In [11]:
```
import numpy as np
import pandas as pd
import os
import math
import glob
import matplotlib.pyplot as plt
import seaborn
import plotly.express as px
import plotly.graph_objects as go
from plotly.subplots import make_subplots
from plotly.offline import download_plotlyjs, init_notebook_mode, plot, iplot
import plotly.figure_factory as ff
import warnings
warnings.filterwarnings('ignore')
```

In [12]:
```
district_df = pd.read_csv('districts_info.csv')
product_df = pd.read_csv('products_info.csv')

csvs = glob.glob('/Users/salazar1210/Data Science/Project prop1/engagement_data/
dframes = []

for file in csvs:
    df = pd.read_csv(file, index_col=None, header=0)
    district_id = file.split('/')[-1].split('.')[0]
    df['district_id'] = district_id
    dframes.append(df)

engagement_df = pd.concat(dframes)
engagement_df = engagement_df.reset_index(drop=True)

engagement_df[['district_id']] = engagement_df[['district_id']].astype(int)
engagement_df2 = pd.merge(engagement_df, district_df, on = 'district_id')
engagement_complete = pd.merge(engagement_df2, product_df, left_on='lp_id', righ


pct_black_hispanic = []
for value in engagement_complete['pct_black/hispanic']:
    val = 0
    if isinstance(value, float):
        val = None
    else:
        k = value.split(", ")
        val = k[0][1:]
    pct_black_hispanic.append(val)
pct_free_reduced = []
for value in engagement_complete['pct_free/reduced']:
    val = 0
    if isinstance(value, float):
        val = None
    else:
        k = value.split(", ")
        val = k[0][1:]
    pct_free_reduced.append(val)
pp_total_raw = []
for value in engagement_complete['pp_total_raw']:
    val = 0
    if isinstance(value, float):
        val = None
    else:
        k = value.split(", ")
        val = k[0][1:]
    pp_total_raw.append(val)

engagement_complete['pct_black_hispanic'] = pct_black_hispanic
engagement_complete['pct_free_reduced'] = pct_free_reduced
engagement_complete['pp_total_raw'] = pp_total_raw
engagement_complete = engagement_complete.drop(['lp_id','URL','county_connection

engagement_complete['pct_black_hispanic'] = engagement_complete['pct_black_hispa
engagement_complete['pct_free_reduced'] = engagement_complete['pct_free_reduced'
engagement_complete['pp_total_raw'] = engagement_complete['pp_total_raw'].astype
```

In [13]:

```
engagement_complete
```

Out[13]:

	time	pct_access	engagement_index	district_id	state	locale	pp_total_raw	LP II
0	2020-01-01	0.04	1.30	3188	NaN	NaN	NaN	2932
1	2020-01-02	0.26	17.78	3188	NaN	NaN	NaN	2932
2	2020-01-03	0.82	121.42	3188	NaN	NaN	NaN	2932
3	2020-01-05	0.00	NaN	3188	NaN	NaN	NaN	2932
4	2020-01-06	2.86	451.43	3188	NaN	NaN	NaN	2932
...	...	...	...	...	...	...	...	.
11691582	2020-12-15	0.11	3.80	4629	Illinois	Suburb	16000.0	4314
11691583	2020-12-17	0.07	1.38	4629	Illinois	Suburb	16000.0	4314
11691584	2020-12-18	0.10	3.28	4629	Illinois	Suburb	16000.0	4314

	time	pct_access	engagement_index	district_id	state	locale	pp_total_raw	LP II
11691585	2020-12-21	0.09	3.28	4629	Illinois	Suburb	16000.0	4314
11691586	2020-12-22	0.08	2.67	4629	Illinois	Suburb	16000.0	4314

11691587 rows × 13 columns

In [14]:
```
engagement_complete.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 11691587 entries, 0 to 11691586
Data columns (total 13 columns):
 #   Column                        Dtype
---  ------                        -----
 0   time                          object
 1   pct_access                    float64
 2   engagement_index              float64
 3   district_id                   int64
 4   state                         object
 5   locale                        object
 6   pp_total_raw                  float64
 7   LP ID                         int64
 8   Product Name                  object
 9   Provider/Company Name         object
 10  Primary Essential Function    object
 11  pct_black_hispanic            float64
 12  pct_free_reduced              float64
dtypes: float64(5), int64(2), object(6)
memory usage: 1.2+ GB
```

In [15]:
```
engagement_complete.describe()
```

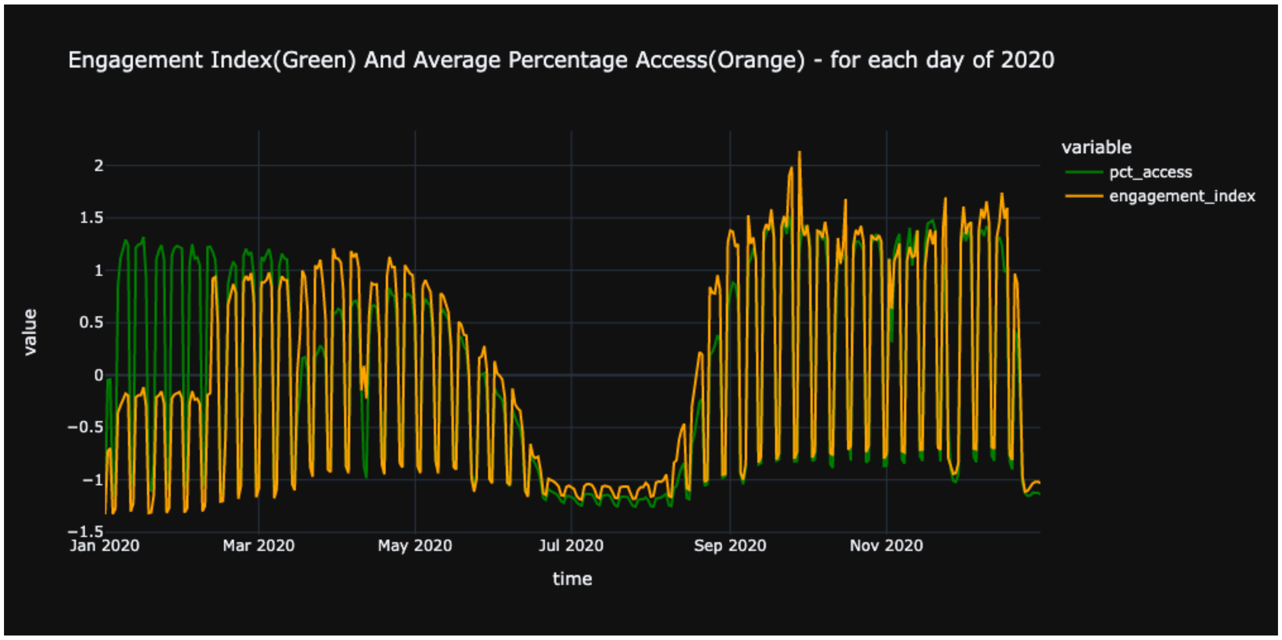
Out[15]:

