BMEN

May 20, 2022

1 Biomedical Engineering Department

[1]:
```
import pandas as pd
import numpy as np
from datetime import datetime
import seaborn as sns
import matplotlib.cm as cm
import matplotlib.pyplot as plt
import matplotlib as mpl
```

[2]:
```
##Find dataset for queryed text

def query_data(Q,qq,cleaned_data,query,indx):
    que=Q[Q['Question'].str.contains(query)==True]
    val=que.values
    ind=que.index.values
    print(Q.loc[ind[indx-1],'Question'])
    start=ind[indx-1]
    end=int(qq.iloc[qq[qq.location==str(ind[indx-1])].index+1]['location'])
    df_return=cleaned_data.iloc[:,start:end]
    return df_return
```

[3]:
```
def barplot(data,decimal=0):
    cmap = mpl.cm.Blues(np.linspace(0.4,0.9,100))
    cmap = mpl.colors.ListedColormap(cmap[10:,:-1])
    fig,ax=plt.subplots(figsize=(8,4),dpi=150)

    data.plot(kind='bar',colormap=cmap,ax=ax)
    plt.xticks(rotation=0)
    ax.spines['top'].set_visible(False)
    ax.spines['right'].set_visible(False)
    ax.spines['bottom'].set_visible(False)
    ax.spines['left'].set_visible(False)
    #ax.legend(loc=(1.05,0.4))
    x_offset = -0.1
    y_offset = 0.0
    for p in ax.patches:
```

```
        b = p.get_bbox()
        val = "{:.0f}".format(b.y1 + b.y0)
        if decimal==2:
            val = "{:.2f}".format(b.y1 + b.y0)
        ax.annotate(val, ((b.x0 + b.x1)/2+ x_offset, b.y1+y_offset),fontsize=10)
```

[4]:
```
def stackplot(data,ind):
    cmap = mpl.cm.Blues(np.linspace(0,0.9,100))
    cmap = mpl.colors.ListedColormap(cmap[10:,:-1])
    fig,ax=plt.subplots(figsize=(8,6),dpi=150)
    data.plot(kind='barh', stacked=True,colormap=cmap, figsize=(10, 6),ax=ax)
    plt.legend(ind[::-1],bbox_to_anchor=(1.05, 1), loc=2, borderaxespad=0.,␣
 ↪ncol=1)
    for n, x in enumerate([*aaa.index.values]):
        m=3
        for (proportion, count, y_loc) in zip(bbb.loc[x],
                                              aaa.loc[x],
                                              bbb.loc[x].cumsum()):
            if m<2:
                 plt.text(x=(y_loc - proportion) + (proportion / 2),
                 y=n - 0.11,
                 s=f'{str(np.round(proportion * 100)).split(".")[0]}%',
                          #s=f'{str(count).split(".")[0]}',
                 color="white",
                 fontsize=8,
                 fontweight="bold")
            if m>=2:
                plt.text(x=(y_loc - proportion) + (proportion / 2)-0.01,
                 y=n - 0.11,
                 s=f'{str(np.round(proportion * 100)).split(".")[0]}%',
                         #s=f'{str(count).split(".")[0]}',
                 color="black",
                 fontsize=8,
                 fontweight="bold")
            m-=1
    ax.spines['top'].set_visible(False)
    ax.spines['right'].set_visible(False)
    ax.spines['bottom'].set_visible(False)
    ax.spines['left'].set_visible(False)
```

[5]:
```
df2019=pd.read_csv('BMEN/Response2019.csv',header=[1],␣
 ↪skipinitialspace=True,index_col=0)
df2022=pd.read_csv('BMEN/Response2022.csv',header=[1],␣
 ↪skipinitialspace=True,index_col=0)
```

[6]:
```
Q2022=pd.read_csv("output/Questions-22.csv",index_col=0)
Q2019=pd.read_csv("output/Questions-19.csv",index_col=0)
```

[7]:
```
qq2022=Q2022[Q2022['location']!='False']
qq2022=qq2022.reset_index(drop=True)
qq2019=Q2019[Q2019['location']!='False']
qq2019=qq2019.reset_index(drop=True)
```

1.1 Basic Statistics

[8]:
```
print('\033[1m' + 'There are '+ str(len(df2022)) +' BMEN students taking the␣
 ↪questionaire in 2022' + '\033[0m')
print('\n')

print('\033[1m' + 'There are '+ str(len(df2019)) +' BMEN students taking the␣
 ↪questionaire in 2019'+ '\033[0m')
```

There are 138 BMEN students taking the questionaire in 2022

There are 87 BMEN students taking the questionaire in 2019

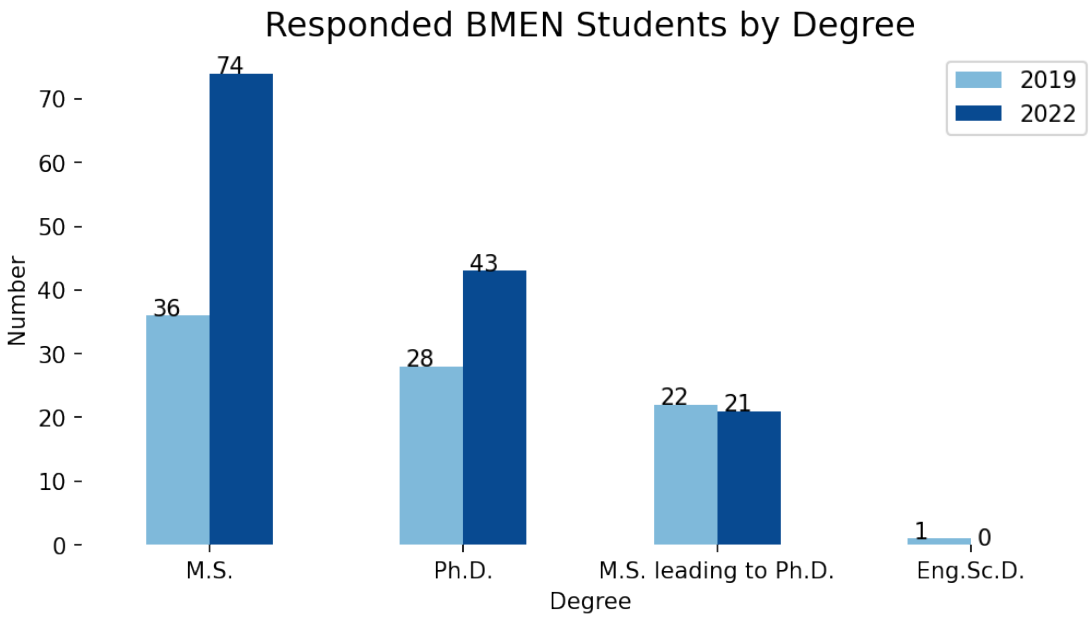
1.1.1 Degree

[9]:
```
dg=pd.DataFrame(df2019['degree'].value_counts())
dg.rename(columns={"degree":'2019'},inplace=True)
dg['2022']=df2022['degree'].value_counts()
dg.rename(inplace=True,index={'Master of Science (M.S.)':'M.S.','Doctor of␣
 ↪Philosophy (Ph.D.)':'Ph.D.'\
                                        ,'Doctor of Engineering Science (Eng.
 ↪Sc.D.)':'Eng.Sc.D.'})
print('\033[1m' + 'The degree componets of BMEN students in 2019 and 2022␣
 ↪'+'\033[0m')
print(dg)
```

