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1  #install.packages("pastecs")
2  library(pastecs)
3
4  library(readr) #importing csv files
5  library(dplyr) #general analysis
6  library(ggplot2) #making charts
7  library(lubridate) #date functions
8  library(reshape2) #use this for melt function to create one record for each team
9  library(tidyr)
10 library(janitor) #use this for doing crosstabs
11 library(scales) #needed for stacked bar chart axis labels
12 library(knitr) #needed for making tables in markdown page
13 library(htmltools) #this is needed for Rstudio to display kable and other html code
14 library(rmarkdown)
15 library(kableExtra)
16 library(ggthemes)
17 library(stringr)
18 library(RMySQL)
19 library(readxl) #for importing Excel files
20 library(DT) #needed for making searchable sortable data table
21 library(waffle)
22 library(foreign) #for importing SPSS files
23 library(jsonlite) #for exporting JSON
24 library(car)
25 library(aws.s3) #for loading to AWS server
26
27
28 options(scipen=999)
29
30 library(scales)
31
32
33 # Import Basic Skills revenue -----
34
35 basicskills <- read_csv('./data/basicskills_revenue_import.csv',
36   col_types=cols(`District Number`=col_character(), `District Type`=col_character()))%>%
37   clean_names() %>% mutate(districtid=paste(district_number, district_type, '000',
38     sep='-'))
39
40 basicskills2 <- basicskills %>% select(-district_number, -district_type, -district)
41
42 basicskills3 <- melt(basicskills2, id.vars='districtid')
43
44 basicskills3 <- basicskills3 %>% mutate(datayr=substr(variable, 2, 6),
45   yr=
46   as.numeric(paste('20',substr(variable,5,6), sep='')),
47   type=substr(variable, 8,100))
48
49 # import UFARS -----
50
51 ufars06_18 <- read_csv('./data/ufars06_18.csv',
52   col_types=cols(.default=col_character(),
53   tot_amt=col_double()))%>% rename(datayear=dat_yer,

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53         districtnum=dst_num,
54         disttype=dst_tye,
55         fund=fun_num,
56         organization=ogz_num,
57         program=prg_num,
58         finance=fna_num,
59         object=obj_num,
60         course=crs_num,
61         schoolclass=unt_cls)
62
63
64 codes <- read_excel("../data/UFARS/09-ListofCodes 2019.1.xlsx", sheet="CODES",
65 range="A1:D730")
66
67
68 # import from mysql -----
69
70
71
72 con <- dbConnect(RMySQL::MySQL(), host = Sys.getenv("host"), dbname="Schools",user=
73 Sys.getenv("userid"), password=Sys.getenv("pwd"))
74
75 #list the tables in the database we've connected to
76 #dbListTables(con)
77
78 #list the fields in the table; change "mytablename" to the name of the table you're
79 trying to connect to
80 #dbListFields(con,'mytablename')
81
82 #Pull DistrictList table
83 data1 <- dbSendQuery(con, "select * from DistrictList")
84
85 #assign it to a new data frame
86 district_list <- fetch(data1, n=-1)
87
88 dbClearResult(data1)
89
90 #Pull mobility data
91 data2 <- dbSendQuery(con, "select schoolid, fiscalyear as yr, midyr_pct as mobility,
92 schoolclassification
93 from mobility")
94
95 #assign it to a new data frame
96 mobility <- fetch(data2, n=-1)
```

```
97 dbClearResult(data2)
98
99
100
101 #Pull race data
102 data3 <- dbSendQuery(con, "select schoolid, schoolyear as yr, pctminority,
103 totalstudents
104 from enroll_race where schoolyear>=2007")
105
106 #assign it to a new data frame
107 race <- fetch(data3, n=-1)
108
109 dbClearResult(data3)
110
111 #Pull teacher data
112 data4 <- dbSendQuery(con, "select idnumber as schoolid, concat('20', right(schoolyr,2))
113 as yr, totfte,
114 newteacher, avgyrsexp
115 from teacher_demographics where distnum<>'9999'")
116
117 #assign it to a new data frame
118 teachers <- fetch(data4, n=-1)
119
120 dbClearResult(data4)
