871	2.9%	High	15.8%	Low	5.6%	Low	5.3%	Low
W	2011	34.8%	908	96.6%	Low	93.6%	High	66%	High	26.5%	High
X	2011	42.4%	807	66.7%	Middle	70.7%	Middle	13%	Low	17.4%	Middle
Y	2011	62.5%	781	32.9%	Middle	47.8%	Middle	7.7%	Low	9.7%	Middle

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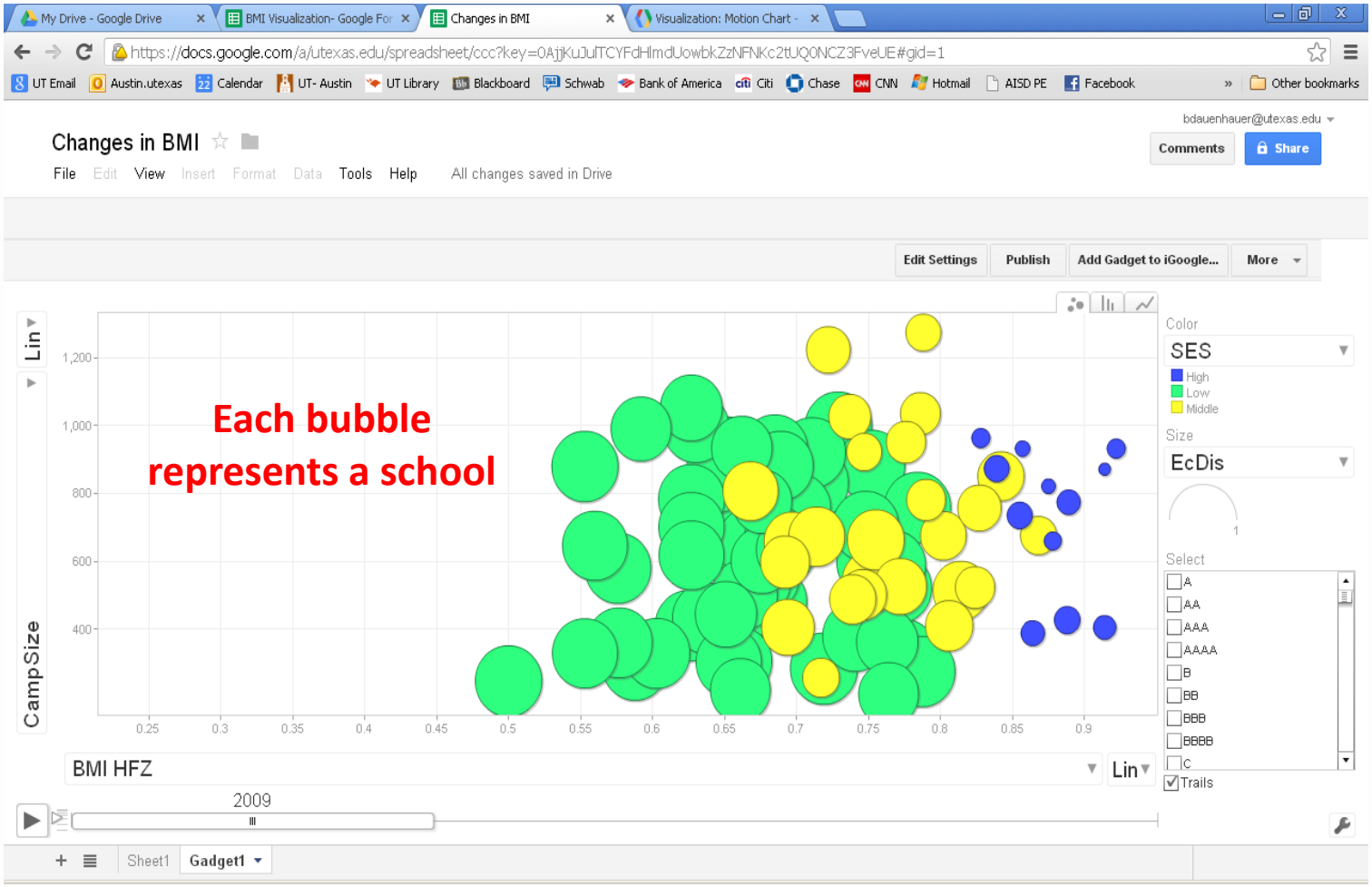
The Motion Chart



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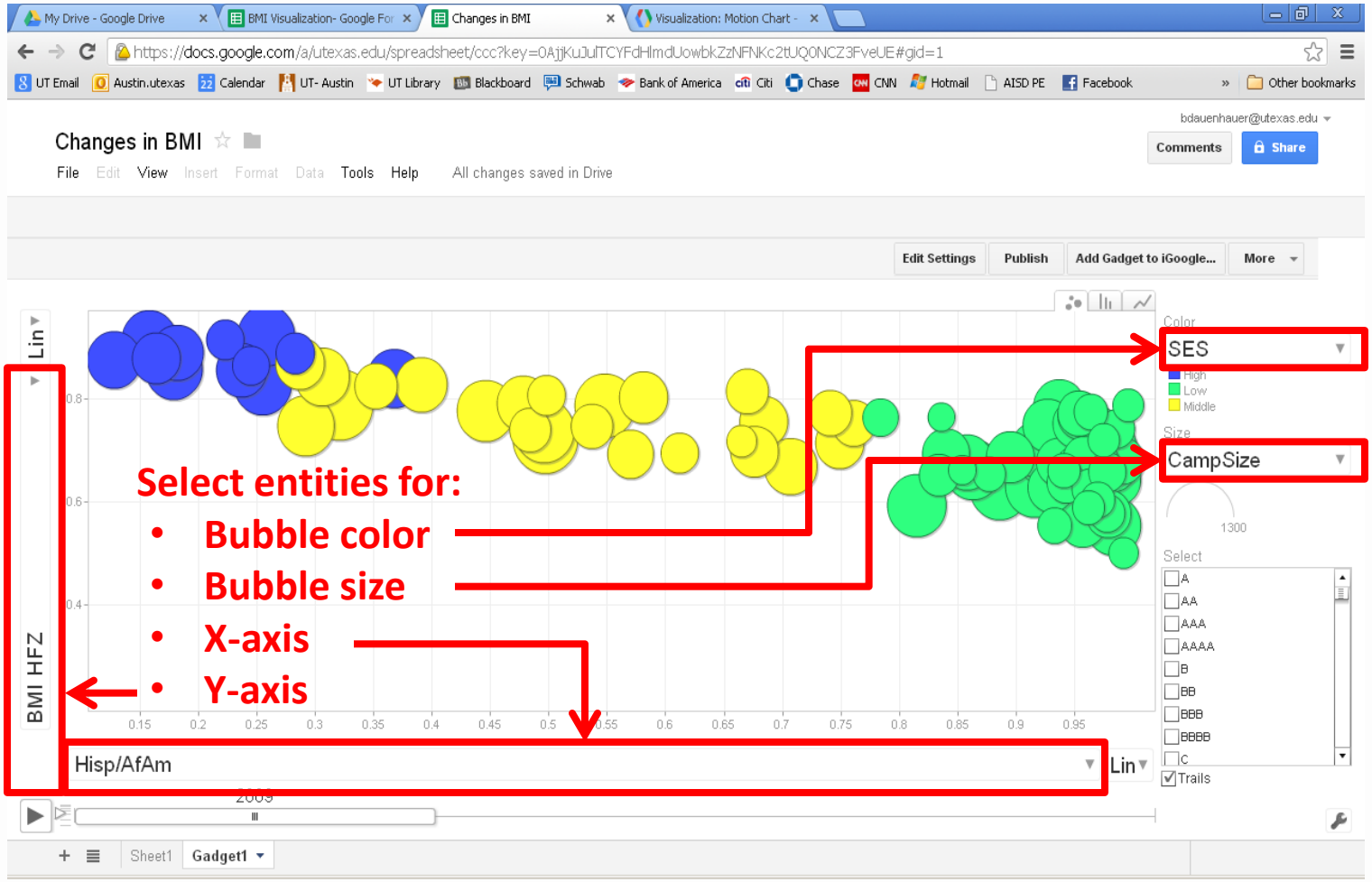
Adjusting Entities