The degree componets of BMEN students in 2019 and 2022

	2019	2022
M.S.	36	74.0
Ph.D.	28	43.0
M.S. leading to Ph.D.	22	21.0
Eng.Sc.D.	1	NaN

[10]:
```
barplot(dg)
plt.ylabel("Number",fontsize=10)
plt.xlabel("Degree",fontsize=10)
plt.title("Responded BMEN Students by Degree",fontsize=15)
plt.show()
```



1.1.2 Gender

[11]:
```
gender22=query_data(Q2022,qq2022,df2022,'gender',indx=3)
gender19=query_data(Q2019,qq2019,df2019,'gender',indx=3)
gender19.replace('I prefer not to¬†answer','I prefer not to␣
 ↪answer',inplace=True)
gender19.rename(columns={'I prefer not to¬†answer':'I prefer not to␣
 ↪answer'},inplace=True)
```

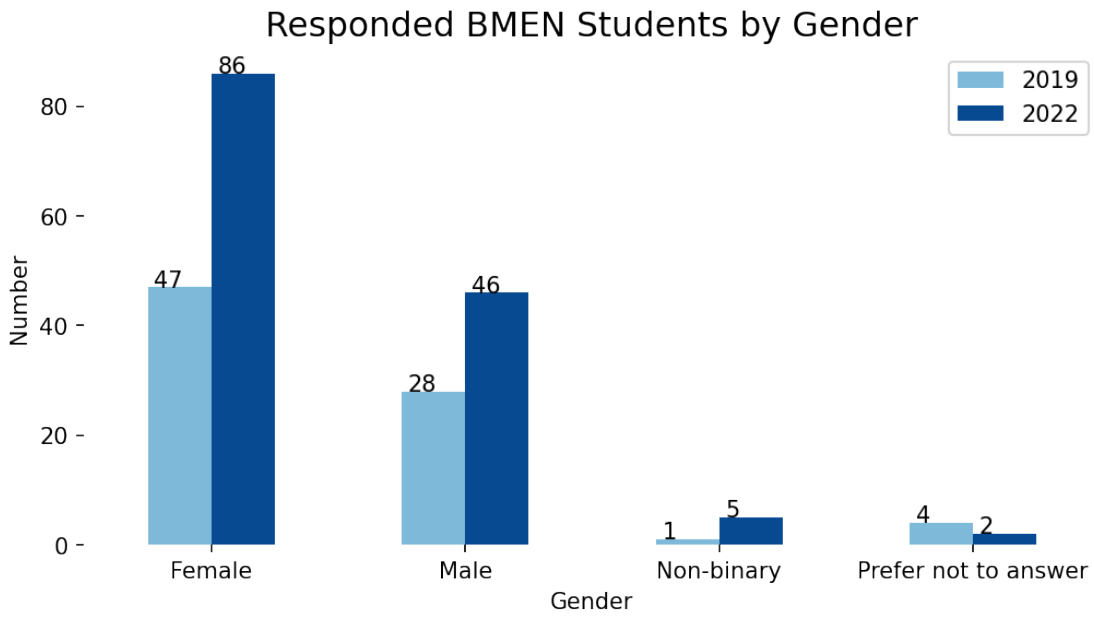
```
Please indicate the gender(s) with which you identify (check all that apply):
Please¬†indicate¬†the gender(s) with which you identify (check all that apply):
```

[12]:
```
gd=pd.DataFrame(gender19.count())
gd.rename(columns={0:'2019'},inplace=True)
gd['2022']=gender22.count()

gd.rename(inplace=True,index={'Do not identify as female, male, or non-binary':
 ↪'Do not identify','I prefer not to answer':'Prefer not to answer'})
print('\033[1m' + 'The gender componets of BMEN students in 2019 and 2022␣
 ↪'+'\033[0m')
print(gd)
gd.drop('Prefer to self-describe',inplace=True)
gd.drop('Do not identify',inplace=True)
```

```
The gender componets of BMEN students in 2019 and 2022
                        2019  2022
Female                    47    86
```

```
Male                        28    46
Non-binary                   1     5
Do not identify              1     0
Prefer not to answer         4     2
Prefer to self-describe      0     0
```

[13]:
```
barplot(gd)
plt.ylabel("Number",fontsize=10)
plt.xlabel("Gender",fontsize=10)
plt.title("Responded BMEN Students by Gender",fontsize=15)
plt.show()
```