121
122 #Pull special enrollment data (free lunch and ELL)
123 data5 <- dbSendQuery(con, "select schoolid, concat('20', right(datayear,2)) as
124 yr,k12enr, freek12, redk12, lepididentifiedk12, lepservedk12
125 from enroll_special
126 where grade='All Grades' and datayear not like '9%'
127 having yr>2006")
128
129 #assign it to a new data frame
130 special <- fetch(data5, n=-1)
131
132 dbClearResult(data5)
133
134
135 #Pull SchoolList table
136 data6 <- dbSendQuery(con, "select * from SchoolList")
137
138 #assign it to a new data frame
139 school_list <- fetch(data6, n=-1)
140
141 dbClearResult(data6)
142
143
144
145 #disconnect connection
146 dbDisconnect(con)
147
148
149
150 # clean up mysql data -----
```

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151
152
153 special$sk12enr[is.na(special$sk12enr)] <- 0
154 special$freek12[is.na(special$freek12)] <- 0
155 special$redk12[is.na(special$redk12)] <- 0
156 special$lepidentifiedk12[is.na(special$lepidentifiedk12)] <- 0
157 special$lepservek12[is.na(special$lepservek12)] <- 0
158
159
160 #clean up district_list data frame and add a districtid number
161 district_list <- district_list %>% clean_names() %>% rename(district_name=organization)
162
163 school_list <- school_list %>% clean_names()
164
165
166 #change the yr variable to integer in a new field and drop the yr variable
167 race <- race %>% mutate(schoolyr=as.integer(yr)) %>% select(-yr)
168
169
170 mobility <- mobility %>% mutate(schoolyr=as.integer(yr)) %>% select(-yr)
171
172 special <- special %>% mutate(schoolyr=as.integer(yr),
173                             districtid=paste(str_sub(schoolid,1,7), '000', sep="-"))
174 %>% select(-yr)
175
176 teachers <- teachers %>% mutate(schoolyr=as.integer(yr)) %>% select(-yr)
177
178 # import text files -----
179
180
181 #open enrollment
182 openenroll <- read_csv('./data/openenroll.csv') %>% group_by(districtid, yr) %>%
183   summarise(enroll=sum(enrolled),
184             leaving=sum(LeavingToTrad)+sum(LeavingToCharter),
185             coming=sum(ComingIn),
186             resident=sum(residents)) %>%
187   mutate(pctleaving=leaving/resident,
188          pctcoming=coming/enroll)
189
190
191 #attendance
192 attend <- read_csv('./data/consistent_attendance_northstar.csv') %>%
193   mutate(schoolid=paste(districtnumber, districttype, schoolnumber, sep="-"))
194
195
196
197 #compensatory revenue / poverty concentration
198 #this one needs districtid attached to grab location information from district_list
199 revenue <- read_csv('./data/compensatory_revenue_bysite_06_18.csv') %>%
200   clean_names() %>%
201   mutate(schoolid=paste(district_number, district_type, site_number, sep="-"),
202          yr=as.integer(str_sub(year,4,6))+2000,
203          districtid=paste(str_sub(schoolid,1,7), '000', sep="-"))
204
205
206

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207
208
209 #mca data
210 math <- read_csv('./data/math_scores.csv', col_types=cols(.default="c",
totaltested=col_integer(),
211                                     level3=col_integer(),
212                                     level4=col_integer())) %>%
213   mutate(math_totalproficient=level3+level4,
214          math_pctproficient=math_totalproficient/totaltested,
215          yr=as.integer(str_sub(datayear,4,6))+2000) %>%
216   filter(yr>=2007)
217
218
219
220 read <- read_csv('./data/read_scores.csv', col_types=cols(.default="c",
totaltested=col_integer(),
221                                     level3=col_integer(),
222                                     level4=col_integer())) %>%
223   mutate(read_totalproficient=level3+level4,
224          read_pctproficient=read_totalproficient/totaltested,
225          yr=as.integer(str_sub(datayear,4,6))+2000) %>%