	pct_access	engagement_index	district_id	pp_total_raw	LP ID	pct_black_
count	1.168087e+07	9.414268e+06	1.169159e+07	6.238946e+06	1.169159e+07	9.13
mean	8.357378e-01	2.573893e+02	5.255355e+03	1.133406e+04	5.476999e+04	1.4
std	4.138046e+00	2.146490e+03	2.642549e+03	4.050854e+03	2.633956e+04	2.24
min	0.000000e+00	1.000000e-02	1.000000e+03	4.000000e+03	1.053300e+04	0.00
25%	1.000000e-02	9.400000e-01	2.956000e+03	8.000000e+03	3.085100e+04	0.00
50%	5.000000e-02	5.080000e+00	5.006000e+03	1.000000e+04	5.482700e+04	0.00
75%	2.200000e-01	3.388000e+01	7.741000e+03	1.400000e+04	7.688900e+04	2.00

	pct_access	engagement_index	district_id	pp_total_raw	LP ID	pct_black_
max	1.000000e+02	1.527471e+05	9.927000e+03	3.200000e+04	9.991600e+04	8.00

In [16]:

```
for_timeseries = engagement_complete[['time','pct_access','engagement_index']]
grouped_by_date = for_timeseries.groupby('time', as_index=False).mean()

from sklearn.preprocessing import StandardScaler
sc = StandardScaler()
grouped_by_date[['engagement_index','pct_access']] = sc.fit_transform(grouped_by

fig = px.line(grouped_by_date, x='time', y=['pct_access', 'engagement_index'],he
                title='Engagement Index(Green) And Average Percentage Access(Ora
                color_discrete_map={"pct_access": "Green", "engagement_index": "
                template="plotly_dark")

fig.show()
```



engagement_index:

Total page-load events per one thousand students of a given product and on a given day

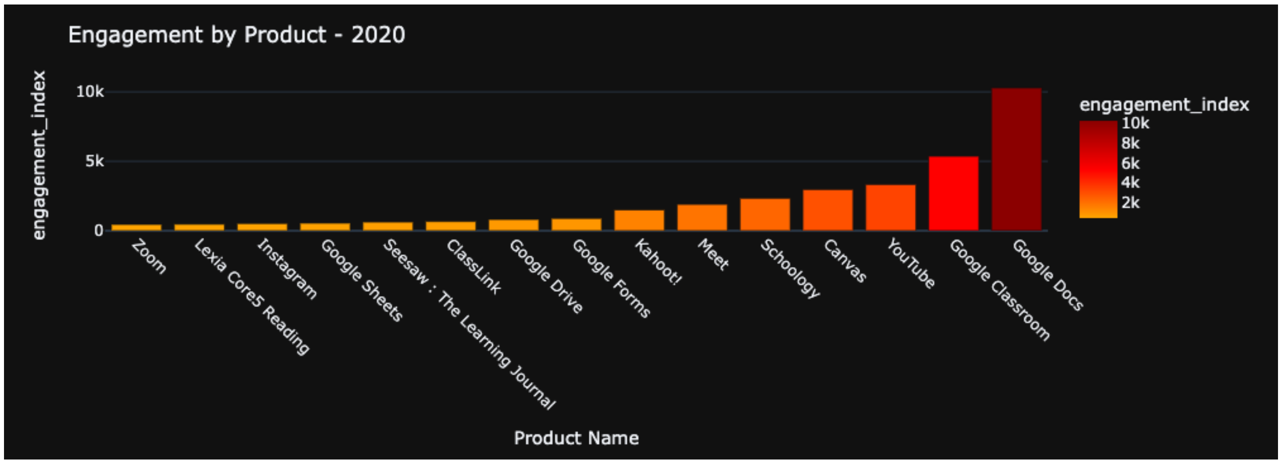
pct_access:

Percentage of students in the district have at least one page-load event of a given product and on a given day

Cyclic behavior due to the weekend weekday hours, the middle drop is due to the mid year holidays the mismatch in the beginning shows the drastic impact of covid

In [17]:

```
for_barchart1 = engagement_complete[['Product Name','engagement_index']]
grouped_for_barchart1 = for_barchart1.groupby(['Product Name'], as_index=False).

grouped_for_barchart1 = grouped_for_barchart1.dropna()
grouped_for_barchart1_sorted = grouped_for_barchart1.sort_values('engagement_ind
fig = px.bar(grouped_for_barchart1_sorted, x='Product Name', y='engagement_index
fig.update_layout(
    title={
        'text': "Engagement by Product - 2020"},template='plotly_dark',xaxis_tic
    )

fig.layout.coloraxis.colorscale = [(0.0, 'Orange'),(0.5,'Red'),(1.0,'darkred')]

fig.show()
```



In [ ]:

In [18]:

```
for_treemap1 = engagement_complete[['Primary Essential Function','Provider/Compa
for_treemap1 = for_treemap1.dropna()

symbol = []
for funct in for_treemap1['Primary Essential Function']:
    f = funct.split(' - ')
    symbol.append(f[0])
for_treemap1['Symbol'] = symbol

grouped_for_treemap1 = for_treemap1.groupby(['Primary Essential Function','Provi
```