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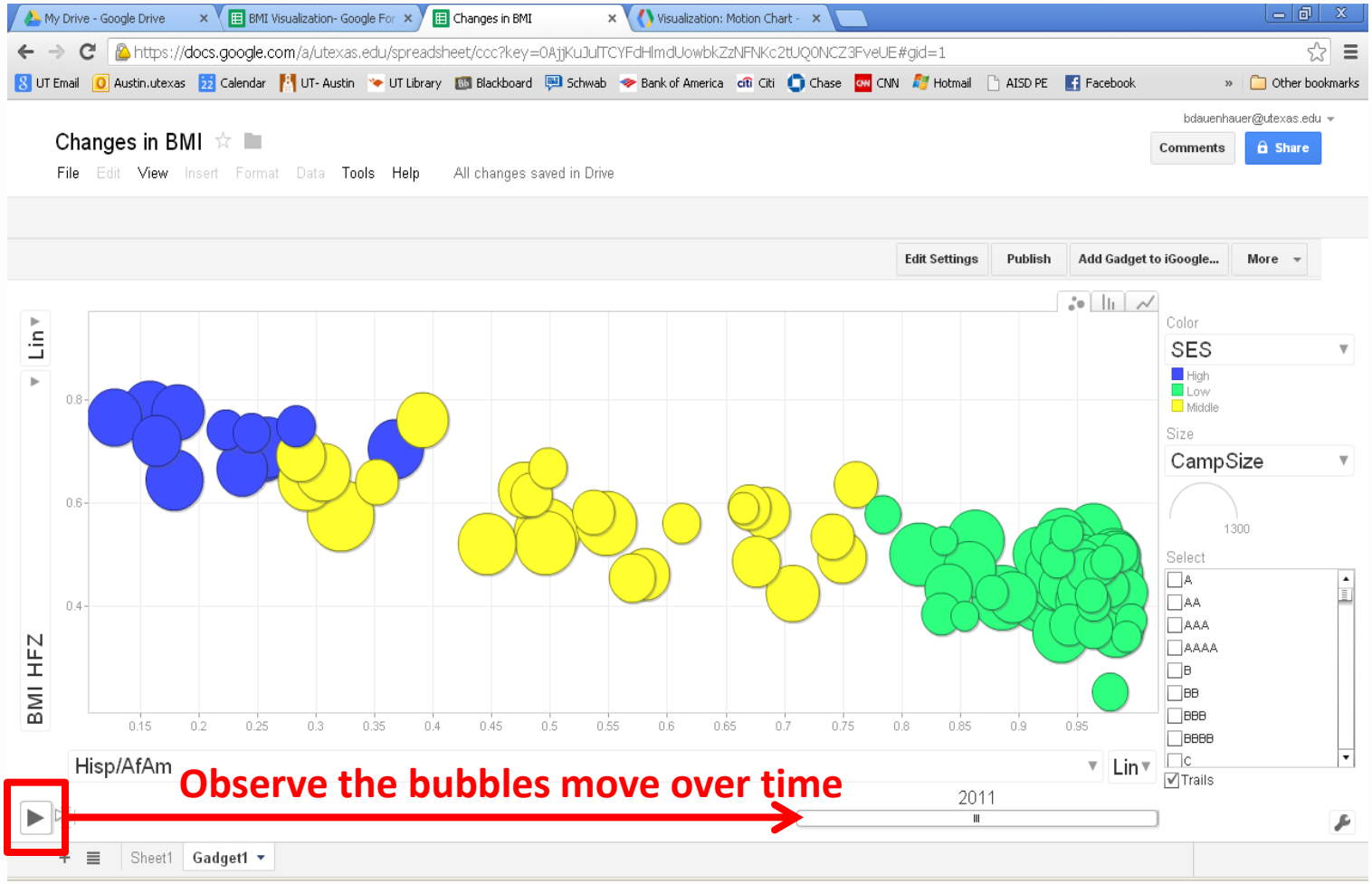
Set the Chart in Motion



Observe the bubbles move over time

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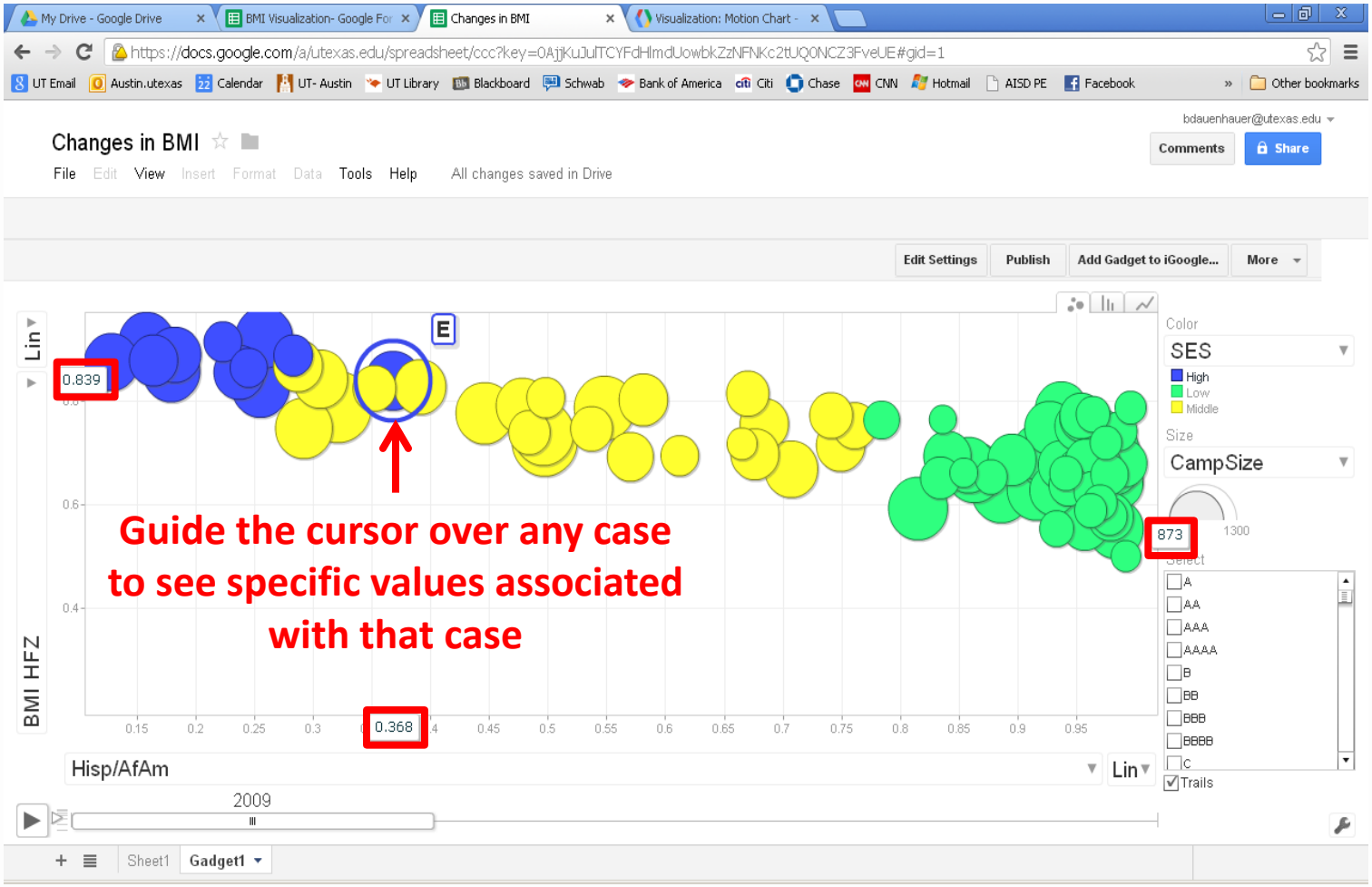
View Details of Cases