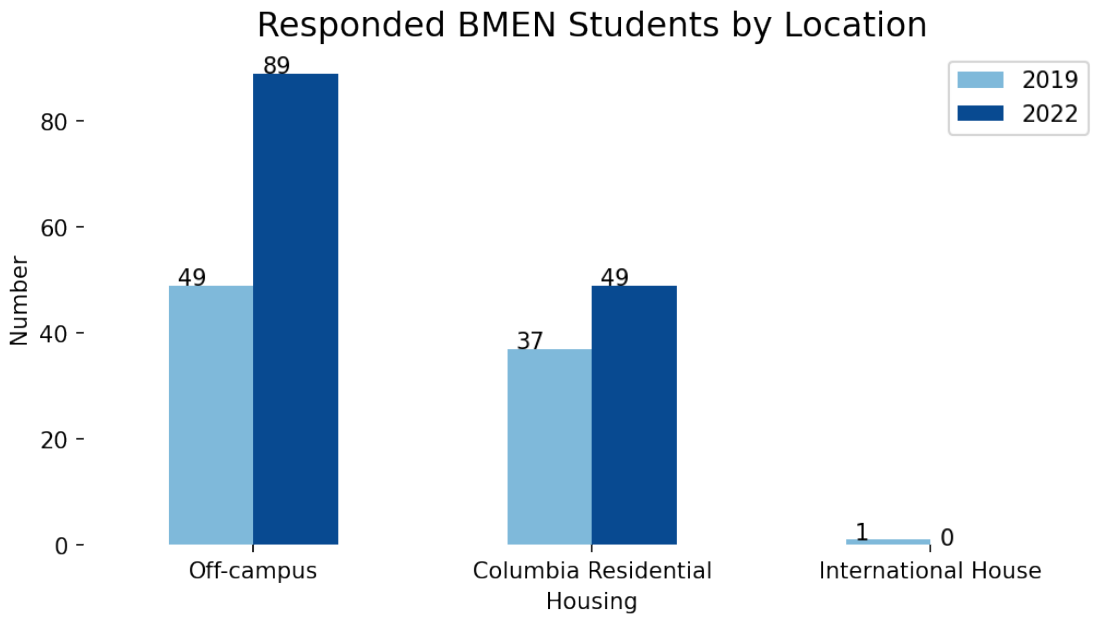
1.1.3 Housing

[14]:
```
location22=query_data(Q2022,qq2022,df2022,'reside',indx=1)
location19=query_data(Q2019,qq2019,df2019,'reside',indx=1)

hous=pd.DataFrame(location19['Response.34'].value_counts())
hous.rename(columns={'Response.34':'2019'},inplace=True)
hous['2022']=location22['Response.35'].value_counts()
hous.rename(index={hous.index[1]:'Columbia Residential'},inplace=True)
print('\033[1m' + 'The housing location of BMEN students in 2019 and 2022␣
↪'+'\033[0m')
print(hous)
```

```
Where do you reside?
Where do you reside?
```

```
The housing location of BMEN students in 2019 and 2022
                      2019  2022
Off-campus              49  89.0
Columbia Residential    37  49.0
International House      1   NaN
```

[15]:
```
barplot(hous)
plt.ylabel("Number",fontsize=10)
plt.xlabel("Housing",fontsize=10)
plt.title("Responded BMEN Students by Location",fontsize=15)
plt.show()
```



1.2 Satisfaction of Biomedical Engineering Department

[16]:
```
sat2019=query_data(Q2019,qq2019,df2019,'satisfied',indx=1)
sat2022=query_data(Q2022,qq2022,df2022,'satisfied',indx=1)
```

```
I am satisfied with my overall experience at Columbia.
I am satisfied with my overall experience at Columbia.
```

[17]:
```
print(f'Mean Satisfaction of 2019 is : {sat2019.mean().sum():0.3f}')
print(f'Mean Satisfaction of 2022 is : {sat2022.mean().sum():0.3f}')
```

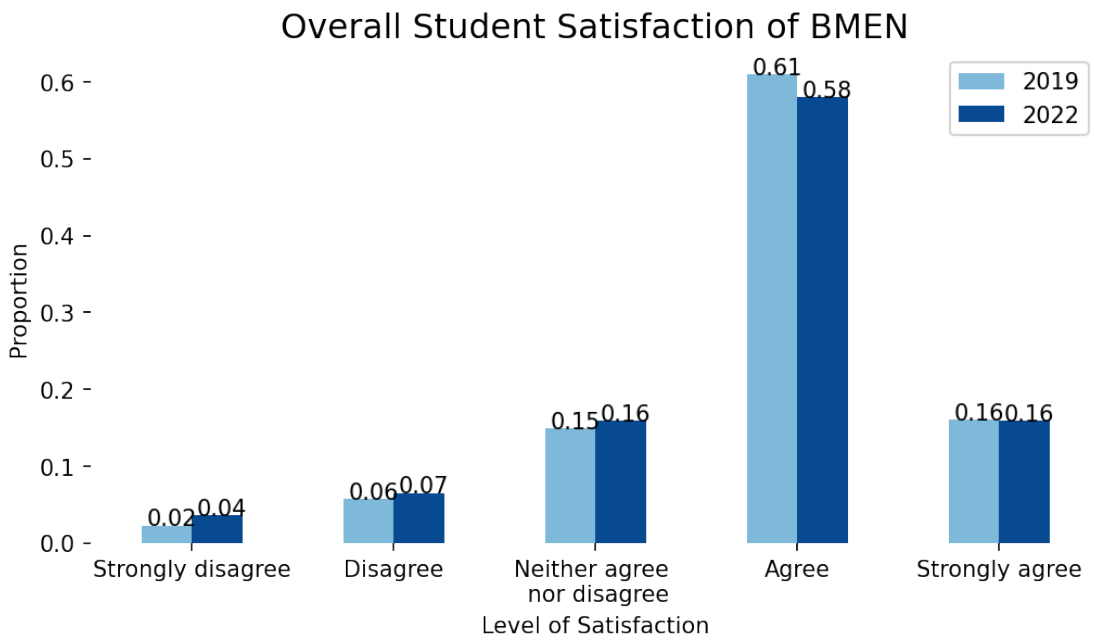
```
Mean Satisfaction of 2019 is : 3.828
Mean Satisfaction of 2022 is : 3.761
```

[18]:
```
a=pd.DataFrame(((sat2019.Response.value_counts()).sort_index(ascending=True)))
a.rename(columns={"Response":'2019'},inplace=True)
b=(sat2022.Response.value_counts()).sort_index(ascending=True)
a['2022']=(b)
ind=['Strongly agree','Agree','Neither agree \n nor␣
 ↪disagree','Disagree','Strongly disagree'][::-1]
a.rename(index={1:ind[0],2:ind[1],3:ind[2],4:ind[3],5:ind[4]},inplace=True)
aa=a.apply(lambda x: x / x.sum(), axis=0)

a
```

[18]:

	2019	2022
Strongly disagree	2	5
Disagree	5	9
Neither agree \n nor disagree	13	22
Agree	53	80
Strongly agree	14	22

[19]:
```
barplot(aa,decimal=2)
plt.ylabel("Proportion",fontsize=10)
plt.xlabel("Level of Satisfaction",fontsize=10)
plt.title("Overall Student Satisfaction of BMEN",fontsize=15)
plt.show()
```



1.3 Satisfaction v.s Importance

[20]:
```
## Satisfaction v.s Importance
important_2019=query_data(Q2019,qq2019,df2019,"important",indx=1)
satisfied2_2019 = query_data(Q2019,qq2019,df2019,"satisfied",indx=2)
important_2022=query_data(Q2022,qq2022,df2022,"important",indx=1)
satisfied2_2022 = query_data(Q2022,qq2022,df2022,"satisfied",indx=2)
```

```
The following are important with respect to my overall experience at Columbia.
I am satisfied with the following with respect to my overall experience at
Columbia.
The following are important with respect to my overall experience at Columbia.
I am satisfied with the following with respect to my overall experience at
Columbia.
```