226   filter(yr>=2007)
227
228
229
230 rm(data1)
231 rm(data2)
232 rm(data3)
233 rm(data4)
234 rm(data5)
235 rm(data6)
236
237
238 # IDENTIFY SCHOOLS IN NEED -----
239
240 #sets a level (1 through 4) depending on math proficiency percentage
241 #for simplicity, I cut it at quartiles, with the highest number (4) being the most in
need
242 math <- math %>% mutate(need_level = case_when(math_pctproficient<.25~4,
243                                     math_pctproficient>=.25 &
math_pctproficient<.5~3,
244                                     math_pctproficient>=.5 &
math_pctproficient<.75~2,
245                                     math_pctproficient>=.75~1))
246
247
248 #create a column that counts that number of kids below proficiency
249 #(levels 1 and 2 added together)
250 math <- math %>% mutate(number_in_need = totaltested-math_totalproficient)
251
252 #math %>% group_by(yr) %>% summarise(in_need=sum(number_in_need))
253
254
255
256
257 # MATCH MONEY -----
258

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259 #to simplify this, going to limit data down to 2017-18 school year
260 #And only district types of 1, 3 and 7
261
262 math2018 <- math %>% filter(yr==2018) %>% select(schoolid, yr, need_level,
totaltested, number_in_need, math_pctproficient) %>%
263   mutate(dist_type=str_sub(schoolid,6,7))%>% filter(dist_type=='01' | dist_type=='03' |
dist_type=='07')
264
265 #names(revenue)
266
267 revenue <- revenue %>% filter(yr>2006) %>% select(schoolid, districtid,
district_number, district_type, district_name, site_number, site_name, yr,
fall_enrollment, free_lunch_count, reduced_lunch_count,
268   adjusted_count, concentration,
factor, pupil_units,
269   revenue_per_adjusted_count, revenue)
%>%
270   rename(students_yr_prior=fall_enrollment)
271
272
273
274
275 df <- left_join(revenue, school_list %>%
276   select(school_id, metro7county, location, school_name,
school_location_county_name, classification, grades, school_type),
by=c("schoolid"="school_id"))
277
278
279 #names(df)
280
281 revenue2018 <- df %>% filter(yr==2018, district_type=='01' | district_type=='03' |
district_type=='07') %>%
282   mutate(grades2= str_trim(grades))
283
284
285 #organization code 005 = districtwide spending
286
287 ufars06_18 <- ufars06_18 %>%
288   filter(finance=='317') %>%
289   mutate(schoolid=paste(districtnum, disttype, organization, sep="-"),
290     yr=as.integer(str_sub(datayear,4,6))+2000,
291     districtid=paste(str_sub(schoolid,1,7), '000', sep="-"))
292
293
294
295
296 ufars06_18 <- left_join(ufars06_18, district_list %>% select(district_number,
district_type, district_name), by=c("districtnum"="district_number",
"disttype"="district_type"))
297
298
299
300
301 program_codes <- codes %>% filter(top_group=='Program')
302

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303 ufars06_18 <- left_join(ufars06_18, program_codes %>% select(code, detail, sub_group),
    by=c("program"="code"))
304
305
306
307
308 ufars2018 <- ufars06_18 %>%
309   filter(datayear=='17-18', disttype=='01' | disttype=='03' | disttype=='07')%>%
310   group_by(yr, schoolid, disttype, districtid) %>%
311   summarise(tot_spent = sum(tot_amt))
312
313
314
315
316 match2018 <- left_join(revenue2018, ufars2018 %>% select(schoolid, tot_spent),
    by=c("schoolid"="schoolid"))
317
318 match2018 <- left_join(match2018, math2018, by=c("schoolid"="schoolid"))
319
320 match2018 %>% group_by(need_level) %>% summarise(tot_revenue =
    sum(revenue),adjusted_rev=sum(revenue_per_adjusted_count), total_spent=sum(tot_spent),
    count=n(), pupils=sum(adjusted_count))
321
322 match2018$tot_spent[is.na(match2018$tot_spent)] <- 0
323 match2018$revenue[is.na(match2018$revenue)] <- 0
324
325