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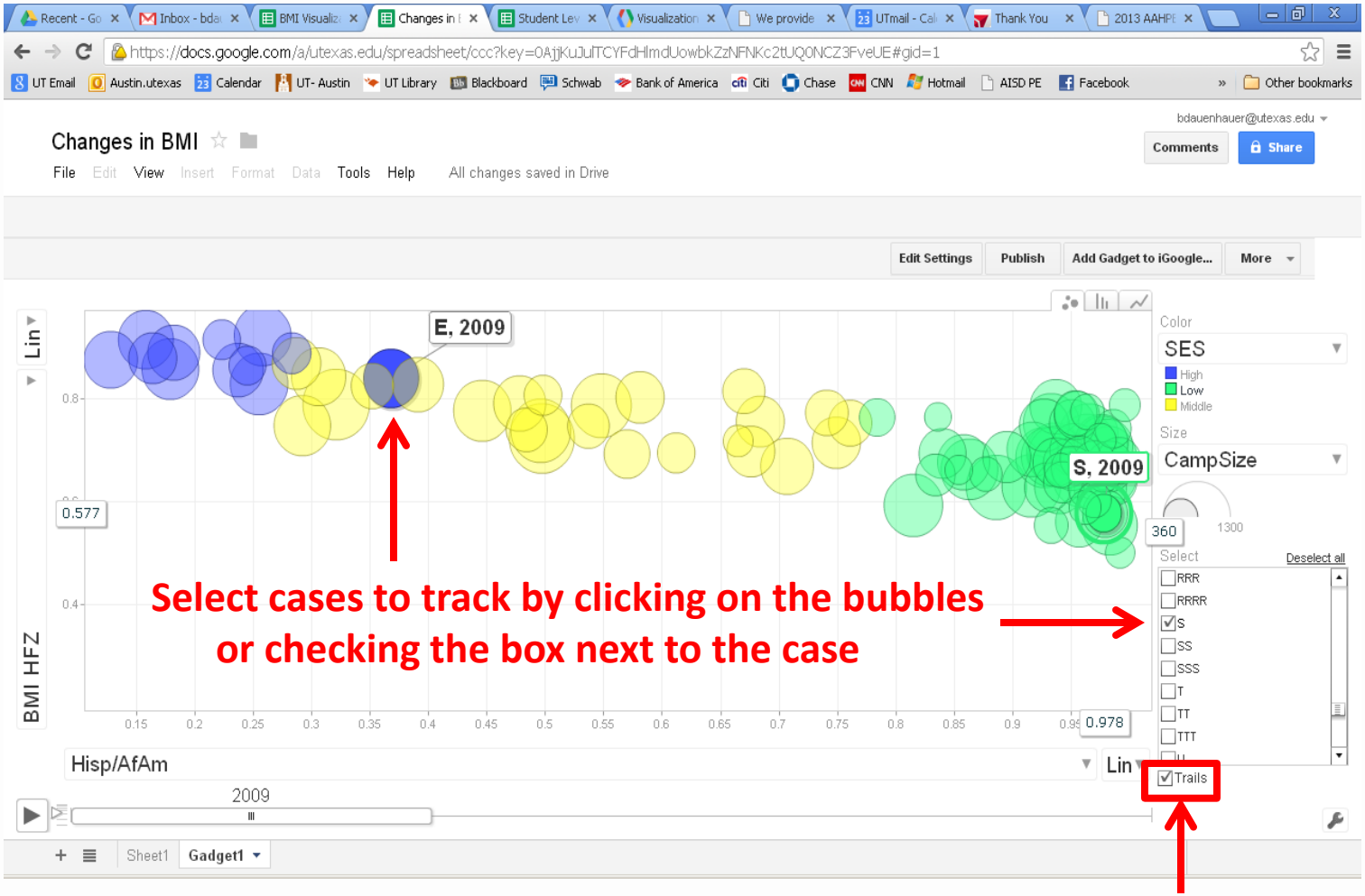
Track Individual Cases Over Time



Select cases to track by clicking on the bubbles or checking the box next to the case