In [19]:

```
grouped_for_treemap1.sort_values('engagement_index')[-15:]
```

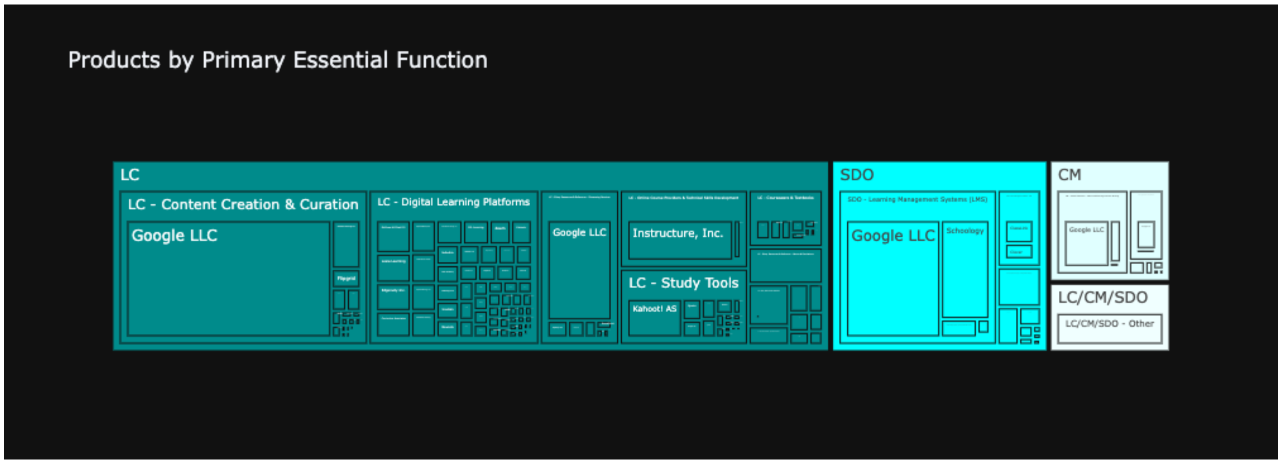
Out[19]:

	Primary Essential Function	Provider/Company Name	Product Name	Symbol	engagement_index
33	CM - Virtual Classroom - Video Conferencing & ...	ZOOM VIDEO COMMUNICATIONS, INC.	Zoom	CM	454.551856
133	LC - Digital Learning Platforms	Lexia Learning	Lexia Core5 Reading	LC	469.961840
315	LC/CM/SDO - Other	Instagram	Instagram	LC/CM/SDO	521.411663
312	LC/CM/SDO - Other	Google LLC	Google Sheets	LC/CM/SDO	548.311132
61	LC - Content Creation & Curation	Seesaw Learning Inc	Seesaw : The Learning Journal	LC	628.701885

	Primary Essential Function	Provider/Company Name	Product Name	Symbol	engagement_index
348	SDO - School Management Software - SSO	ClassLink	ClassLink	SDO	666.844419
311	LC/CM/SDO - Other	Google LLC	Google Drive	LC/CM/SDO	814.455172
0	CM - Classroom Engagement & Instruction - Asse...	Google LLC	Google Forms	CM	888.950223
282	LC - Study Tools	Kahoot! AS	Kahoot!	LC	1503.386972
29	CM - Virtual Classroom - Video Conferencing & ...	Google LLC	Meet	CM	1903.177151
344	SDO - Learning Management Systems (LMS)	Schoology	Schoology	SDO	2336.762399
166	LC - Online Course Providers & Technical Skill...	Instructure, Inc.	Canvas	LC	2969.429030
255	LC - Sites, Resources & Reference - Streaming ...	Google LLC	YouTube	LC	3331.426261
341	SDO - Learning Management Systems (LMS)	Google LLC	Google Classroom	SDO	5366.451342
49	LC - Content Creation & Curation	Google LLC	Google Docs	LC	10289.882475

CSScolor: aliceblue, antiquewhite, aqua, aquamarine, azure, beige, bisque, black, blanchedalmond, blue, blueviolet, brown, burlywood, cadetblue, chartreuse, chocolate, coral, cornflowerblue, cornsilk, crimson, cyan, darkblue, darkcyan, darkgoldenrod, darkgray, darkgrey, darkgreen, darkkhaki, darkmagenta, darkolivegreen, darkorange, darkorchid, darkred, darksalmon, darkseagreen, darkslateblue, darkslategray, darkslategrey, darkturquoise, darkviolet, deeppink, deepskyblue, dimgray, dimgrey, dodgerblue, firebrick, floralwhite, forestgreen, fuchsia, gainsboro, ghostwhite, gold, goldenrod, gray, grey, green, greenyellow, honeydew, hotpink, indianred, indigo, ivory, khaki, lavender, lavenderblush, lawngreen, lemonchiffon, lightblue, lightcoral, lightcyan, lightgoldenrodyellow, lightgray, lightgrey, lightgreen, lightpink, lightsalmon, lightseagreen, lightskyblue, lightslategray, lightslategrey, lightsteelblue, lightyellow, lime, limegreen, linen, magenta, maroon, mediumaquamarine, mediumblue, mediumorchid, mediumpurple, mediumseagreen, mediumslateblue, mediumspringgreen, mediumturquoise, mediumvioletred, midnightblue, mintcream, mistyrose, moccasin, navajowhite, navy, oldlace, olive, olivedrab, orange, orangered, orchid, palegoldenrod, palegreen, paleturquoise, palevioletred, papayawhip, peachpuff, peru, pink, plum, powderblue, purple, red, rosybrown, royalblue, saddlebrown, salmon, sandybrown, seagreen, seashell, sienna, silver, skyblue, slateblue, slategray, slategrey, snow, springgreen, steelblue, tan, teal, thistle, tomato, turquoise, violet, wheat, white, whitesmoke, yellow, yellowgreen

In [20]:
```
fig = px.treemap(grouped_for_treemap1,
                 path=['Symbol','Primary Essential Function','Provider/Company Na
                 values='engagement_index',
                 color='Symbol',
                 color_discrete_map={'LC':'darkcyan','SDO':'cyan','CM':'lightcyan
                 template='plotly_dark')

fig.show()
```



In [21]:
```
engagement_complete.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 11691587 entries, 0 to 11691586
Data columns (total 13 columns):
 #   Column                      Dtype
---  ------                      -----
 0   time                        object
 1   pct_access                  float64
 2   engagement_index            float64
 3   district_id                 int64
 4   state                       object
 5   locale                      object
 6   pp_total_raw                float64
 7   LP ID                       int64
 8   Product Name                object
 9   Provider/Company Name       object
 10  Primary Essential Function  object
 11  pct_black_hispanic          float64
 12  pct_free_reduced            float64
dtypes: float64(5), int64(2), object(6)
memory usage: 1.2+ GB
```

In [22]:
```
for_chloropleth = engagement_complete[['engagement_index','pct_access','time','s
grouped_by_date_chloropleth = for_chloropleth[['time','pct_access','engagement_i
```