[21]:
```
a=pd.DataFrame(satisfied2_2019.mean()).T
b=pd.DataFrame(important_2019.mean()).T
b.columns=a.columns
c2019=pd.concat([a,b],ignore_index=True)
c2019.rename(index={0:'Satisfaction',1:'Importance'},inplace=True)
print('\033[1m' + 'The satisfaction and importance of BMEN students in 2019:␣
↪'+'\033[0m')
c2019
```

The satisfaction and importance of BMEN students in 2019:

[21]:

	Academics	Mental health	Physical health	\
Satisfaction	3.873563	3.436782	3.333333	
Importance	4.574713	4.356322	4.333333	

	Professional development	Social life	Career services	\
Satisfaction	3.770115	3.609195	3.609195	
Importance	4.390805	4.068966	4.298851	

	Housing	Intercampus Shuttle	Library services	\
Satisfaction	3.390805	3.160920	3.988506	
Importance	4.011494	3.827586	3.931034	

	Funding opportunities	Student life and academic advising	\
Satisfaction	3.333333	3.586207	
Importance	4.287356	4.218391	

	Technology services and support
Satisfaction	3.666667
Importance	3.977011

[22]:
```
a=pd.DataFrame(satisfied2_2022.mean()).T
b=pd.DataFrame(important_2022.mean()).T
```

```
b.columns=a.columns
c2022=pd.concat([a,b],ignore_index=True)
c2022.rename(index={0:'Satisfaction',1:'Importance'},inplace=True)
print('\033[1m' + 'The satisfaction and importance of BMEN students in 2022:␣
↪'+'\033[0m')
c2022
```

The satisfaction and importance of BMEN students in 2022:

[22]:

	Academics	Mental health	Physical health	\
Satisfaction	3.731884	3.268116	3.456522	
Importance	4.572464	4.420290	4.275362	

	Professional development	Social life	Career Placement Team	\
Satisfaction	3.775362	3.739130	3.471014	
Importance	4.376812	4.173913	4.181159	

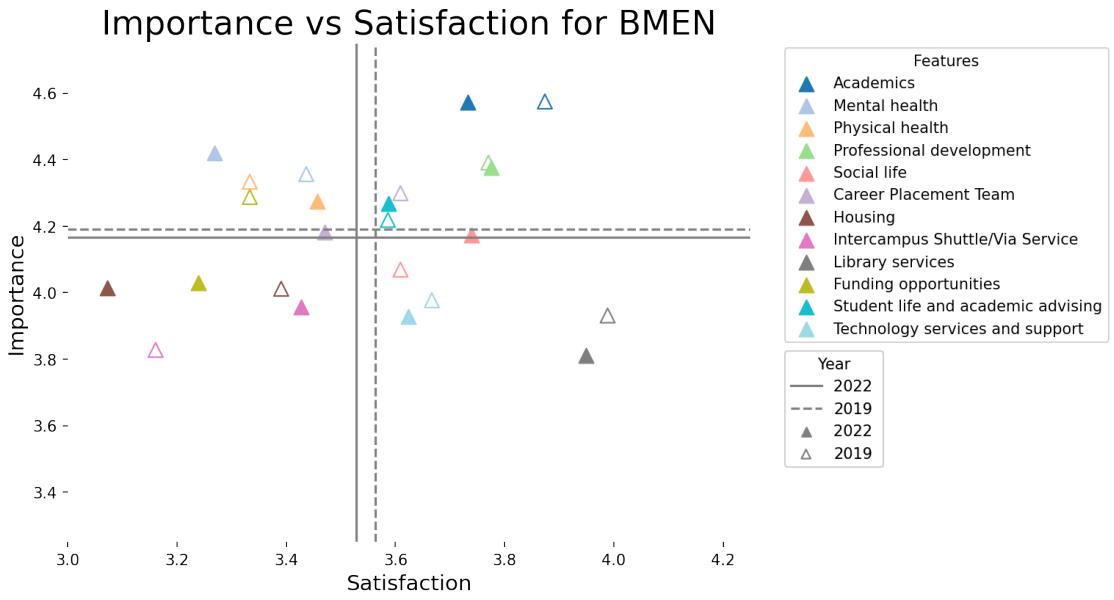
	Housing	Intercampus Shuttle/Via Service	Library services	\
Satisfaction	3.072464	3.427536	3.949275	
Importance	4.014493	3.956522	3.811594	

	Funding opportunities	Student life and academic advising	\
Satisfaction	3.239130	3.586957	
Importance	4.028986	4.268116	

	Technology services and support
Satisfaction	3.623188
Importance	3.927536

[23]:
```
import matplotlib.cm as cm
colors = cm.tab20(np.linspace(0, 1, (12)))

fig,ax=plt.subplots(figsize=(8,6),dpi=150)

for i in range(12):
    ax.scatter(c2022.iloc[0,i], c2022.iloc[1,i],s=90,marker='^',label=c2022.
↪columns[i],c=colors[i].reshape(1,-1))

for i in range(12):
    ax.scatter(c2019.iloc[0,i], c2019.
↪iloc[1,i],s=90,marker='^',facecolors='none',edgecolors=colors[i].
↪reshape(1,-1))

line1=ax.axhline(y=c2022.iloc[1,:].mean(),c='grey')
ax.axvline(x=c2022.iloc[0,:].mean(),c='grey' )

line2=ax.axhline(y=c2019.iloc[1,:].mean(),c='grey',ls='--')
```

```
ax.axvline(x=c2019.iloc[0,:].mean(),c='grey' ,ls='--')


ax.set_xlim([3.0, 4.250])
ax.set_ylim([3.25, 4.750])


ax.set_title("Importance vs Satisfaction for BMEN",fontsize=22)

leg = plt.legend(loc=(1.05,0.4), title="Features")
ax.add_artist(leg)
import matplotlib.patches as mpatches

grey_triangle1 = ax.scatter([], [], color='grey', marker='^', linestyle='None')
grey_triangle2 = ax.scatter([], [], color='grey', marker='^',␣
 ↪facecolors='none',edgecolors="grey",linestyle='None')

leg1=plt.legend(handles=[line1,line2,grey_triangle1,grey_triangle2],␣
 ↪labels=['2022 ','2019','2022 ','2019'],loc=(1.05,0.15), title="Year")
ax.add_artist(leg1)

ax.set_xlabel("Satisfaction",fontsize=14)
ax.set_ylabel("Importance",fontsize=14)
ax.spines['top'].set_visible(False)
ax.spines['right'].set_visible(False)
ax.spines['bottom'].set_visible(False)
ax.spines['left'].set_visible(False)

plt.show()
```



1.4 Academics

[24]:
```
## Academics
aca_import_2019=query_data(Q2019,qq2019,df2019,"academics",indx=1)
aca_import_2022=query_data(Q2022,qq2022,df2022,"academics",indx=1)
aca=pd.DataFrame(aca_import_2019.mean(axis=0)[:4])
aca.rename(columns={0:'2019'},inplace=True)
aca['2022']=(aca_import_2022.mean(axis=0)[:4])
```

The following are important with respect to my overall satisfaction with SEAS classes and academics.
The following are important with respect to my overall satisfaction with SEAS classes and academics.