Check the "trails" box

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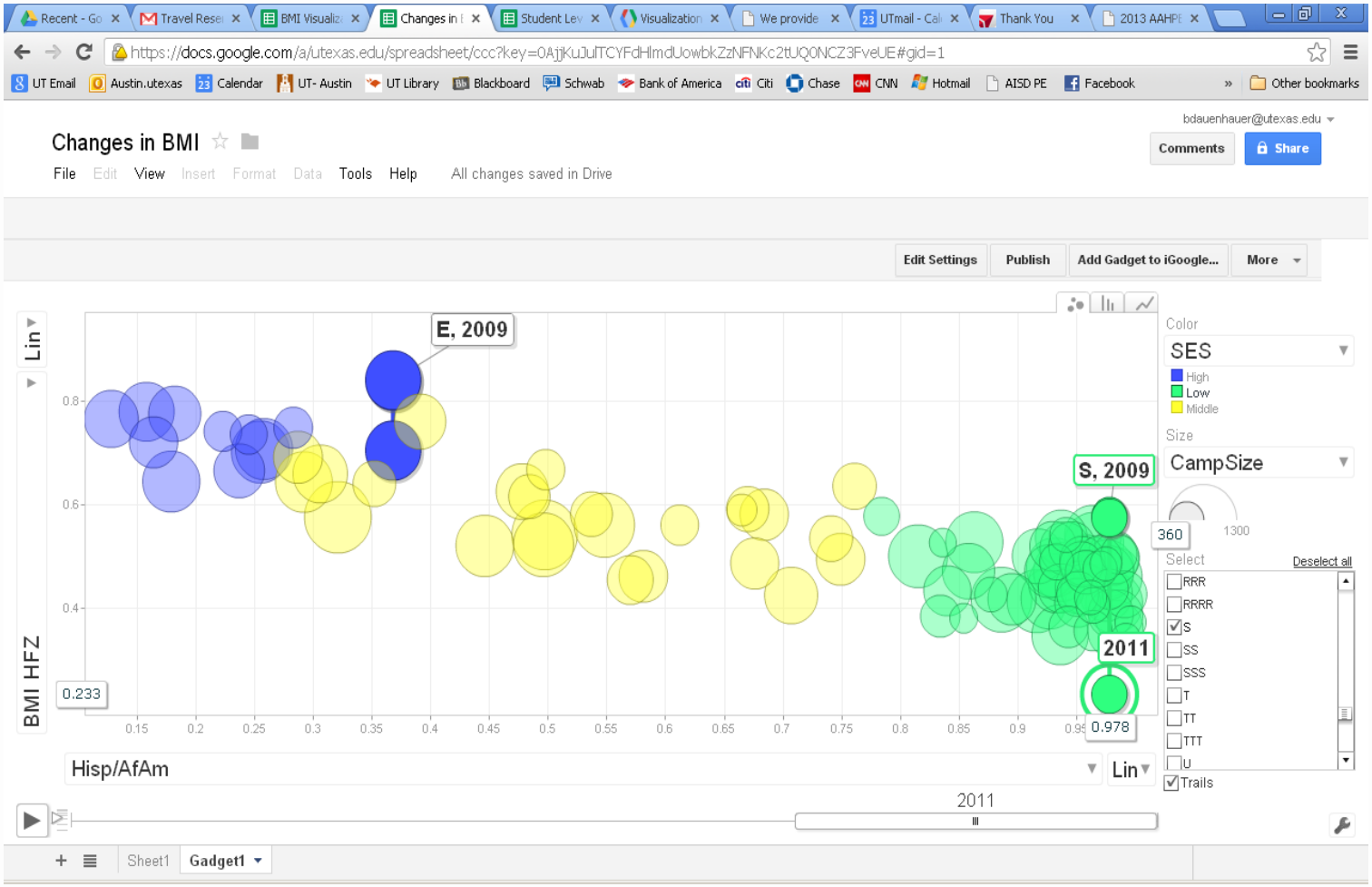
Track Individual Cases Over Time



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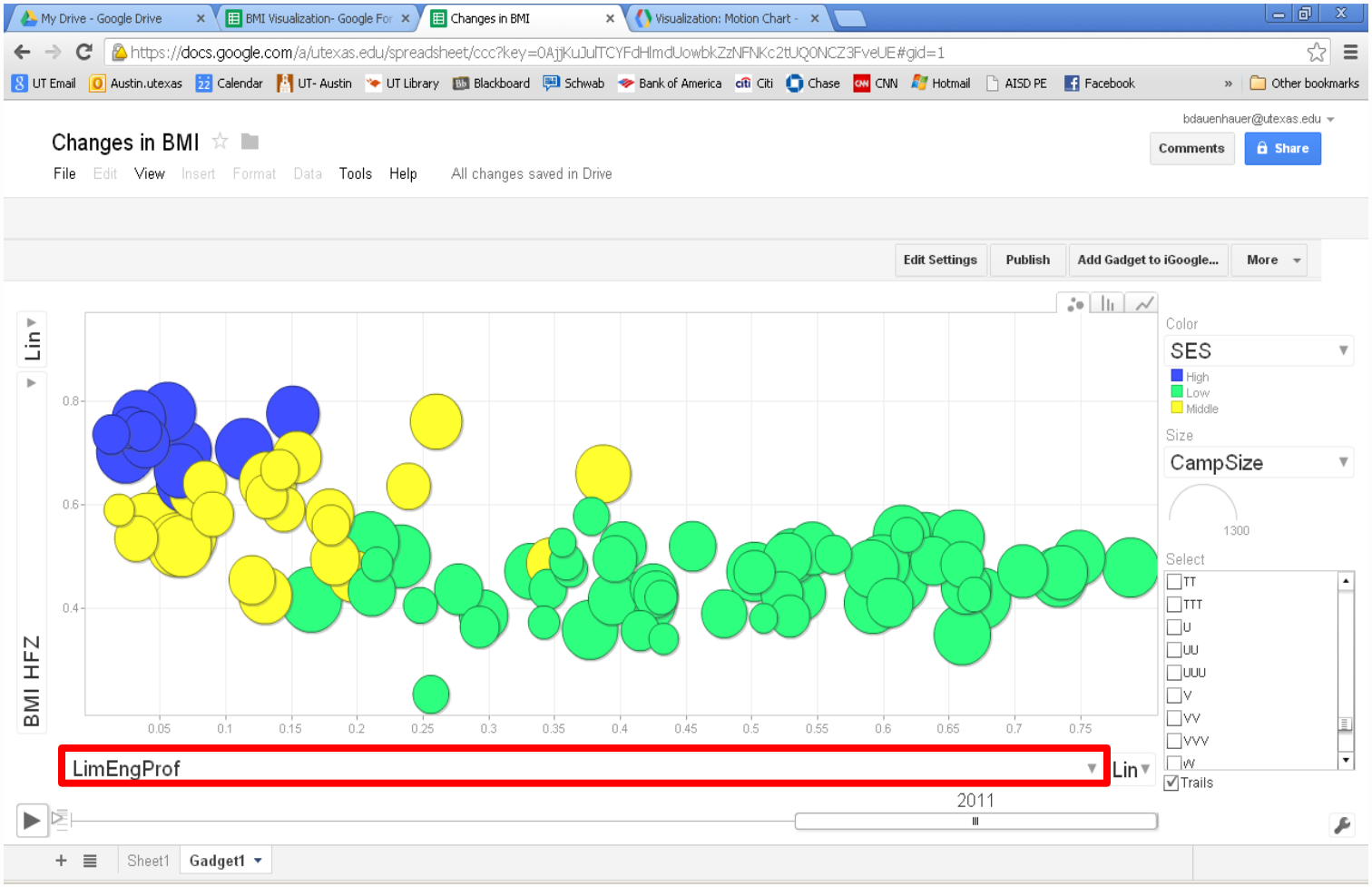
Explore With Different Entities