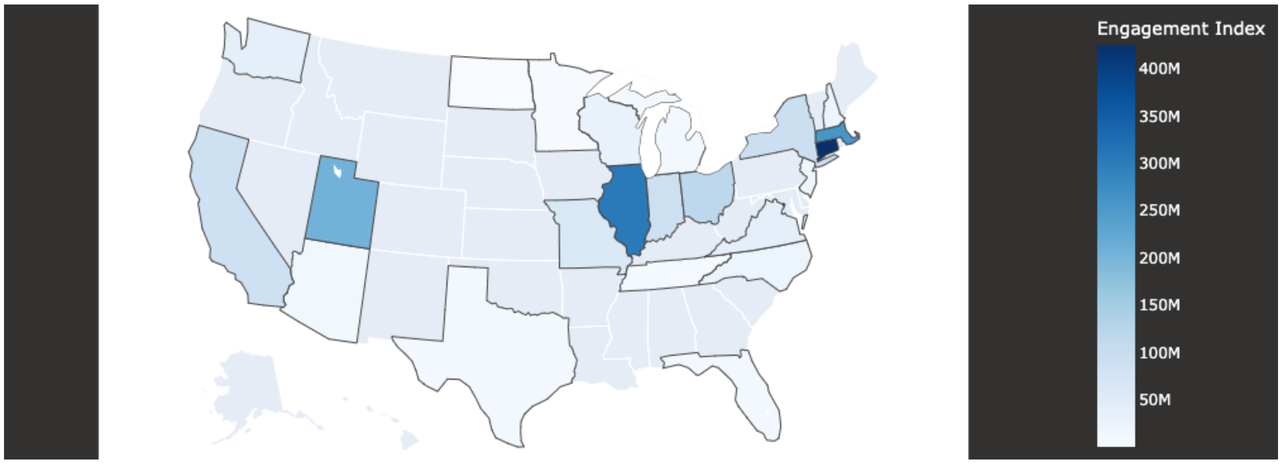
In [23]:
```
us_state_abbrev = {
    'Alabama': 'AL',
    'Alaska': 'AK',
    'American Samoa': 'AS',
    'Arizona': 'AZ',
    'Arkansas': 'AR',
    'California': 'CA',
    'Colorado': 'CO',
    'Connecticut': 'CT',
    'Delaware': 'DE',
    'District Of Columbia': 'DC',
    'Florida': 'FL',
    'Georgia': 'GA',
    'Guam': 'GU',
    'Hawaii': 'HI',
    'Idaho': 'ID',
    'Illinois': 'IL',
    'Indiana': 'IN',
    'Iowa': 'IA',
    'Kansas': 'KS',
    'Kentucky': 'KY',
    'Louisiana': 'LA',
    'Maine': 'ME',
    'Maryland': 'MD',
    'Massachusetts': 'MA',
    'Michigan': 'MI',
    'Minnesota': 'MN',
    'Mississippi': 'MS',
    'Missouri': 'MO',
    'Montana': 'MT',
    'Nebraska': 'NE',
    'Nevada': 'NV',
    'New Hampshire': 'NH',
    'New Jersey': 'NJ',
    'New Mexico': 'NM',
    'New York': 'NY',
    'North Carolina': 'NC',
    'North Dakota': 'ND',
    'Northern Mariana Islands':'MP',
    'Ohio': 'OH',
    'Oklahoma': 'OK',
    'Oregon': 'OR',
    'Pennsylvania': 'PA',
    'Puerto Rico': 'PR',
    'Rhode Island': 'RI',
    'South Carolina': 'SC',
    'South Dakota': 'SD',
    'Tennessee': 'TN',
    'Texas': 'TX',
    'Utah': 'UT',
    'Vermont': 'VT',
    'Virgin Islands': 'VI',
    'Virginia': 'VA',
    'Washington': 'WA',
    'West Virginia': 'WV',
    'Wisconsin': 'WI',
    'Wyoming': 'WY'
}
```

In [24]:

```
codes = []
for i in grouped_by_date_chloropleth['state']:
    codes.append(us_state_abbrev[i])

grouped_by_date_chloropleth['state_codes'] = codes
```

In [166…

```
data2 = dict(
        type = 'choropleth',
        colorscale = 'blues',
        locations = codes,
        locationmode = 'USA-states',
        z = list(grouped_by_date_chloropleth['engagement_index']),
        colorbar = {'title':'Engagement Index'}
      )

from urllib.request import urlopen
import json
with urlopen('https://raw.githubusercontent.com/plotly/datasets/master/geojson-c
    geojson = json.load(response)

fig = px.choropleth(grouped_by_date_chloropleth, geojson=geojson, color='engagem
                           color_continuous_scale="Viridis",
                           range_color=(0, 12),
                           scope="usa"
                          )
fig.update_layout(
        geo_scope='usa',
        plot_bgcolor="#323130",
        paper_bgcolor="#323130",
        margin=go.layout.Margin(l=0, r=35, t=0, b=0),
        font=dict(color="white"))

hexcode = 0
borders=[hexcode for x in range(len(df))]
fig.update_traces(marker_line_width=borders)

fig.add_trace(go.Choropleth(data2))
```



In [26]:

```
grouped_by_date_chloropleth.sort_values('engagement_index')[-3:]
```

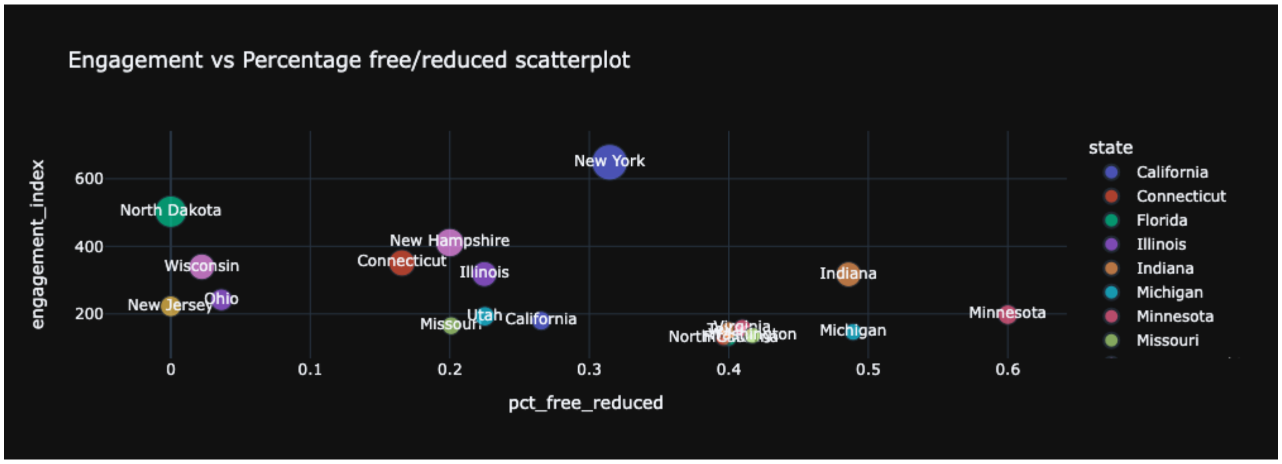
Out[26]:

```
          state  pct_access  engagement_index  state_codes
7  Massachusetts   961992.83      2.592307e+08           MA
5       Illinois  1191045.82      3.040042e+08           IL
2    Connecticut  1594691.52      4.253337e+08           CT
```

```
In [52]: engagement_complete['state'].unique()
```

```
Out[52]: array([nan, 'Massachusetts', 'Utah', 'California', 'Indiana',
                'New Jersey', 'Connecticut', 'Illinois', 'Virginia', 'Ohio',
                'North Carolina', 'Michigan', 'New York', 'Washington',
                'District Of Columbia', 'North Dakota', 'Tennessee', 'Wisconsin',
                'Arizona', 'New Hampshire', 'Texas', 'Missouri', 'Florida',
                'Minnesota'], dtype=object)
```

```
In [27]: for_scatterplot = engagement_complete[['engagement_index','pct_free_reduced','st
         for_scatterplot = for_scatterplot.dropna()
         for_scatterplot_groupedby_state = for_scatterplot.groupby(['state'], as_index=Fa
         fig = px.scatter(for_scatterplot_groupedby_state,
                       x="pct_free_reduced",
                       y="engagement_index",
                       color="state",
                       size='engagement_index',
                       template="plotly_dark",
                       text='state',
                       title= 'Engagement vs Percentage free/reduced scatterplot')

         fig.show()
```