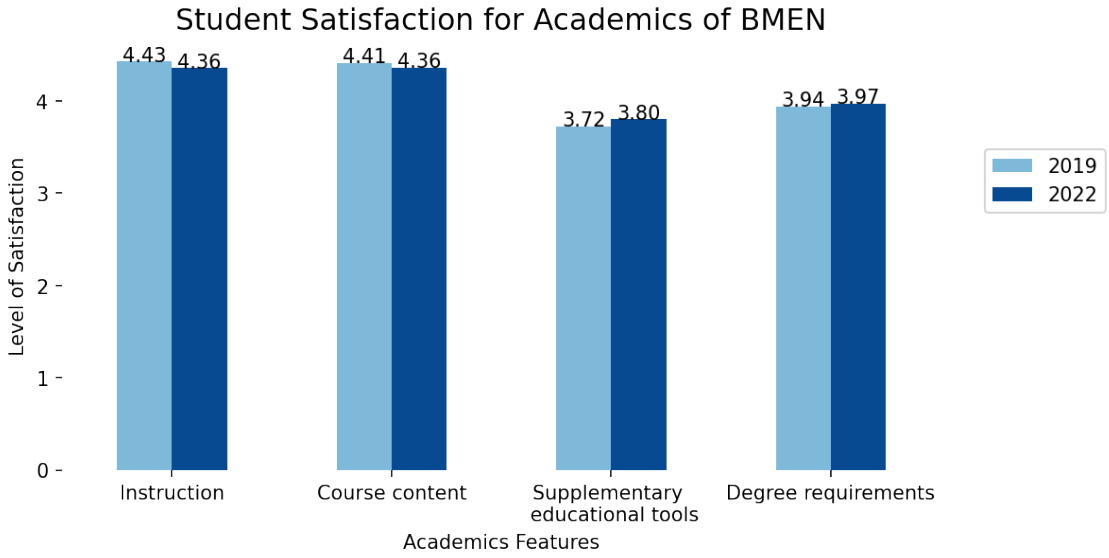
[25]:
```
print('\033[1m'+'The satisfaction score with SEAS classes and academics of BMEN␣
↪in 2019 and 2022: '+'\033[0m'+'(out of 5)')
print(aca)
aca.rename(index={'Supplementary educational tools':'Supplementary \n␣
↪educational tools'},inplace=True)
```

The satisfaction score with SEAS classes and academics of BMEN in 2019 and

2022: (out of 5)

	2019	2022
Instruction	4.425287	4.355072
Course content	4.413793	4.362319
Supplementary educational tools	3.724138	3.804348
Degree requirements	3.942529	3.971014

[26]:
```
barplot(aca,decimal=2)
plt.ylabel("Level of Satisfaction",fontsize=10)
plt.xlabel("Academics Features",fontsize=10)
plt.title("Student Satisfaction for Academics of BMEN",fontsize=15)
plt.legend(loc=(1.05,0.6))
plt.show()
```



1.5 Academics: Integrity

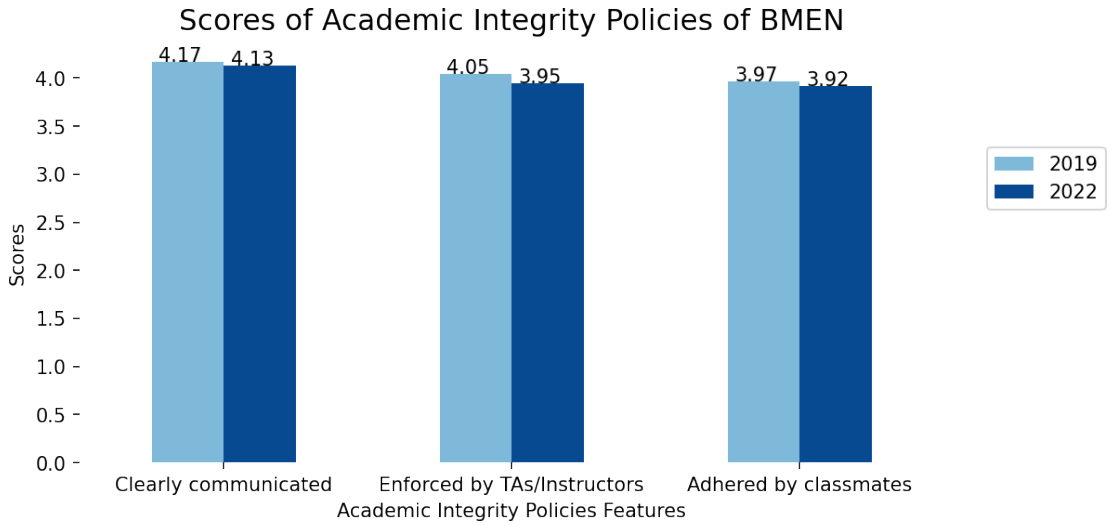
1.5.1 The Academic Integrity Policies

[27]:
```
communicated = df2022['The academic integrity policies were clearly␣
↪communicated:']
enforced = df2022['The academic integrity policies were enforced by TAs or␣
↪course instructors:']
classmates = df2022['My classmates adhered to the university policies on␣
↪academic integrity:']
communicated19 = df2019['The academic integrity policies were clearly␣
↪communicated:']
enforced19 = df2019['The academic integrity policies were enforced by TAs or␣
↪course instructors:']
classmates19 = df2019['My classmates adhered to the university policies on␣
↪academic integrity:']


aca_in_pol=pd.DataFrame([[communicated19.mean(),communicated.mean()],\
             [enforced19.mean(),enforced.mean()],\
             [classmates19.mean(),classmates.mean()]],columns=['2019','2022'],\
            index=['Clearly communicated','Enforced by TAs/
↪Instructors','Adhered by classmates'])
print('\033[1m'+'The score of academic integrity policies of BMEN in 2019 and␣
↪2022: '+'\033[0m'+'(out of 5)')
print(aca_in_pol)
```

```
The score of academic integrity policies of BMEN in 2019 and 2022: (out
```

```
of 5)
                                  2019      2022
Clearly communicated          4.172414  4.130435
Enforced by TAs/Instructors   4.045977  3.949275
Adhered by classmates         3.965517  3.920290
```