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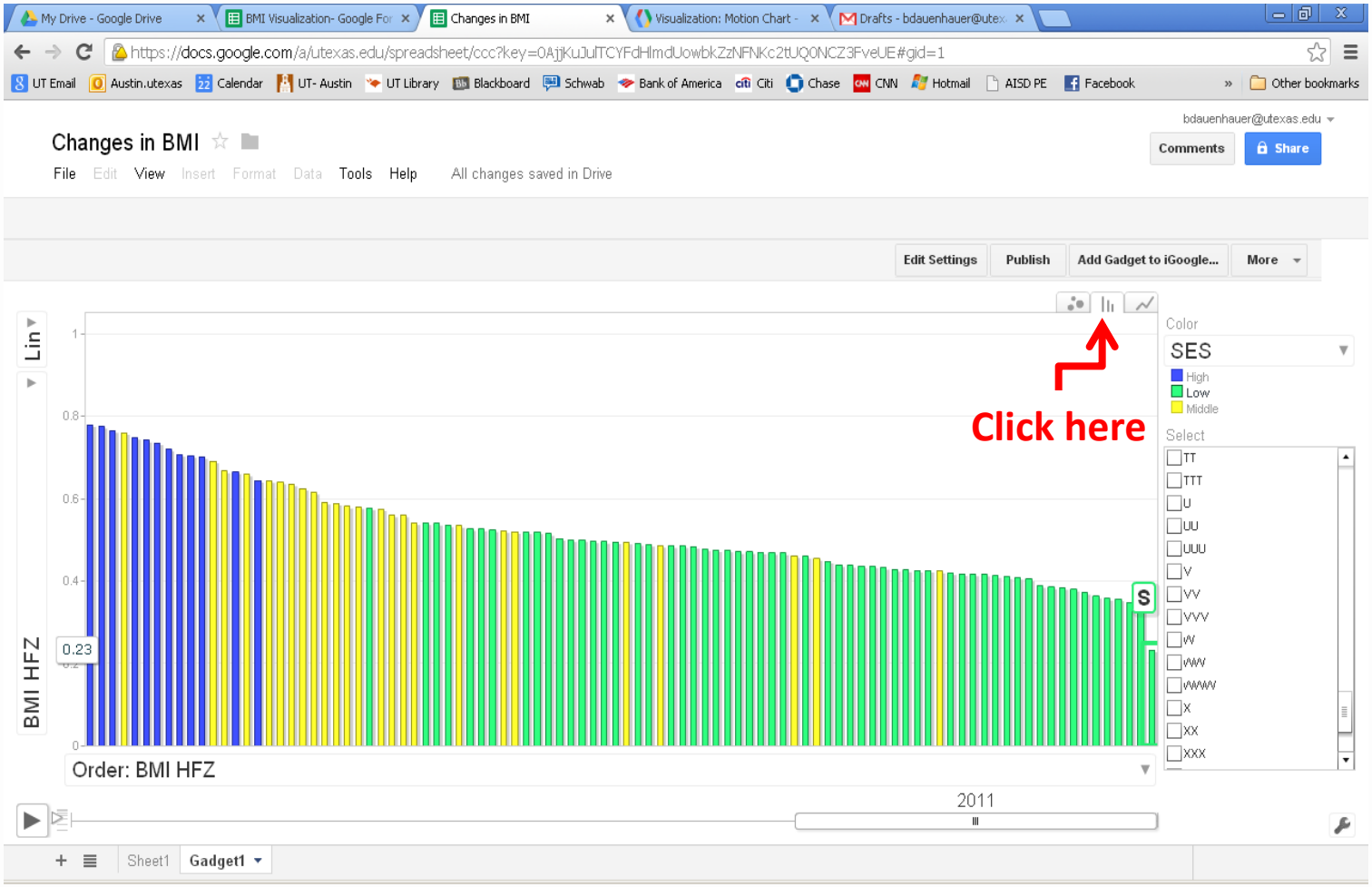
View Data as a Bar Graph



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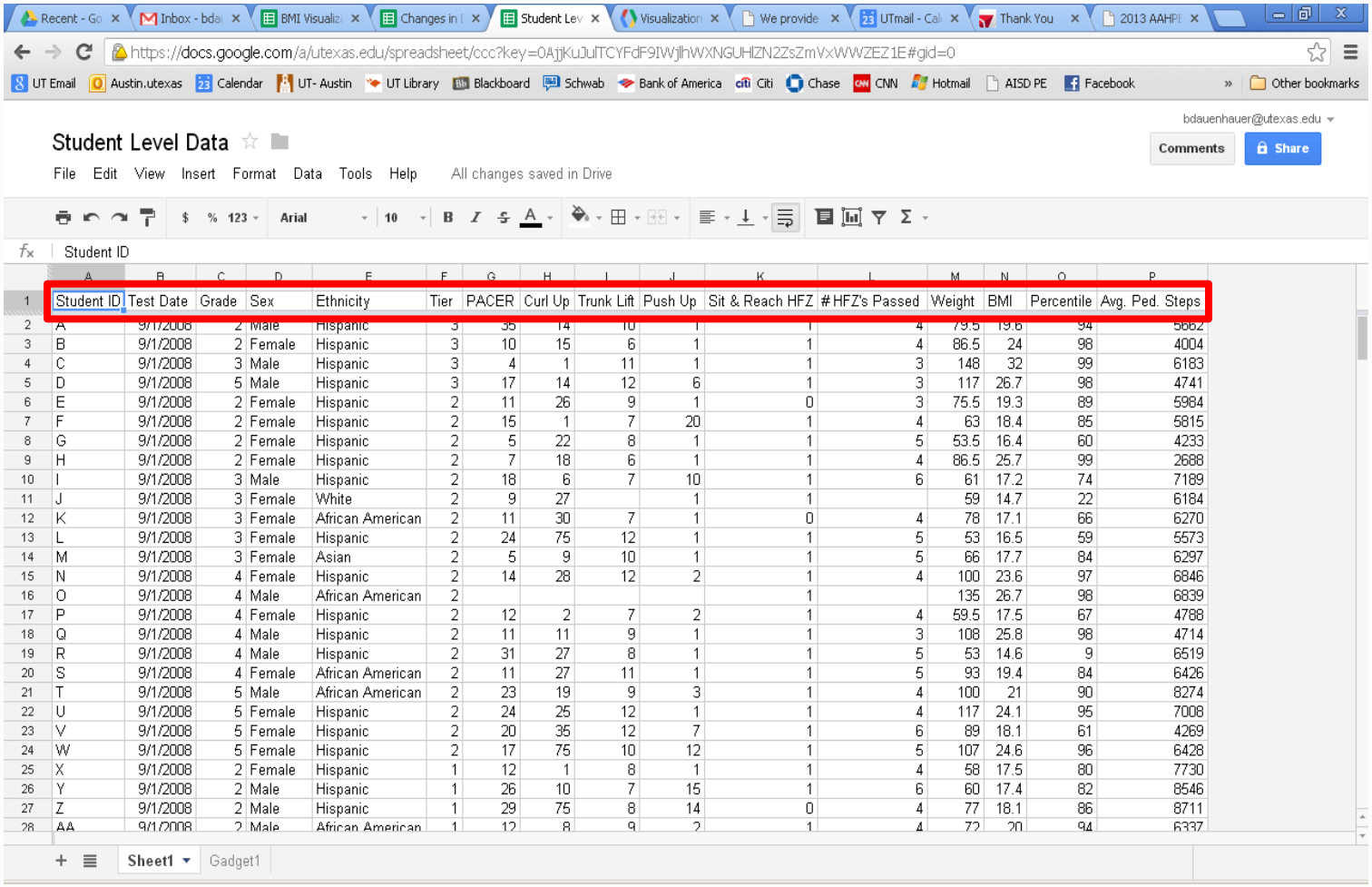
Examining Student Level Data