No relation temon between the two

```
In [28]: engagement_complete.head(2)
```

Out[28]:

	time	pct_access	engagement_index	district_id	state	locale	pp_total_raw	LP ID	Produ Nam
0	2020-01-01	0.04	1.30	3188	NaN	NaN	NaN	29322	Kha Academ
1	2020-01-02	0.26	17.78	3188	NaN	NaN	NaN	29322	Kha Academ

```
In [30]: engagement_complete_clean_prep = engagement_complete.copy()
```

```
engagement_complete_clean = engagement_complete_clean_prep.dropna(subset=['Prima
engagement_complete_sorted = engagement_complete_clean.sort_values('time')
#to get mean engagement of all productucts, each day, on the basis of states.
grouped_by_date = engagement_complete_sorted[['time','engagement_index','Primary
#to get sum of avg engagements on each day from every functional category there
grouped_by_date = grouped_by_date.groupby(['time','Primary Essential Function'],
grouped_by_date['time'] = pd.to_datetime(grouped_by_date["time"])
grouped_by_date = grouped_by_date.set_index('time', drop=False)
#making 3 different dataframes for the 3 primary type of functionalities
grouped_by_date_LC = grouped_by_date[grouped_by_date['Primary Essential Function
grouped_by_date_SDO = grouped_by_date[grouped_by_date['Primary Essential Functio
grouped_by_date_CM = grouped_by_date[grouped_by_date['Primary Essential Function
```

In [79]:

```
grouped_by_date_LC.groupby(pd.Grouper(freq="7D", origin="start_day")).sum()
#aita all the PEF er 1 week er sum diye dicche
```

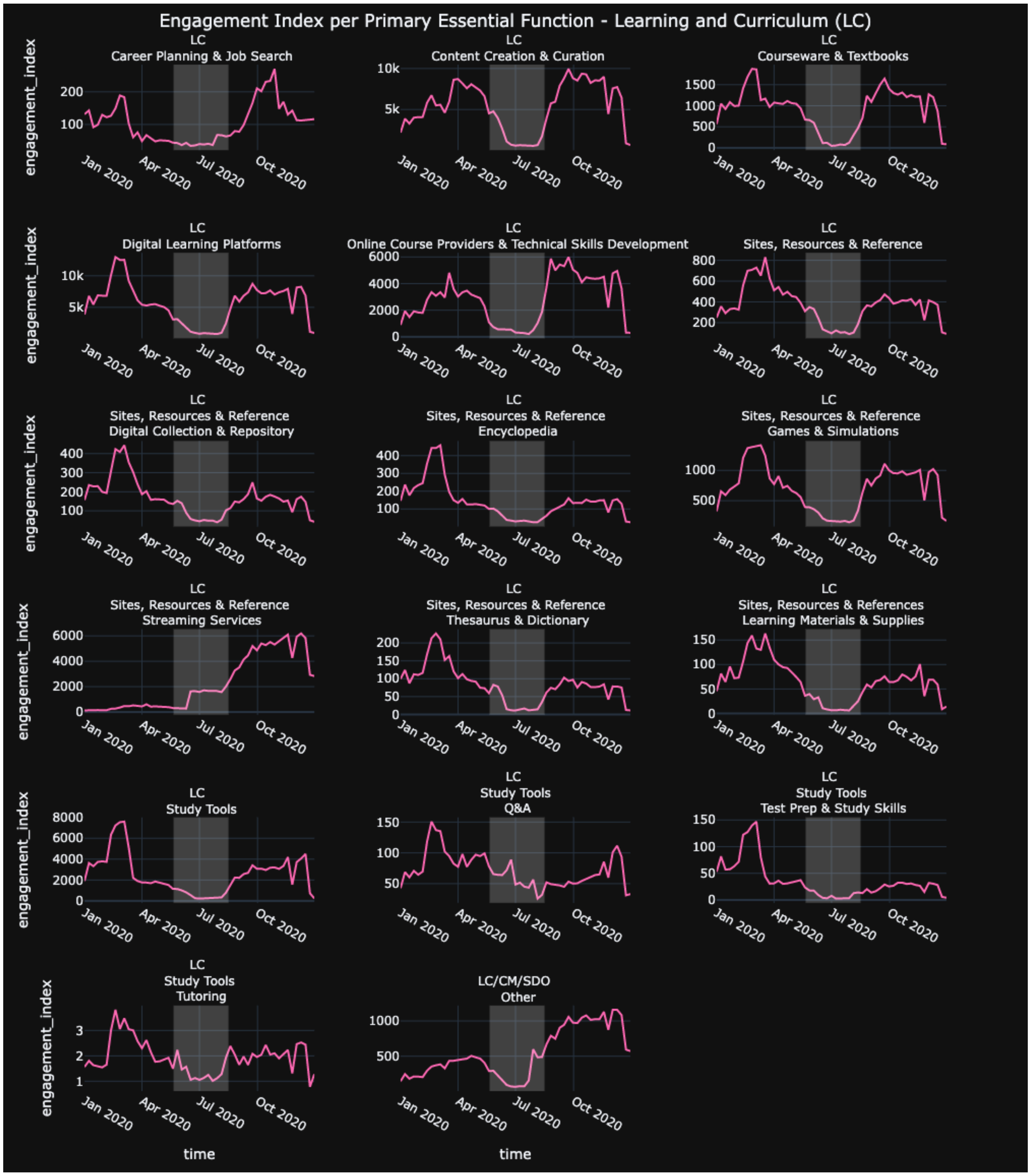
Out[79]:

	engagement_index
time	
2020-01-01	76572.909650
2020-01-08	137788.417947
2020-01-15	115186.741477
2020-01-22	139311.122605
2020-01-29	138861.628365
2020-02-05	138636.467936
2020-02-12	210988.760793
2020-02-19	254208.852397
2020-02-26	245182.837974
2020-03-04	249315.652534
2020-03-11	189607.120346
2020-03-18	180529.269794
2020-03-25	171304.877260
2020-04-01	160067.322827
2020-04-08	160315.598961
2020-04-15	153752.784122
2020-04-22	157986.253117
2020-04-29	150497.719617
2020-05-06	143815.768911
2020-05-13	127421.163797
2020-05-20	86158.588304
2020-05-27	85852.561884
2020-06-03	71886.711185

	engagement_index
time	
2020-06-10	52982.383840
2020-06-17	40345.501693
2020-06-24	33734.096665
2020-07-01	28743.961700
2020-07-08	31275.029104
2020-07-15	30144.772980
2020-07-22	29332.889306
2020-07-29	34522.164701
2020-08-05	40986.102998
2020-08-12	74930.291924
2020-08-19	134933.776586
2020-08-26	194177.278268
2020-09-02	182269.056031
2020-09-09	216397.929514
2020-09-16	231794.404274
2020-09-23	268796.345671
2020-09-30	238827.268339
2020-10-07	233578.291825
2020-10-14	233793.499878
2020-10-21	243254.170698
2020-10-28	228045.496651
2020-11-04	233196.051396
2020-11-11	238058.120231
2020-11-18	253872.330075
2020-11-25	133613.699817
2020-12-02	242657.685423
2020-12-09	249950.556688
2020-12-16	218073.554107
2020-12-23	50716.762108
2020-12-30	12291.051017

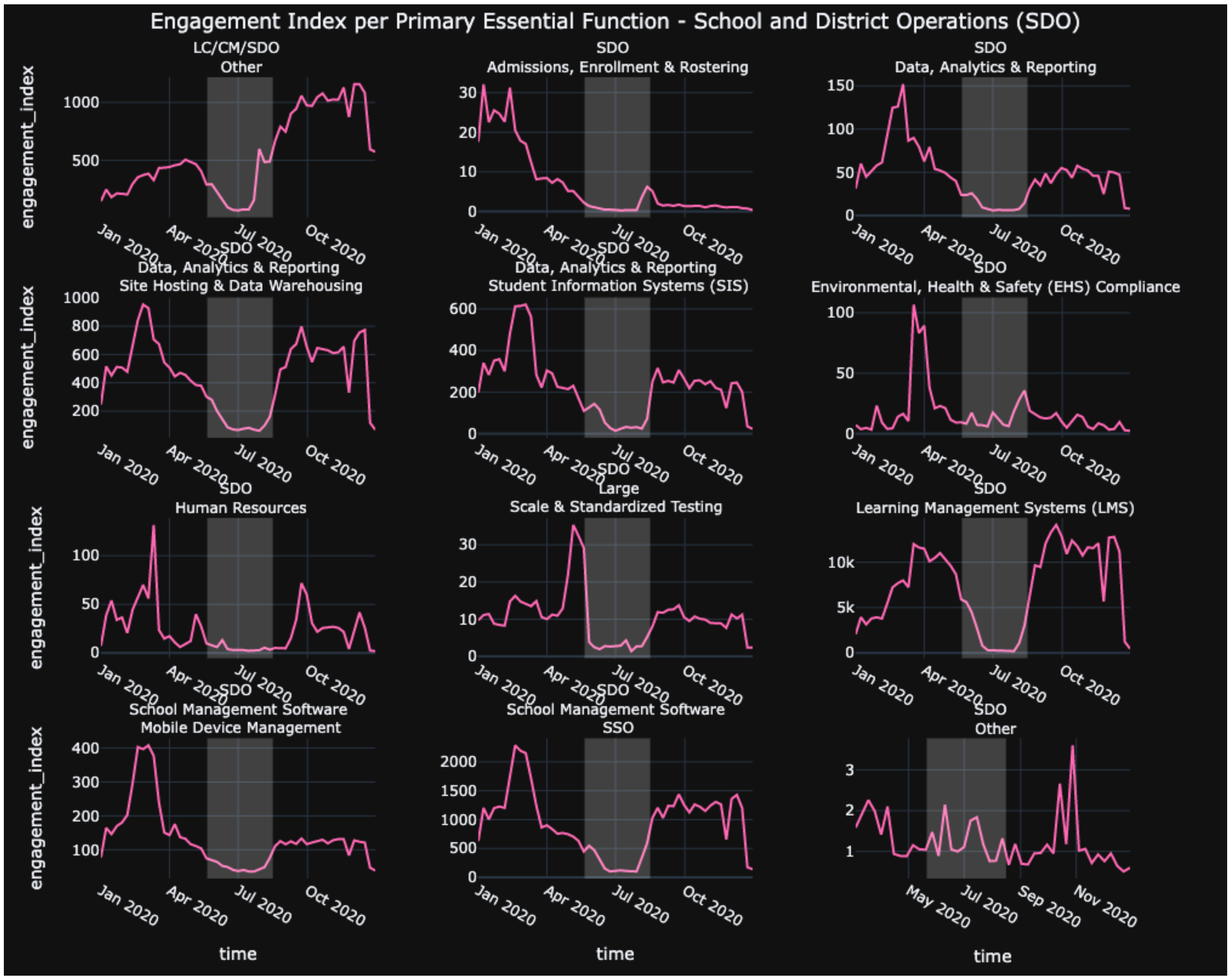
In [172…

```
#the next part will have to extract grouped data of 17 PEFs across 53 weeks and
cols = []
for x, y in grouped_by_date_LC.groupby(pd.Grouper(freq="7D", origin="start_day")
    functions = []
    for function in y['Primary Essential Function']:
        if function not in functions:
            cols.append((y['time'][0], y[y['Primary Essential Function']==functi
            functions.append(function)
        else:
            break

dr_strage_time = pd.DataFrame(cols, columns=['time','engagement_index','Primary

fig = px.line(dr_strage_time, x='time', y='engagement_index', facet_col="Primary
              facet_col_wrap=3,color_discrete_map={'engagement_index':'cyan'},
             facet_row_spacing = 0.10, facet_col_spacing=0.10)

fig.update_layout(
    title={'text': "Engagement Index per Primary Essential Function - Learning a
    'y':.99, 'x':0.5,'xanchor': 'center', 'yanchor': 'top'}, template='plotly_da
fig.update_yaxes(matches=None, showticklabels=True)
fig.update_xaxes(matches=None, showticklabels=True)

fig.add_vrect(x0='2020-05-21', x1='2020-08-16', fillcolor="white", opacity=0.2,
for i in range(len(fig.data)):
    fig.data[i].line.color = 'hotpink'
    fig.layout.annotations[i].text = '<br>'.join(fig.layout.annotations[i].text[

fig.show()
```