[28]:
```
barplot(aca_in_pol,decimal=2)
plt.ylabel("Scores",fontsize=10)
plt.xlabel("Academic Integrity Policies Features",fontsize=10)
plt.title("Scores of Academic Integrity Policies of BMEN",fontsize=15)
plt.legend(loc=(1.05,0.6))
plt.show()
```



1.5.2 Violation

[29]:
```
print('\033[1m' + 'The Academic Integrity of BMEN students in 2019 and 2022␣
↪'+'\033[0m')
aca4_int19=query_data(Q2019,qq2019,df2019,"Integrity",indx=4)
aca4_int22=query_data(Q2022,qq2022,df2022,"Integrity",indx=4)
aca4_int=pd.DataFrame(aca4_int19['Response.46'].value_counts())
aca4_int.rename(columns={'Response.46':'2019'},inplace=True)
aca4_int['2022']=aca4_int22['Response.48'].value_counts()
print(aca4_int)
```

```
The Academic Integrity of BMEN students in 2019 and 2022
Have you ever violated an Academic Integrity policy? (all answers are anonymous)
Have you ever violated an Academic Integrity policy? (all answers are anonymous)
          2019  2022
No          79   123
Not Sure     4     9
```

```
Yes          4     6
```

1.5.3 Awareness

[30]:
```
print('\033[1m' + 'The Academic Integrity Awareness of BMEN students in 2019␣
 ↪and 2022 '+'\033[0m')
aca_int19=query_data(Q2019,qq2019,df2019,"Integrity",indx=1)
aca_int22=query_data(Q2022,qq2022,df2022,"Integrity",indx=1)
aca_int=pd.DataFrame(aca_int19['Response.43'].value_counts())
aca_int.rename(columns={'Response.43':'2019'},inplace=True)
aca_int['2022']=aca_int22['Response.45'].value_counts()
print(aca_int)
```

The Academic Integrity Awareness of BMEN students in 2019 and 2022

```
Have you ever become aware of an Academic Integrity violation?
Have you ever become aware of an Academic Integrity violation?
          2019  2022
No          64   108
Yes         12    14
Not Sure    11    16
```

[31]:
```
print('\033[1m' + 'The Academic Integrity Awareness of BMEN students from TAs␣
 ↪in 2019 and 2022 '+'\033[0m')
aca_int19=query_data(Q2019,qq2019,df2019,"Integrity",indx=2)
aca_int22=query_data(Q2022,qq2022,df2022,"Integrity",indx=2)
aca_int=pd.DataFrame(aca_int19['Response.45'].value_counts())
aca_int.rename(columns={'Response.45':'2019'},inplace=True)
aca_int['2022']=aca_int22['Response.47'].value_counts()
print(aca_int)
```

The Academic Integrity Awareness of BMEN students from TAs in 2019 and 2022

```
If you have served as a TA, did you ever suspect or become aware of an Academic
Integrity Violation?
If you have served as a TA, did you ever suspect or become aware of an Academic
Integrity Violation?
                        2019  2022
I did not serve as a TA    52    83
No                         28    43
Yes                         7    12
```

1.5.4 Report

[32]:
```
aca_r19=query_data(Q2019,qq2019,df2019,"report it?",indx=1).dropna()
aca_r22=query_data(Q2022,qq2022,df2022,"report it?",indx=1).dropna()
aca_r=pd.DataFrame(aca_r19['Response.44'].value_counts())
aca_r.rename(columns={'Response.44':'2019'},inplace=True)
aca_r['2022']=aca_r22['Response.46'].value_counts()
```

```
print(aca_r)
```

```
If you answered "Yes," did you report it?
Did you report it?
                                                2019  2022
No                                                 8    10
Yes, I reported it to both TA and Instructor       3     1
Yes, I reported it to the Instructor/Professor     2     4
```

1.6 PDL

1.6.1 Attendence M.S. Students only

[33]:
```
pdl_A19=query_data(Q2019,qq2019,df2019[df2019['degree']=='Master of Science (M.
↪S.)'],"PDL",indx=1).fillna("NA")
pdl_A22=query_data(Q2022,qq2022,df2022[df2022['degree']=='Master of Science (M.
↪S.)'],"PDL",indx=1).fillna("NA")
pdl_A=pd.DataFrame(pdl_A19['Response.5'].value_counts())
pdl_A.rename(columns={'Response.5':'2019'},inplace=True)
pdl_A['2022']=pdl_A22['Response.5'].value_counts()
print(pdl_A)
```

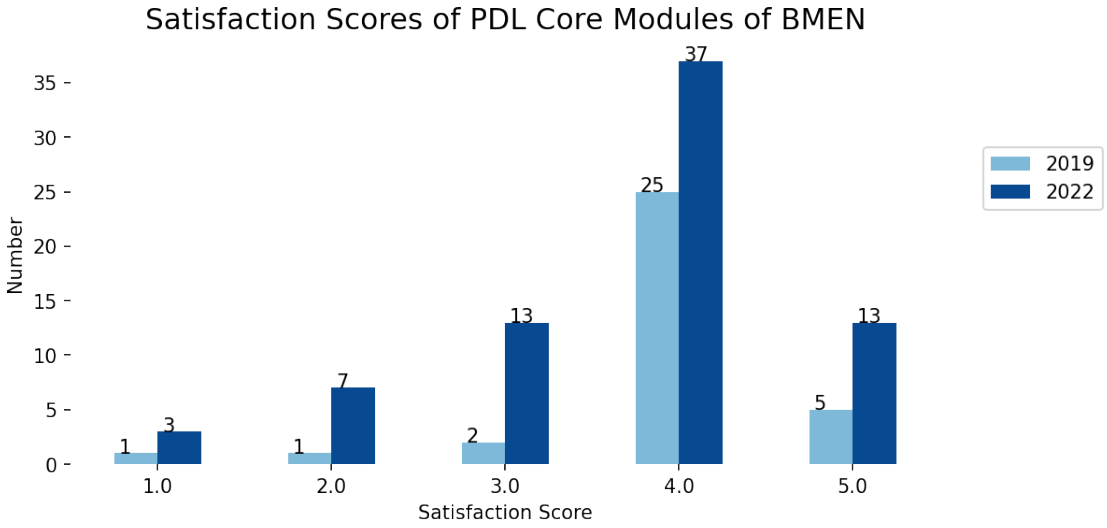
```
Did you attend the Professional Development and Leadership (PDL) Program?
Did you attend the Professional Development and Leadership (PDL) Program?
     2019  2022
Yes    34    73
No      2     1
```