Student ID	Test Date	Grade	Sex	Ethnicity	Tier	PACER	Curl Up	Trunk Lift	Push Up	Sit & Reach HFZ	# HFZ's Passed	Weight	BMI	Percentile	Avg. Ped. Steps
A	9/1/2008	2	Male	Hispanic	3	35	14	10	1	1	4	79.5	19.6	94	5662
B	9/1/2008	2	Female	Hispanic	3	10	15	6	1	1	4	86.5	24	98	4004
C	9/1/2008	3	Male	Hispanic	3	4	1	11	1	1	3	148	32	99	6183
D	9/1/2008	5	Male	Hispanic	3	17	14	12	6	1	3	117	26.7	98	4741
E	9/1/2008	2	Female	Hispanic	2	11	26	9	1	0	3	75.5	19.3	89	5984
F	9/1/2008	2	Female	Hispanic	2	15	1	7	20	1	4	63	18.4	85	5815
G	9/1/2008	2	Female	Hispanic	2	5	22	8	1	1	5	53.5	16.4	60	4233
H	9/1/2008	2	Female	Hispanic	2	7	18	6	1	1	4	86.5	25.7	99	2688
I	9/1/2008	3	Male	Hispanic	2	18	6	7	10	1	6	61	17.2	74	7189
J	9/1/2008	3	Female	White	2	9	27		1	1		59	14.7	22	6184
K	9/1/2008	3	Female	African American	2	11	30	7	1	0	4	78	17.1	66	6270
L	9/1/2008	3	Female	Hispanic	2	24	75	12	1	1	5	53	16.5	59	5573
M	9/1/2008	3	Female	Asian	2	5	9	10	1	1	5	66	17.7	84	6297
N	9/1/2008	4	Female	Hispanic	2	14	28	12	2	1	4	100	23.6	97	6846
O	9/1/2008	4	Male	African American	2					1		135	26.7	98	6839
P	9/1/2008	4	Female	Hispanic	2	12	2	7	2	1	4	59.5	17.5	67	4788
Q	9/1/2008	4	Male	Hispanic	2	11	11	9	1	1	3	108	25.8	98	4714
R	9/1/2008	4	Male	Hispanic	2	31	27	8	1	1	5	53	14.6	9	6519
S	9/1/2008	4	Female	African American	2	11	27	11	1	1	5	93	19.4	84	6426
T	9/1/2008	5	Male	African American	2	23	19	9	3	1	4	100	21	90	8274
U	9/1/2008	5	Female	Hispanic	2	24	25	12	1	1	4	117	24.1	95	7008
V	9/1/2008	5	Female	Hispanic	2	20	35	12	7	1	6	89	18.1	61	4269
W	9/1/2008	5	Female	Hispanic	2	17	75	10	12	1	5	107	24.6	96	6428
X	9/1/2008	2	Female	Hispanic	1	12	1	8	1	1	4	58	17.5	80	7730
Y	9/1/2008	2	Male	Hispanic	1	26	10	7	15	1	6	60	17.4	82	8546
Z	9/1/2008	2	Male	Hispanic	1	29	75	8	14	0	4	77	18.1	86	8711
AA	9/1/2008	2	Male	African American	1	12	8	9	2	1	4	72	20	94	6337

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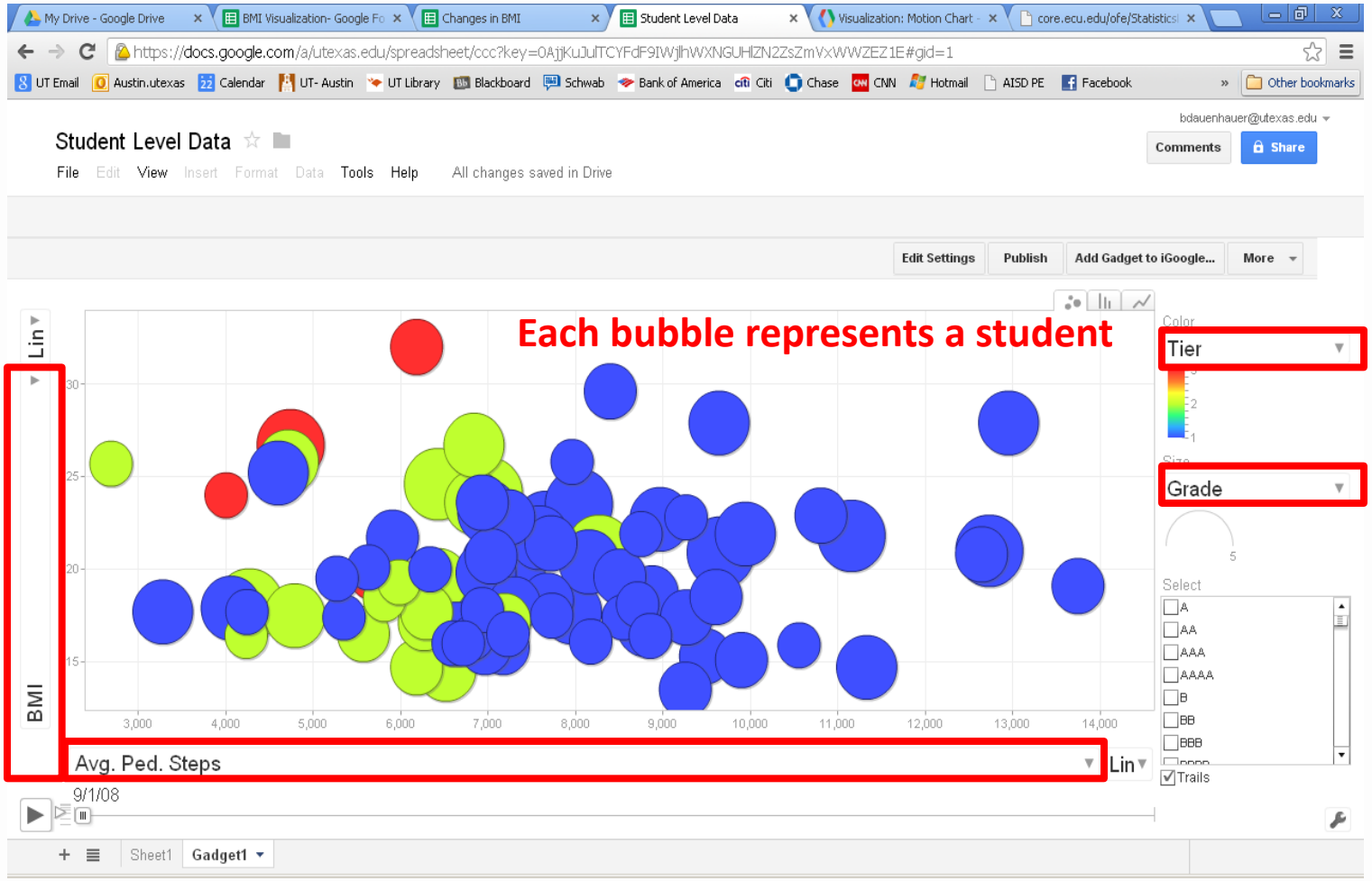
Examining Student Level Data