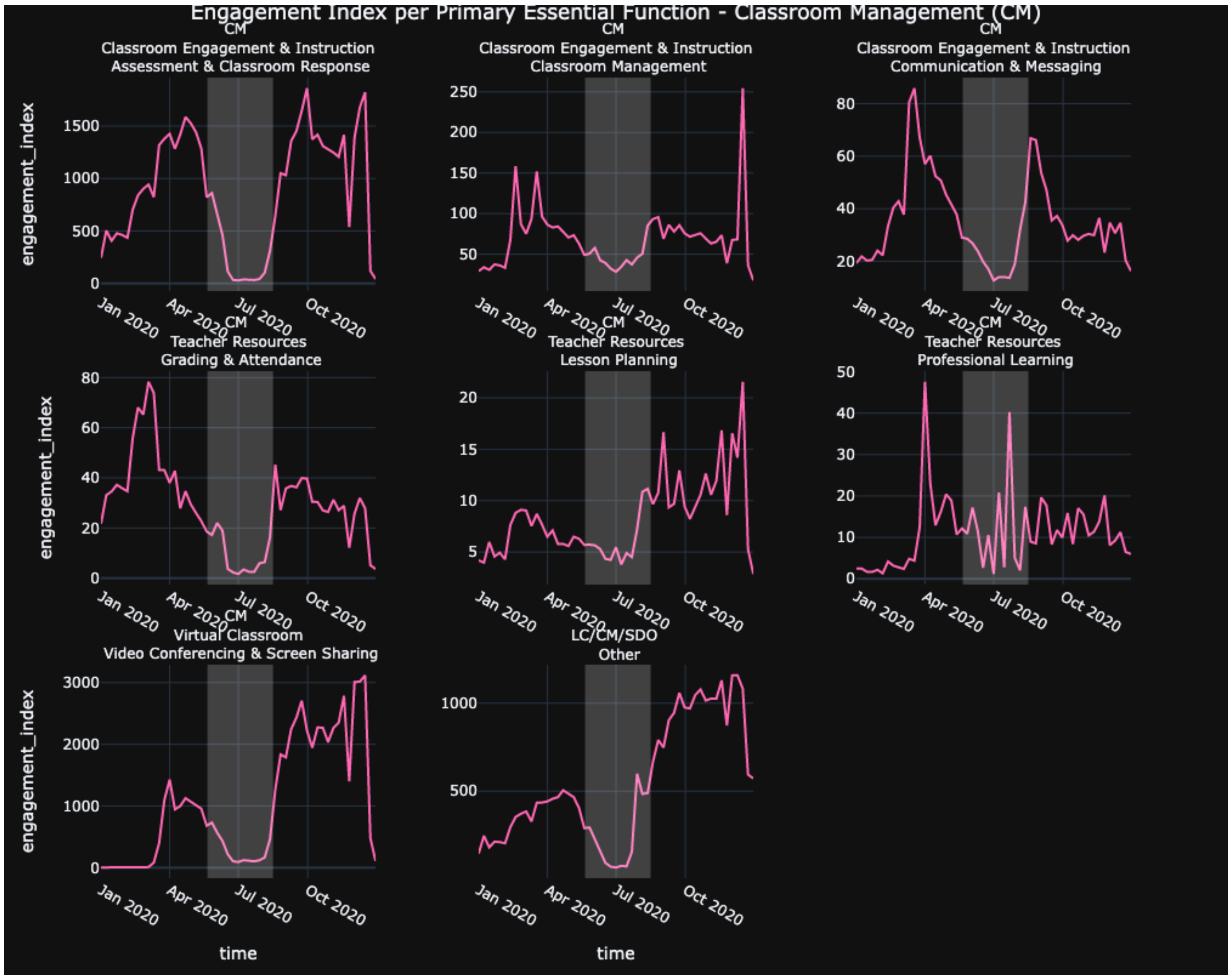


In [169…

```
cols = []
for x, y in grouped_by_date_SDO.groupby(pd.Grouper(freq="7D", origin="start_day"
    functions = []
    for function in y['Primary Essential Function']:
        if function not in functions:
            cols.append((y['time'][0], y[y['Primary Essential Function']==functi
            functions.append(function)
        else:
            break

dr_strage_time = pd.DataFrame(cols, columns=['time','engagement_index','Primary

fig = px.line(dr_strage_time, x='time', y='engagement_index', facet_col="Primary
                 facet_col_wrap=3,color_discrete_map={'engagement_index':'cyan'},
                facet_row_spacing = 0.10, facet_col_spacing=0.10)

fig.update_layout(
    title={'text': "Engagement Index per Primary Essential Function - School and
    'y':.99, 'x':0.5,'xanchor': 'center', 'yanchor': 'top'}, template='plotly_da
fig.update_yaxes(matches=None, showticklabels=True)
fig.update_xaxes(matches=None, showticklabels=True)

fig.add_vrect(x0='2020-05-21', x1='2020-08-16', fillcolor="white", opacity=0.2,
for i in range(len(fig.data)):
    fig.data[i].line.color = 'hotpink'
    fig.layout.annotations[i].text = '<br>'.join(fig.layout.annotations[i].text[

fig.show()
```



```
In [168…

cols = []
for x, y in grouped_by_date_CM.groupby(pd.Grouper(freq="7D", origin="start_day")
    functions = []
    for function in y['Primary Essential Function']:
        if function not in functions:
            cols.append((y['time'][0], y[y['Primary Essential Function']==functi
            functions.append(function)
        else:
            break

dr_strage_time = pd.DataFrame(cols, columns=['time','engagement_index','Primary
fig = px.line(dr_strage_time, x='time', y='engagement_index', facet_col="Primary
              facet_col_wrap=3,color_discrete_map={'engagement_index':'cyan'},
             facet_row_spacing = 0.10, facet_col_spacing=0.10)

fig.update_layout(
    title={'text': "Engagement Index per Primary Essential Function - Classroom
    'y':1, 'x':0.5,'xanchor': 'center', 'yanchor': 'top'}, template='plotly_dark
fig.update_yaxes(matches=None, showticklabels=True)
fig.update_xaxes(matches=None, showticklabels=True)

fig.add_vrect(x0='2020-05-21', x1='2020-08-16', fillcolor="white", opacity=0.2,

for i in range(len(fig.data)):
    fig.data[i].line.color = 'hotpink'
    fig.layout.annotations[i].text = '<br>'.join(fig.layout.annotations[i].text[

fig.show()
```



In [200…

```
grouped_by_date = engagement_complete[['time','pct_access','engagement_index','l
#grouped_by_date_lowexp = engagement_complete[['time','pct_access','engagement_i
#grouped_by_date_highexp = engagement_complete[['time','pct_access','engagement_

grouped_by_date_sorted = grouped_by_date.sort_values('time')
grouped_by_date_sorted2 = grouped_by_date_sorted[['time','engagement_index','loc
grouped_by_date_sorted2['time'] = pd.to_datetime(grouped_by_date_sorted2["time"]
grouped_by_date_sorted2 = grouped_by_date_sorted2.set_index('time', drop=False)
```

In [194…

```
grouped_by_date_sorted2
```

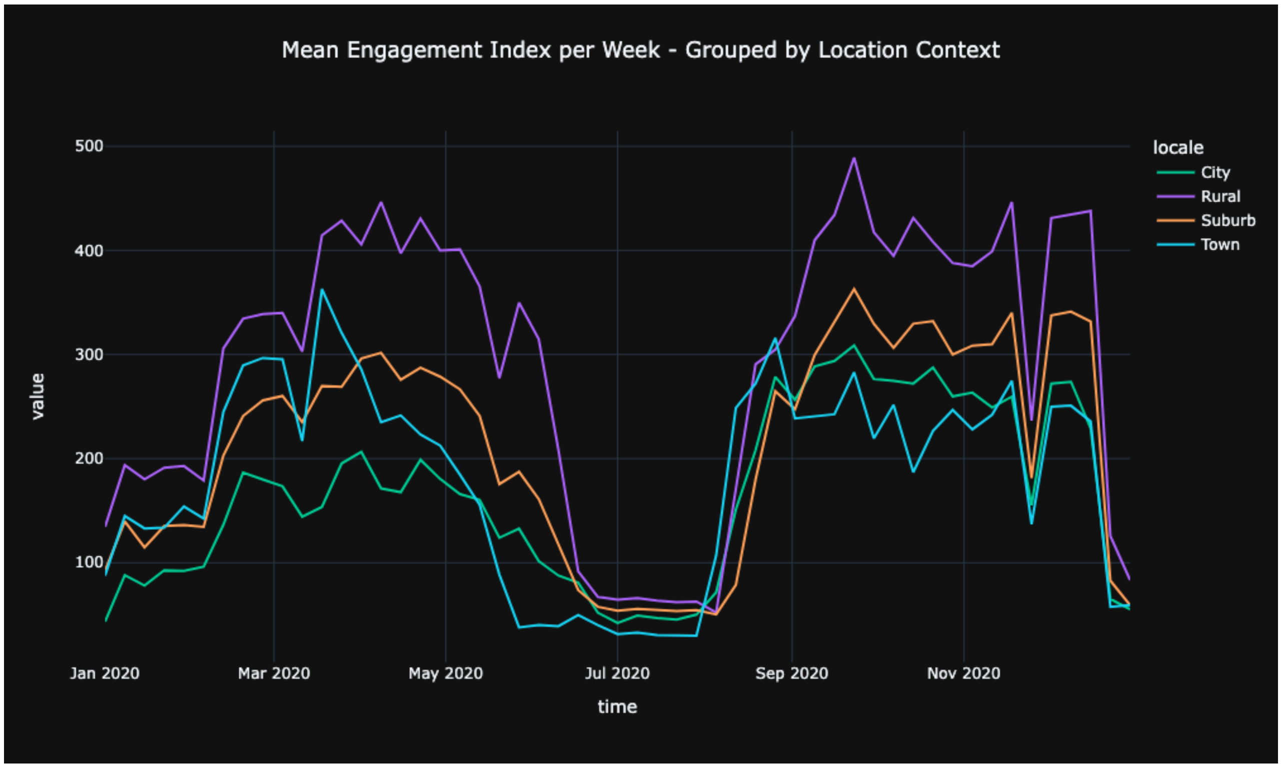
Out[194…

time	time	locale	engagement_index
2020-01-01	2020-01-01	City	6.265015
2020-01-01	2020-01-01	Rural	33.440543
2020-01-01	2020-01-01	Suburb	22.511022
2020-01-01	2020-01-01	Town	15.936756
2020-01-02	2020-01-02	City	40.694297
...	...	...	...
2020-12-30	2020-12-30	Town	60.036701
2020-12-31	2020-12-31	City	53.863697
2020-12-31	2020-12-31	Rural	82.102976
2020-12-31	2020-12-31	Suburb	58.297083
2020-12-31	2020-12-31	Town	58.875928

1464 rows × 3 columns

In [216…

```
cols = []
for x, y in grouped_by_date_sorted2.groupby(pd.Grouper(freq="7D", origin="start_
    locale = []
    for loc in y['locale']:
        if loc not in locale:
            cols.append((y['time'][0], y[y['locale']==loc]['engagement_index'].m
            locale.append(loc)
        else:
            break

dr_strage_time_2 = pd.DataFrame(cols, columns=['time','engagement_index','locale

fig = px.line(dr_strage_time_2, x='time', y=['engagement_index'], color='locale'
        title='Engagement Index - High Per-Pupil Total Expenditure vs Low Per-Pu
        color_discrete_map={"engagement_lowexp": "Red", "engagement_highexp": "M
        template="plotly_dark"
        )

fig.update_layout(
    title={
        'text': "Mean Engagement Index per Week - Grouped by Location Context",
        'y':0.95,'x':0.5,'xanchor': 'center', 'yanchor': 'top'},
    template='plotly_dark',
    height=600
    )

fig.show()
```


Mean Engagement Index per Week - Grouped by Location Context
value
500
400
300
200
100
Jan 2020
Mar 2020
May 2020
Jul 2020
Sep 2020
Nov 2020
time
locale
City
Rural
Suburb
Town

```
In [ ]:
```