[34]:
```
pdl_c19=query_data(Q2019,qq2019,df2019[df2019['degree']=='Master of Science (M.
↪S.)'],"PDL",indx=2)
pdl_c22=query_data(Q2022,qq2022,df2022[df2022['degree']=='Master of Science (M.
↪S.)'],"PDL",indx=2)
pdl_c=pd.DataFrame(pdl_c19['Response.6'].value_counts())
pdl_c.rename(columns={'Response.6':'2019'},inplace=True)
pdl_c['2022']=pdl_c22['Response.6'].value_counts()
print(pdl_c.sort_index())
```

```
I am satisfied with the PDL Core Modules.
I am satisfied with the PDL Core Modules.
     2019  2022
1.0     1     3
2.0     1     7
3.0     2    13
4.0    25    37
5.0     5    13
```

[35]:
```
barplot(pdl_c.sort_index())
plt.ylabel("Number",fontsize=10)
plt.xlabel("Satisfaction Score",fontsize=10)
```

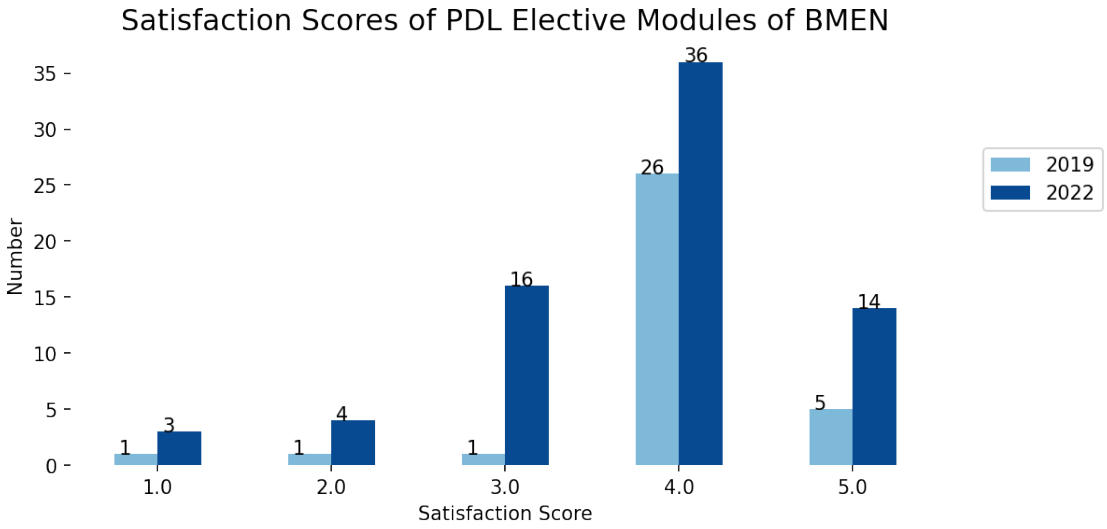
```
plt.title("Satisfaction Scores of PDL Core Modules of BMEN",fontsize=15)
plt.legend(loc=(1.05,0.6))
plt.show()
```



[36]:
```
pdl_s19=query_data(Q2019,qq2019,df2019[df2019['degree']=='Master of Science (M.
↪S.)'],"PDL",indx=3)
pdl_s22=query_data(Q2022,qq2022,df2022[df2022['degree']=='Master of Science (M.
↪S.)'],"PDL",indx=3)
pdl_s=pd.DataFrame(pdl_s19['Response.7'].value_counts())
pdl_s.rename(columns={'Response.7':'2019'},inplace=True)
pdl_s['2022']=pdl_s22['Response.7'].value_counts()
print(pdl_s.sort_index())
```

```
I am satisfied with the PDL Elective Modules.
I am satisfied with the PDL Elective Modules.
     2019  2022
1.0     1     3
2.0     1     4
3.0     1    16
4.0    26    36
5.0     5    14
```

[37]:
```
barplot(pdl_s.sort_index())
plt.ylabel("Number",fontsize=10)
plt.xlabel("Satisfaction Score",fontsize=10)
plt.title("Satisfaction Scores of PDL Elective Modules of BMEN",fontsize=15)
plt.legend(loc=(1.05,0.6))
plt.show()
```



1.7 Career Development

[38]:
```
lookingforjob=query_data(Q2022,qq2022,df2022,"looking for a job",indx=1)
lookingforjob.value_counts()
```

Are you currently looking for a job or plan to look for one in the near future?

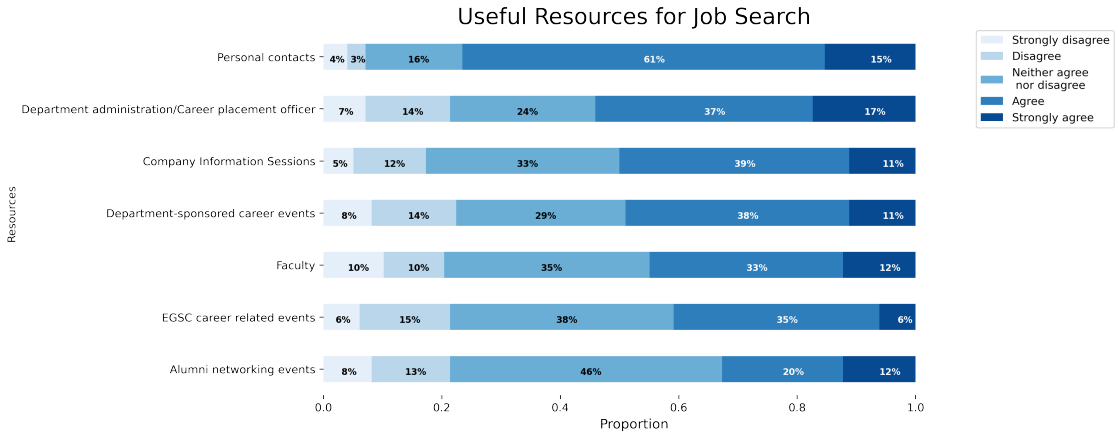
[38]:
```
Response.10
Yes            85
No             40
Not Sure       13
dtype: int64
```