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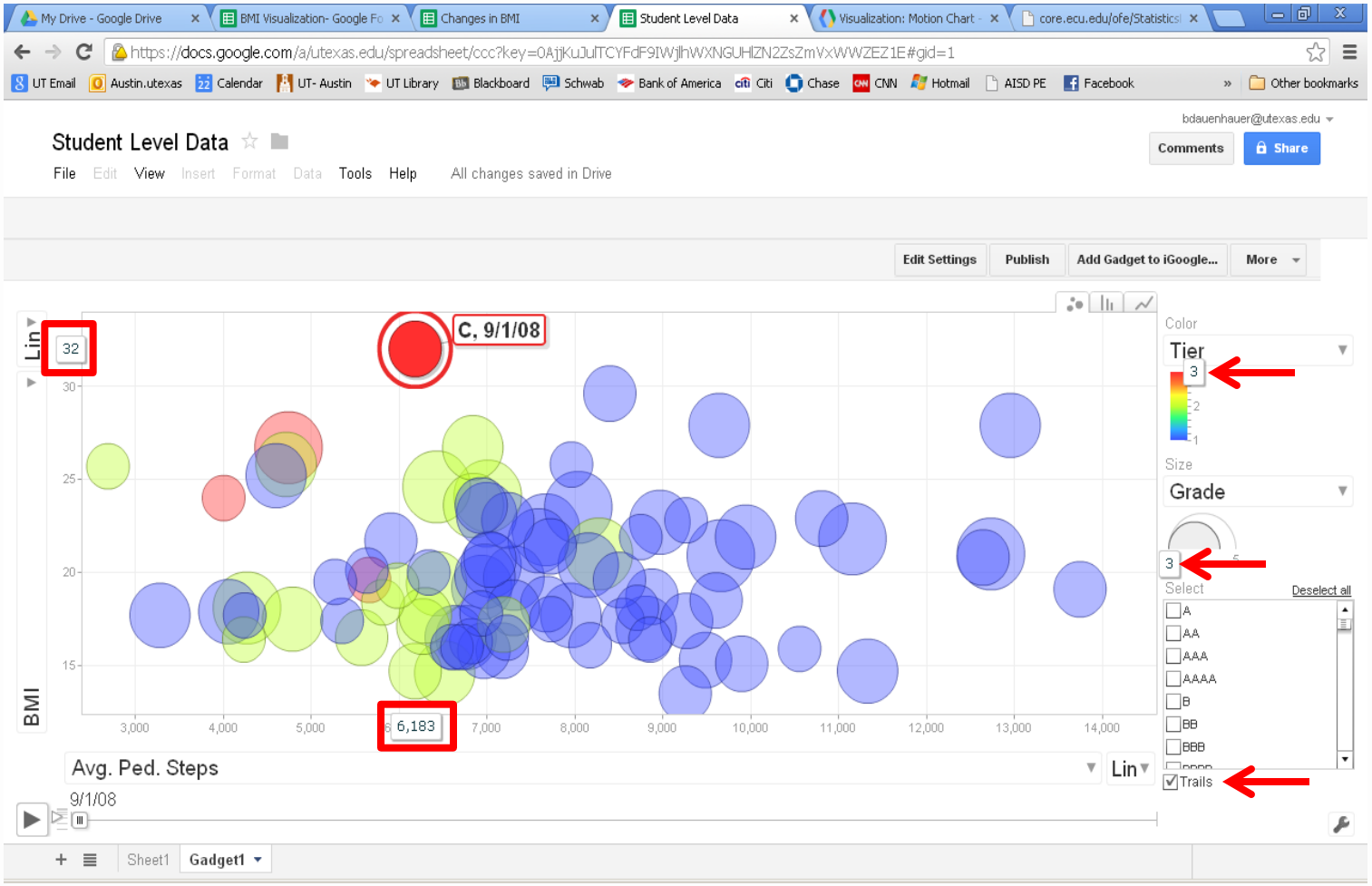
Tracking Individual Student Progress



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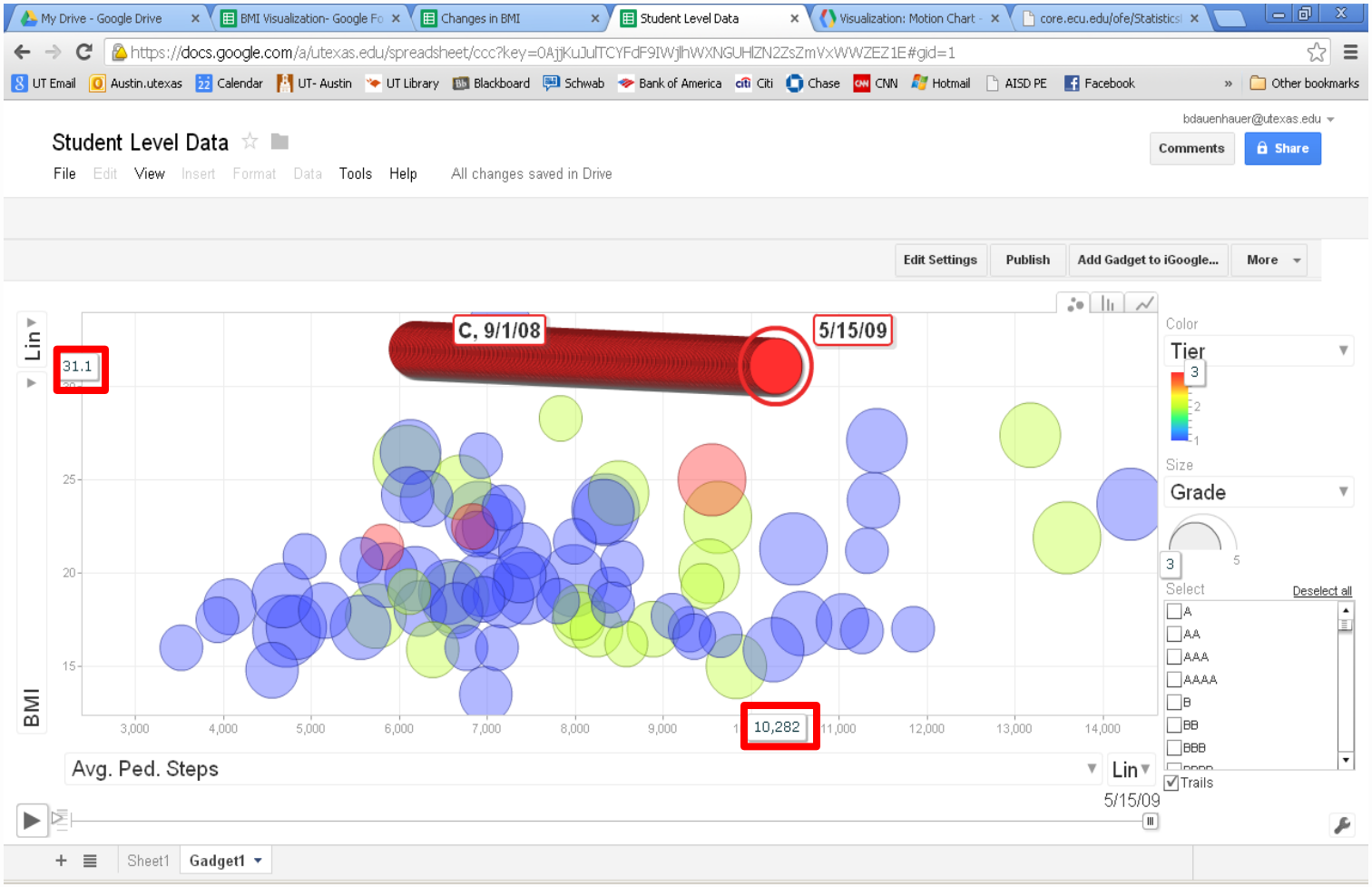
Tracking Individual Student Progress



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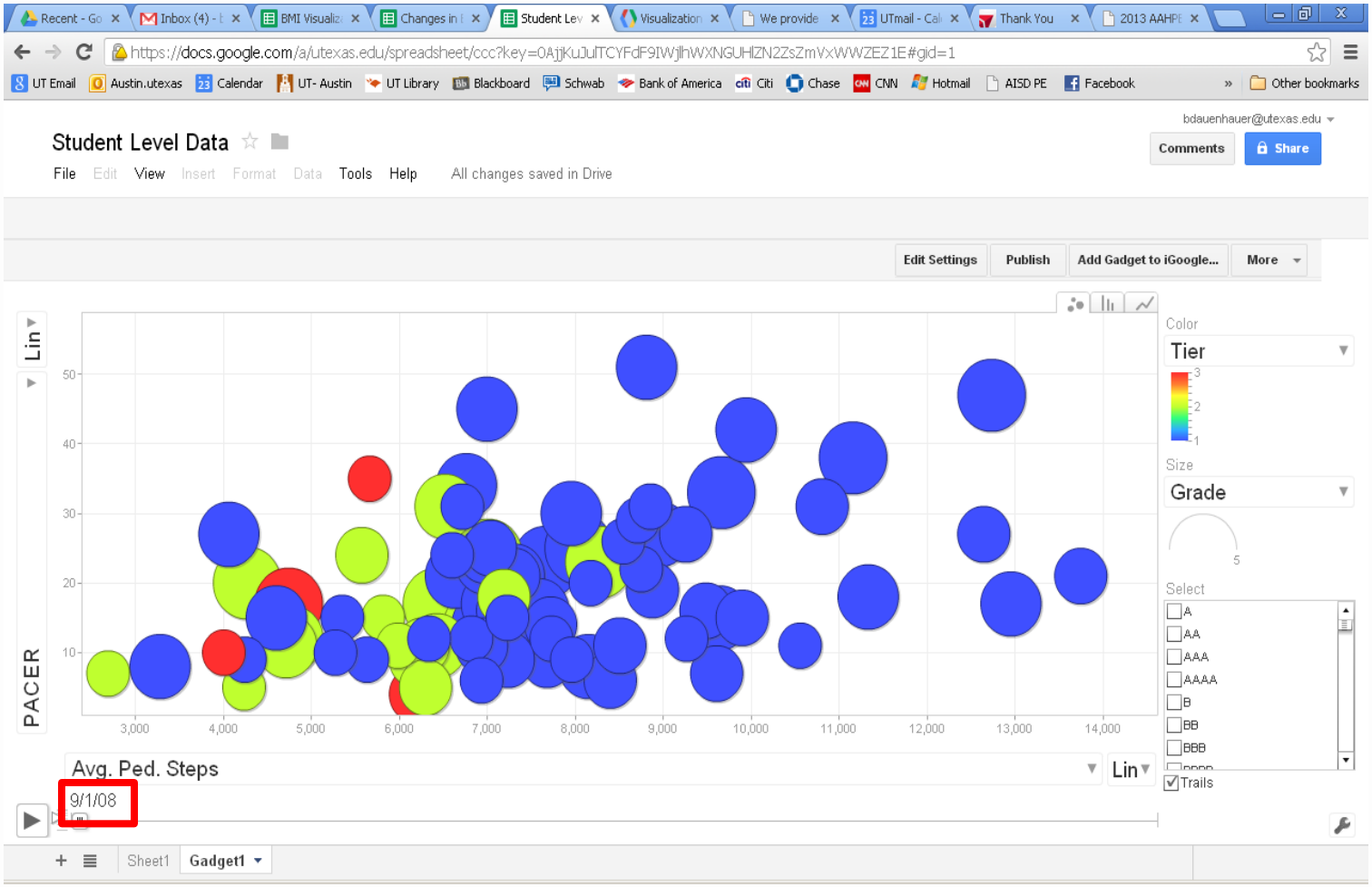
Examining Program Effectiveness



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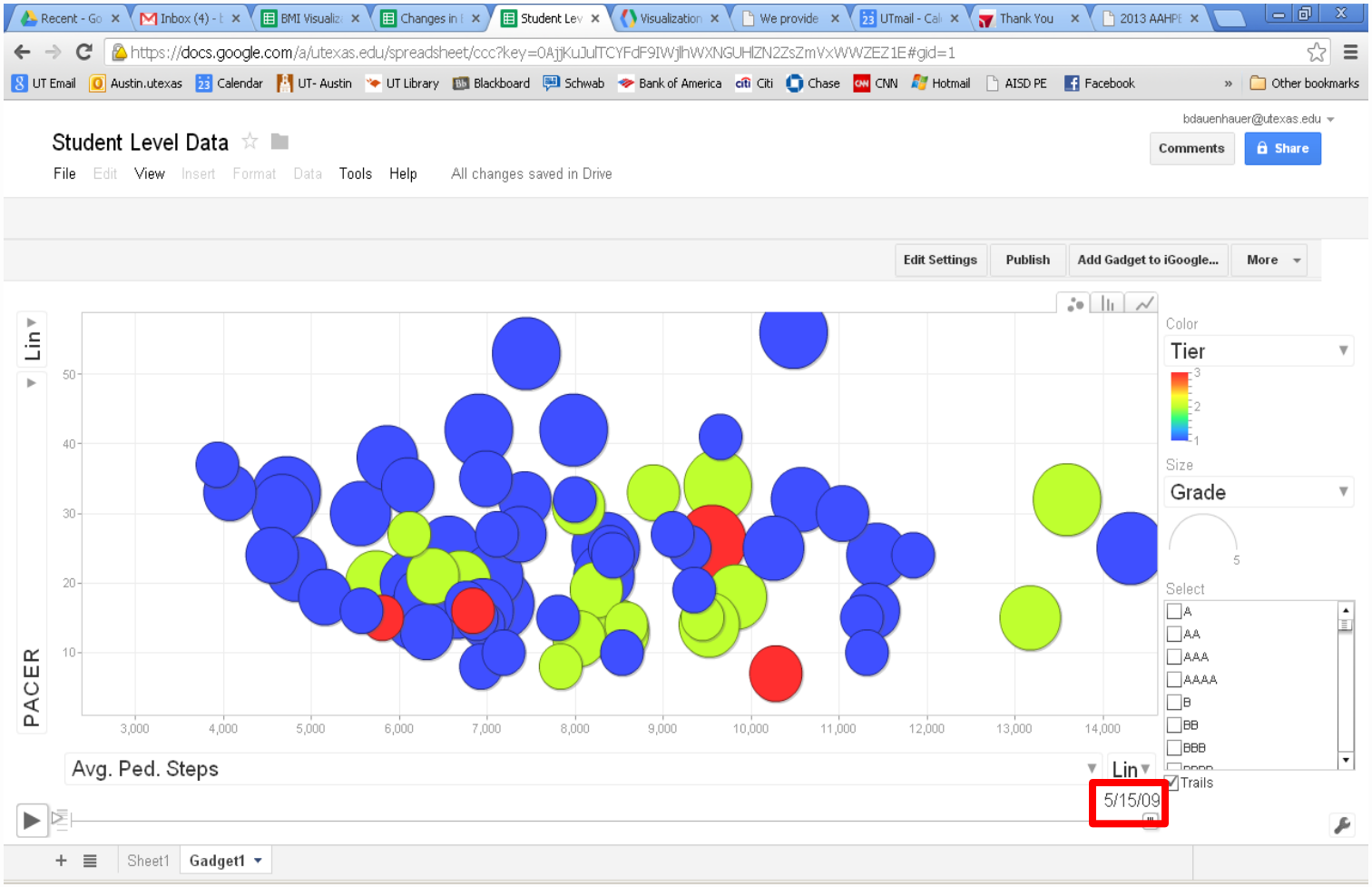
Examining Program Effectiveness



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To Whom Should We Present Our Data?

1. Students
2. Teachers
3. Administrators
4. Parents
5. School board members
6. Community members
7. Businesses

In other words… **EVERYONE!**

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Questions/Comments

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