326 match2018 <- match2018 %>% mutate(poverty_level = case_when(concentration>=.8~'very
    high',
327                                                                 concentration>=.6 &
    concentration<.8~'high',
328                                                                 concentration>=.4 &
    concentration<.6~'medium',
329                                                                 concentration>=.2 &
    concentration<.4~'low',
330                                                                 concentration<.2~'very
    low'))
331
332
333 #match2018 %>% filter(tot_spent>0) %>% group_by(poverty_level) %>%
334 # summarise(tot_revenue = sum(revenue),adjusted_rev=sum(revenue_per_adjusted_count),
    total_spent=sum(tot_spent), count=n(), pupils=sum(adjusted_count))
335
336
337 match2018 <- match2018 %>% mutate(rev_per_need = if_else(is.na(revenue), 0,
    round_half_up(as.double(revenue/adjusted_count))),
338                                spend_per_need = if_else(is.na(tot_spent), 0,
    round_half_up(as.double(tot_spent/adjusted_count)))
339
340
341
342
343 special_district <- special %>% group_by(districtid) %>%
    summarise(tot_enroll=sum(k12enr), totfreek12= sum(freek12), totredk12= sum(redk12)) %>%
    mutate(freelunch=totfreek12+totredk12, pctfreelunch = freelunch/tot_enroll,
    poverty_level = case_when(pctfreelunch>=.8~'very high',

```

```

344
345 pctfreelunch >= .6 & pctfreelunch < .8 ~ 'high',
346
347 pctfreelunch >= .4 & pctfreelunch < .6 ~ 'medium',
348
349 pctfreelunch >= .2 & pctfreelunch < .4 ~ 'low',
350
351 pctfreelunch < .2 ~ 'very low'))
352
353 # DISTRICT LEVEL ANALYSIS -----
354
355 dist_spent <- ufars06_18 %>% filter(disttype == '01' | disttype == '03') %>%
356   group_by(yr, districtnum, disttype) %>% summarise(spent = sum(tot_amt))
357
358 dist_rev <- revenue %>% filter(district_type == '01' | district_type == '03') %>%
359   group_by(yr, district_number, district_type, district_name) %>%
360   summarise(rev = sum(revenue), poverty = sum(adjusted_count))
361
362 dist_match_all yrs <- left_join(dist_rev, dist_spent, by = c("yr" = "yr",
363   "district_number" = "districtnum", "district_type" = "disttype"))
364
365 dist_match_all yrs$rev[is.na(dist_match_all yrs$rev)] <- 0
366 dist_match_all yrs$spent[is.na(dist_match_all yrs$spent)] <- 0
367
368 dist_match_all yrs <- dist_match_all yrs %>% mutate(diff = round(spent - rev, 2),
369   pct = round((diff / rev) * 100, 1))
370
371 dist_match_all yrs <- dist_match_all yrs %>%
372   mutate(scope = case_when(pct >= 14.49 ~ 'over by 15% or more',
373     pct < 14.49 & pct > 9.49 ~ 'over by 10%-14%',
374     pct <= 9.49 & pct > 0 ~ 'over by less than 10%',
375     pct == 0 ~ 'even',
376     pct < 0 & pct > -9.49 ~ 'under by less than 10%',
377     pct > -14.49 & pct < -9.49 ~ 'under by 10-14%',
378     pct <= -14.49 ~ 'under by 15% or more',
379     TRUE ~ 'something went wrong'),
380     districtid = paste(district_number, district_type, '000', sep = "-"))
381
382 dist_match_all yrs <- left_join(dist_match_all yrs, special_district %>%
383   select(districtid, tot_enroll, pctfreelunch, poverty_level),
384   by = c("districtid" = "districtid"))
385
386 #add size of district
387 dist_match_all yrs <- dist_match_all yrs %>%
388   mutate(size = case_when(tot_enroll > 24735 ~ 4,

```



```
384         tot_enroll<=24735 & tot_enroll>10915~3,  
385         tot_enroll<=10915 & tot_enroll>5657~2,  
386         tot_enroll<=5657~1))  
387  
388 #use this to figure out the break points in the above case_when  
389 #quantile(dist_match_allyrs$tot_enroll)  
390  
391 #where located-- by location  
392 dist_match_allyrs <- left_join(dist_match_allyrs, district_list %>% select(id_number,  
393 location), by=c("districtid"="id_number"))  
394
```