[39]:
```
jobres=query_data(Q2022,qq2022,df2022,"job search",indx=1)
jobres['looking']=lookingforjob
```

The following resources have been/were useful in aiding my job search:

[41]:
```
inddd=['Strongly agree','Agree','Neither agree \n nor␣
 ↪disagree','Disagree','Strongly disagree']
cmap = mpl.cm.Blues(np.linspace(0,0.9,100))
cmap = mpl.colors.ListedColormap(cmap[10:,:-1])
lokres=jobres[jobres['looking']!="No"].drop(columns="looking")
lokres_count=lokres.apply(pd.value_counts,axis=0)
d_=lokres_count[(lokres_count.iloc[3:,:].sum()).sort_values().index]
b_prob=d_.apply(lambda x: x / x.sum(), axis=0)
aaa=d_.T
bbb=b_prob.T
```

```
fig,ax=plt.subplots(figsize=(8,6),dpi=300)
bbb.plot(kind='barh', stacked=True,colormap=cmap, figsize=(10, 6),ax=ax)
#pd.DataFrame(b)
plt.legend(inddd[::-1],bbox_to_anchor=(1.05, 1), loc=2, borderaxespad=0.,␣
↪ncol=1)

plt.ylabel("Resources")
plt.xlabel("Proportion",fontsize=12)
plt.title("Useful Resources for Job Search",fontsize=20)


for n, x in enumerate([*aaa.index.values]):
    m=5
    for (proportion, count, y_loc) in zip(bbb.loc[x],
                                          aaa.loc[x],
                                          bbb.loc[x].cumsum()):

        if m<3:
                 plt.text(x=(y_loc - proportion) + (proportion / 2),
                 y=n - 0.11,
                 #s=f'{str(count).split(".")[0]}',
                 s=f'{str(np.round(proportion * 100)).split(".")[0]}%',
                 color="white",
                 fontsize=8,
                 fontweight="bold")
        if m>=3:
                plt.text(x=(y_loc - proportion) + (proportion / 2)-0.01,
                 y=n - 0.11,
                 #s=f'{str(count).split(".")[0]}',
                 s=f'{str(np.round(proportion * 100)).split(".")[0]}%',
                 color="black",
                 fontsize=8,
                 fontweight="bold")
        m-=1
ax.spines['top'].set_visible(False)
ax.spines['right'].set_visible(False)
ax.spines['bottom'].set_visible(False)
ax.spines['left'].set_visible(False)


plt.show()
```



1.8 Skills Improved

[42]:
```
skill=query_data(Q2022,qq2022,df2022,"skills",indx=1)
skill.replace(2,1,inplace=True)
skill.replace(4,5,inplace=True)
skill_count=skill.apply(pd.value_counts,axis=0).sort_index()
b_prob=(skill_count[(skill_count.iloc[2:,:].sum()).sort_values().index]).
 ↪apply(lambda x: x / x.sum(), axis=0)
aaa=(skill_count[(skill_count.iloc[2:,:].sum()).sort_values().index]).T
bbb=b_prob.T
bbb.rename(columns={1:'Disagree',3:'Neither agree nor disagree',5:'Agree'})
```

The following skills have been improved/enhanced by my time at Columbia SEAS.

[42]:

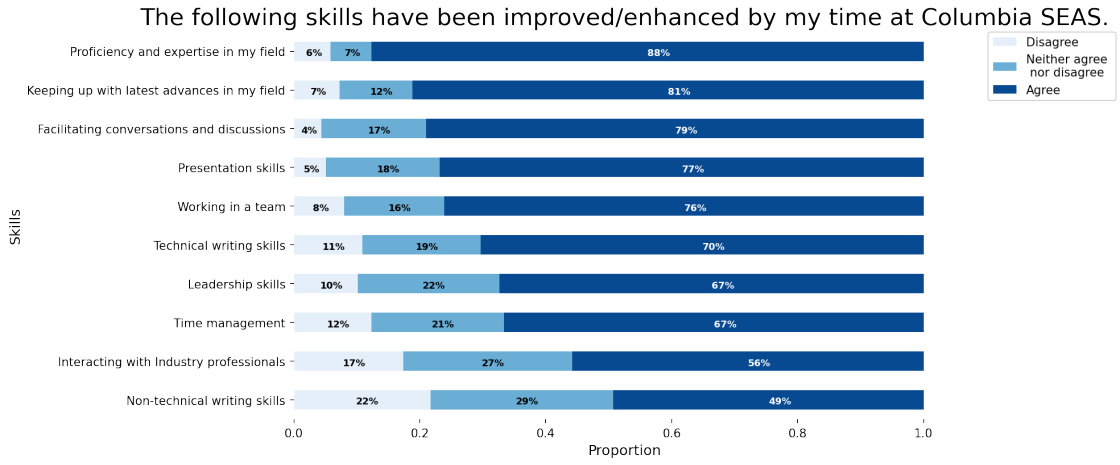
	Disagree	\
Non-technical writing skills	0.217391	
Interacting with Industry professionals	0.173913	
Time management	0.123188	
Leadership skills	0.101449	
Technical writing skills	0.108696	
Working in a team	0.079710	
Presentation skills	0.050725	
Facilitating conversations and discussions	0.043478	
Keeping up with latest advances in my field	0.072464	
Proficiency and expertise in my field	0.057971	

	Neither agree nor disagree	\
Non-technical writing skills	0.289855	
Interacting with Industry professionals	0.268116	
Time management	0.210145	
Leadership skills	0.224638	
Technical writing skills	0.188406	

```
Working in a team                                          0.159420
Presentation skills                                        0.181159
Facilitating conversations and discussions                 0.166667
Keeping up with latest advances in my field                0.115942
Proficiency and expertise in my field                      0.065217
```

```
                                             Agree
Non-technical writing skills                 0.492754
Interacting with Industry professionals      0.557971
Time management                              0.666667
Leadership skills                            0.673913
Technical writing skills                     0.702899
Working in a team                            0.760870
Presentation skills                          0.768116
Facilitating conversations and discussions   0.789855
Keeping up with latest advances in my field  0.811594
Proficiency and expertise in my field        0.876812
```

[43]:
```
ind=['Agree','Neither agree \n nor disagree','Disagree']
stackplot(bbb,ind)
plt.ylabel("Skills",fontsize=12)
plt.xlabel("Proportion",fontsize=12)
plt.title("The following skills have been improved/enhanced by my time at␣
 ↪Columbia SEAS.",fontsize=20)
plt.show()
```



[ ]: