

Install and Import Packages

```
In [ ]: !pip install plotly>=4.7.1
!wget https://github.com/plotly/orca/releases/download/v1.2.1/orca-1.2.1-x86_64.AppImage -O /usr/local/bin/orca
!chmod +x /usr/local/bin/orca

--2020-11-30 22:22:26-- https://github.com/plotly/orca/releases/download/v1.2.1/orca-1.2.1-x86_64.AppImage
Resolving github.com (github.com)... 140.82.113.3
Connecting to github.com (github.com)|140.82.113.3|:443... connected.
HTTP request sent, awaiting response... 302 Found
Location: https://github-production-release-asset-2e65be.s3.amazonaws.com/99037241/9dc3a580-286a-11e9-8a21-4312b7c8a512?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWNJYAX4CSVEH53A%2F20201130%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201130T222226Z&X-Amz-Expires=300&X-Amz-Signature=4b3045e099b5c7ab2d6bd079053f24a8b738e84ffb580d5c4281d2cc82674e0d&X-Amz-SignedHeaders=host&actor_id=0&key_id=0&repo_id=99037241&response-content-disposition=attachment%3B%20filename%3Dorca-1.2.1-x86_64.AppImage&response-content-type=application%2Foctet-stream [following]
--2020-11-30 22:22:26-- https://github-production-release-asset-2e65be.s3.amazonaws.com/99037241/9dc3a580-286a-11e9-8a21-4312b7c8a512?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWNJYAX4CSVEH53A%2F20201130%2Fus-east-1%2Fs3%2Faws4_request&X-Amz-Date=20201130T222226Z&X-Amz-Expires=300&X-Amz-Signature=4b3045e099b5c7ab2d6bd079053f24a8b738e84ffb580d5c4281d2cc82674e0d&X-Amz-SignedHeaders=host&actor_id=0&key_id=0&repo_id=99037241&response-content-disposition=attachment%3B%20filename%3Dorca-1.2.1-x86_64.AppImage&response-content-type=application%2Foctet-stream
Resolving github-production-release-asset-2e65be.s3.amazonaws.com (github-production-release-asset-2e65be.s3.amazonaws.com)... 52.217.85.204
Connecting to github-production-release-asset-2e65be.s3.amazonaws.com (github-production-release-asset-2e65be.s3.amazonaws.com)|52.217.85.204|:443... connected.
HTTP request sent, awaiting response... 200 OK
Length: 51607939 (49M) [application/octet-stream]
Saving to: '/usr/local/bin/orca'

/usr/local/bin/orca 100%[=====] 49.22M 78.0MB/s    in
0.6s

2020-11-30 22:22:27 (78.0 MB/s) - '/usr/local/bin/orca' saved [51607939/51607939]
```

```
In [ ]: !sudo apt-get update  
!apt-get install xvfb libgtk2.0-0 libgconf-2-4
```

```
Get:1 http://security.ubuntu.com/ubuntu bionic-security InRelease [88.7 kB]
Ign:2 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64 InRelease
Get:3 https://cloud.r-project.org/bin/linux/ubuntu bionic-cran40/ InRelease [3,626 B]
Get:4 http://ppa.launchpad.net/c2d4u.team/c2d4u4.0+/ubuntu bionic InRelease [15.9 kB]
Ign:5 https://developer.download.nvidia.com/compute/machine-learning/repos/ubuntu1804/x86_64 InRelease
Hit:6 http://archive.ubuntu.com/ubuntu bionic InRelease
Get:7 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64 Release [697 B]
Hit:8 https://developer.download.nvidia.com/compute/machine-learning/repos/ubuntu1804/x86_64 Release
Get:9 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64 Release.gpg [836 B]
Get:10 http://archive.ubuntu.com/ubuntu bionic-updates InRelease [88.7 kB]
Get:11 http://security.ubuntu.com/ubuntu bionic-security/main amd64 Packages [1,781 kB]
Get:12 http://ppa.launchpad.net/graphics-drivers/ppa/ubuntu bionic InRelease [21.3 kB]
Get:13 http://security.ubuntu.com/ubuntu bionic-security/universe amd64 Packages [1,366 kB]
Get:14 http://archive.ubuntu.com/ubuntu bionic-backports InRelease [74.6 kB]
Ign:16 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64 Packages
Get:16 https://developer.download.nvidia.com/compute/cuda/repos/ubuntu1804/x86_64 Packages [443 kB]
Get:17 http://ppa.launchpad.net/c2d4u.team/c2d4u4.0+/ubuntu bionic/main Sources [1,691 kB]
Get:18 http://archive.ubuntu.com/ubuntu bionic-updates/main amd64 Packages [2,218 kB]
Get:19 http://archive.ubuntu.com/ubuntu bionic-updates/restricted amd64 Packages [257 kB]
Get:20 http://archive.ubuntu.com/ubuntu bionic-updates/multiverse amd64 Packages [54.3 kB]
Get:21 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 Packages [2,131 kB]
Get:22 http://ppa.launchpad.net/c2d4u.team/c2d4u4.0+/ubuntu bionic/main amd64 Packages [865 kB]
Get:23 http://ppa.launchpad.net/graphics-drivers/ppa/ubuntu bionic/main amd64 Packages [46.5 kB]
Fetched 11.1 MB in 3s (3,852 kB/s)
Reading package lists... Done
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  gconf-service gconf-service-backend gconf2-common libdbus-glib-1-2
    libgail-common libgail18 libgtk2.0-bin libgtk2.0-common
Suggested packages:
  gvfs
The following NEW packages will be installed:
  gconf-service gconf-service-backend gconf2-common libdbus-glib-1-2
    libgail-common libgail18 libgconf-2-4 libgtk2.0-0 libgtk2.0-bin
    libgtk2.0-common xvfb
0 upgraded, 11 newly installed, 0 to remove and 64 not upgraded.
Need to get 3,714 kB of archives.
After this operation, 17.2 MB of additional disk space will be used.
Get:1 http://archive.ubuntu.com/ubuntu bionic/main amd64 libdbus-glib-1
```

```
-2 amd64 0.110-2 [58.3 kB]
Get:2 http://archive.ubuntu.com/ubuntu bionic/universe amd64 gconf2-common all 3.2.6-4ubuntul [700 kB]
Get:3 http://archive.ubuntu.com/ubuntu bionic/universe amd64 libgconf-2-4 amd64 3.2.6-4ubuntul [84.8 kB]
Get:4 http://archive.ubuntu.com/ubuntu bionic/universe amd64 gconf-service-backend amd64 3.2.6-4ubuntul [58.1 kB]
Get:5 http://archive.ubuntu.com/ubuntu bionic/universe amd64 gconf-service amd64 3.2.6-4ubuntul [2,036 B]
Get:6 http://archive.ubuntu.com/ubuntu bionic/main amd64 libgtk2.0-common all 2.24.32-1ubuntul [125 kB]
Get:7 http://archive.ubuntu.com/ubuntu bionic/main amd64 libgtk2.0-0 amd64 2.24.32-1ubuntul [1,769 kB]
Get:8 http://archive.ubuntu.com/ubuntu bionic/main amd64 libgail18 amd64 2.24.32-1ubuntul [14.2 kB]
Get:9 http://archive.ubuntu.com/ubuntu bionic/main amd64 libgail-common amd64 2.24.32-1ubuntul [112 kB]
Get:10 http://archive.ubuntu.com/ubuntu bionic/main amd64 libgtk2.0-bin amd64 2.24.32-1ubuntul [7,536 B]
Get:11 http://archive.ubuntu.com/ubuntu bionic-updates/universe amd64 xvfb amd64 2:1.19.6-1ubuntu4.7 [783 kB]
Fetched 3,714 kB in 1s (3,827 kB/s)
Selecting previously unselected package libdbus-glib-1-2:amd64.
(Reading database ... 144793 files and directories currently installed.)
Preparing to unpack .../00-libdbus-glib-1-2_0.110-2_amd64.deb ...
Unpacking libdbus-glib-1-2:amd64 (0.110-2) ...
Selecting previously unselected package gconf2-common.
Preparing to unpack .../01-gconf2-common_3.2.6-4ubuntul_all.deb ...
Unpacking gconf2-common (3.2.6-4ubuntul) ...
Selecting previously unselected package libgconf-2-4:amd64.
Preparing to unpack .../02-libgconf-2-4_3.2.6-4ubuntul_amd64.deb ...
Unpacking libgconf-2-4:amd64 (3.2.6-4ubuntul) ...
Selecting previously unselected package gconf-service-backend.
Preparing to unpack .../03-gconf-service-backend_3.2.6-4ubuntul_amd64.deb ...
Unpacking gconf-service-backend (3.2.6-4ubuntul) ...
Selecting previously unselected package gconf-service.
Preparing to unpack .../04-gconf-service_3.2.6-4ubuntul_amd64.deb ...
Unpacking gconf-service (3.2.6-4ubuntul) ...
Selecting previously unselected package libgtk2.0-common.
Preparing to unpack .../05-libgtk2.0-common_2.24.32-1ubuntul_all.deb ...
...
Unpacking libgtk2.0-common (2.24.32-1ubuntul) ...
Selecting previously unselected package libgtk2.0-0:amd64.
Preparing to unpack .../06-libgtk2.0-0_2.24.32-1ubuntul_amd64.deb ...
Unpacking libgtk2.0-0:amd64 (2.24.32-1ubuntul) ...
Selecting previously unselected package libgail18:amd64.
Preparing to unpack .../07-libgail18_2.24.32-1ubuntul_amd64.deb ...
Unpacking libgail18:amd64 (2.24.32-1ubuntul) ...
Selecting previously unselected package libgail-common:amd64.
Preparing to unpack .../08-libgail-common_2.24.32-1ubuntul_amd64.deb ...
...
Unpacking libgail-common:amd64 (2.24.32-1ubuntul) ...
Selecting previously unselected package libgtk2.0-bin.
Preparing to unpack .../09-libgtk2.0-bin_2.24.32-1ubuntul_amd64.deb ...
Unpacking libgtk2.0-bin (2.24.32-1ubuntul) ...
Selecting previously unselected package xvfb.
Preparing to unpack .../10-xvfb_2%3a1.19.6-1ubuntu4.7_amd64.deb ...
Unpacking xvfb (2:1.19.6-1ubuntu4.7) ...
Setting up gconf2-common (3.2.6-4ubuntul) ...
```

Creating config file /etc/gconf/2/path with new version

```
Setting up libgtk2.0-common (2.24.32-1ubuntu1) ...
Setting up libdbus-glib-1-2:amd64 (0.110-2) ...
Setting up xvfb (2:1.19.6-1ubuntu4.7) ...
Setting up libgconf-2-4:amd64 (3.2.6-4ubuntu1) ...
Setting up libgtk2.0-0:amd64 (2.24.32-1ubuntu1) ...
Setting up libgail18:amd64 (2.24.32-1ubuntu1) ...
Setting up libgail-common:amd64 (2.24.32-1ubuntu1) ...
Setting up libgtk2.0-bin (2.24.32-1ubuntu1) ...
Setting up gconf-service-backend (3.2.6-4ubuntu1) ...
Setting up gconf-service (3.2.6-4ubuntu1) ...
Processing triggers for libc-bin (2.27-3ubuntu1.2) ...
/sbin/ldconfig.real: /usr/local/lib/python3.6/dist-packages/ideep4py/li
b/libmkldnn.so.0 is not a symbolic link

Processing triggers for man-db (2.8.3-2ubuntu0.1) ...
```

```
In [ ]: # Import the packages we'll be using
import rpy2 as r
import pandas as pd
import numpy as np
from scipy import stats
import matplotlib.pyplot as plt
import scipy.stats as sts
import matplotlib
import plotly.express as px
import plotly.graph_objects as go
from plotly.subplots import make_subplots
from google.colab import files
```

Data Pre-processing

Import and process data

```
In [ ]: from google.colab import drive
drive.mount('/content/gdrive')
```

Mounted at /content/gdrive

```
In [ ]: # Define more concise headers for the data
headers = ["timestamp", "level", "country", "is_online",
           "first_survey", "agree", "primary_mode", "preferred_mode",
           "why_mode", "platforms_used", "methods_used",
           "techniques_outside", "remote_enjoy", "remote_motivated",
           "remote_satisfied", "remote_engaging", "remote_distracted",
           "remote_questions", "remote_changes", "prior_enjoy",
           "prior_motivated", "prior_satisfied", "prior_engaging",
           "prior_distracted", "prior_questions", "prior_changes",
           "preference", "why_preference"]

# Read in the raw data
full_data = pd.read_csv("/content/gdrive/My Drive/Summer 2020/Minerva In
ternship/Team Stein/raw_data.csv", skiprows=[0], names=headers, na_value
s="?")
```

```
In [ ]: full_data.shape
```

```
Out[ ]: (10561, 28)
```

```
In [ ]: # Define some other lists that will be useful
```

```
# List of just the Likert questions about remote instructions
remote_survey_q = ["remote_enjoy", "remote_motivated",
                    "remote_satisfied", "remote_engaging",
                    "remote_distracted", "remote_questions"]
change_survey_q = ["change_enjoy", "change_motivated",
                    "change_satisfied", "change_engaging",
                    "change_distracted", "change_questions"]
remote_q_long = ["I enjoy having courses online",
                 "I feel motivated to learn",
                 "I am satisfied with the instruction\nof my online courses",
                 "My courses are engaging",
                 "I am often distracted when doing\ncourse work / attending classes",
                 "I often ask questions, comment, join discussions"]
change_q_long = ["I enjoy",
                 "I feel motivated to learn",
                 "I am satisfied with the instruction",
                 "My courses are engaging",
                 "I am often distracted when doing\ncourse work / attending classes",
                 "I often ask questions, comment, join discussions"]
```

```
In [ ]: # Drop the rows that we're not going to be using
```

```
data = full_data.drop(["timestamp", "agree"], axis=1)
```

```
In [ ]: # Drop duplicates
duplicate = data[data.duplicated()]
print('# of duplicates: ', len(duplicate))
print('Valid entries: ', duplicate[duplicate['primary_mode'].isna() == False].index)
print('# of duplicates for valid entries: ', len(duplicate[duplicate['primary_mode'].isna() == False].index))
print('NaN entries: ', duplicate[duplicate['primary_mode'].isna()].index)
print('# of duplicates for NaN entries: ', len(duplicate[duplicate['primary_mode'].isna()]))

data = data.drop(duplicate.index, axis=0)
data = data.reset_index(drop=True)

data.head()
```

```
# of duplicates: 91
Valid entries: Int64Index([ 1143, 2304, 2966, 2968, 3441, 4090,
4550, 4778, 5406,
5710, 6885, 7130, 7140, 7191, 7536, 7537, 7767, 84
11,
9016, 9314, 9371, 10154, 10186, 10447, 10472, 10531],
dtype='int64')
# of duplicates for valid entries: 26
NaN entries: Int64Index([ 20, 124, 208, 416, 431, 587, 7
73, 995, 1018,
1027, 1754, 1841, 2083, 2439, 2466, 2754, 2892, 30
77,
3403, 3552, 3728, 3876, 4093, 4232, 4386, 4576, 50
14,
5048, 5196, 5209, 5346, 5583, 5658, 5719, 5908, 59
92,
6067, 6226, 6383, 6416, 6571, 6576, 6672, 7607, 77
21,
7986, 8037, 8080, 8145, 8260, 8344, 8461, 8529, 90
37,
9063, 9099, 9127, 9259, 9291, 9479, 9789, 9800, 98
48,
10064, 10151],
dtype='int64')
# of duplicates for NaN entries: 65
```

Out[]:

	level	country	is_online	first_survey	primary_mode	preferred_mode	why_
0	High school/A-levels/Gymnasium	United Kingdom	Yes	No	Live classes (ie: Zoom, Google Meet etc.)	Live classes (ie: Zoom, google meet etc.)	inter can help
1	High school/A-levels/Gymnasium	United Kingdom	Yes	Yes	Live classes (ie: Zoom, Google Meet etc.)	Live classes (ie: Zoom, google meet etc.)	Mo to fa
2	High school/A-levels/Gymnasium	Ireland	Yes	Yes	Live classes (ie: Zoom, Google Meet etc.)	Recorded Lectures/Videos	Can yo
3	Graduate (studying for Masters/Ph.D./Professio...	Belgium	Yes	Yes	Recorded Lectures	Recorded Lectures/Videos	
4	Undergraduate (studying for associates or bach...	United Kingdom	Yes	No	Recorded Lectures	Recorded Lectures/Videos	Ea follo

```
In [ ]: # Recode Likert responses into numerical code
likert_dict = {"Strongly Disagree": 1, "Disagree": 2, "Neutral": 3,
               "Agree": 4, "Strongly Agree": 5}
likert_code = {"remote_enjoy": likert_dict,
               "remote_motivated": likert_dict,
               "remote_satisfied": likert_dict,
               "remote_engaging": likert_dict,
               "remote_distracted": likert_dict,
               "remote_questions": likert_dict,
               "prior_enjoy": likert_dict,
               "prior_motivated": likert_dict,
               "prior_satisfied": likert_dict,
               "prior_engaging": likert_dict,
               "prior_distracted": likert_dict,
               "prior_questions": likert_dict}
data.replace(likert_code, inplace=True)
```

```
In [ ]: # Recode Primary mode entries into shorter things
modes = {"primary_mode": {"Live classes (ie: Zoom, Google Meet etc.)": "live",
                           "Uploaded or emailed Materials": "upload",
                           "Recorded Lectures": "recorded",
                           "Discussion forums/chats": "chat"},
         "preferred_mode": {"Live classes (ie: Zoom, google meet et c.)": "live",
                           "Uploaded or emailed Materials": "upload",
                           "Recorded Lectures/Videos": "recorded",
                           "Discussion forums/chats": "chat"}}
data.replace(modes, inplace=True)
```

```
In [ ]: data["change_enjoy"] = data["remote_enjoy"] - data["prior_enjoy"]
data["change_motivated"] = data["remote_motivated"] - data["prior_motivated"]
data["change_satisfied"] = data["remote_satisfied"] - data["prior_satisfied"]
data["change_engaging"] = data["remote_engaging"] - data["prior_engaging"]
data["change_distracted"] = data["remote_distracted"] - data["prior_distracted"]
data["change_questions"] = data["remote_questions"] - data["prior_questions"]
```

```
In [ ]: data["active"] = data["methods_used"].str.contains(pat='In-class assessments/quizzes|Small group activities|Whole class discussion/debate|Q&A with students\' questions|Classroom chat')
data["passive"] = data["methods_used"].str.contains(pat='Lecture/presentation|Explanation using Diagrams/White Boards/other media')

data["fully_active"] = data["methods_used"].str.contains(pat='Small group activities|Whole class discussion/debate')
data["partly_active"] = data["methods_used"].str.contains(pat='In-class assessments/quizzes|Q&A with students\' questions|Classroom chat')

data["outside_passive"] = data["techniques_outside"].str.contains(pat='Video lectures|Video content|Posted readings/study material')
data["outside_interactive"] = data["techniques_outside"].str.contains(pat='Discussion/Chat Forums|Live office hours|Email Q&A with instructors')
data["outside_assignments"] = data["techniques_outside"].str.contains(pat='Assignments/un-proctored exams')
```

In []: `data.head()`

Out[]:

	level	country	is_online	first_survey	primary_mode	preferred_mode	why_
0	High school/A-levels/Gymnasium	United Kingdom	Yes	No	live	live	inter can help
1	High school/A-levels/Gymnasium	United Kingdom	Yes	Yes	live	live	Mo to fa
2	High school/A-levels/Gymnasium	Ireland	Yes	Yes	live	recorded	Can yo
3	Graduate (studying for Masters/Ph.D./Professio...	Belgium	Yes	Yes	recorded	recorded	
4	Undergraduate (studying for associates or bachelors degrees)	United Kingdom	Yes	No	recorded	recorded	Ea follo loo

In []: `data.to_csv('processed_data_1.csv')`

Split to different datasets

```
In [ ]: # Create sub-lists for different educational levels / settings
# We'll only be using undergrad datasets from now
ug = data[data.level.eq("Undergraduate (studying for associates or bachelors degrees)")]
ug = ug.reset_index()
hs = data[data.level.eq("High school/A-levels/Gymnasium")]
hs = hs.reset_index()
```

```
In [ ]: # Drop NA rows for Likert score
ug = ug.dropna(axis=0, subset=[ 'primary_mode' ])
```

```
In [ ]: ug.isna().sum()
```

```
Out[ ]: index          0
         level          0
         country         0
         is_online        0
         first_survey     5
         primary_mode     0
         preferred_mode   0
         why_mode         468
         platforms_used   0
         methods_used     0
         techniques_outside 1
         remote_enjoy      0
         remote_motivated  0
         remote_satisfied  0
         remote_engaging    0
         remote_distracted  0
         remote_questions   0
         remote_changes     29
         prior_enjoy        0
         prior_motivated    0
         prior_satisfied    0
         prior_engaging     0
         prior_distracted   0
         prior_questions     0
         prior_changes       1538
         preference         0
         why_preference     1
         change_enjoy        0
         change_motivated   0
         change_satisfied    0
         change_engaging     0
         change_distracted   0
         change_questions    0
         active              0
         passive             0
         fully_active        0
         partly_active       0
         outside_passive     1
         outside_interactive 1
         outside_assignments 1
dtype: int64
```

```
In [ ]: ug['is_online_short'] = ug['is_online']
ug['is_online_short'][((ug['is_online_short'] != 'Yes') & (ug['is_online_short'] != 'No'))] = 'Other'

def number_ops(data):
    if pd.isna(data):
        return -1
    elif 'My instructors do not use live instruction.' in data:
        return 0
    else:
        return data.count(',') + 1

ug['num_methods'] = pd.Series(ug['methods_used'].apply(number_ops)).rename('num_methods')
ug['num_techniques'] = pd.Series(ug['techniques_outside'].apply(number_ops)).rename('num_techniques')
```

/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:2: SettingWithCopyWarning:

A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

```
In [ ]: ug.to_csv('ug_processed.csv')
```

```
In [ ]: ug.shape
```

```
Out[ ]: (4789, 43)
```

```
In [ ]: ug.head()
```

```
Out[ ]:
```

		index	level	country	is_online	first_survey	primary_mode	preferred_mode	why_n
0	4	Undergraduate (studying for associates or bach...		United Kingdom	Yes	No	recorded	recorded	Easi follow look
1	6	Undergraduate (studying for associates or bach...		United Kingdom	Yes	No	live	live	Most si to norm provic ro
2	9	Undergraduate (studying for associates or bach...		United Kingdom	Yes	Yes	recorded	live	It is i intera
3	13	Undergraduate (studying for associates or bach...		United Kingdom	Yes	Yes	live	live	Allows i convers to flow ql
4	15	Undergraduate (studying for associates or bach...		Czech Republic	Yes	Yes	live	live	

In []: ug.tail()

Out[]:

		index	level	country	is_online	first_survey	primary_mode	preferred_mode	why
4786	10465	Undergraduate (studying for associates or bach...	Tunisia	Yes	No	live	live	ob not p bu us	
4787	10466	Undergraduate (studying for associates or bach...	Tunisia	Yes	No	live	recorded	be can the lec	
4788	10467	Undergraduate (studying for associates or bach...	Tunisia	Yes	No	live	recorded	Bec m ii con	
4789	10468	Undergraduate (studying for associates or bach...	Algeria	Yes	No	chat	recorded	Bec ho the i is.	
4790	10469	Undergraduate (studying for associates or bach...	United States	Yes	No	live	live		

```
In [ ]: # Create frames for undergraduates learning synchronously and asynchronously
ug_sync = ug[ug.primary_mode.eq("live")]
ug_async = ug[ug["primary_mode"] != "live"]

# Create frames for active / passive / mixed methods
ug_active_only = ug[ug.active & (ug.passive==False)]
ug_passive_only = ug[(ug.active==False) & ug.passive]
ug_act_pass_mix = ug[ug.active & ug.passive]

ug_fully_active = ug[ug.fully_active.eq(True)]
ug_partly_active = ug[ug.partly_active.eq(True)]
ug_passive = ug[ug.passive.eq(True)]

# Create analogous frames for high-school students
hs_sync = hs[hs.primary_mode.eq("live")]
hs_async = hs[hs["primary_mode"] != "live"]

# Create frames for active / passive / mixed methods
hs_active_only = hs[hs.active & (hs.passive==False)]
hs_passive_only = hs[(hs.active==False) & hs.passive]
hs_act_pass_mix = hs[hs.active & hs.passive]

# Create frames for preference undergrad
ug_prefer_inperson = ug[ug['preference']=='In-person Courses']
ug_prefer_remote = ug[ug['preference']=='Online Courses']
ug_prefer_no = ug[ug['preference'].isna()]

# Create frames for preference high school
hs_prefer_inperson = hs[hs['preference']=='In-person Courses']
hs_prefer_remote = hs[hs['preference']=='Online Courses']
hs_prefer_no = hs[hs['preference'].isna()]

# Name the datasets
subset_ls = [ug_sync, ug_async, ug_active_only, ug_passive_only, ug_act_pass_mix, ug_fully_active, ug_partly_active, ug_passive, \
            hs_sync, hs_async, hs_active_only, hs_passive_only, hs_act_pass_mix, ug_prefer_inperson, ug_prefer_remote, ug_prefer_no, \
            hs_prefer_inperson, hs_prefer_remote, hs_prefer_no]
subset_name = ['Synchronous', 'Asynchronous', 'Active only', 'Passive only', 'Mixed', 'Fully active', 'Partly active', 'Passive', \
               'Synchronous', 'Asynchronous', 'Active only', 'Passive only', 'Mixed', 'Prefer in-person', 'Prefer remote', 'Prefer none', \
               'Prefer in-person', 'Prefer remote', 'Prefer none']
for i in range(len(subset_ls)):
    subset_ls[i].name = subset_name[i]
```

```
In [ ]: ug['techniques_outside'].str.contains('Email', case=False).value_counts()
```

```
Out[ ]: False      3019
        True      1769
Name: techniques_outside, dtype: int64
```

Comparison Functions

```
In [ ]: # Set up our Cohen's d function
def cohens_d (x,y):
    n1 = x.shape[0]
    n2 = y.shape[0]
    sd = (((n1 - 1) * x.var() + (n2 - 1) * y.var())/(n1 + n2 - 2))**0.5
    return ((x.mean()-y.mean())/sd)

def eff(U, n_a, n_b):
    # print(U, n_a, n_b)
    return U / (n_a * n_b)
```

```
In [ ]: # Compare the mean of 3 datasets
```

```
def mean_comparison(a, b, c):
    dim = (6,5)
    aa = np.zeros(dim)
    bb = np.zeros(dim)
    cc = np.zeros(dim)

    for i in range (6):
        for j in range (5):
            cc[i,j] = c[remote_survey_q[i]].value_counts(normalize=True)
            aa[i,j] = a[remote_survey_q[i]].value_counts(normalize=True)
            bb[i,j] = b[remote_survey_q[i]].value_counts(normalize=True)

    for q in range (6):
        ind = np.arange(5)
        width = 0.2

        plt.bar(ind + width + width, aa[q], width, label=a.name)
        plt.bar(ind, cc[q], width, label=c.name)
        plt.bar(ind + width, bb[q], width, label=b.name)

    plt.ylabel('Fraction of Responses')
    plt.title(remote_q_long[q])

    plt.xticks(ind + width , ('Strongly\\nDisagree', 'Disagree',
                               'Neutral', 'Agree', 'Strongly\\nAgree'))
    plt.legend(loc='best')
    plt.show()
    #print (stats.mannwhitneyu(ug_passive_only[remote_survey_q[q]],ug_act_pass_mix[remote_survey_q[q]]))
    print (a.name,"{:.3}".format(a[remote_survey_q[q]].mean()))
    print (c.name,"{:.3}".format(c[remote_survey_q[q]].mean()))
    print (b.name,"{:.3}".format(b[remote_survey_q[q]].mean()))
    #print ("Cohen's d =", "{:.2}".format(cohens_d(ug_passive_only[remote_survey_q[q]],ug_act_pass_mix[remote_survey_q[q]])))
```

```
In [ ]: def mean_comparison_plotly(groupa, groupb):

    x = ['Enjoyment', 'Motivation', 'Satisfaction', 'Engagement', 'Distraction', 'Participation']

    fig = go.Figure()

    a = [[], []]
    b = [[], []]

    name1 = groupa.name
    name2 = groupb.name

    for col in remote_survey_q:
        a[0].append(groupa[col].mean())
        b[0].append(groupb[col].mean())
        a[1].append(groupa[col].std())
        b[1].append(groupb[col].std())

    fig.add_trace(go.Bar(
        x=x,
        y=a[0],
        name=name1,
        marker_color='#26828e',
        error_y=dict(type='data', array=a[1])
    ))
    fig.add_trace(go.Bar(
        x=x,
        y=b[0],
        name=name2,
        marker_color='#b5de2b',
        error_y=dict(type='data', array=b[1])
    ))

    fig.update_layout(
        autosize=False,
        width=1000,
        height=700,
        title=f'Comparison of mean of remote learning experiences between {name1} and {name2}',
        title_x=0.5,
        title_y=0.95,
        font=dict(
            family="sans-serif",
            size=16,
        ),
        xaxis=dict(
            title='Remote learning experiences',
            titlefont_size=16,
            tickfont_size=14,
        ),
        yaxis=dict(
            title='Likert scores mean',
            titlefont_size=16,
            tickfont_size=14,
        ),
        legend=dict(
            x=0.9,
            y=1.05,
            font=dict(
                family="sans-serif",
                size=14,
            )
        )
    )
```

```
        ),
        bgcolor='rgba(255, 255, 255, 0)',
        bordercolor='rgba(255, 255, 255, 0)',

        # traceorder='reversed'
    ) ,

    barmode='group',
    bargap=0.15, # gap between bars of adjacent location coordinate
s.
    bargroupgap=0.1, # gap between bars of the same location coordin
ate.
    paper_bgcolor = 'rgba(0,0,0,0)',
    plot_bgcolor = 'rgba(0,0,0,0)'
)

fig.show()
```

In []: mean_comparison_plotly(ug_sync, ug_async)

```
In [ ]: ug_sync['remote_enjoy'].mean()
```

```
Out[ ]: 2.7897310513447433
```

```
In [ ]: ug_sync['remote_enjoy'].std()
```

```
Out[ ]: 1.1338037464477861
```

```
In [ ]: # Comparing the Likert score between 2 groups and return the summary table

# table_size = pd.DataFrame(columns=['name', 'size'])
def mwu_comparison(a, b):
    # table_size.head()
    # table_size = table_size.append({'name': a.name, 'size': a.shape[0]}, ignore_index=True)
    # table_size = table_size.append({'name': b.name, 'size': b.shape[0]}, ignore_index=True)
    # print(table_size)
    acount = np.zeros((6,5))
    bcount = np.zeros((6,5))
    for i in range (6):
        for j in range (5):
            if j+1 in a[remote_survey_q[i]].value_counts(normalize=True).index:
                acount[i,j] = a[remote_survey_q[i]].value_counts(normalize=True)[j+1]
            if j+1 in b[remote_survey_q[i]].value_counts(normalize=True).index:
                bcount[i,j] = b[remote_survey_q[i]].value_counts(normalize=True)[j+1]
    table_result = pd.DataFrame(columns=[ 'question', f'{a.name} median (n = {a.shape[0]})', f'{b.name} median (n = {b.shape[0]})', 'cohens d', 'f', 'p-value'])

    for q in range (6):
        ind = np.arange(5)
        width = 0.35
        plt.bar(ind, acount[q], width, label=a.name)
        plt.bar(ind + width, bcount[q], width, label=b.name)

        plt.ylabel('Fraction of Responses')
        plt.title(remote_q_long[q])

        plt.xticks(ind + width / 2, ('Strongly\\nDisagree', 'Disagree', 'Neutral', 'Agree', 'Strongly\\nAgree'))
        plt.legend(loc='best')
        plt.show()

        amed = "{:.3}".format(a[remote_survey_q[q]].median())
        bmed = "{:.3}".format(b[remote_survey_q[q]].median())
        d = "{:.3}".format(cohens_d(a[remote_survey_q[q]],b[remote_survey_q[q]]))
        mwu = stats.mannwhitneyu(a[remote_survey_q[q]],b[remote_survey_q[q]], alternative='two-sided')
        U_a = mwu[0]
        p = "{:.3}".format(mwu[1])
        f = "{:.3}".format(eff(U_a, a.shape[0], b.shape[0]))
        # eta2 = "{:.3}".format(mwu[1] / (a.shape[0] + b.shape[0] - 1))

        print(f'{a.name} shape: {a.shape}, {b.name} shape: {b.shape}')
        print('MWU results: ', mwu)

        print(f'{a.name} median: {amed}')
        print(f'{b.name} median: {bmed}')
        print(f'cohens d: {d}')
        print(f'f: {f}')



```

```
# print(f'eta2: {eta2}')
table_result = table_result.append({'question': remote_survey_q[q], f'{a.name} median (n = {a.shape[0]})': amed, f'{b.name} median (n = {b.shape[0]})': bmed, 'cohens d': d, 'f': f, 'p-value': p}, ignore_index=True)
# table_result.to_excel(writer, 'Sheet1', startrow = writer.sheets['Sheet1'].max_row + 1)
# writer.save()

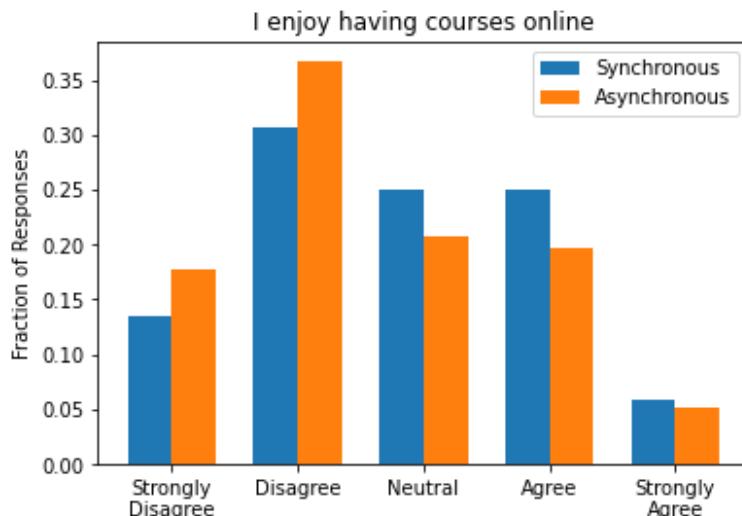
mean_comparison_plotly(a, b)
return table_result
```

```
In [ ]: # writer = pd.ExcelWriter('output.xlsx')
# pd.DataFrame(columns=['result table']).to_excel(writer, 'Sheet1')
```

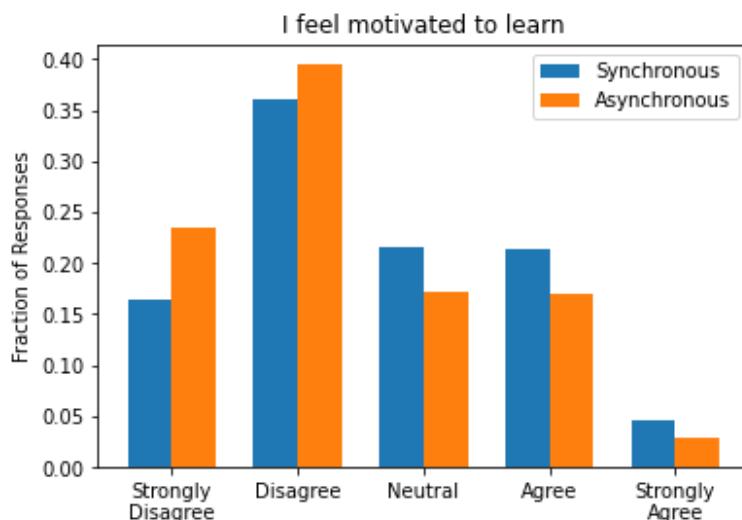
Pairwise Comparisons

Synchronous vs. Asynchronous

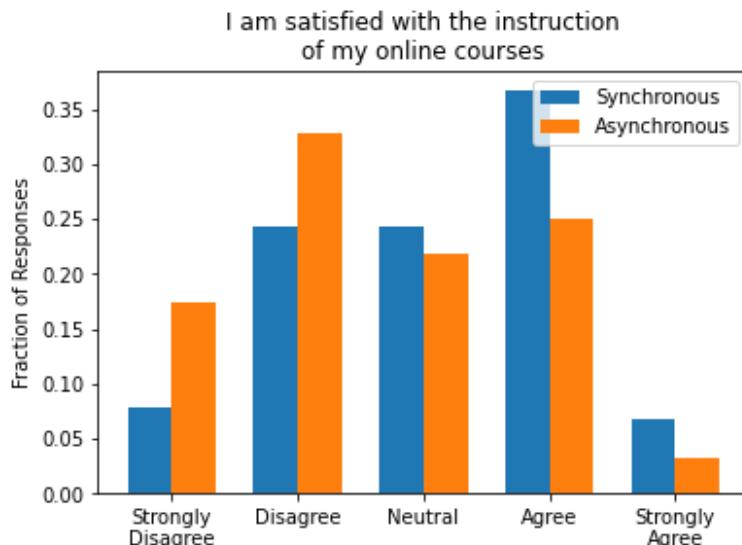
```
In [ ]: mwu_comparison(ug_sync, ug_async)
```



Synchronous shape: (2045, 43), Asynchronous shape: (2744, 43)
 MWU results: MannwhitneyuResult(statistic=3108972.5, pvalue=3.37600307
 $1762842e-11$)
 Synchronous median: 3.0
 Asynchronous median: 2.0
 cohens d: 0.186
 f: 0.554



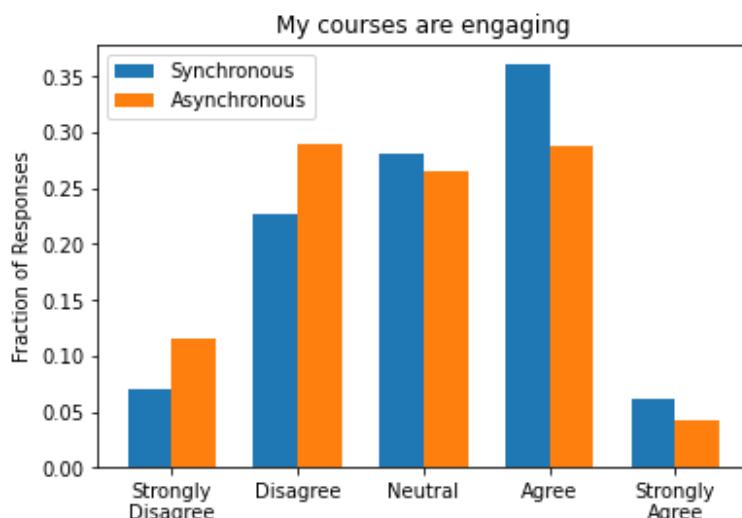
Synchronous shape: (2045, 43), Asynchronous shape: (2744, 43)
 MWU results: MannwhitneyuResult(statistic=3162445.0, pvalue=4.31324677
 $1553796e-15$)
 Synchronous median: 2.0
 Asynchronous median: 2.0
 cohens d: 0.225
 f: 0.564



```

Synchronous shape: (2045, 43), Asynchronous shape: (2744, 43)
MWU results: MannwhitneyuResult(statistic=3443971.0, pvalue=2.98235434
36762524e-44)
Synchronous median: 3.0
Asynchronous median: 2.0
cohens d: 0.418
f: 0.614

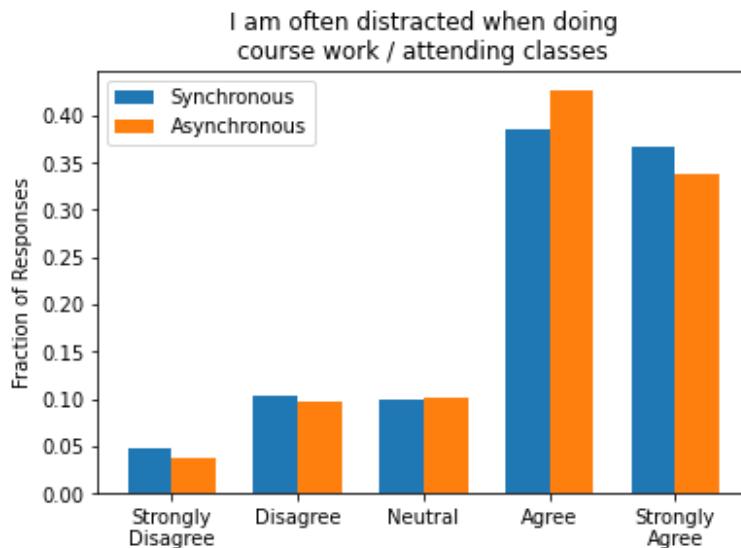
```



```

Synchronous shape: (2045, 43), Asynchronous shape: (2744, 43)
MWU results: MannwhitneyuResult(statistic=3190511.5, pvalue=3.21767729
2171622e-17)
Synchronous median: 3.0
Asynchronous median: 3.0
cohens d: 0.25
f: 0.569

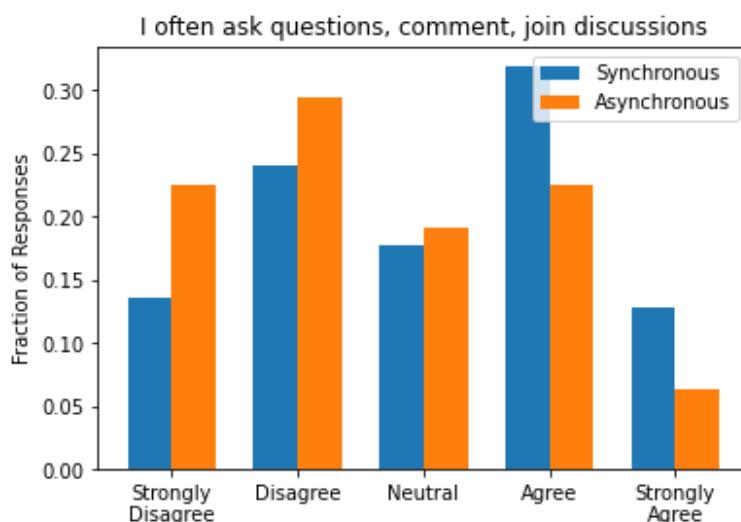
```



```

Synchronous shape: (2045, 43), Asynchronous shape: (2744, 43)
MWU results: MannwhitneyuResult(statistic=2831503.5, pvalue=0.56324092
95847932)
Synchronous median: 4.0
Asynchronous median: 4.0
cohens d: -0.0103
f: 0.505

```



```

Synchronous shape: (2045, 43), Asynchronous shape: (2744, 43)
MWU results: MannwhitneyuResult(statistic=3370036.0, pvalue=1.73255481
77312908e-34)
Synchronous median: 3.0
Asynchronous median: 2.0
cohens d: 0.365
f: 0.601

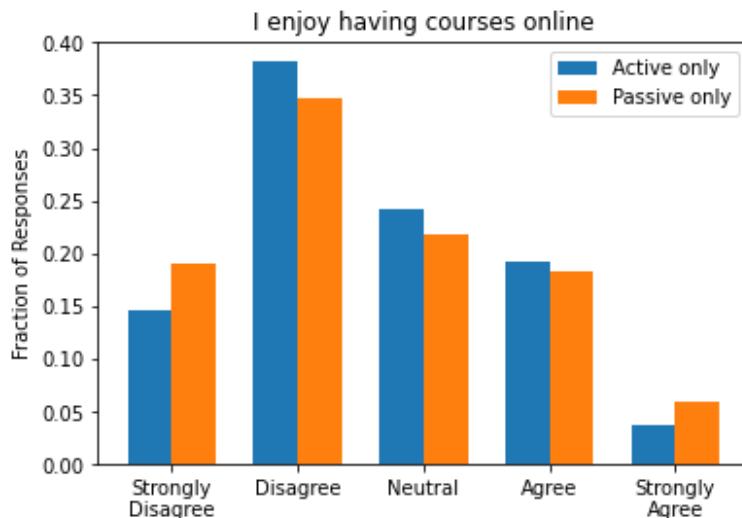
```

Out[]:

	question	Synchronous median (n = 2045)	Asynchronous median (n = 2744)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.186	0.554	3.38e-11
1	remote_motivated	2.0	2.0	0.225	0.564	4.31e-15
2	remote_satisfied	3.0	2.0	0.418	0.614	2.98e-44
3	remote_engaging	3.0	3.0	0.25	0.569	3.22e-17
4	remote_distracted	4.0	4.0	-0.0103	0.505	0.563
5	remote_questions	3.0	2.0	0.365	0.601	1.73e-34

Active vs. Passive

```
In [ ]: mwu_comparison(ug_active_only, ug_passive_only)
```



Active only shape: (720, 43), Passive only shape: (759, 43)

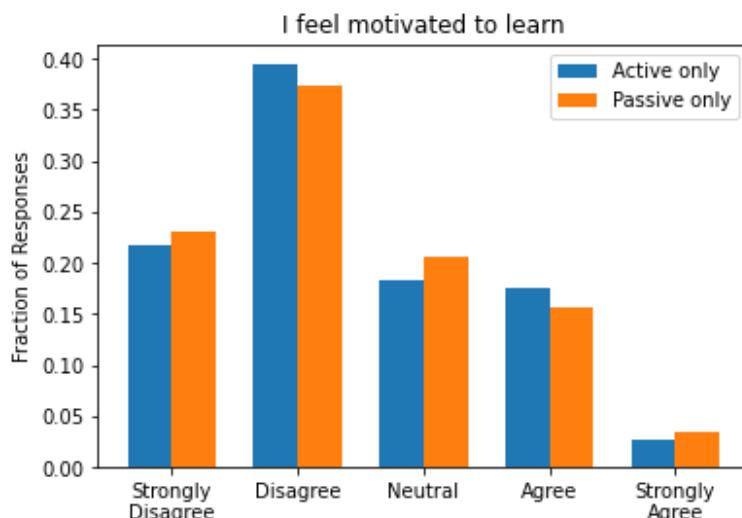
MWU results: MannwhitneyuResult(statistic=278866.5, pvalue=0.476819791
4904755)

Active only median: 2.0

Passive only median: 2.0

cohens d: 0.0202

f: 0.51



Active only shape: (720, 43), Passive only shape: (759, 43)

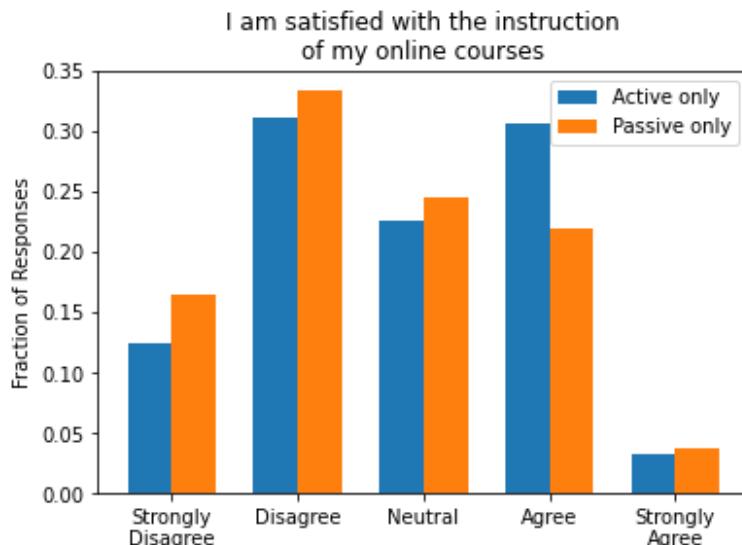
MWU results: MannwhitneyuResult(statistic=274830.0, pvalue=0.840058499
6427551)

Active only median: 2.0

Passive only median: 2.0

cohens d: 0.00917

f: 0.503



Active only shape: (720, 43), Passive only shape: (759, 43)

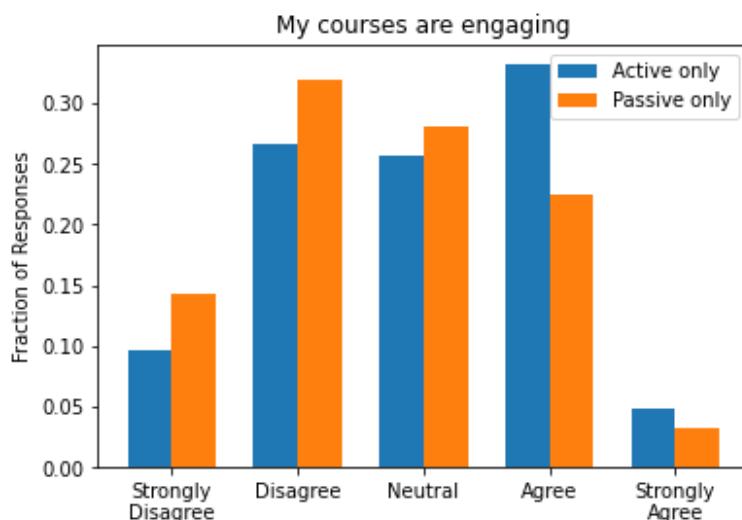
MWU results: MannwhitneyuResult(statistic=298319.0, pvalue=0.001557604
4944151934)

Active only median: 3.0

Passive only median: 3.0

cohens d: 0.161

f: 0.546



Active only shape: (720, 43), Passive only shape: (759, 43)

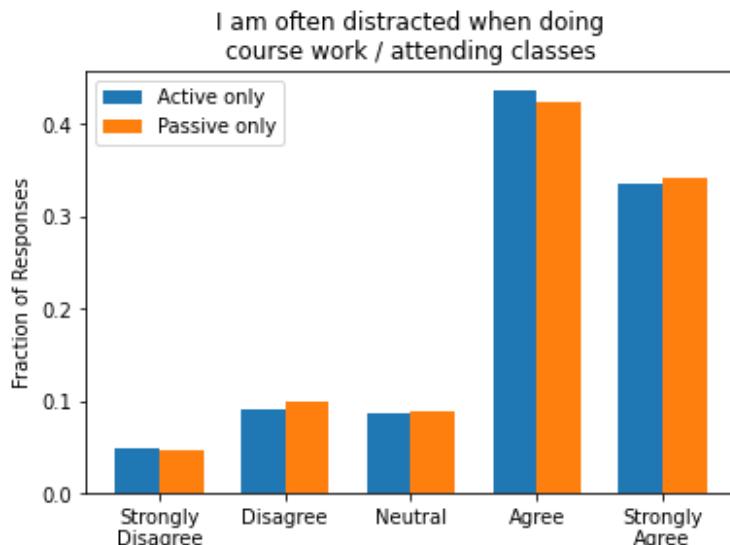
MWU results: MannwhitneyuResult(statistic=313265.5, pvalue=4.426994056
0136573e-07)

Active only median: 3.0

Passive only median: 3.0

cohens d: 0.263

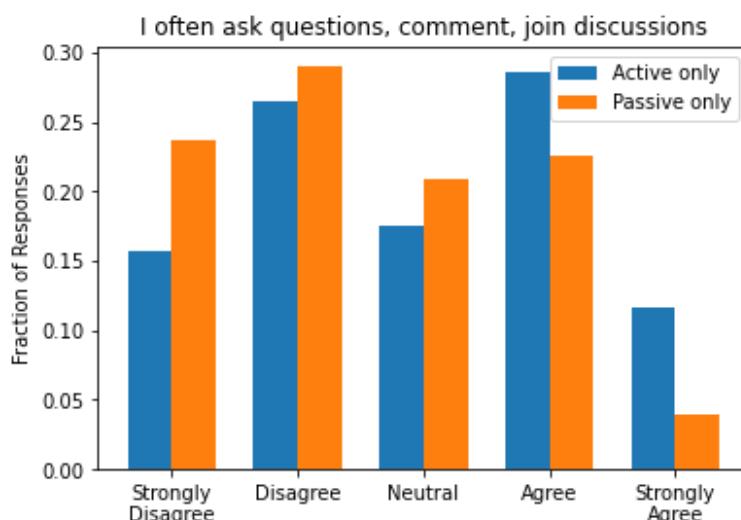
f: 0.573



```

Active only shape: (720, 43), Passive only shape: (759, 43)
MWU results: MannwhitneyuResult(statistic=273507.5, pvalue=0.972348332
0918852)
Active only median: 4.0
Passive only median: 4.0
cohens d: 0.00577
f: 0.5

```



```

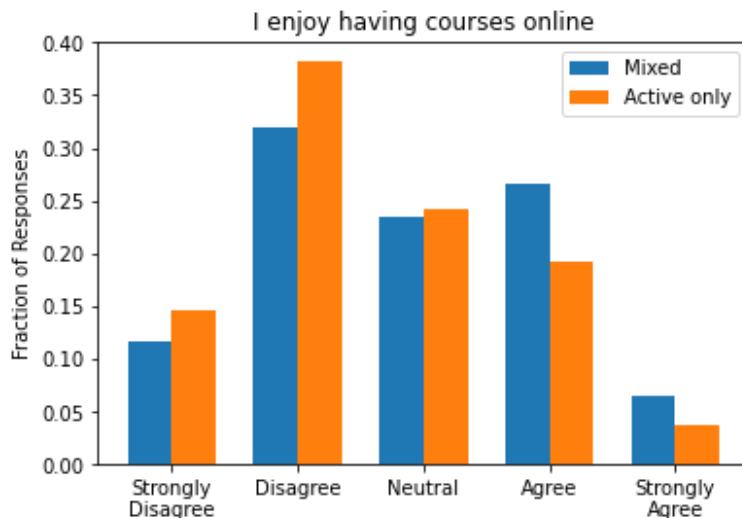
Active only shape: (720, 43), Passive only shape: (759, 43)
MWU results: MannwhitneyuResult(statistic=320971.0, pvalue=2.294609684
799871e-09)
Active only median: 3.0
Passive only median: 2.0
cohens d: 0.324
f: 0.587

```

Out[]:

	question	Active only median (n = 720)	Passive only median (n = 759)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	0.0202	0.51	0.477
1	remote_motivated	2.0	2.0	0.00917	0.503	0.84
2	remote_satisfied	3.0	3.0	0.161	0.546	0.00156
3	remote_engaging	3.0	3.0	0.263	0.573	4.43e-07
4	remote_distracted	4.0	4.0	0.00577	0.5	0.972
5	remote_questions	3.0	2.0	0.324	0.587	2.29e-09

```
In [ ]: mwu_comparison(ug_act_pass_mix, ug_active_only)
```



Mixed shape: (2348, 43), Active only shape: (720, 43)

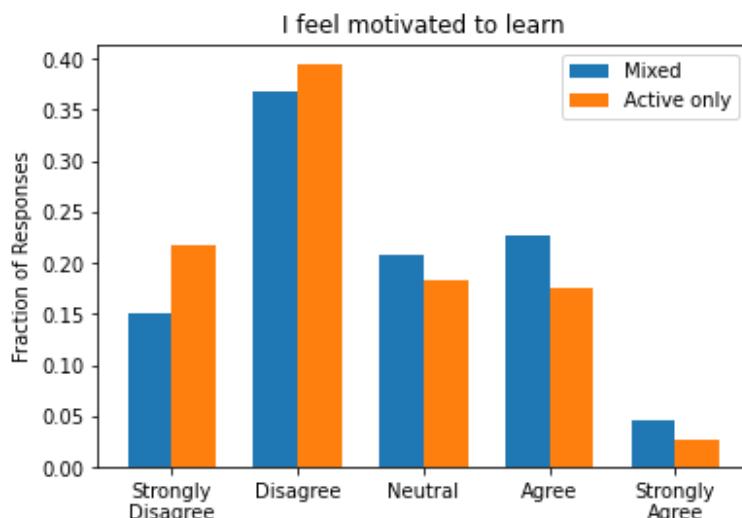
MWU results: MannwhitneyuResult(statistic=949267.0, pvalue=2.2240344855605918e-07)

Mixed median: 3.0

Active only median: 2.0

cohens d: 0.223

f: 0.562



Mixed shape: (2348, 43), Active only shape: (720, 43)

MWU results: MannwhitneyuResult(statistic=949485.5, pvalue=1.8727682462615186e-07)

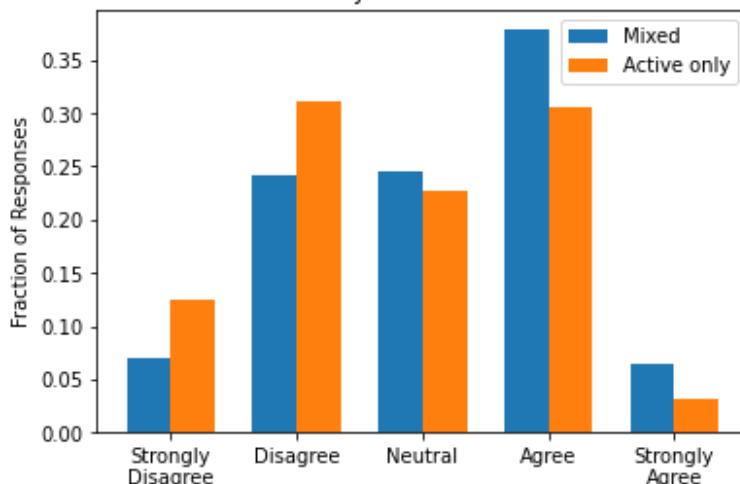
Mixed median: 2.0

Active only median: 2.0

cohens d: 0.221

f: 0.562

**I am satisfied with the instruction
of my online courses**



Mixed shape: (2348, 43), Active only shape: (720, 43)

MWU results: MannwhitneyuResult(statistic=978870.0, pvalue=2.157647943
551402e-11)

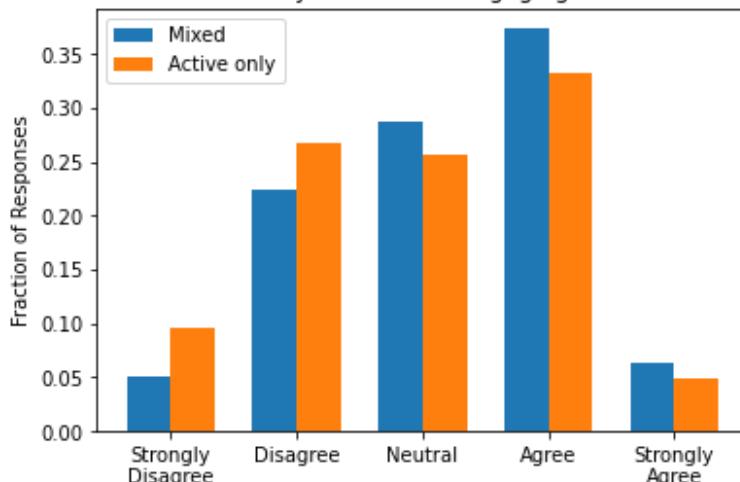
Mixed median: 3.0

Active only median: 3.0

cohens d: 0.295

f: 0.579

My courses are engaging



Mixed shape: (2348, 43), Active only shape: (720, 43)

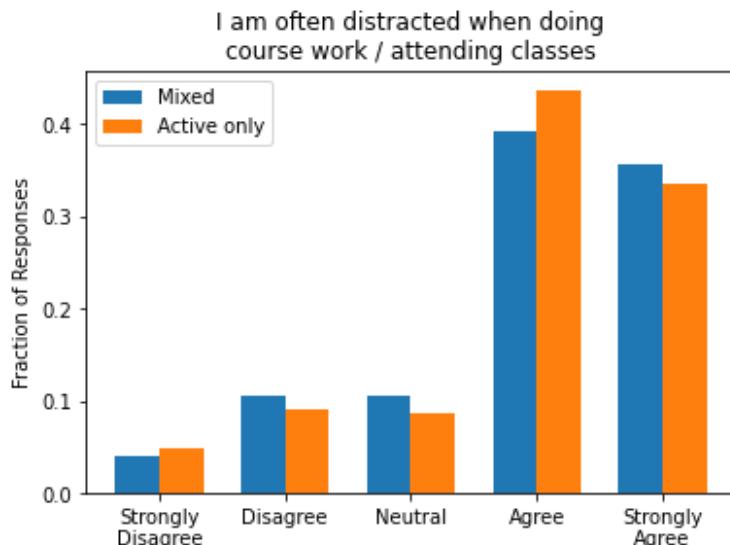
MWU results: MannwhitneyuResult(statistic=930454.0, pvalue=1.879061324
617055e-05)

Mixed median: 3.0

Active only median: 3.0

cohens d: 0.197

f: 0.55



Mixed shape: (2348, 43), Active only shape: (720, 43)

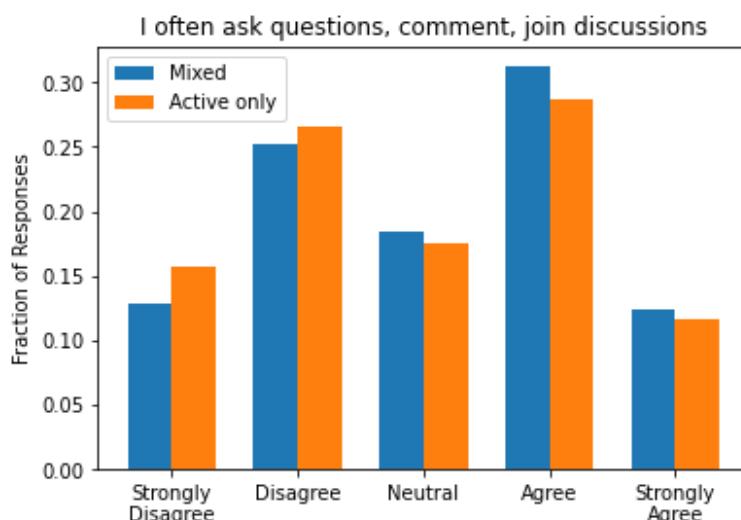
MWU results: MannwhitneyuResult(statistic=848764.0, pvalue=0.858957090496196)

Mixed median: 4.0

Active only median: 4.0

cohens d: 0.000822

f: 0.502



Mixed shape: (2348, 43), Active only shape: (720, 43)

MWU results: MannwhitneyuResult(statistic=885829.0, pvalue=0.04479515924350737)

Mixed median: 3.0

Active only median: 3.0

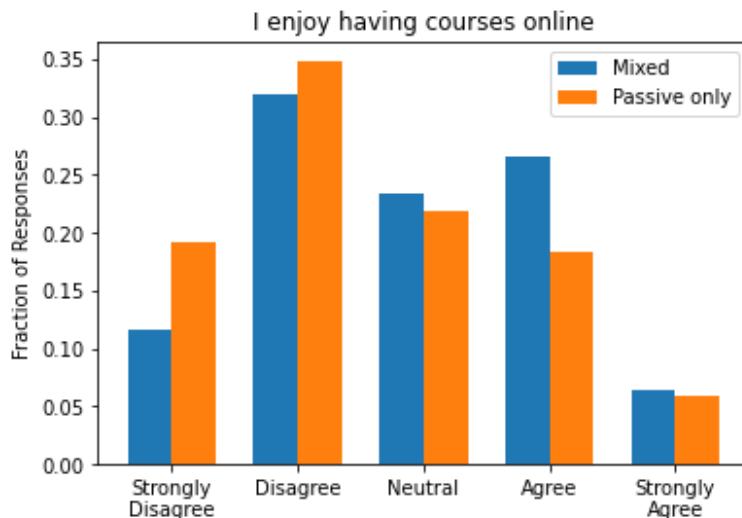
cohens d: 0.0866

f: 0.524

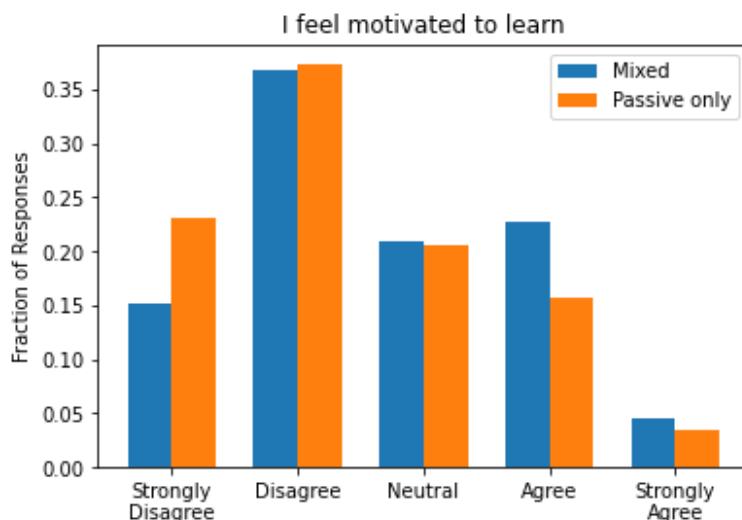
Out[]:

	question	Mixed median (n = 2348)	Active only median (n = 720)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.223	0.562	2.22e-07
1	remote_motivated	2.0	2.0	0.221	0.562	1.87e-07
2	remote_satisfied	3.0	3.0	0.295	0.579	2.16e-11
3	remote_engaging	3.0	3.0	0.197	0.55	1.88e-05
4	remote_distracted	4.0	4.0	0.000822	0.502	0.859
5	remote_questions	3.0	3.0	0.0866	0.524	0.0448

```
In [ ]: mwu_comparison(ug_act_pass_mix, ug_passive_only)
```

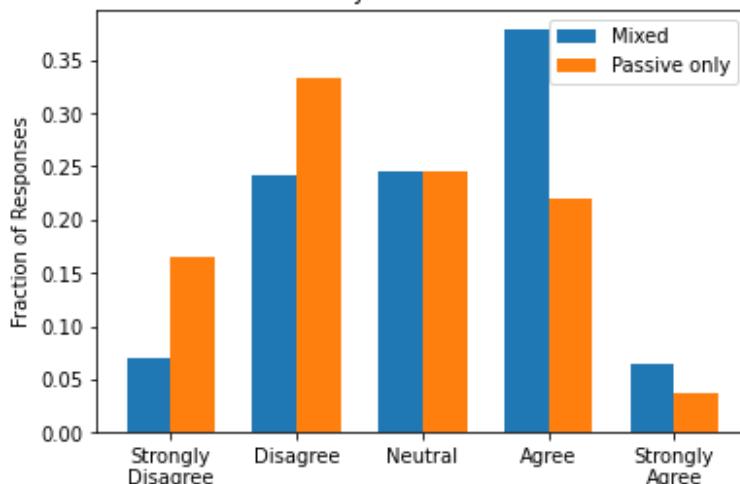


Mixed shape: (2348, 43), Passive only shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=1011981.5, pvalue=5.93625310
 $5021297e-09$)
 Mixed median: 3.0
 Passive only median: 2.0
 cohens d: 0.238
 f: 0.568



Mixed shape: (2348, 43), Passive only shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=1005567.0, pvalue=3.07955050
 $9120408e-08$)
 Mixed median: 2.0
 Passive only median: 2.0
 cohens d: 0.23
 f: 0.564

**I am satisfied with the instruction
of my online courses**



Mixed shape: (2348, 43), Passive only shape: (759, 43)

MWU results: MannwhitneyuResult(statistic=1112575.0, pvalue=9.04333300
886651e-27)

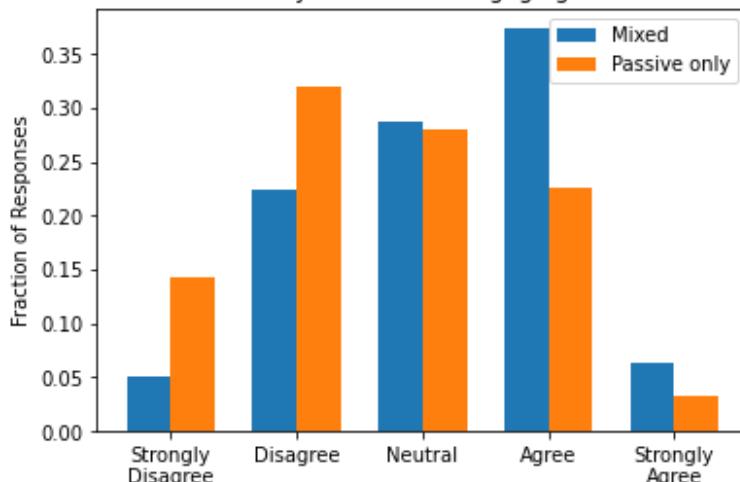
Mixed median: 3.0

Passive only median: 3.0

cohens d: 0.459

f: 0.624

My courses are engaging



Mixed shape: (2348, 43), Passive only shape: (759, 43)

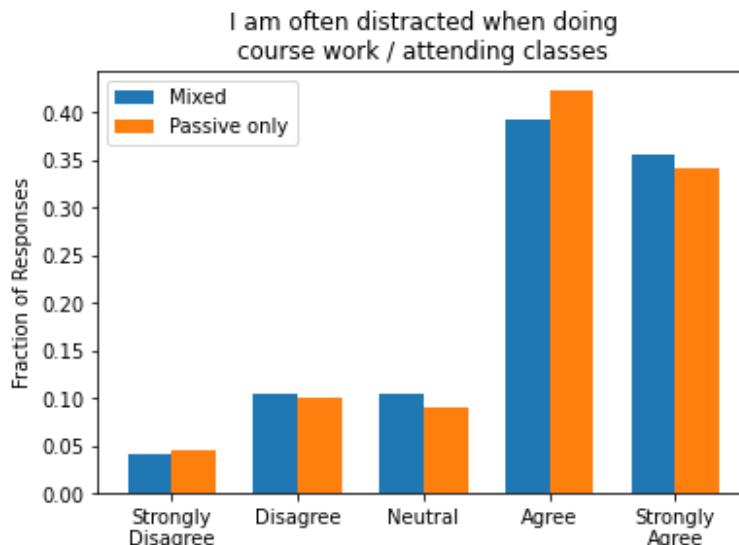
MWU results: MannwhitneyuResult(statistic=1115438.5, pvalue=1.54238844
31317781e-27)

Mixed median: 3.0

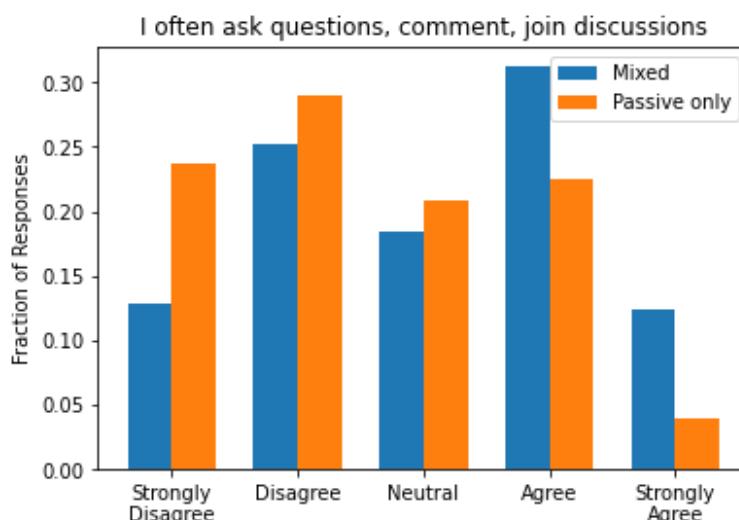
Passive only median: 3.0

cohens d: 0.474

f: 0.626



Mixed shape: (2348, 43), Passive only shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=895685.5, pvalue=0.819697857
 9520002)
 Mixed median: 4.0
 Passive only median: 4.0
 cohens d: 0.00657
 f: 0.503

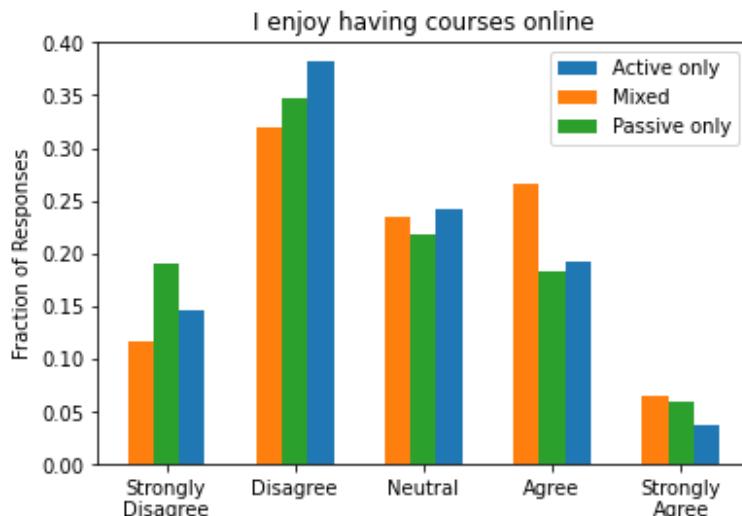


Mixed shape: (2348, 43), Passive only shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=1092554.5, pvalue=5.27480737
 7421017e-22)
 Mixed median: 3.0
 Passive only median: 2.0
 cohens d: 0.411
 f: 0.613

Out[]:

	question	Mixed median (n = 2348)	Passive only median (n = 759)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.238	0.568	5.94e-09
1	remote_motivated	2.0	2.0	0.23	0.564	3.08e-08
2	remote_satisfied	3.0	3.0	0.459	0.624	9.04e-27
3	remote_engaging	3.0	3.0	0.474	0.626	1.54e-27
4	remote_distracted	4.0	4.0	0.00657	0.503	0.82
5	remote_questions	3.0	2.0	0.411	0.613	5.27e-22

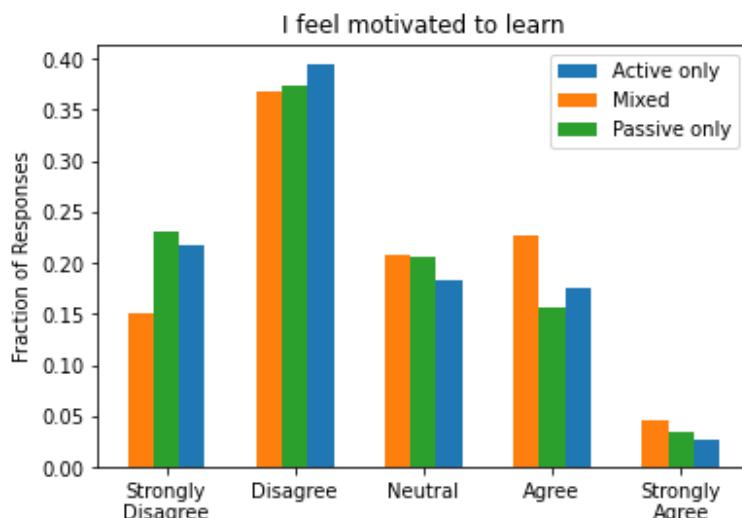
```
In [ ]: mean_comparison(ug_active_only, ug_passive_only, ug_act_pass_mix)
```



Active only 2.59

Mixed 2.84

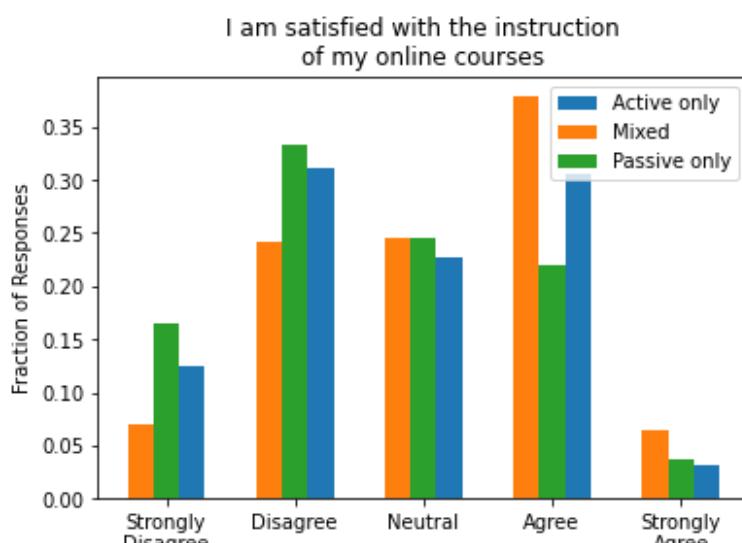
Passive only 2.57



Active only 2.4

Mixed 2.65

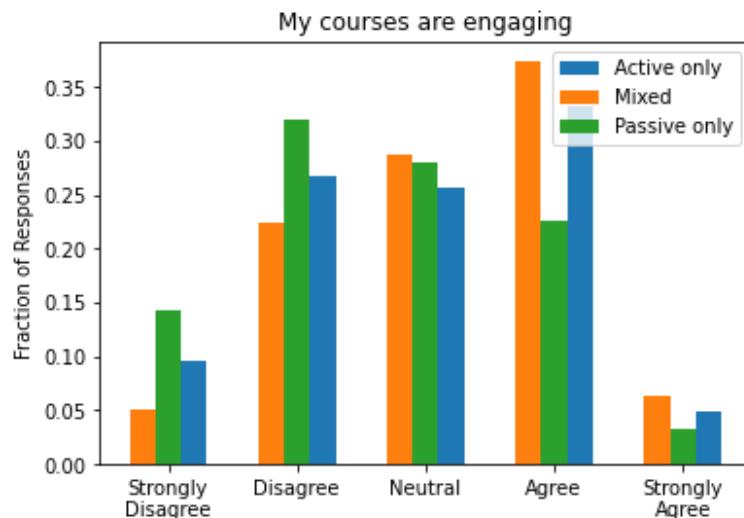
Passive only 2.39



Active only 2.81

Mixed 3.13

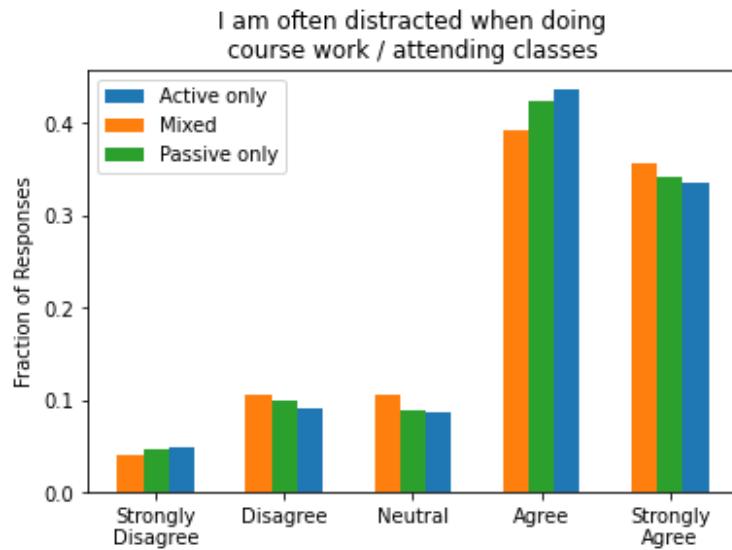
Passive only 2.63



Active only 2.97

Mixed 3.17

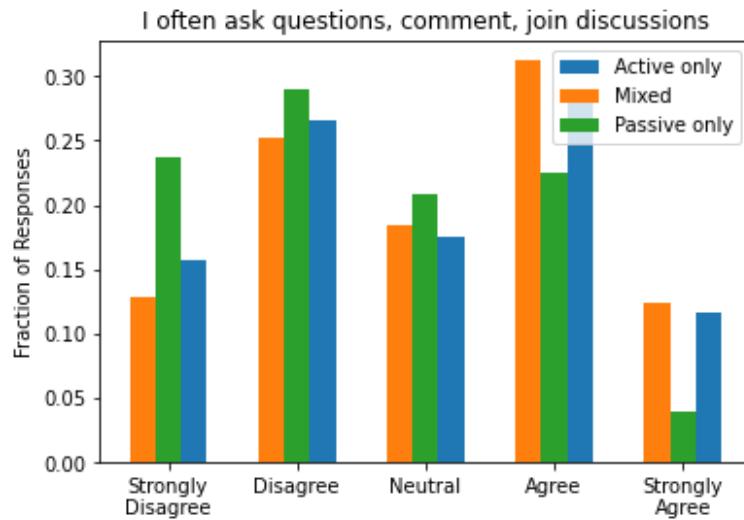
Passive only 2.69



Active only 3.92

Mixed 3.92

Passive only 3.91

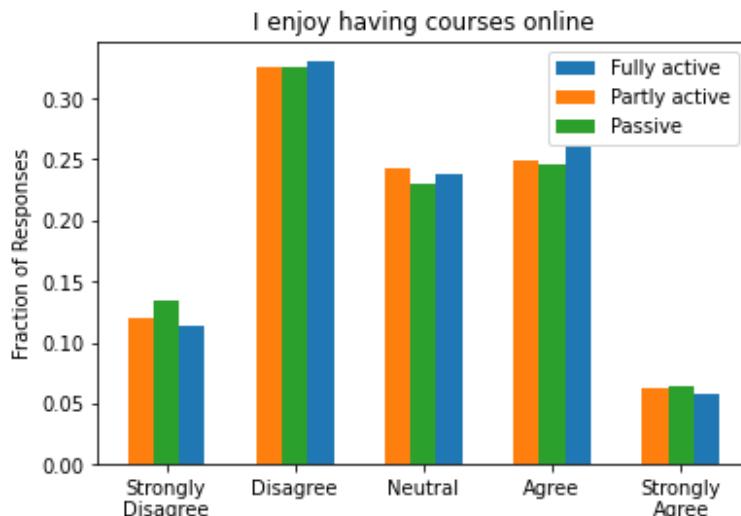


Active only 2.94

Mixed 3.05

Passive only 2.54

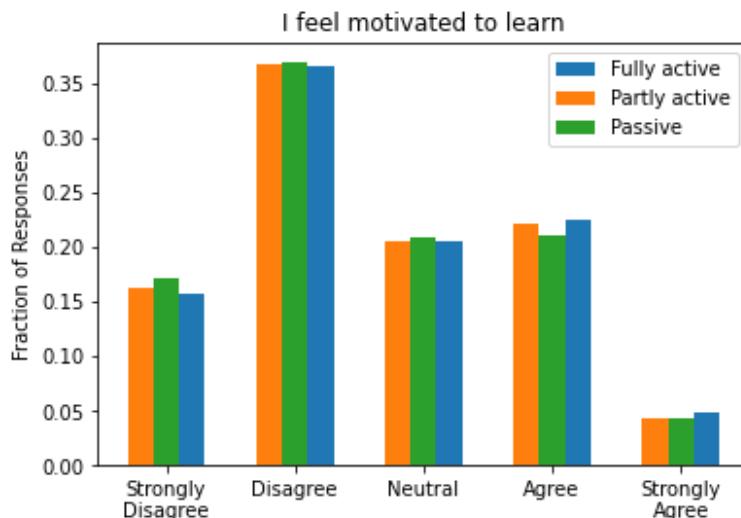
```
In [ ]: mean_comparison(ug_fully_active, ug_passive, ug_partly_active)
```



Fully active 2.82

Partly active 2.81

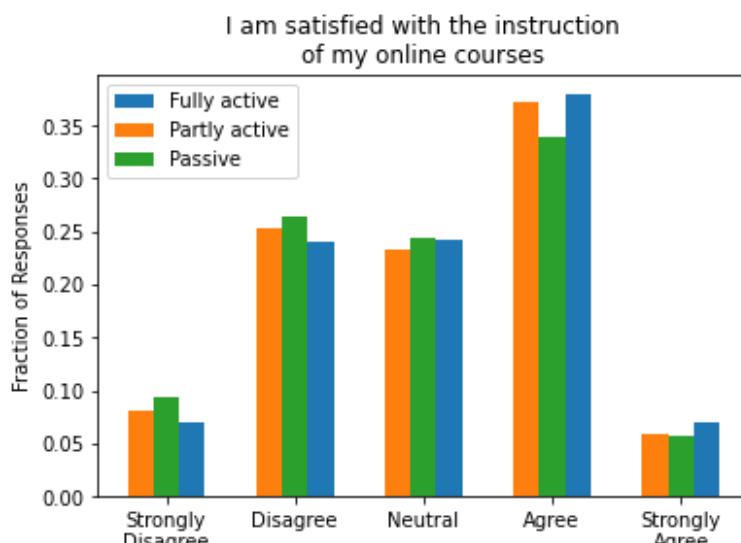
Passive 2.78



Fully active 2.64

Partly active 2.61

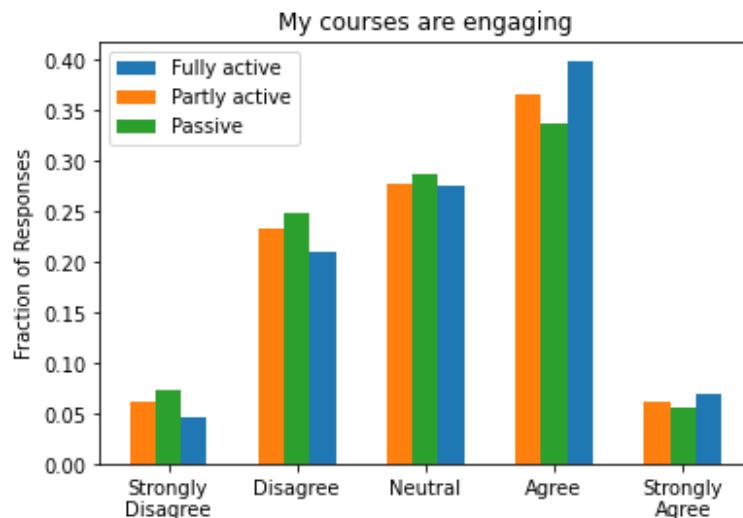
Passive 2.59



Fully active 3.14

Partly active 3.08

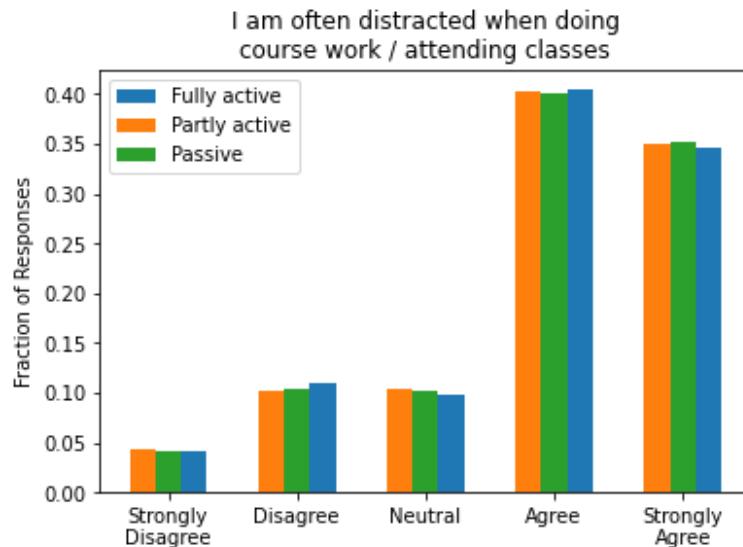
Passive 3.01



Fully active 3.23

Partly active 3.13

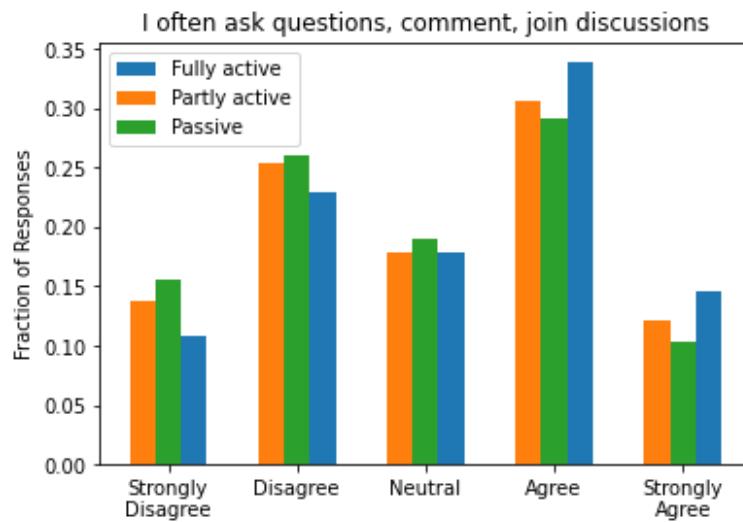
Passive 3.06



Fully active 3.9

Partly active 3.91

Passive 3.92



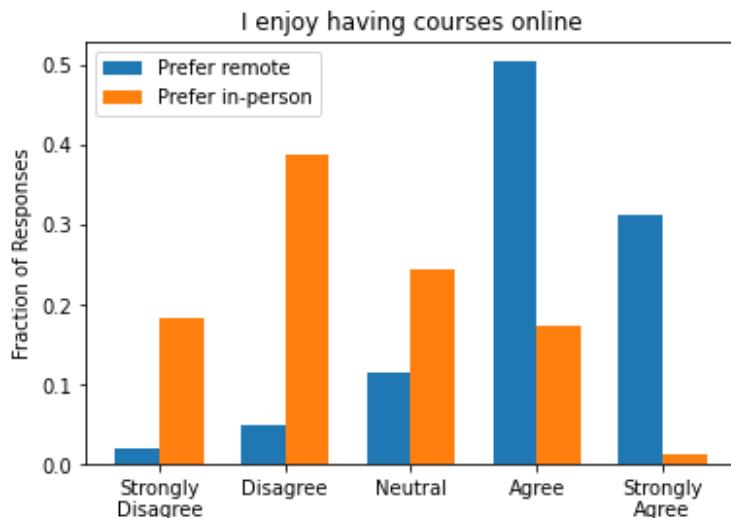
Fully active 3.19

Partly active 3.02

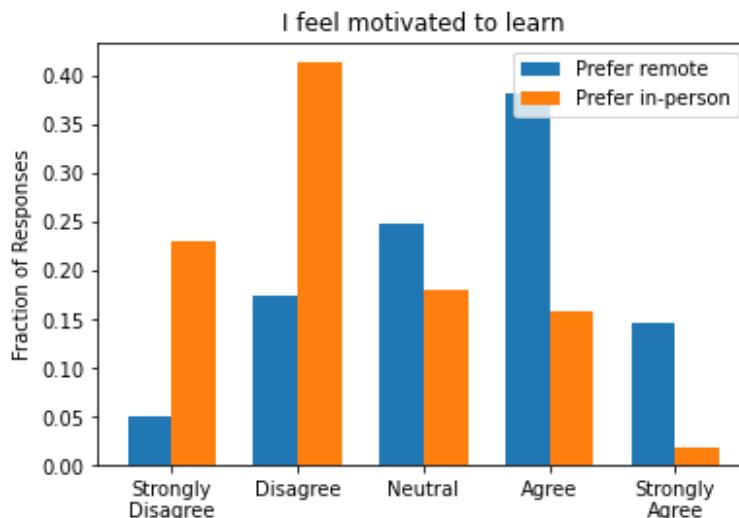
Passive 2.93

Prefer in-person vs. Prefer remote

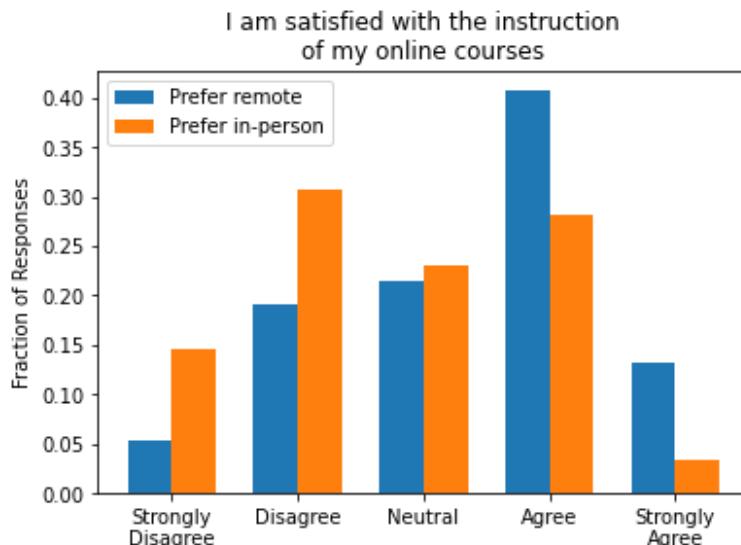
```
In [ ]: mwu_comparison(ug_prefer_remote, ug_prefer_inperson)
```



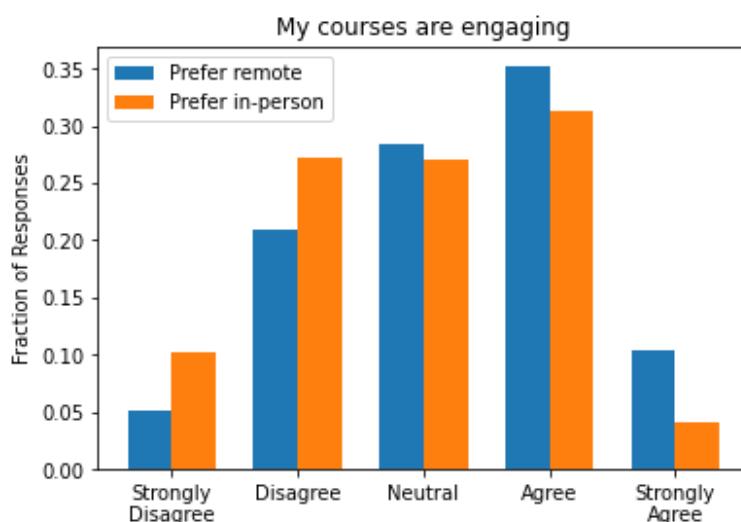
Prefer remote shape: (668, 43), Prefer in-person shape: (4121, 43)
 MWU results: MannwhitneyuResult(statistic=2379625.0, pvalue=3.10418894
 $0564427e-215$)
 Prefer remote median: 4.0
 Prefer in-person median: 2.0
 cohens d: 1.59
 f: 0.864



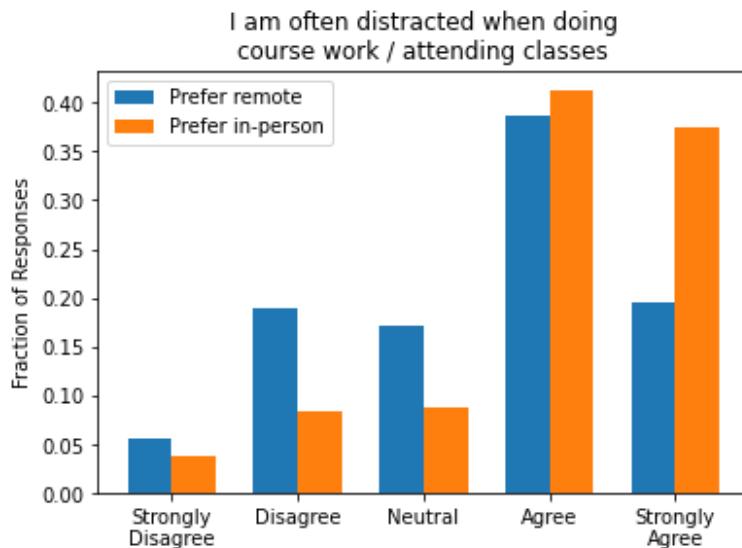
Prefer remote shape: (668, 43), Prefer in-person shape: (4121, 43)
 MWU results: MannwhitneyuResult(statistic=2075282.5, pvalue=9.46183460
 $3810205e-107$)
 Prefer remote median: 4.0
 Prefer in-person median: 2.0
 cohens d: 1.02
 f: 0.754



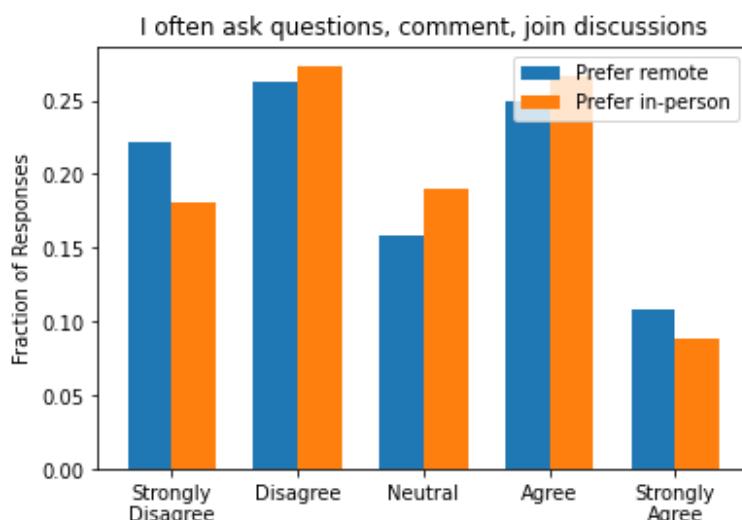
Prefer remote shape: (668, 43), Prefer in-person shape: (4121, 43)
 MWU results: MannwhitneyuResult(statistic=1788934.0, pvalue=6.07820408
 $8518291e-38$)
 Prefer remote median: 4.0
 Prefer in-person median: 3.0
 cohens d: 0.559
 f: 0.65



Prefer remote shape: (668, 43), Prefer in-person shape: (4121, 43)
 MWU results: MannwhitneyuResult(statistic=1598848.0, pvalue=3.28966809
 $5832739e-12$)
 Prefer remote median: 3.0
 Prefer in-person median: 3.0
 cohens d: 0.305
 f: 0.581



Prefer remote shape: (668, 43), Prefer in-person shape: (4121, 43)
 MWU results: MannwhitneyuResult(statistic=1005587.5, pvalue=1.52342436
 $29995833e-32$)
 Prefer remote median: 4.0
 Prefer in-person median: 4.0
 cohens d: -0.486
 f: 0.365



Prefer remote shape: (668, 43), Prefer in-person shape: (4121, 43)
 MWU results: MannwhitneyuResult(statistic=1343820.0, pvalue=0.31249568
 519694926)
 Prefer remote median: 3.0
 Prefer in-person median: 3.0
 cohens d: -0.0373
 f: 0.488

Out[]:

	question	Prefer remote median (n = 668)	Prefer in-person median (n = 4121)	cohens d	f	p-value
0	remote_enjoy	4.0	2.0	1.59	0.864	3.1e-215
1	remote_motivated	4.0	2.0	1.02	0.754	9.46e-107
2	remote_satisfied	4.0	3.0	0.559	0.65	6.08e-38
3	remote_engaging	3.0	3.0	0.305	0.581	3.29e-12
4	remote_distracted	4.0	4.0	-0.486	0.365	1.52e-32
5	remote_questions	3.0	3.0	-0.0373	0.488	0.312

Effects of number of methods/platforms/techniques used

Exceptions

```
In [ ]: # equals "No live instructions"
print(ug[ug['methods_used'] == 'My instructors do not use live instruction.'].index)

Int64Index([ 6, 8, 14, 15, 27, 34, 35, 36, 38, 40,
             ...
             4708, 4709, 4711, 4713, 4714, 4715, 4736, 4738, 4762, 478
         9],
            dtype='int64', length=792)
```



```
In [ ]: # "No live instructions" but still choose other boxes
print(ug['methods_used'][((ug['methods_used'].isna() == False) & (ug['methods_used'] != 'My instructors do not use live instruction.')) |
    & (ug['methods_used'].str.contains('My instructors do not use live instruction.'))].index)

Int64Index([ 2, 26, 37, 64, 103, 146, 250, 308, 396, 440,
             ...
             4427, 4460, 4468, 4488, 4581, 4628, 4665, 4735, 4760, 477
         9],
            dtype='int64', length=135)
```



```
In [ ]: # contains "No live instructions"
print(ug['methods_used'][((ug['methods_used'].isna() == False) |
    & (ug['methods_used'].str.contains('My instructors do not use live instruction.'))].index)

Int64Index([ 2, 6, 8, 14, 15, 26, 27, 34, 35, 36,
             ...
             4713, 4714, 4715, 4735, 4736, 4738, 4760, 4762, 4779, 478
         9],
            dtype='int64', length=927)
```



```
In [ ]: # Unique number of methods
print(ug['num_methods'].value_counts(normalize=True))
ug_by_methods = ug.groupby('num_methods')

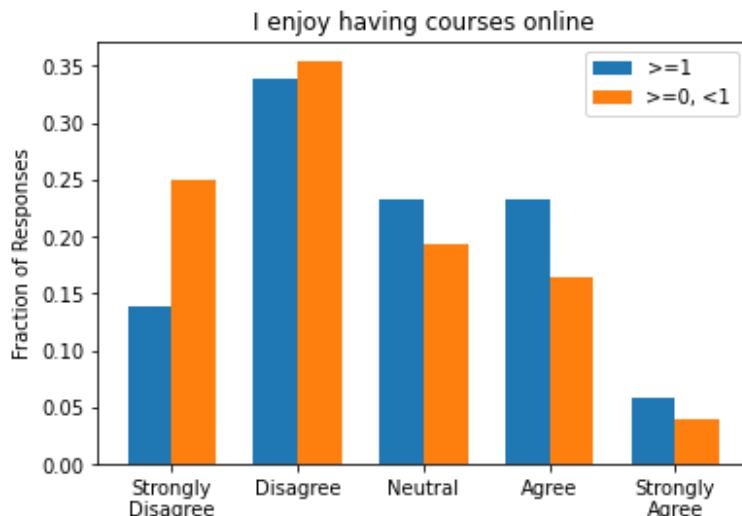
1    0.228231
2    0.214032
0    0.193569
3    0.169138
4    0.107956
5    0.051994
6    0.022552
7    0.012111
9    0.000209
8    0.000209
Name: num_methods, dtype: float64
```

Pairwise comparison

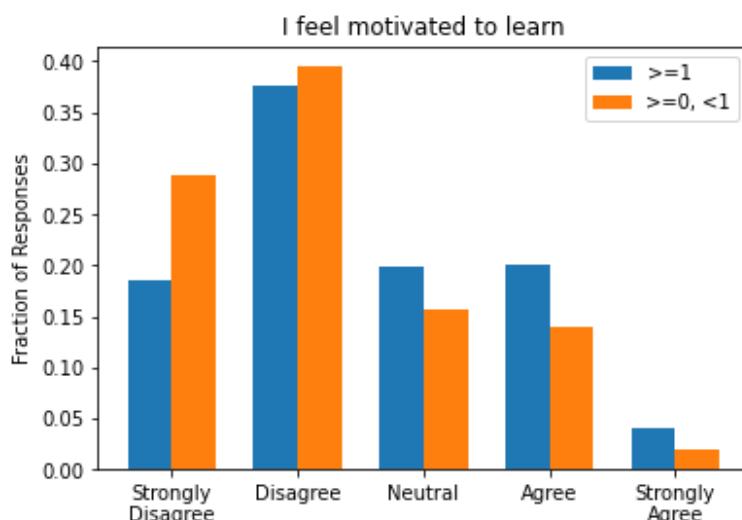
```
In [ ]: def num_comp(data, num, q, k):
    methods_less = data[(data[num] >= q) & (data[num] < k)]
    methods_more = data[data[num] >= k]
    subset_ls.extend([methods_less, methods_more])
    subset_name.extend([f'{num}: >={str(q)}, <{str(k)}', f'{num}: >={str(k)}'])
    methods_less.name = f'>={str(q)}, <{str(k)}'
    methods_more.name = f'>={str(k)}'
    # print(f'>={str(q)}, <{str(k)}', methods_less.shape)
    # print(f'>={str(k)}', methods_more.shape)
    return mwu_comparison(methods_more, methods_less)
```

Undergrad

```
In [ ]: num_comp(ug, 'num_methods', 0, 1)
```

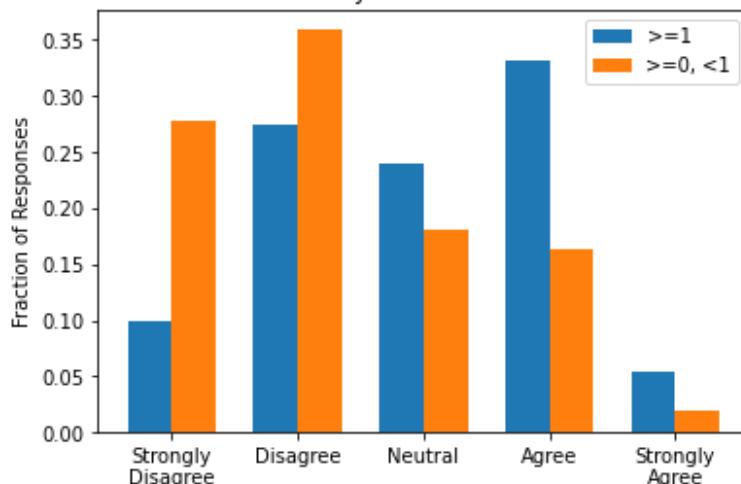


```
>=1 shape: (3862, 43), >=0, <1 shape: (927, 43)
MWU results: MannwhitneyuResult(statistic=2098274.5, pvalue=3.27052325
6423041e-17)
>=1 median: 3.0
>=0, <1 median: 2.0
cohens d: 0.305
f: 0.586
```



```
>=1 shape: (3862, 43), >=0, <1 shape: (927, 43)
MWU results: MannwhitneyuResult(statistic=2085901.5, pvalue=3.73199109
00981187e-16)
>=1 median: 2.0
>=0, <1 median: 2.0
cohens d: 0.294
f: 0.583
```

**I am satisfied with the instruction
of my online courses**

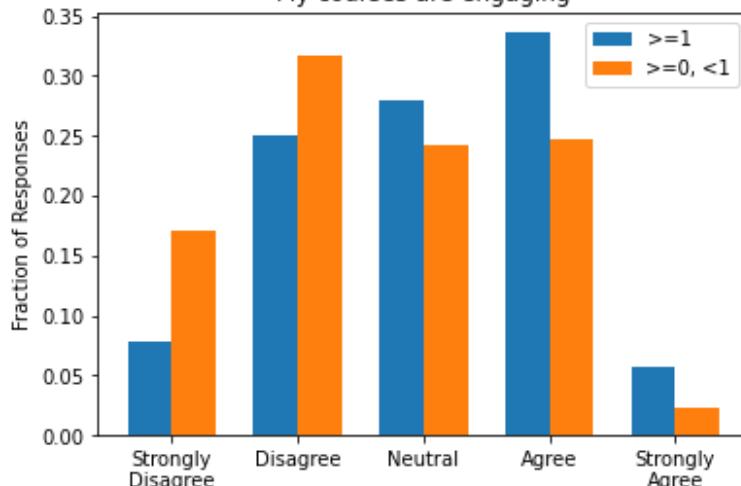


```

>=1 shape: (3862, 43), >=0, <1 shape: (927, 43)
MWU results: MannwhitneyuResult(statistic=2383716.0, pvalue=2.22556940
51683156e-59)
>=1 median: 3.0
>=0, <1 median: 2.0
cohens d: 0.616
f: 0.666

```

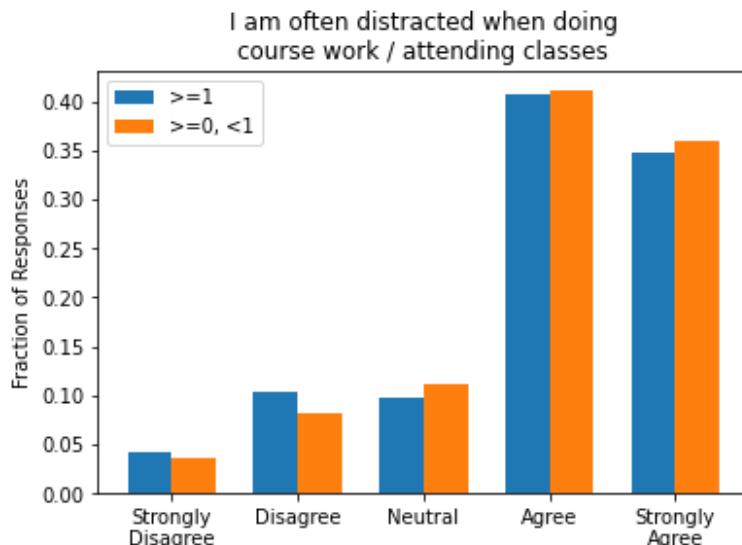
My courses are engaging



```

>=1 shape: (3862, 43), >=0, <1 shape: (927, 43)
MWU results: MannwhitneyuResult(statistic=2153300.0, pvalue=1.98057993
8801262e-23)
>=1 median: 3.0
>=0, <1 median: 3.0
cohens d: 0.382
f: 0.601

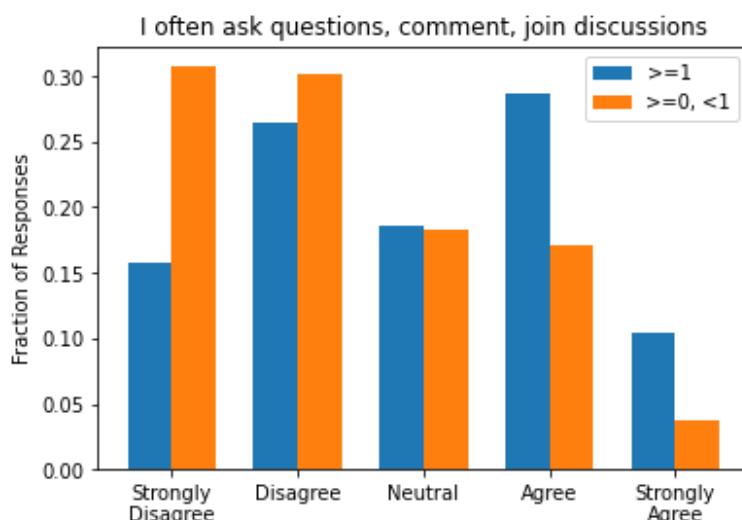
```



```

>=1 shape: (3862, 43), >=0, <1 shape: (927, 43)
MWU results: MannwhitneyuResult(statistic=1746763.0, pvalue=0.22415733
44972625)
>=1 median: 4.0
>=0, <1 median: 4.0
cohens d: -0.0574
f: 0.488

```



```

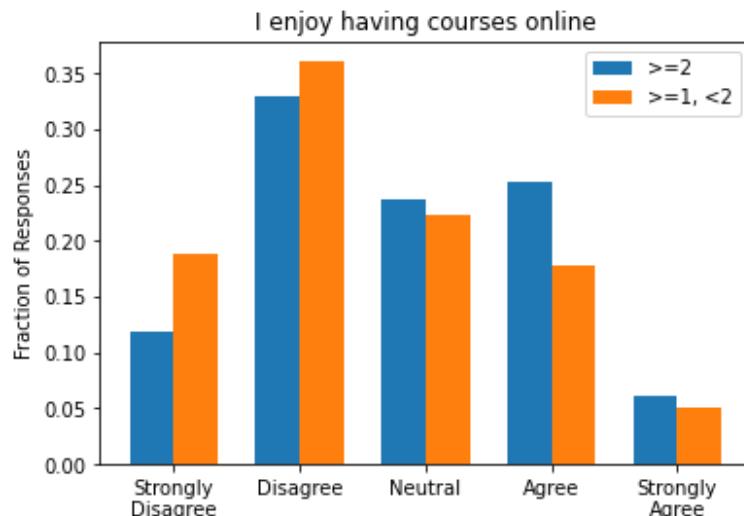
>=1 shape: (3862, 43), >=0, <1 shape: (927, 43)
MWU results: MannwhitneyuResult(statistic=2255104.5, pvalue=1.31746092
82899582e-36)
>=1 median: 3.0
>=0, <1 median: 2.0
cohens d: 0.469
f: 0.63

```

Out[]:

	question	>=1 median (n = 3862)	>=0, <1 median (n = 927)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.305	0.586	3.27e-17
1	remote_motivated	2.0	2.0	0.294	0.583	3.73e-16
2	remote_satisfied	3.0	2.0	0.616	0.666	2.23e-59
3	remote_engaging	3.0	3.0	0.382	0.601	1.98e-23
4	remote_distracted	4.0	4.0	-0.0574	0.488	0.224
5	remote_questions	3.0	2.0	0.469	0.63	1.32e-36

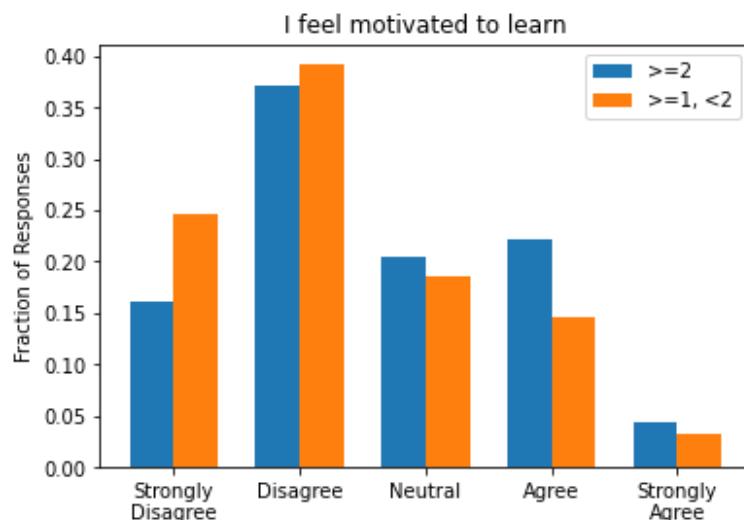
```
In [ ]: num_comp(ug, 'num_methods', 1, 2)
```



```

>=2 shape: (2769, 43), >=1, <2 shape: (1093, 43)
MWU results: MannwhitneyuResult(statistic=1717992.5, pvalue=1.12728242
46391973e-11)
>=2 median: 3.0
>=1, <2 median: 2.0
cohens d: 0.24
f: 0.568

```

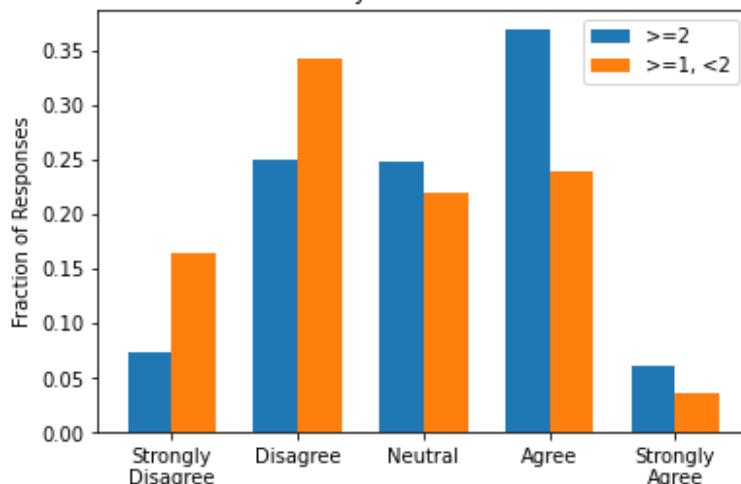


```

>=2 shape: (2769, 43), >=1, <2 shape: (1093, 43)
MWU results: MannwhitneyuResult(statistic=1736282.5, pvalue=1.07540636
22339664e-13)
>=2 median: 2.0
>=1, <2 median: 2.0
cohens d: 0.262
f: 0.574

```

**I am satisfied with the instruction
of my online courses**

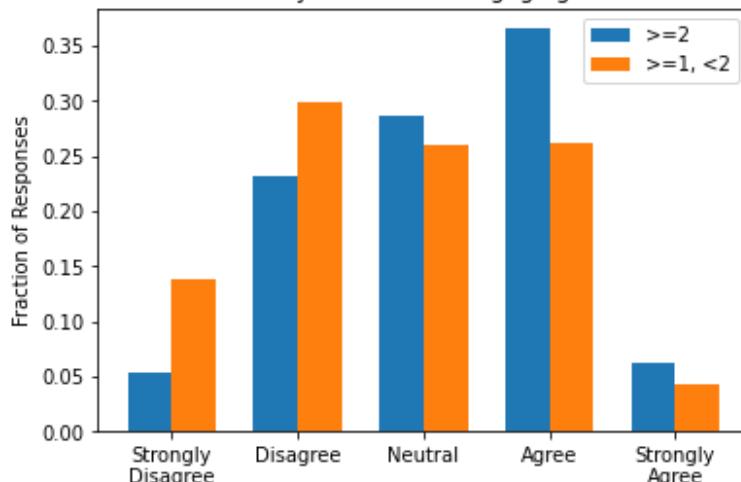


```

>=2 shape: (2769, 43), >=1, <2 shape: (1093, 43)
MWU results: MannwhitneyuResult(statistic=1856154.5, pvalue=3.89002981
4206096e-30)
>=2 median: 3.0
>=1, <2 median: 2.0
cohens d: 0.419
f: 0.613

```

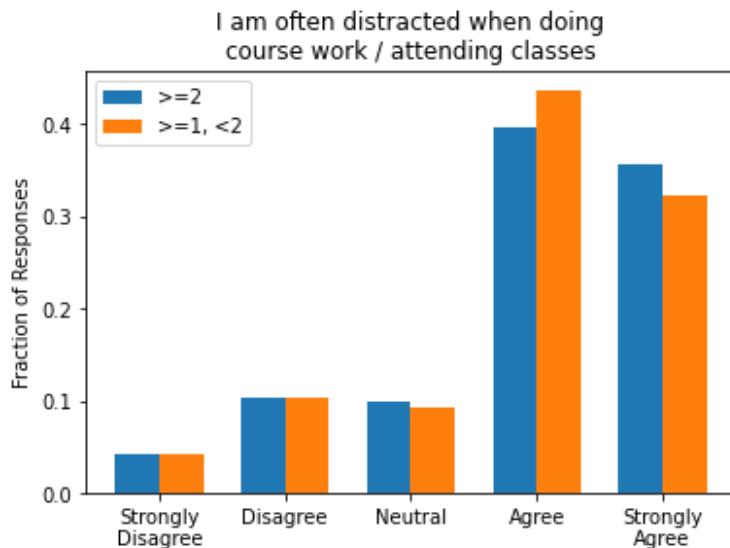
My courses are engaging



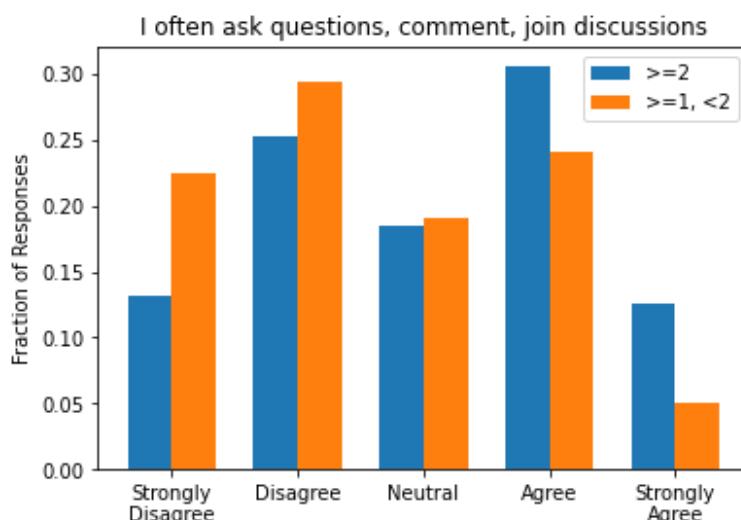
```

>=2 shape: (2769, 43), >=1, <2 shape: (1093, 43)
MWU results: MannwhitneyuResult(statistic=1801387.5, pvalue=7.74069075
1289684e-22)
>=2 median: 3.0
>=1, <2 median: 3.0
cohens d: 0.36
f: 0.595

```



```
>=2 shape: (2769, 43), >=1, <2 shape: (1093, 43)
MWU results: MannwhitneyuResult(statistic=1546290.0, pvalue=0.26144209
492070414)
>=2 median: 4.0
>=1, <2 median: 4.0
cohens d: 0.0241
f: 0.511
```

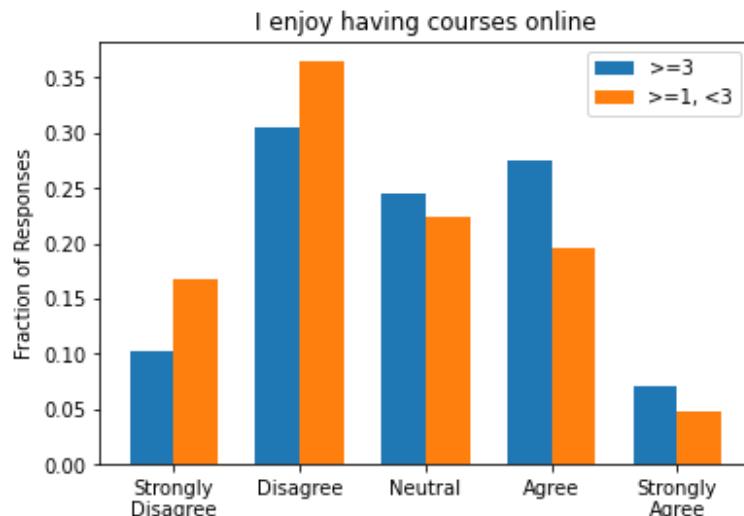


```
>=2 shape: (2769, 43), >=1, <2 shape: (1093, 43)
MWU results: MannwhitneyuResult(statistic=1808137.5, pvalue=2.69444140
9711781e-22)
>=2 median: 3.0
>=1, <2 median: 2.0
cohens d: 0.354
f: 0.597
```

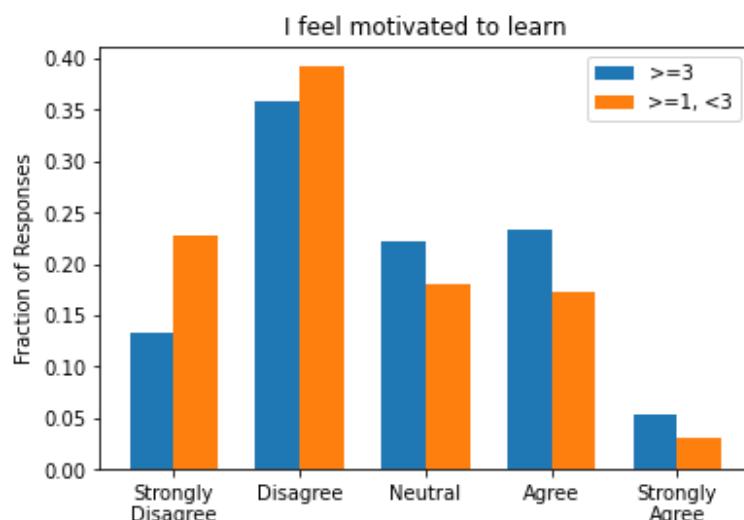
Out[]:

	question	>=2 median (n = 2769)	>=1, <2 median (n = 1093)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.24	0.568	1.13e-11
1	remote_motivated	2.0	2.0	0.262	0.574	1.08e-13
2	remote_satisfied	3.0	2.0	0.419	0.613	3.89e-30
3	remote_engaging	3.0	3.0	0.36	0.595	7.74e-22
4	remote_distracted	4.0	4.0	0.0241	0.511	0.261
5	remote_questions	3.0	2.0	0.354	0.597	2.69e-22

```
In [ ]: num_comp(ug, 'num_methods', 1, 3)
```

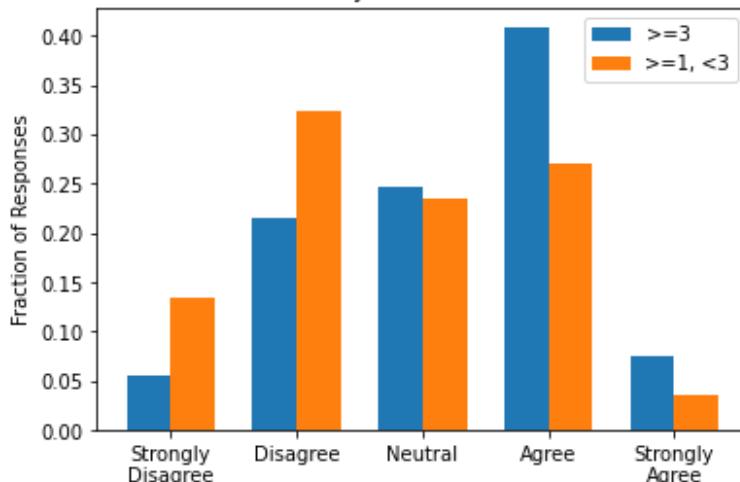


```
>=3 shape: (1744, 43), >=1, <3 shape: (2118, 43)
MWU results: MannwhitneyuResult(statistic=2134060.0, pvalue=6.70776863
9488851e-18)
>=3 median: 3.0
>=1, <3 median: 2.0
cohens d: 0.279
f: 0.578
```



```
>=3 shape: (1744, 43), >=1, <3 shape: (2118, 43)
MWU results: MannwhitneyuResult(statistic=2151424.5, pvalue=4.11753124
6344876e-20)
>=3 median: 3.0
>=1, <3 median: 2.0
cohens d: 0.296
f: 0.582
```

**I am satisfied with the instruction
of my online courses**

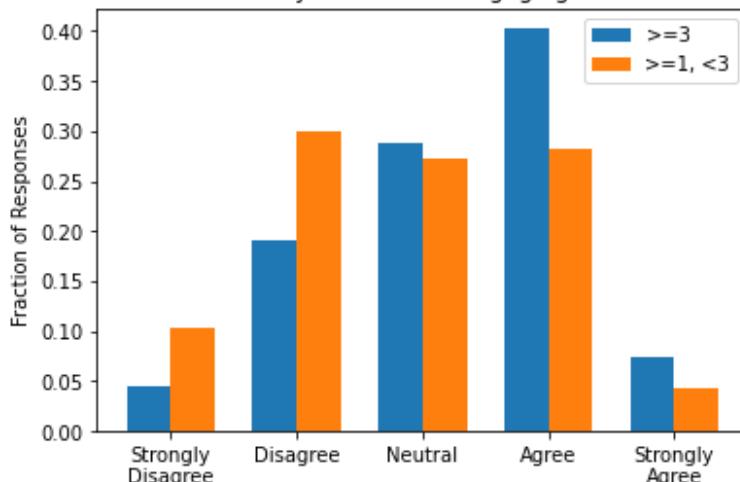


```

>=3 shape: (1744, 43), >=1, <3 shape: (2118, 43)
MWU results: MannwhitneyuResult(statistic=2294924.0, pvalue=1.78318384
88040315e-41)
>=3 median: 3.0
>=1, <3 median: 3.0
cohens d: 0.448
f: 0.621

```

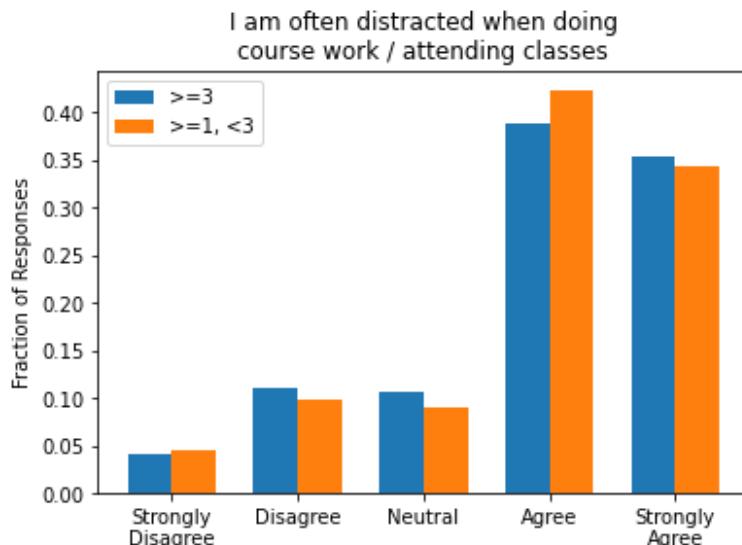
My courses are engaging



```

>=3 shape: (1744, 43), >=1, <3 shape: (2118, 43)
MWU results: MannwhitneyuResult(statistic=2243676.5, pvalue=5.05842276
01202325e-33)
>=3 median: 3.0
>=1, <3 median: 3.0
cohens d: 0.396
f: 0.607

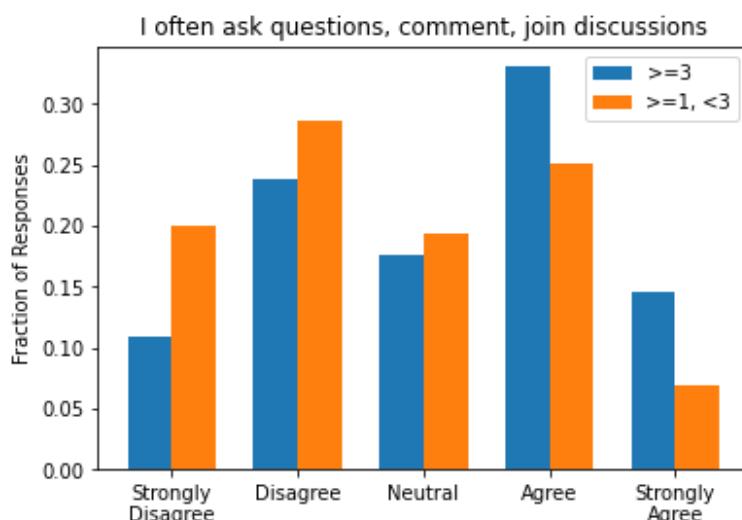
```



```

>=3 shape: (1744, 43), >=1, <3 shape: (2118, 43)
MWU results: MannwhitneyuResult(statistic=1839167.5, pvalue=0.81201734
00063482)
>=3 median: 4.0
>=1, <3 median: 4.0
cohens d: -0.0142
f: 0.498

```



```

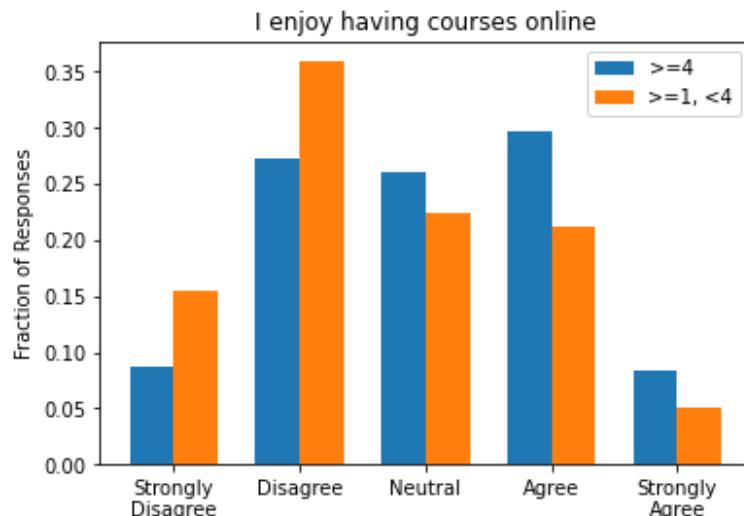
>=3 shape: (1744, 43), >=1, <3 shape: (2118, 43)
MWU results: MannwhitneyuResult(statistic=2225804.5, pvalue=1.37904822
6815139e-29)
>=3 median: 3.0
>=1, <3 median: 3.0
cohens d: 0.373
f: 0.603

```

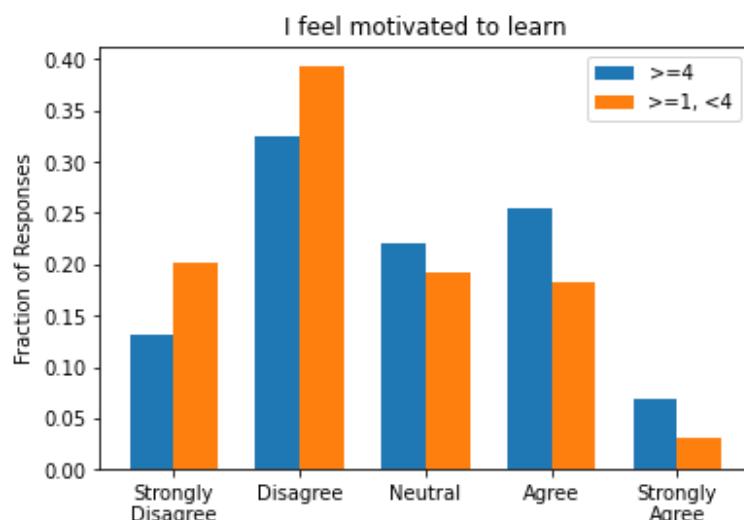
Out[]:

	question	>=3 median (n = 1744)	>=1, <3 median (n = 2118)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.279	0.578	6.71e-18
1	remote_motivated	3.0	2.0	0.296	0.582	4.12e-20
2	remote_satisfied	3.0	3.0	0.448	0.621	1.78e-41
3	remote_engaging	3.0	3.0	0.396	0.607	5.06e-33
4	remote_distracted	4.0	4.0	-0.0142	0.498	0.812
5	remote_questions	3.0	3.0	0.373	0.603	1.38e-29

```
In [ ]: num_comp(ug, 'num_methods', 1, 4)
```

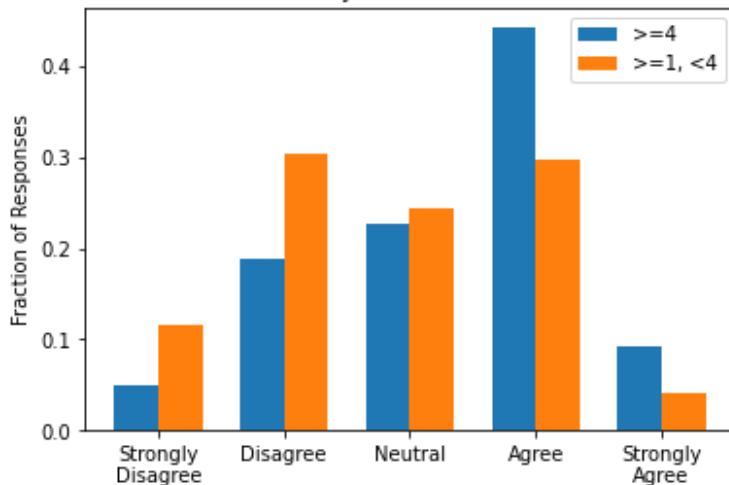


```
>=4 shape: (934, 43), >=1, <4 shape: (2928, 43)
MWU results: MannwhitneyuResult(statistic=1618257.0, pvalue=2.09446051
812286e-18)
>=4 median: 3.0
>=1, <4 median: 2.0
cohens d: 0.33
f: 0.592
```



```
>=4 shape: (934, 43), >=1, <4 shape: (2928, 43)
MWU results: MannwhitneyuResult(statistic=1601508.5, pvalue=2.26686388
16616163e-16)
>=4 median: 3.0
>=1, <4 median: 2.0
cohens d: 0.319
f: 0.586
```

**I am satisfied with the instruction
of my online courses**

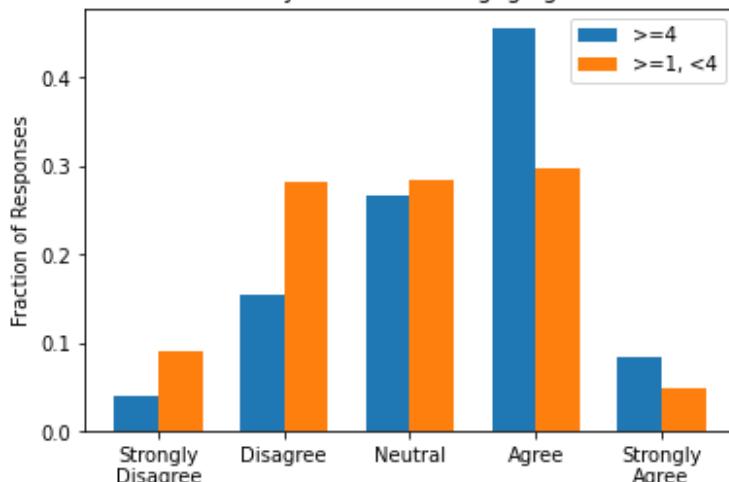


```

>=4 shape: (934, 43), >=1, <4 shape: (2928, 43)
MWU results: MannwhitneyuResult(statistic=1708988.5, pvalue=6.15717114
3484908e-33)
>=4 median: 4.0
>=1, <4 median: 3.0
cohens d: 0.456
f: 0.625

```

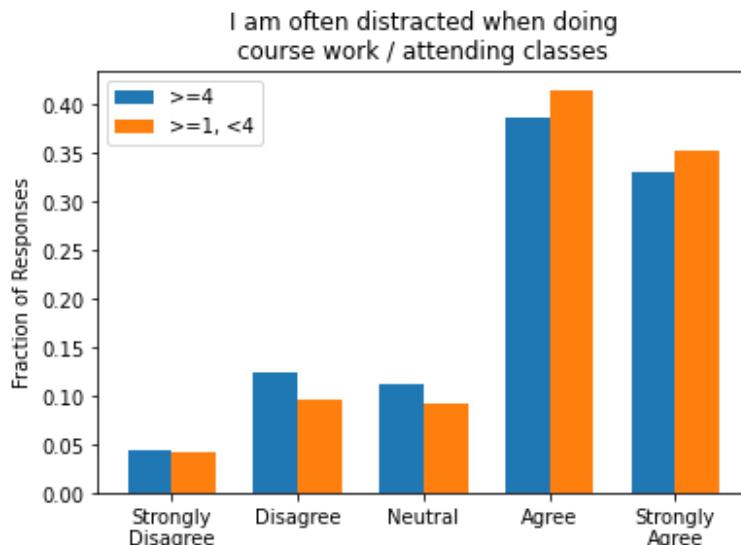
My courses are engaging



```

>=4 shape: (934, 43), >=1, <4 shape: (2928, 43)
MWU results: MannwhitneyuResult(statistic=1699131.5, pvalue=2.82399559
37241786e-31)
>=4 median: 4.0
>=1, <4 median: 3.0
cohens d: 0.437
f: 0.621

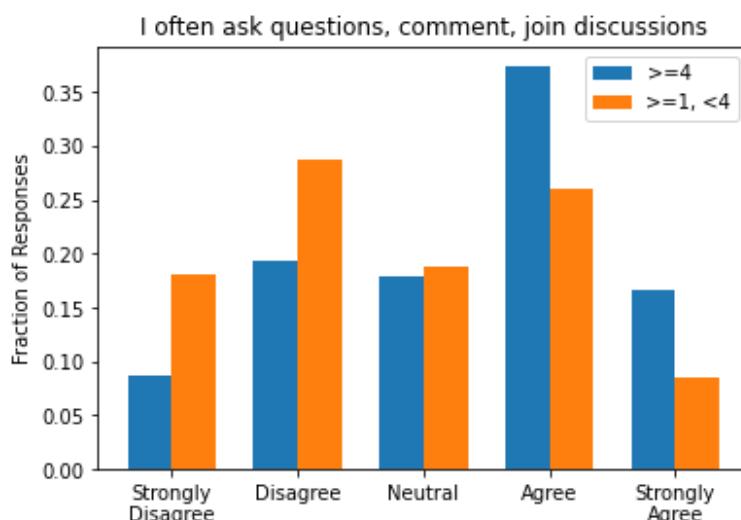
```



```

>=4 shape: (934, 43), >=1, <4 shape: (2928, 43)
MWU results: MannwhitneyuResult(statistic=1300651.0, pvalue=0.01701206
840029141)
>=4 median: 4.0
>=1, <4 median: 4.0
cohens d: -0.0949
f: 0.476

```



```

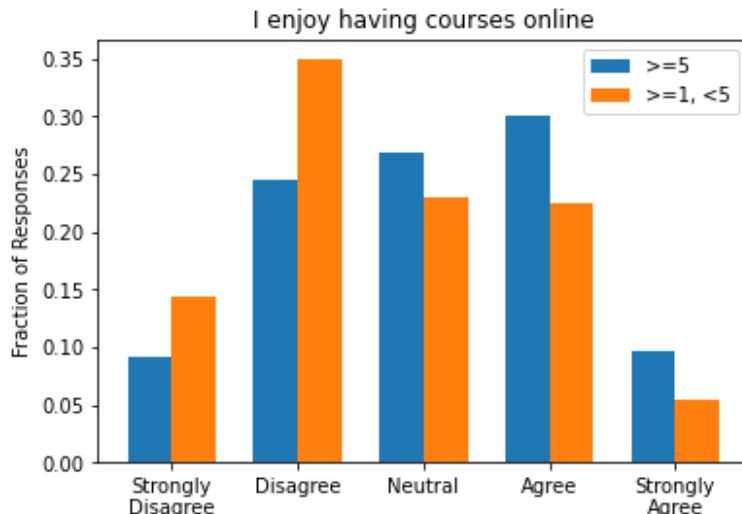
>=4 shape: (934, 43), >=1, <4 shape: (2928, 43)
MWU results: MannwhitneyuResult(statistic=1705919.5, pvalue=9.03214476
783886e-32)
>=4 median: 4.0
>=1, <4 median: 3.0
cohens d: 0.449
f: 0.624

```

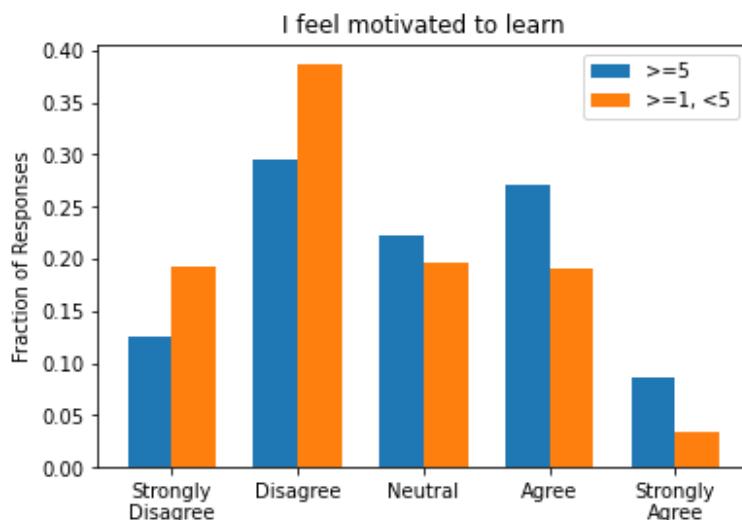
Out[]:

	question	>=4 median (n = 934)	>=1, <4 median (n = 2928)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.33	0.592	2.09e-18
1	remote_motivated	3.0	2.0	0.319	0.586	2.27e-16
2	remote_satisfied	4.0	3.0	0.456	0.625	6.16e-33
3	remote_engaging	4.0	3.0	0.437	0.621	2.82e-31
4	remote_distracted	4.0	4.0	-0.0949	0.476	0.017
5	remote_questions	4.0	3.0	0.449	0.624	9.03e-32

```
In [ ]: num_comp(ug, 'num_methods', 1, 5)
```

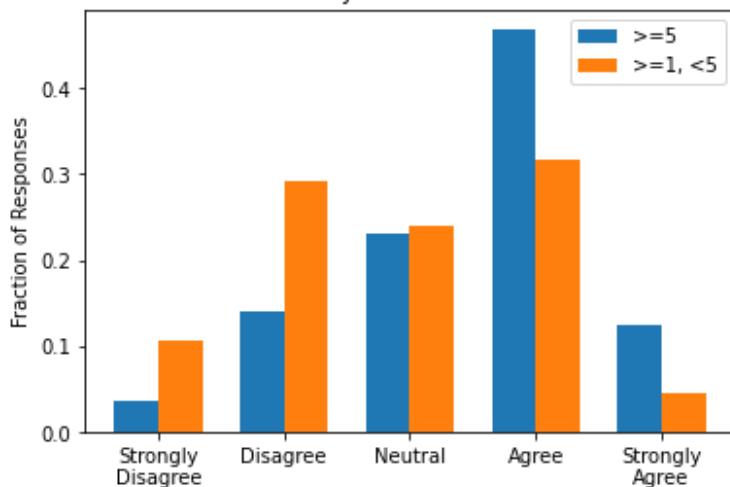


```
>=5 shape: (417, 43), >=1, <5 shape: (3445, 43)
MWU results: MannwhitneyuResult(statistic=848813.0, pvalue=3.325884851
762265e-10)
>=5 median: 3.0
>=1, <5 median: 3.0
cohens d: 0.327
f: 0.591
```



```
>=5 shape: (417, 43), >=1, <5 shape: (3445, 43)
MWU results: MannwhitneyuResult(statistic=857191.0, pvalue=1.840407477
5644173e-11)
>=5 median: 3.0
>=1, <5 median: 2.0
cohens d: 0.366
f: 0.597
```

**I am satisfied with the instruction
of my online courses**

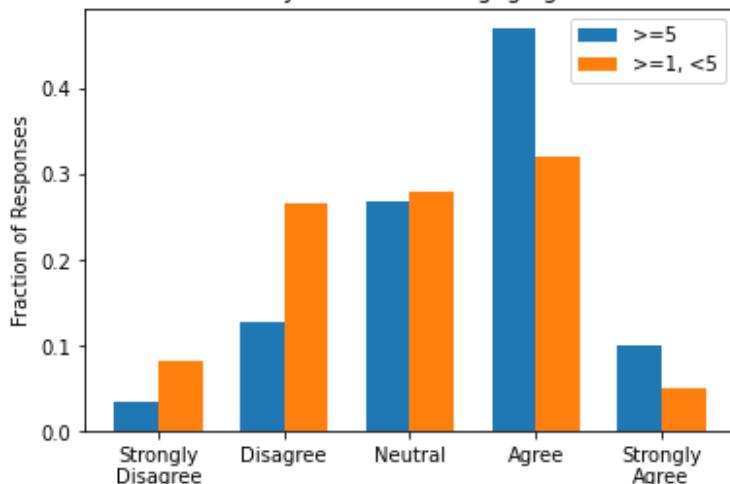


```

>=5 shape: (417, 43), >=1, <5 shape: (3445, 43)
MWU results: MannwhitneyuResult(statistic=935838.5, pvalue=8.265573548
902466e-26)
>=5 median: 4.0
>=1, <5 median: 3.0
cohens d: 0.553
f: 0.651

```

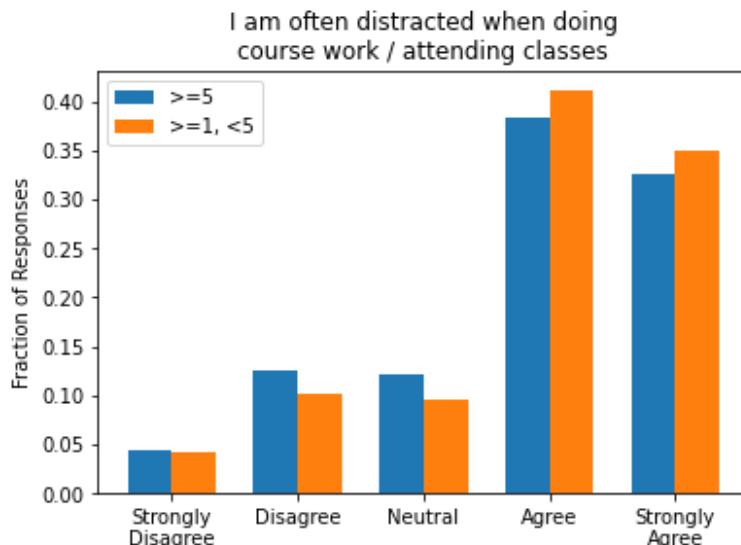
My courses are engaging



```

>=5 shape: (417, 43), >=1, <5 shape: (3445, 43)
MWU results: MannwhitneyuResult(statistic=903382.0, pvalue=3.408315762
335199e-19)
>=5 median: 4.0
>=1, <5 median: 3.0
cohens d: 0.463
f: 0.629

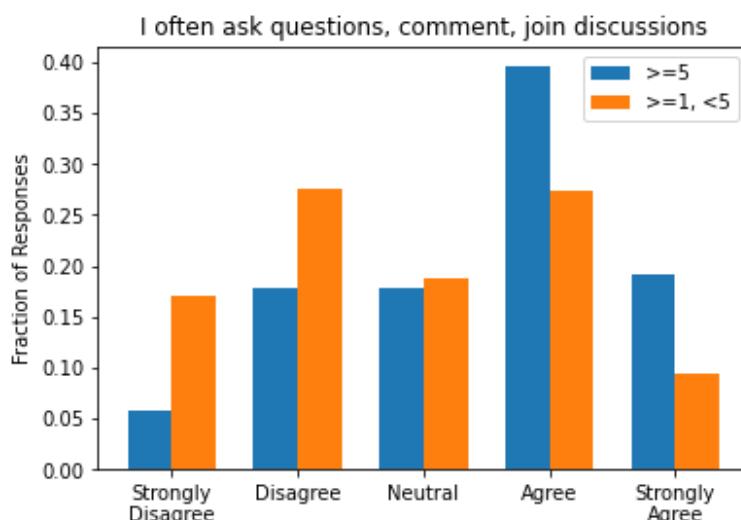
```



```

>=5 shape: (417, 43), >=1, <5 shape: (3445, 43)
MWU results: MannwhitneyuResult(statistic=682999.5, pvalue=0.081667176
84719765)
>=5 median: 4.0
>=1, <5 median: 4.0
cohens d: -0.0898
f: 0.475

```



```

>=5 shape: (417, 43), >=1, <5 shape: (3445, 43)
MWU results: MannwhitneyuResult(statistic=923037.0, pvalue=1.270938523
096828e-22)
>=5 median: 4.0
>=1, <5 median: 3.0
cohens d: 0.515
f: 0.643

```

Out[]:

	question	>=5 median (n = 417)	>=1, <5 median (n = 3445)	cohens d	f	p-value
0	remote_enjoy	3.0	3.0	0.327	0.591	3.33e-10
1	remote_motivated	3.0	2.0	0.366	0.597	1.84e-11
2	remote_satisfied	4.0	3.0	0.553	0.651	8.27e-26
3	remote_engaging	4.0	3.0	0.463	0.629	3.41e-19
4	remote_distracted	4.0	4.0	-0.0898	0.475	0.0817
5	remote_questions	4.0	3.0	0.515	0.643	1.27e-22

Combinations of types of methods

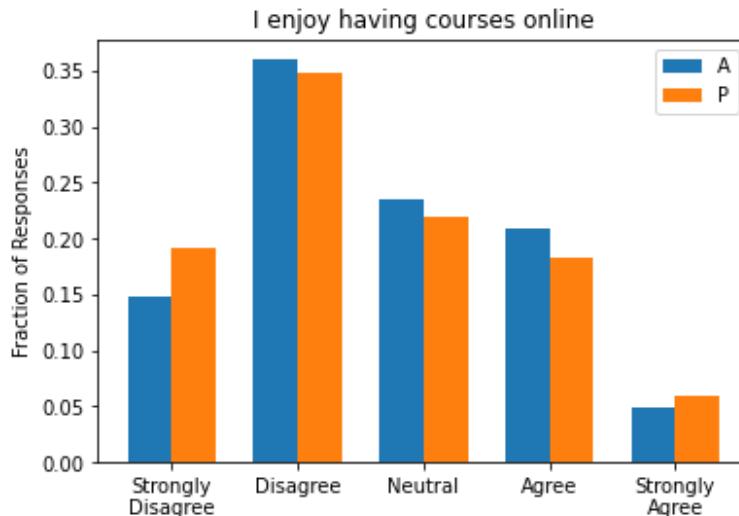
```
In [ ]: ugcats = []
ugcat1 = ug[(ug['passive']==True) & (ug['partly_active']==False) & (ug['fully_active']==False)]
ugcat2 = ug[(ug['passive']==False) & (ug['partly_active']==True) & (ug['fully_active']==False)]
ugcat3 = ug[(ug['passive']==False) & (ug['partly_active']==False) & (ug['fully_active']==True)]
ugcat4 = ug[(ug['passive']==True) & (ug['partly_active']==True) & (ug['fully_active']==False)]
ugcat5 = ug[(ug['passive']==True) & (ug['partly_active']==False) & (ug['fully_active']==True)]
ugcat6 = ug[(ug['passive']==False) & (ug['partly_active']==True) & (ug['fully_active']==True)]
ugcat7 = ug[(ug['passive']==True) & (ug['partly_active']==True) & (ug['fully_active']==True)]
ugcats = [ugcat1, ugcats, ugcats, ugcats, ugcats, ugcats, ugcats]
```

```
In [ ]: names = ['P', 'A', 'F', 'PA', 'PF', 'AF', 'PAF']
for i in range(len(ugcats)):
    subset_ls.append(ugcats[i])
    subset_name.append(names[i])
    ugcats[i].name = names[i]
```

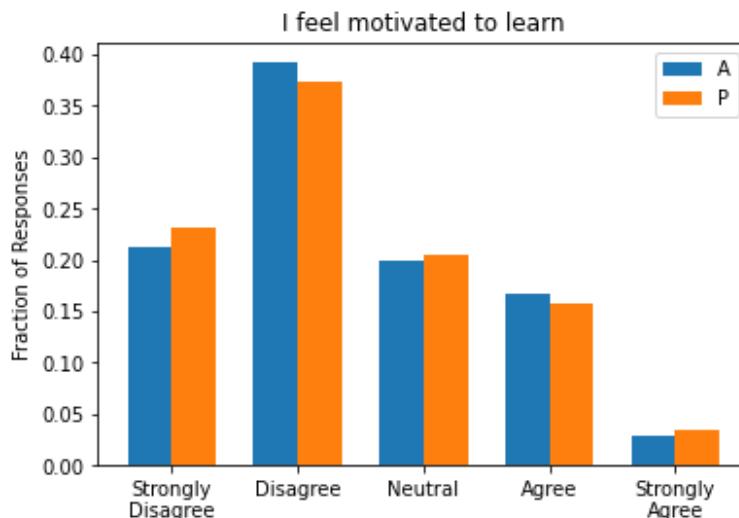
Undergrad

```
In [ ]: types_undergrad = []
for i in range(len(ugcats)-1):
    for j in range(i+1, len(ugcats)):
        print('-----')
        print(ugcats[i].name, ugcats[i].shape)
        print(ugcats[j].name, ugcats[j].shape)
    types_undergrad.append(mwu_comparison(ugcats[j], ugcats[i]))
```

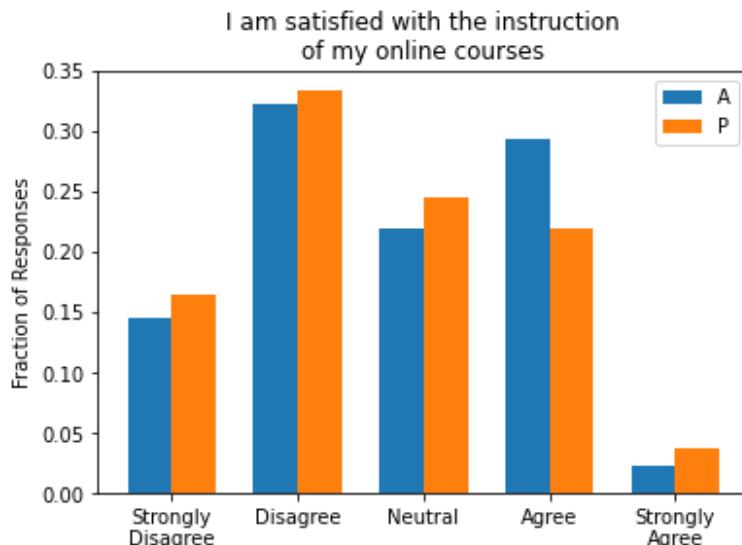
P (759, 43)
A (311, 43)



A shape: (311, 43), P shape: (759, 43)
MWU results: MannwhitneyuResult(statistic=123215.0, pvalue=0.241662501
531967)
A median: 2.0
P median: 2.0
cohens d: 0.0677
f: 0.522



A shape: (311, 43), P shape: (759, 43)
MWU results: MannwhitneyuResult(statistic=119356.0, pvalue=0.762623623
9911449)
A median: 2.0
P median: 2.0
cohens d: 0.0155
f: 0.506



A shape: (311, 43), P shape: (759, 43)

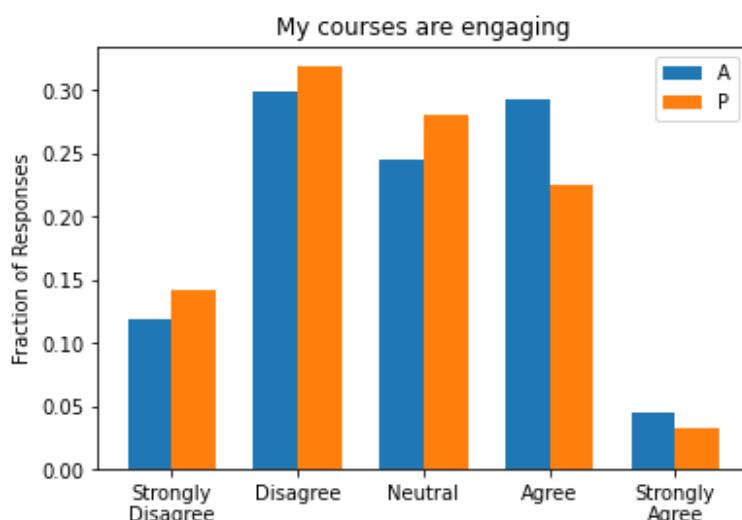
MWU results: MannwhitneyuResult(statistic=124128.0, pvalue=0.16856706214272998)

A median: 3.0

P median: 3.0

cohens d: 0.0865

f: 0.526



A shape: (311, 43), P shape: (759, 43)

MWU results: MannwhitneyuResult(statistic=127453.5, pvalue=0.03339119341566209)

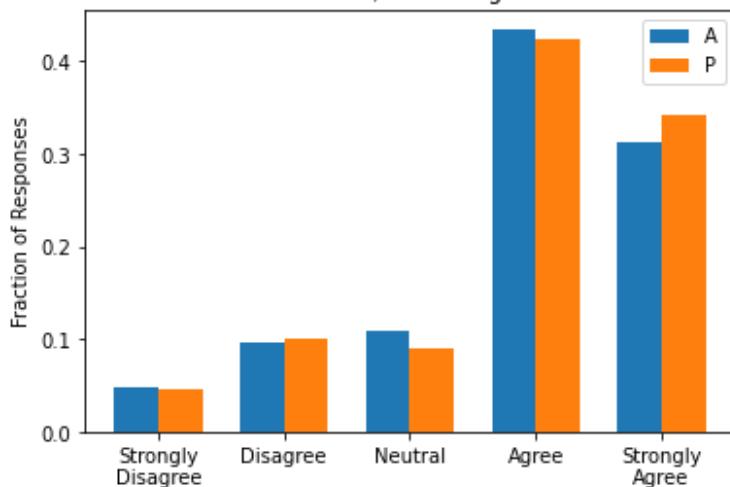
A median: 3.0

P median: 3.0

cohens d: 0.146

f: 0.54

I am often distracted when doing
course work / attending classes



A shape: (311, 43), P shape: (759, 43)

MWU results: MannwhitneyuResult(statistic=114276.5, pvalue=0.385140120
6098095)

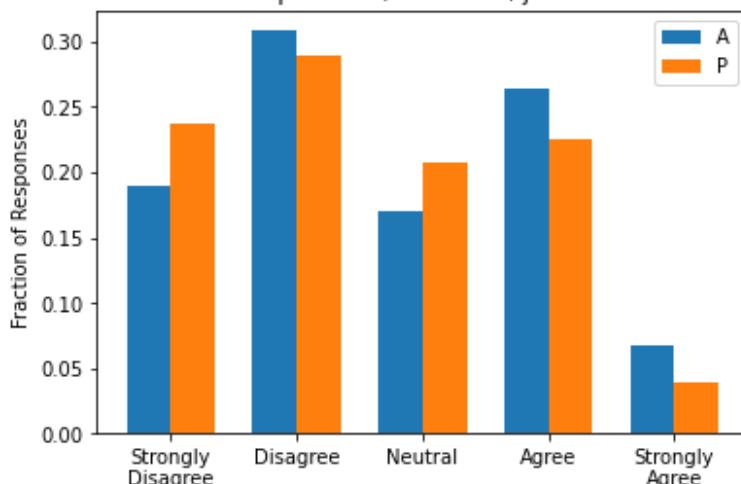
A median: 4.0

P median: 4.0

cohens d: -0.0432

f: 0.484

I often ask questions, comment, join discussions



A shape: (311, 43), P shape: (759, 43)

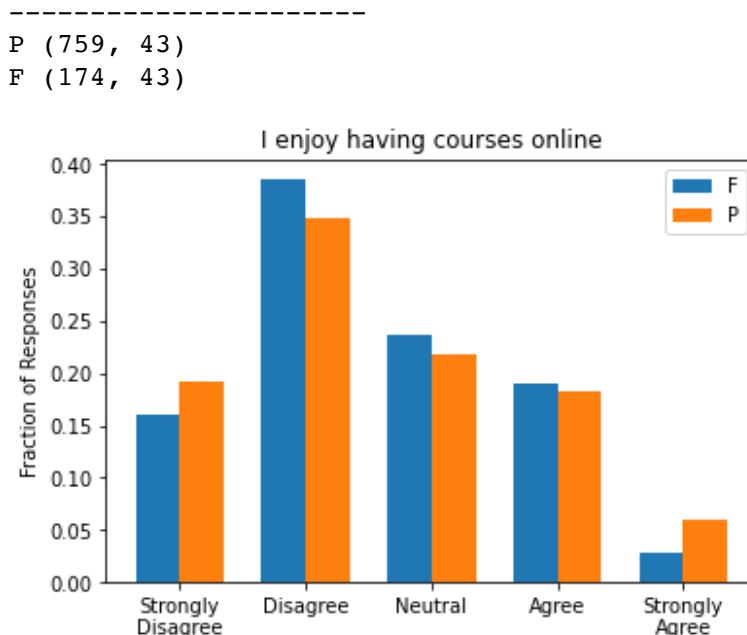
MWU results: MannwhitneyuResult(statistic=126928.0, pvalue=0.045673533
478062536)

A median: 3.0

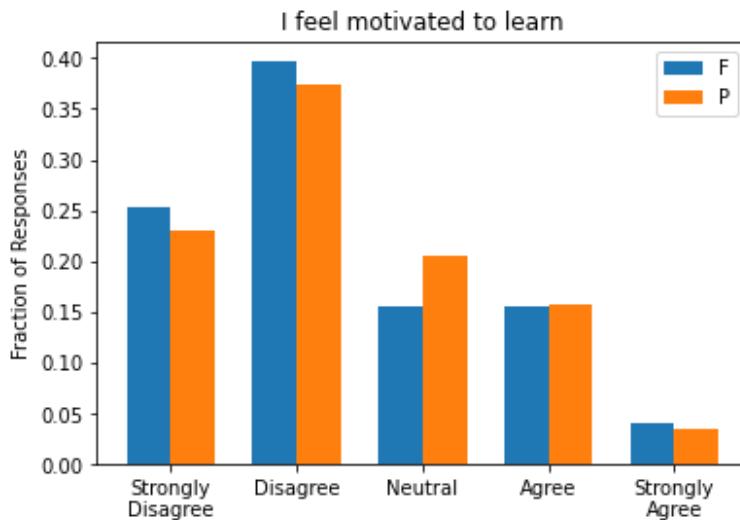
P median: 2.0

cohens d: 0.142

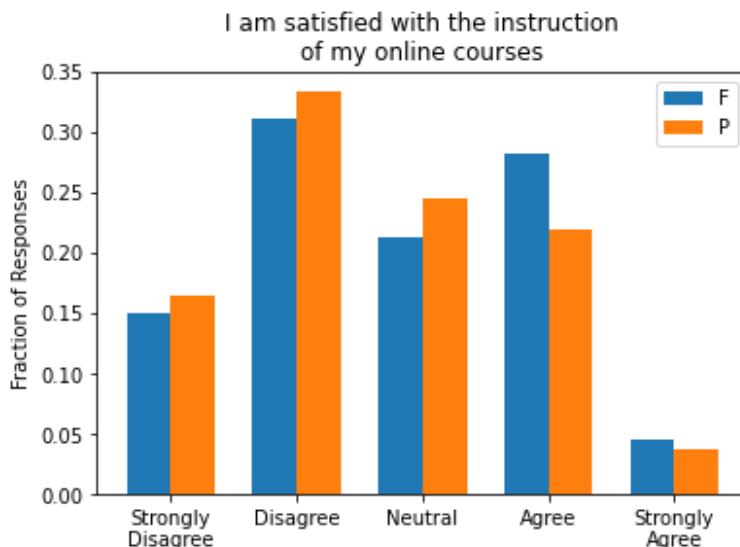
f: 0.538



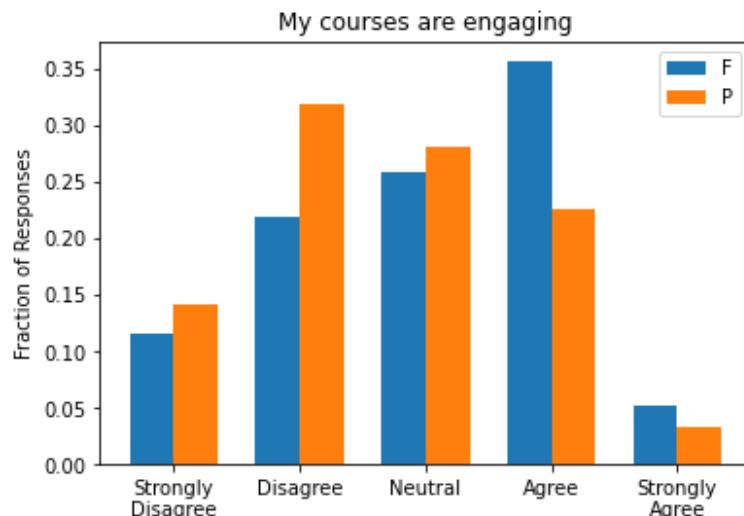
F shape: (174, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=65712.0, pvalue=0.9175118991
 472185)
 F median: 2.0
 P median: 2.0
 cohens d: -0.0276
 f: 0.498



F shape: (174, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=63567.0, pvalue=0.4231940229
 331952)
 F median: 2.0
 P median: 2.0
 cohens d: -0.0522
 f: 0.481



F shape: (174, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=70320.5, pvalue=0.1664930929
 1832592)
 F median: 3.0
 P median: 3.0
 cohens d: 0.119
 f: 0.532



F shape: (174, 43), P shape: (759, 43)

MWU results: MannwhitneyuResult(statistic=77250.0, pvalue=0.0002937967

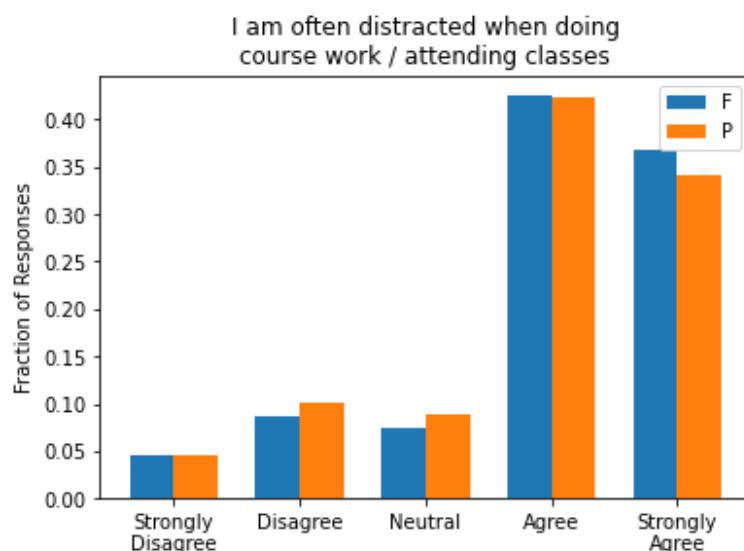
5333046445)

F median: 3.0

P median: 3.0

cohens d: 0.3

f: 0.585



F shape: (174, 43), P shape: (759, 43)

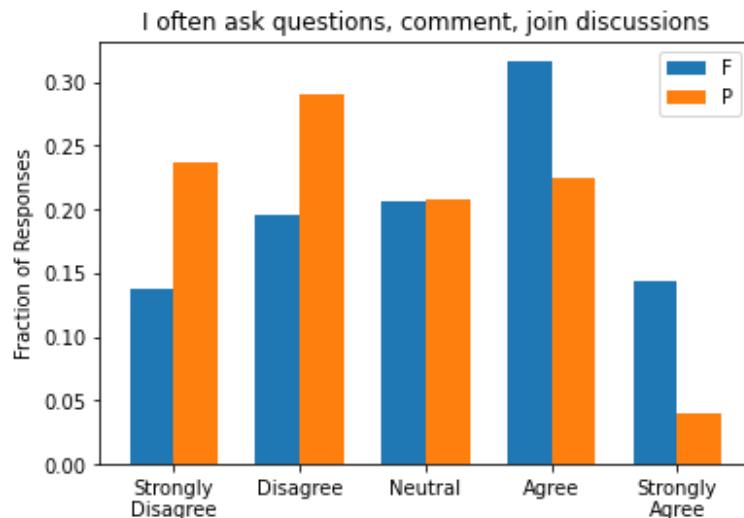
MWU results: MannwhitneyuResult(statistic=68531.0, pvalue=0.4065663436
391719)

F median: 4.0

P median: 4.0

cohens d: 0.0627

f: 0.519



F shape: (174, 43), P shape: (759, 43)

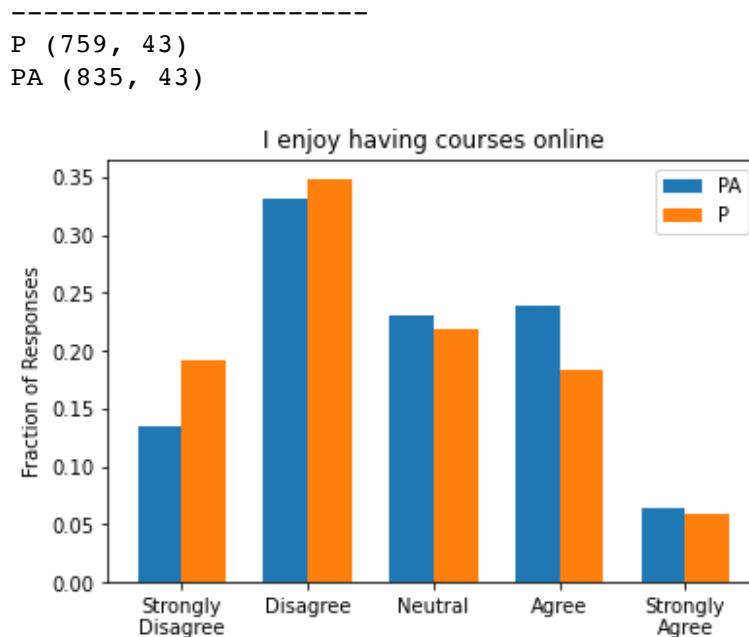
MWU results: MannwhitneyuResult(statistic=83256.5, pvalue=3.3281873872
648477e-08)

F median: 3.0

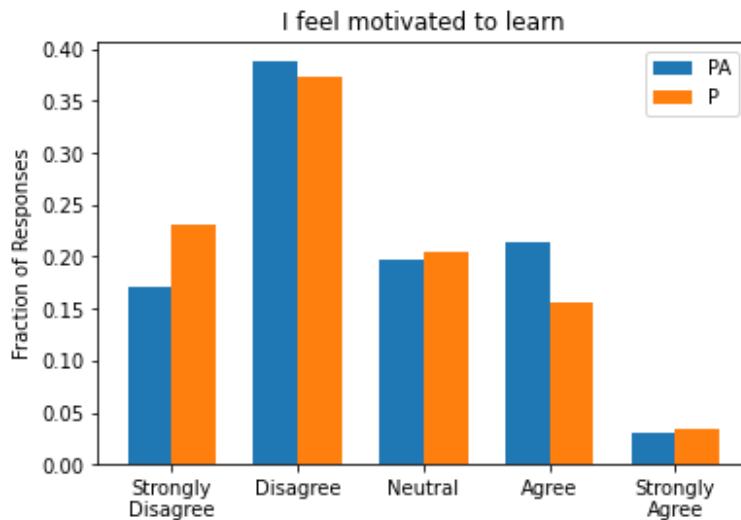
P median: 2.0

cohens d: 0.491

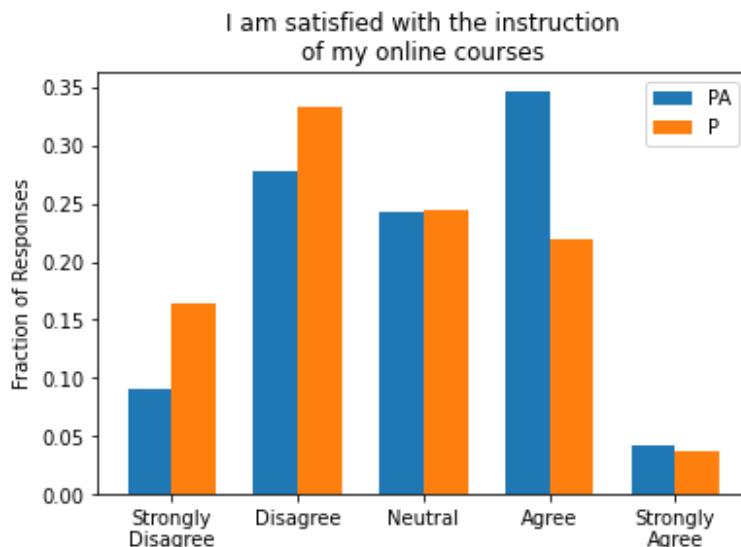
f: 0.63



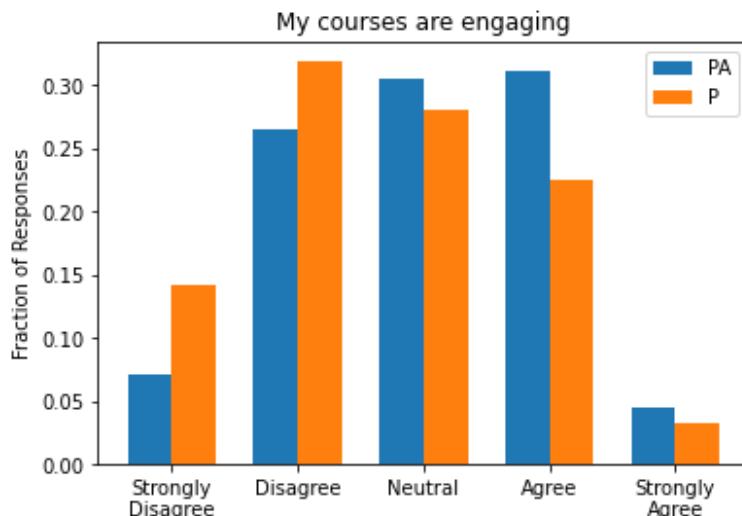
PA shape: (835, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=347167.5, pvalue=0.000645965
 7733711504)
 PA median: 3.0
 P median: 2.0
 cohens d: 0.166
 f: 0.548



PA shape: (835, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=342031.5, pvalue=0.004326338
 507266754)
 PA median: 2.0
 P median: 2.0
 cohens d: 0.138
 f: 0.54



PA shape: (835, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=371913.5, pvalue=5.254263281
 621489e-10)
 PA median: 3.0
 P median: 3.0
 cohens d: 0.311
 f: 0.587



PA shape: (835, 43), P shape: (759, 43)

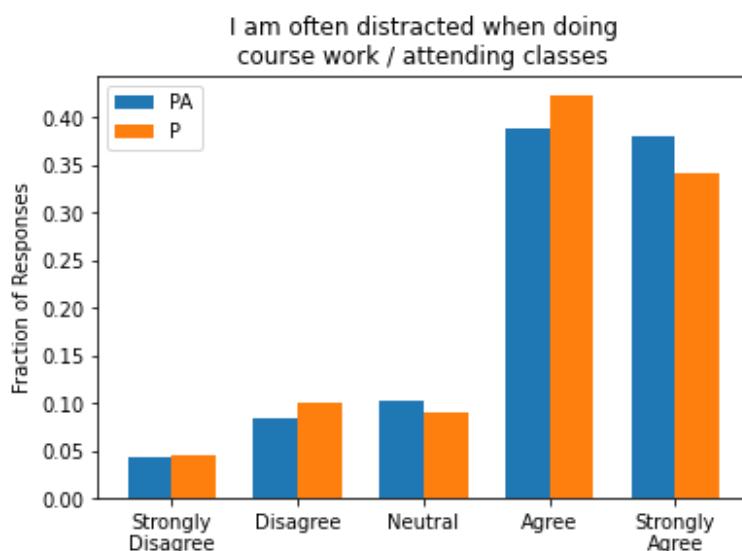
MWU results: MannwhitneyuResult(statistic=367462.5, pvalue=1.080966313
9104759e-08)

PA median: 3.0

P median: 3.0

cohens d: 0.291

f: 0.58



PA shape: (835, 43), P shape: (759, 43)

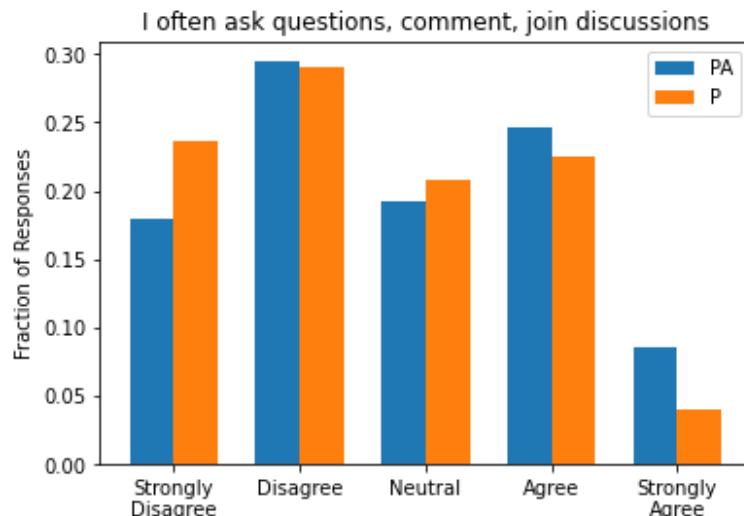
MWU results: MannwhitneyuResult(statistic=328116.5, pvalue=0.193117548
71060471)

PA median: 4.0

P median: 4.0

cohens d: 0.0568

f: 0.518



PA shape: (835, 43), P shape: (759, 43)

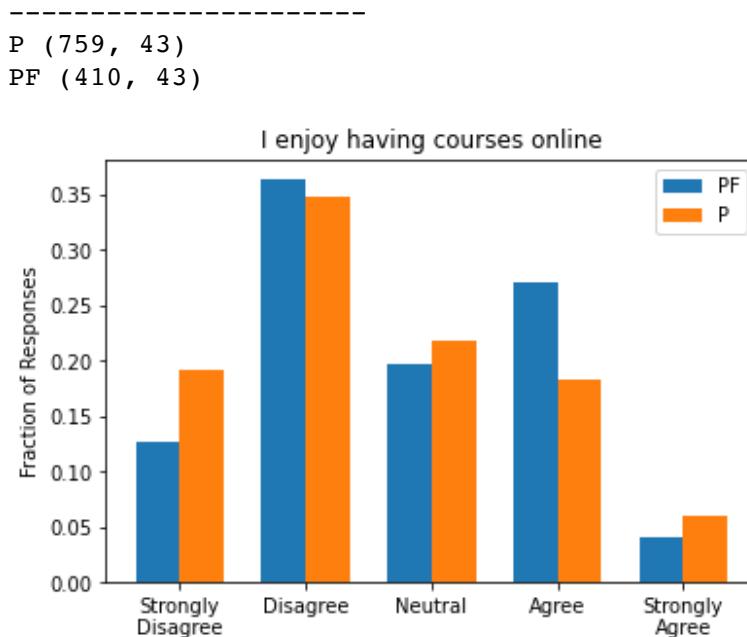
MWU results: MannwhitneyuResult(statistic=348088.0, pvalue=0.000468497
08846728413)

PA median: 3.0

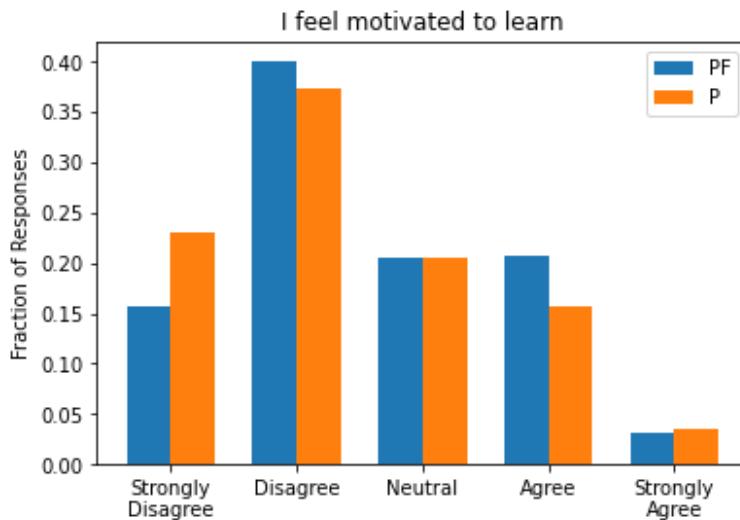
P median: 2.0

cohens d: 0.185

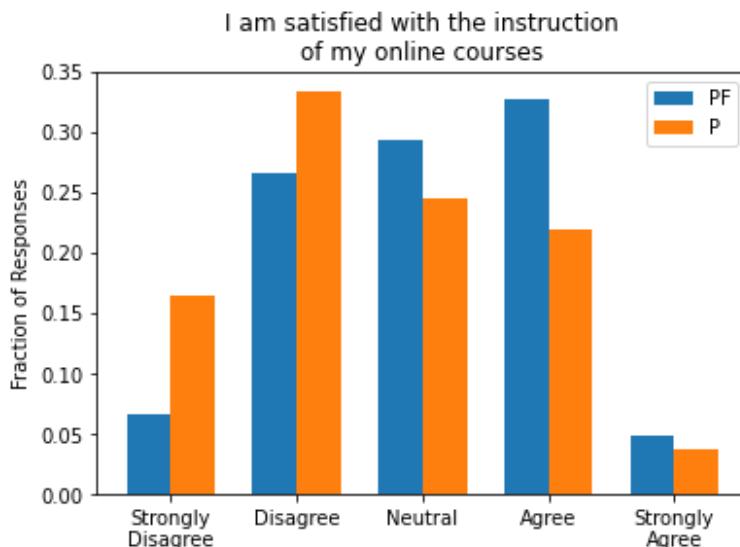
f: 0.549



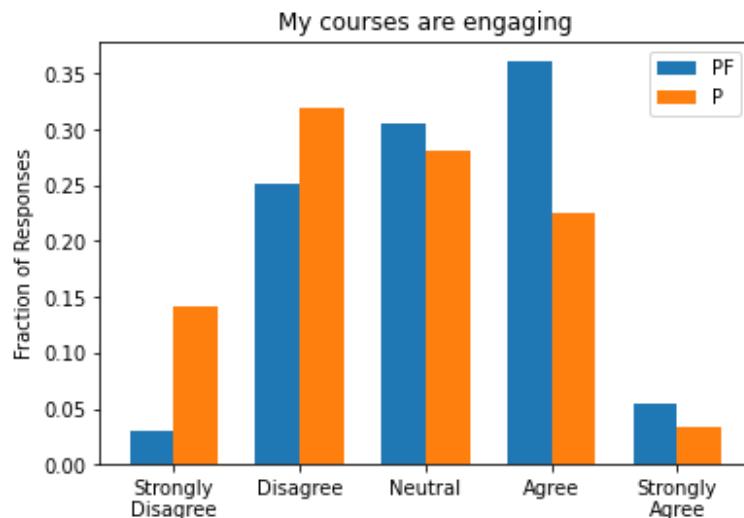
PF shape: (410, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=168955.0, pvalue=0.011984351
 102125283)
 PF median: 3.0
 P median: 2.0
 cohens d: 0.144
 f: 0.543



PF shape: (410, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=169475.5, pvalue=0.008666801
 37754172)
 PF median: 2.0
 P median: 2.0
 cohens d: 0.153
 f: 0.545



PF shape: (410, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=187286.0, pvalue=2.582455103
 80559e-09)
 PF median: 3.0
 P median: 3.0
 cohens d: 0.367
 f: 0.602



PF shape: (410, 43), P shape: (759, 43)

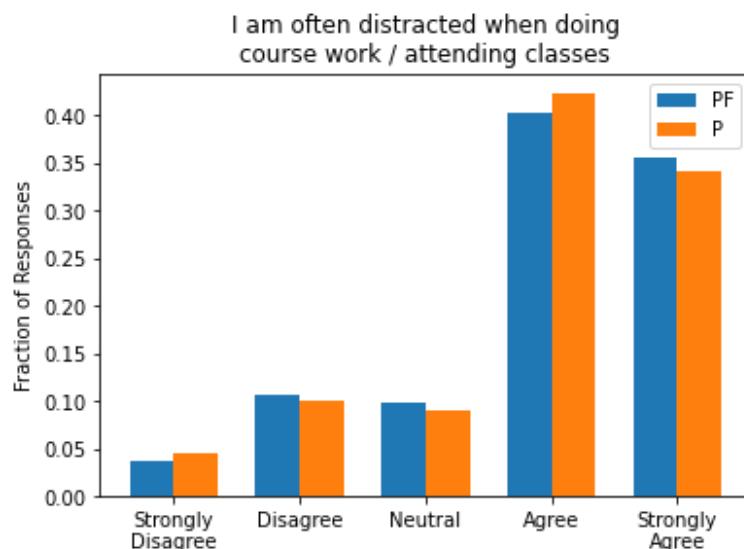
MWU results: MannwhitneyuResult(statistic=193698.5, pvalue=7.062883542
395144e-13)

PF median: 3.0

P median: 3.0

cohens d: 0.455

f: 0.622



PF shape: (410, 43), P shape: (759, 43)

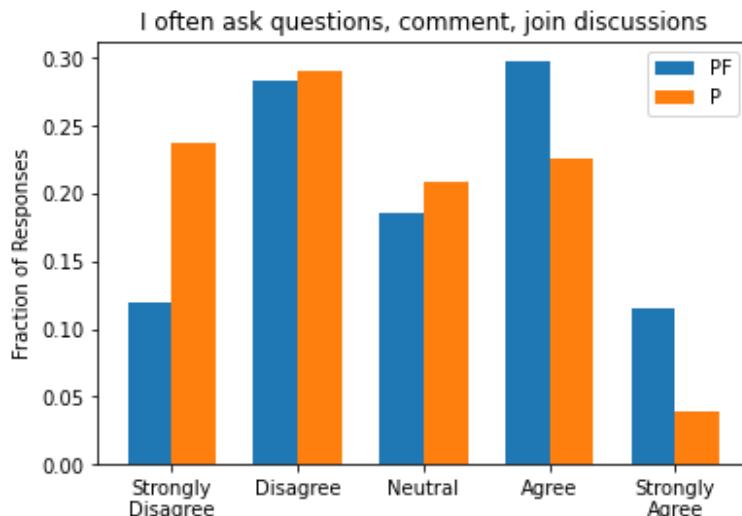
MWU results: MannwhitneyuResult(statistic=157199.0, pvalue=0.756932153
9545877)

PF median: 4.0

P median: 4.0

cohens d: 0.019

f: 0.505



PF shape: (410, 43), P shape: (759, 43)

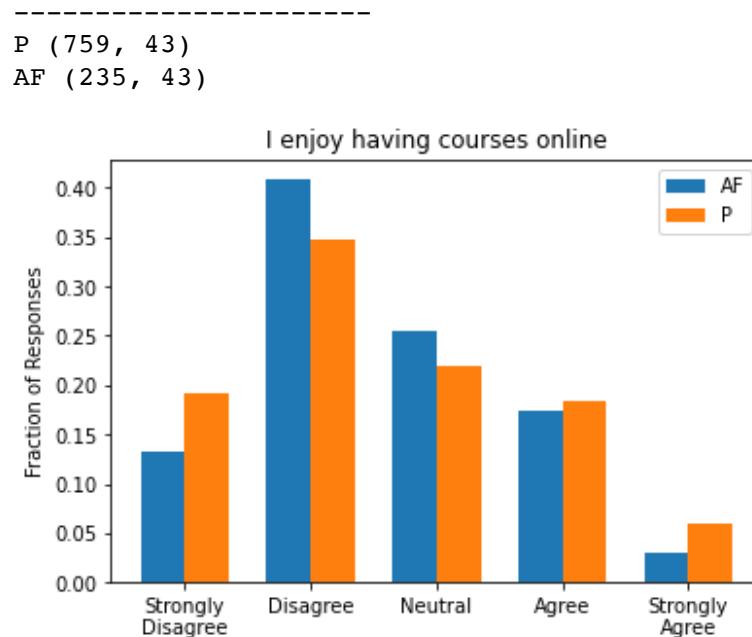
MWU results: MannwhitneyuResult(statistic=187929.0, pvalue=1.546885503
8701558e-09)

PF median: 3.0

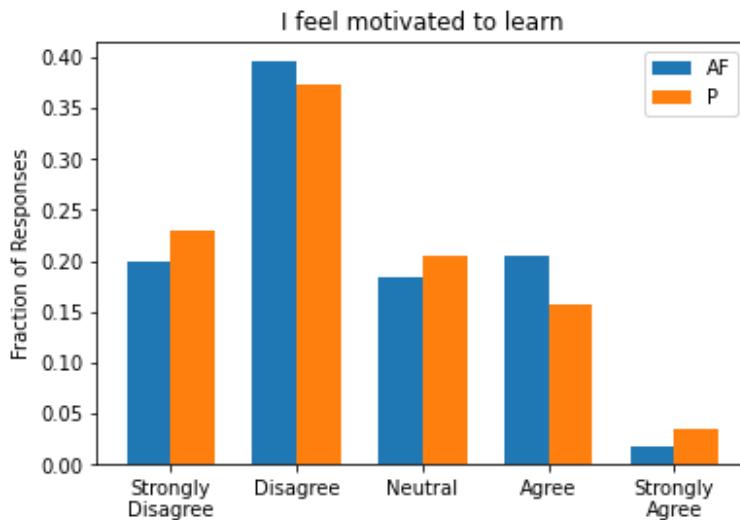
P median: 2.0

cohens d: 0.386

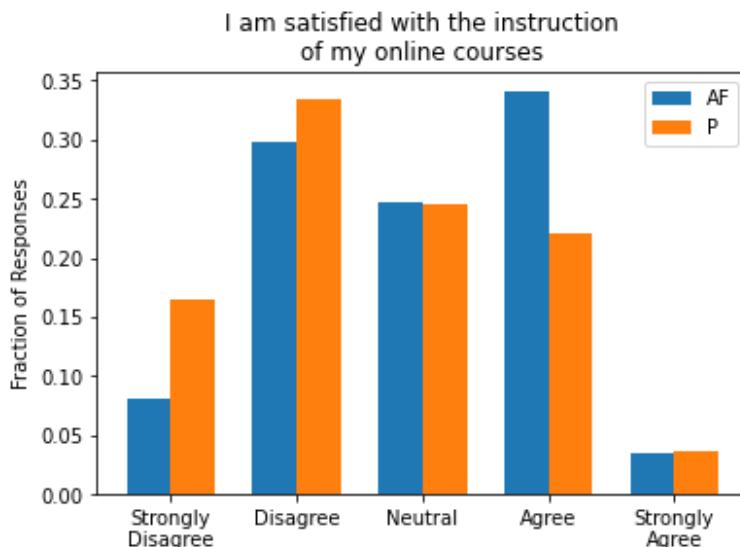
f: 0.604



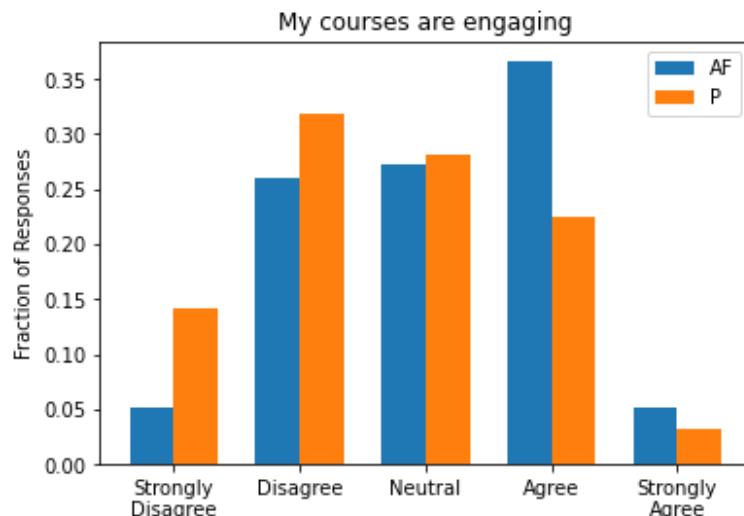
AF shape: (235, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=89939.5, pvalue=0.8382911943
 334874)
 AF median: 2.0
 P median: 2.0
 cohens d: -0.00894
 f: 0.504



AF shape: (235, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=91907.0, pvalue=0.4606966987
 106218)
 AF median: 2.0
 P median: 2.0
 cohens d: 0.0467
 f: 0.515



AF shape: (235, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=103870.5, pvalue=7.650775211
 359167e-05)
 AF median: 3.0
 P median: 3.0
 cohens d: 0.291
 f: 0.582



AF shape: (235, 43), P shape: (759, 43)

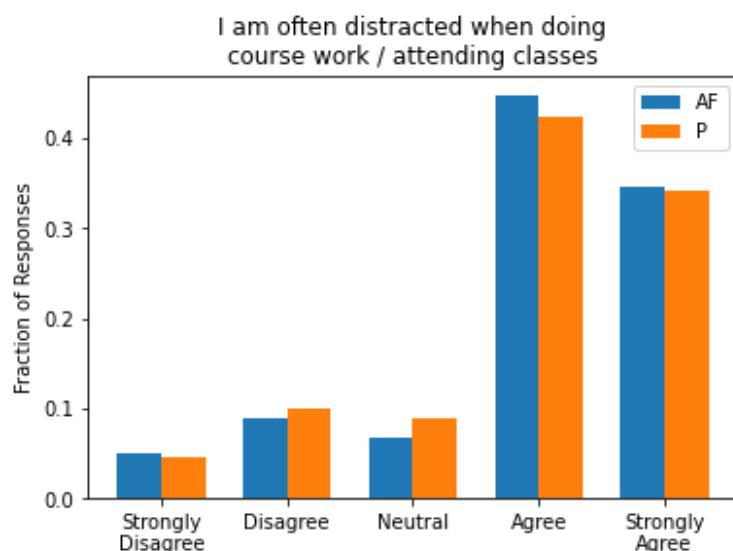
MWU results: MannwhitneyuResult(statistic=108562.0, pvalue=1.763363234
3734805e-07)

AF median: 3.0

P median: 3.0

cohens d: 0.396

f: 0.609



AF shape: (235, 43), P shape: (759, 43)

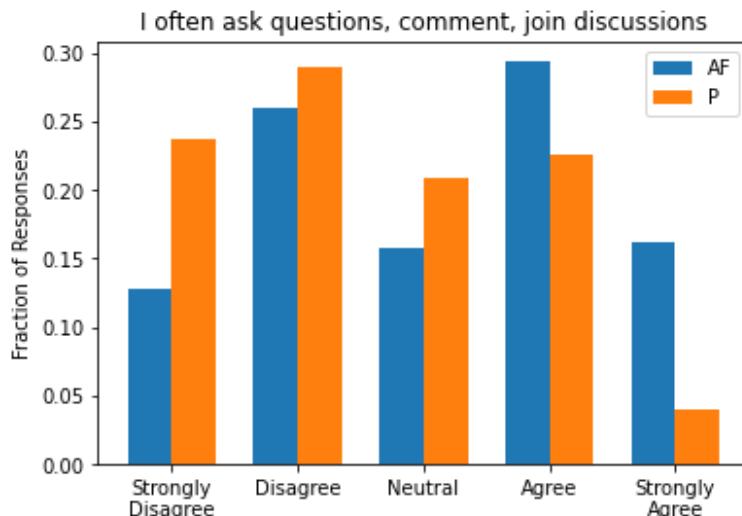
MWU results: MannwhitneyuResult(statistic=90700.0, pvalue=0.6740530197
422695)

AF median: 4.0

P median: 4.0

cohens d: 0.0284

f: 0.509



AF shape: (235, 43), P shape: (759, 43)

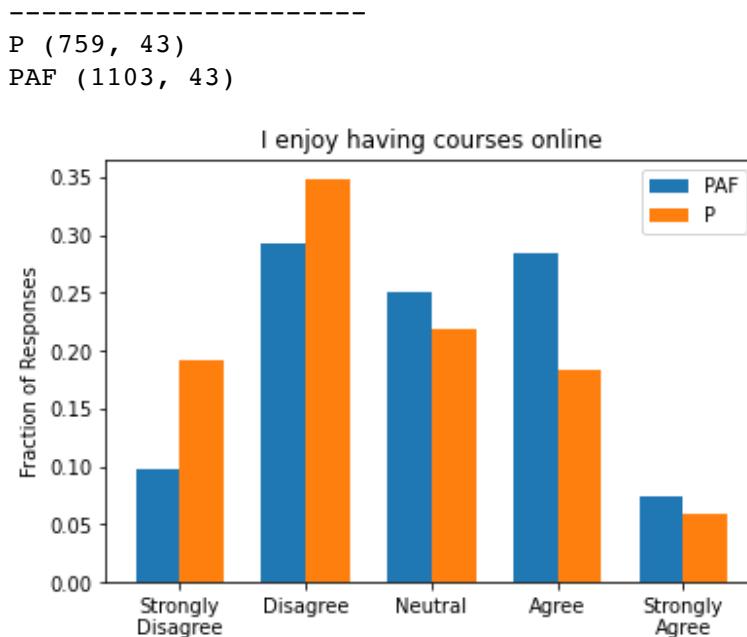
MWU results: MannwhitneyuResult(statistic=110786.5, pvalue=7.669067317
485222e-09)

AF median: 3.0

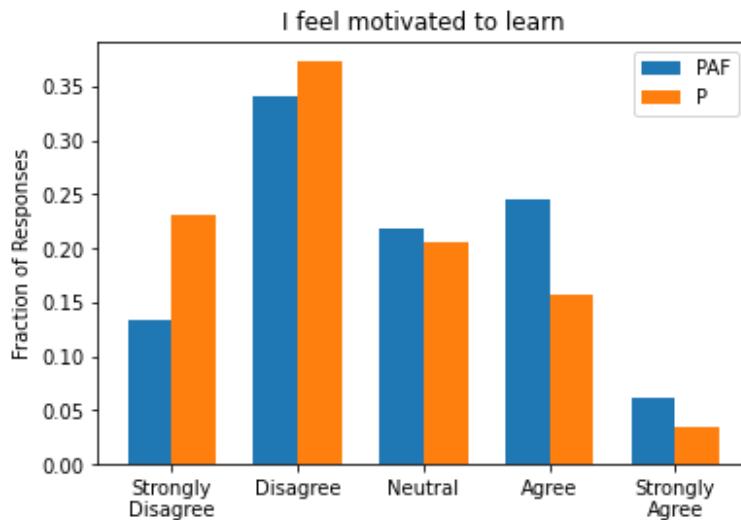
P median: 2.0

cohens d: 0.462

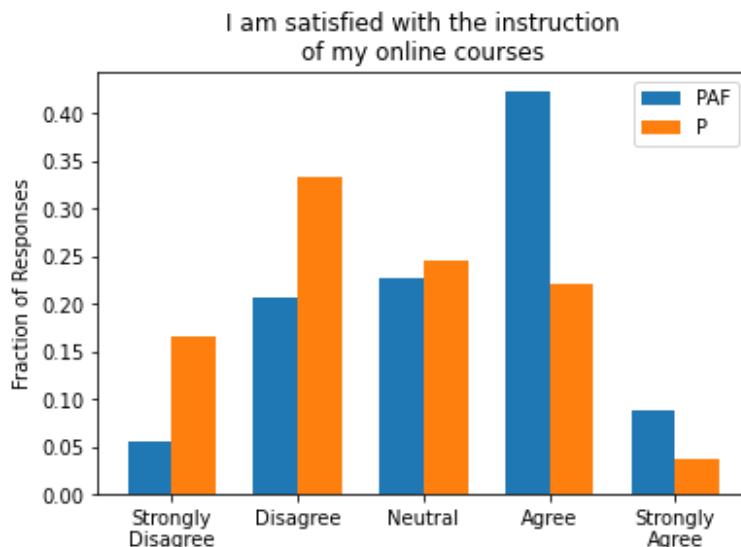
f: 0.621



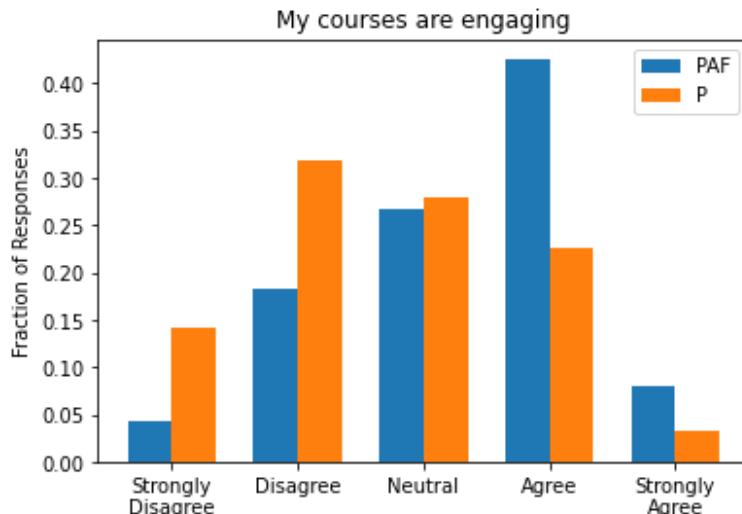
PAF shape: (1103, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=495859.0, pvalue=2.597772487
 1900237e-12)
 PAF median: 3.0
 P median: 2.0
 cohens d: 0.327
 f: 0.592



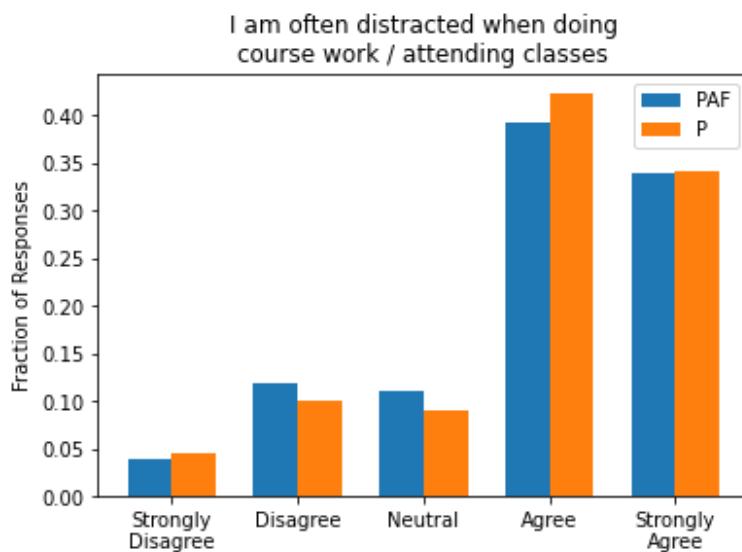
PAF shape: (1103, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=494060.0, pvalue=6.956851389
 5391115e-12)
 PAF median: 3.0
 P median: 2.0
 cohens d: 0.327
 f: 0.59



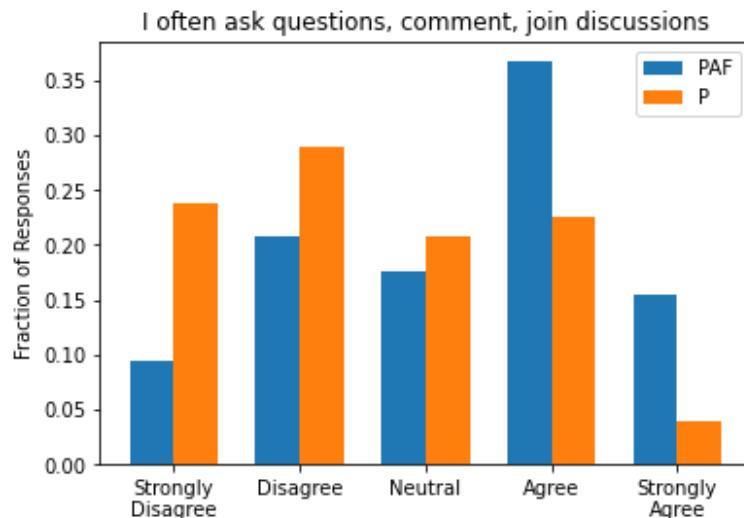
PAF shape: (1103, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=553375.5, pvalue=1.401493502
 4209035e-34)
 PAF median: 4.0
 P median: 3.0
 cohens d: 0.602
 f: 0.661



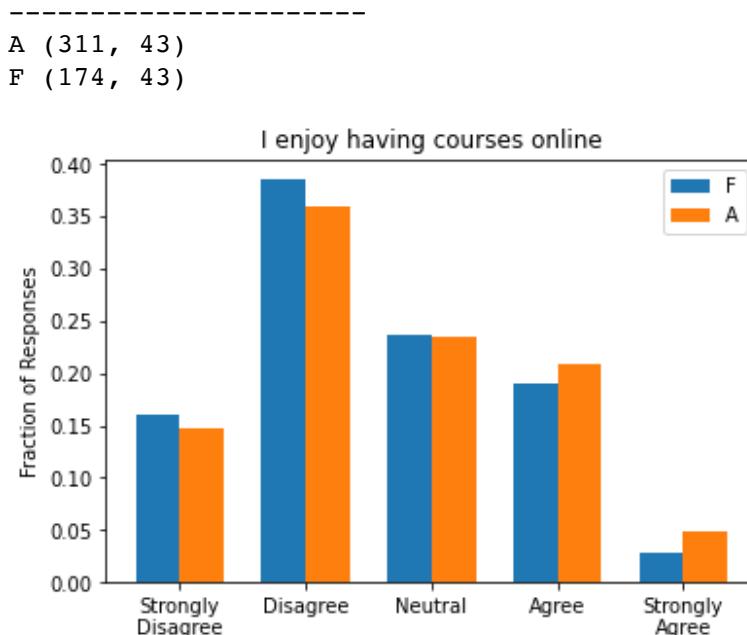
PAF shape: (1103, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=554277.5, pvalue=3.457289507
 $9963734e-35$)
 PAF median: 4.0
 P median: 3.0
 cohens d: 0.611
 f: 0.662



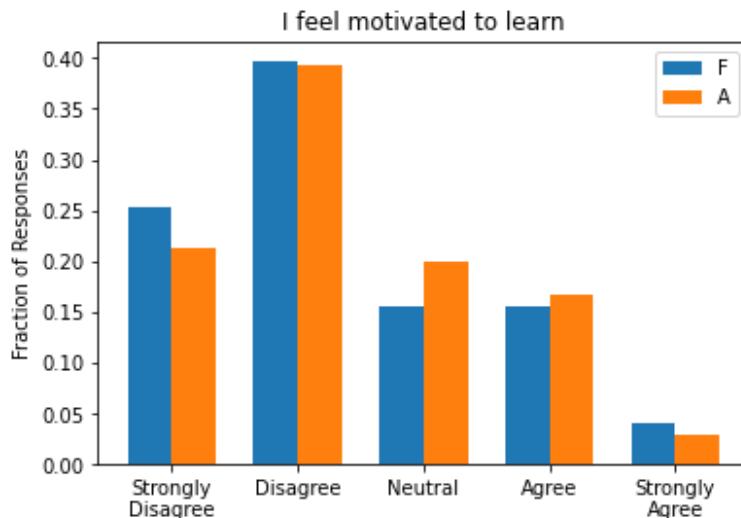
PAF shape: (1103, 43), P shape: (759, 43)
 MWU results: MannwhitneyuResult(statistic=410370.0, pvalue=0.445270392
 6972337)
 PAF median: 4.0
 P median: 4.0
 cohens d: -0.0357
 f: 0.49



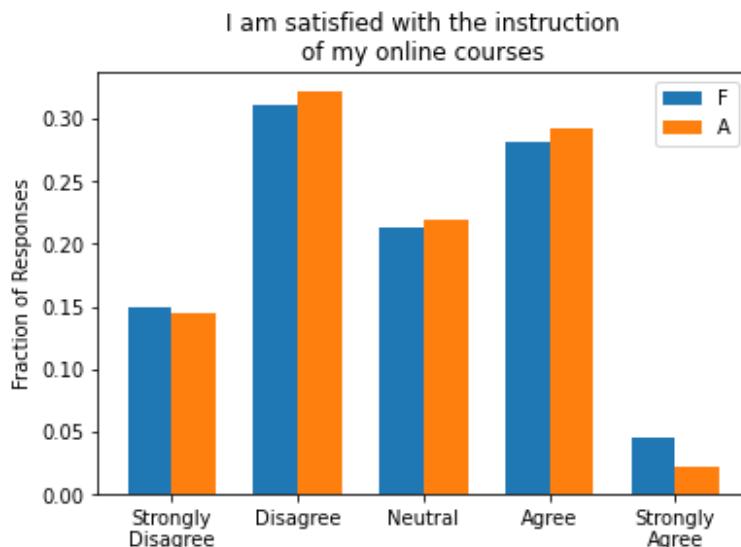
PAF shape: (1103, 43), P shape: (759, 43)
MWU results: MannwhitneyuResult(statistic=556537.5, pvalue=1.423770626
9747546e-35)
PAF median: 4.0
P median: 2.0
cohens d: 0.613
f: 0.665



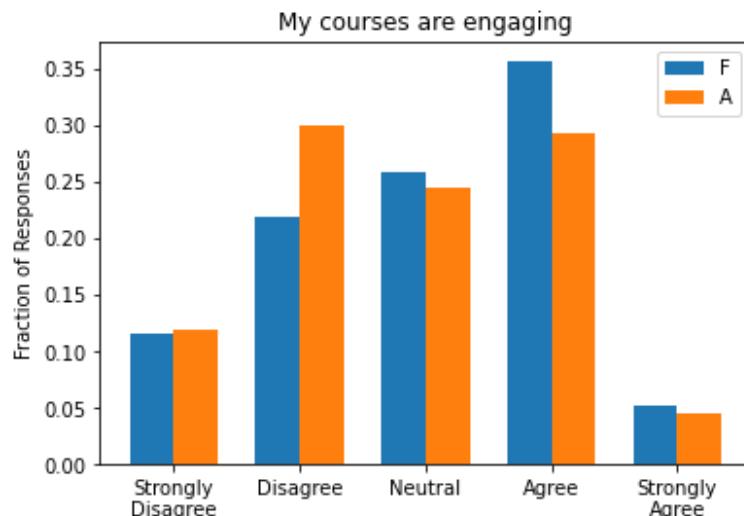
F shape: (174, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=25665.5, pvalue=0.3285588023
 031931)
 F median: 2.0
 A median: 2.0
 cohens d: -0.0999
 f: 0.474



F shape: (174, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=25725.5, pvalue=0.3477185794
 3318685)
 F median: 2.0
 A median: 2.0
 cohens d: -0.068
 f: 0.475



F shape: (174, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=27464.5, pvalue=0.7756541252
 783192)
 F median: 3.0
 A median: 3.0
 cohens d: 0.0337
 f: 0.508



F shape: (174, 43), A shape: (311, 43)

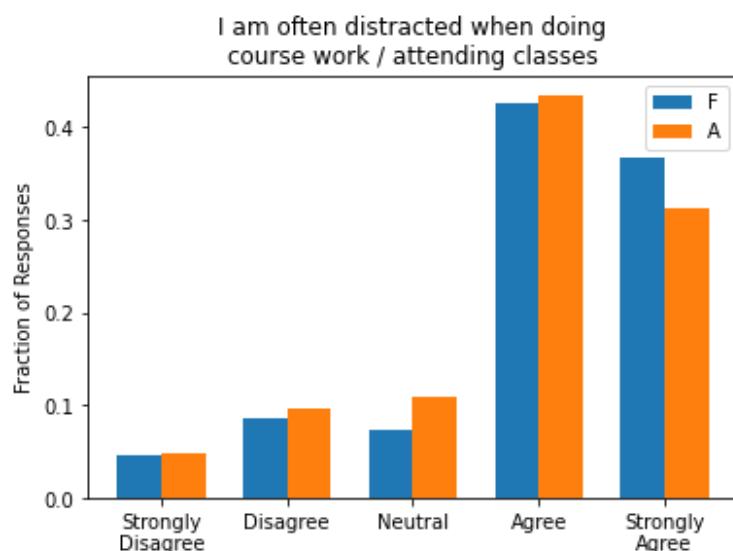
MWU results: MannwhitneyuResult(statistic=29432.0, pvalue=0.0965638649
68749)

F median: 3.0

A median: 3.0

cohens d: 0.149

f: 0.544



F shape: (174, 43), A shape: (311, 43)

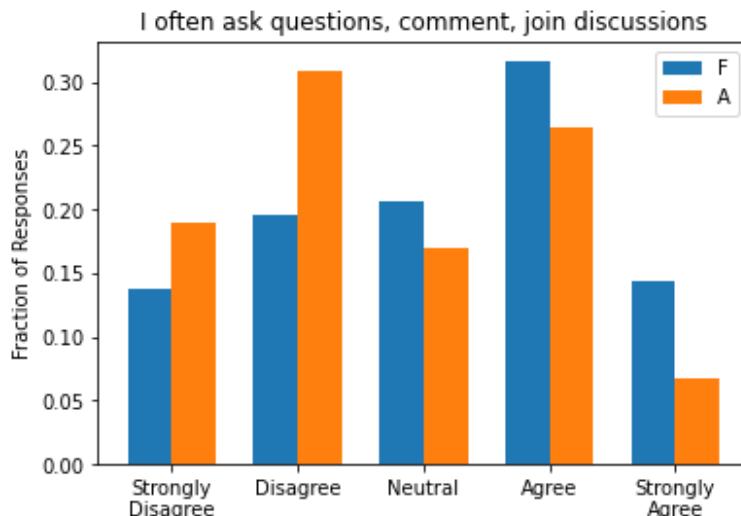
MWU results: MannwhitneyuResult(statistic=28957.0, pvalue=0.1717669899
5617323)

F median: 4.0

A median: 4.0

cohens d: 0.107

f: 0.535



F shape: (174, 43), A shape: (311, 43)

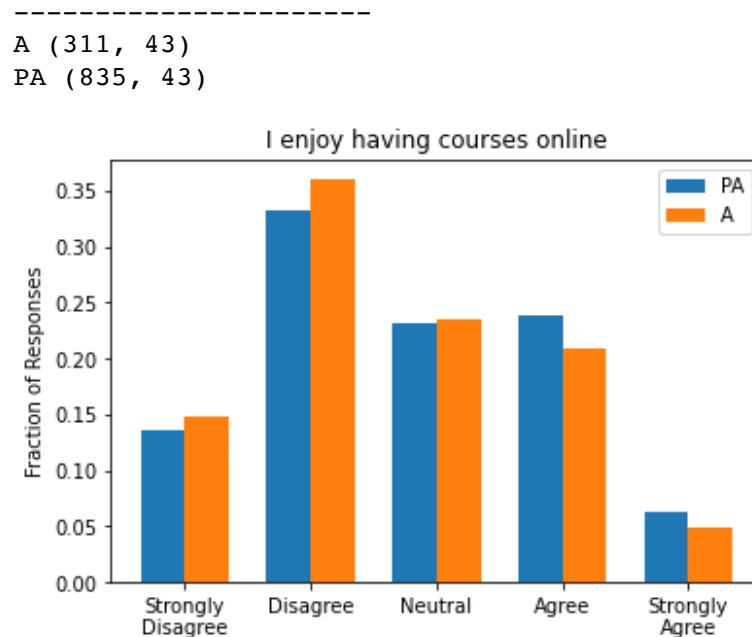
MWU results: MannwhitneyuResult(statistic=32087.5, pvalue=0.0004775665
6214532846)

F median: 3.0

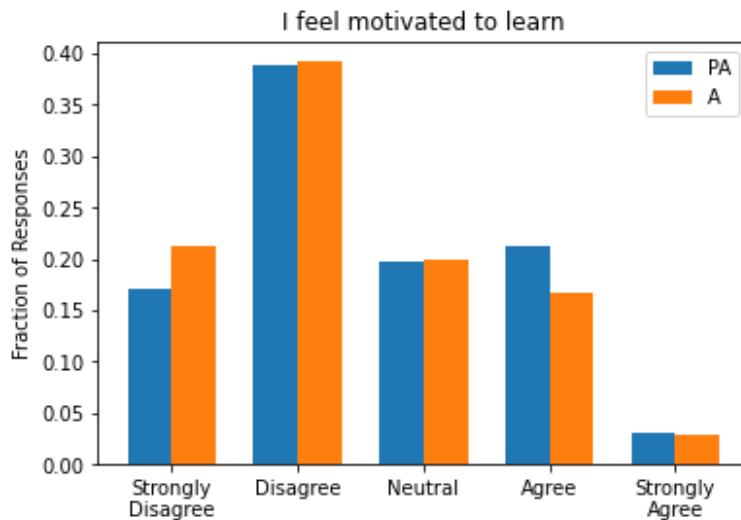
A median: 3.0

cohens d: 0.337

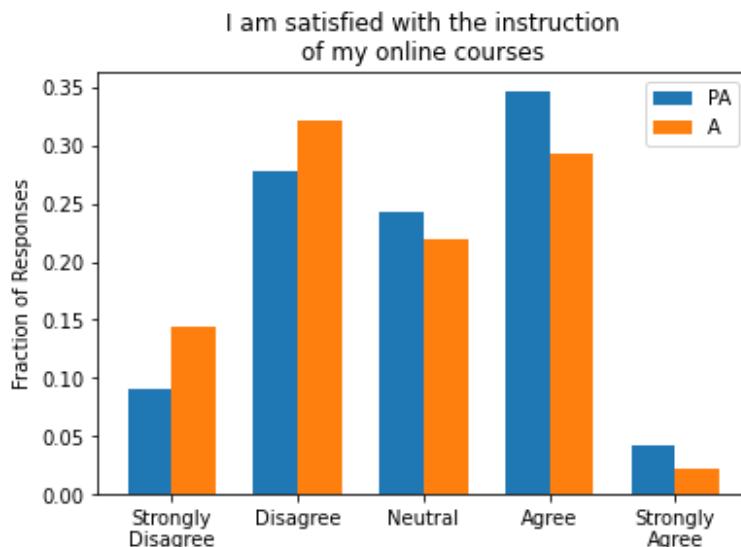
f: 0.593



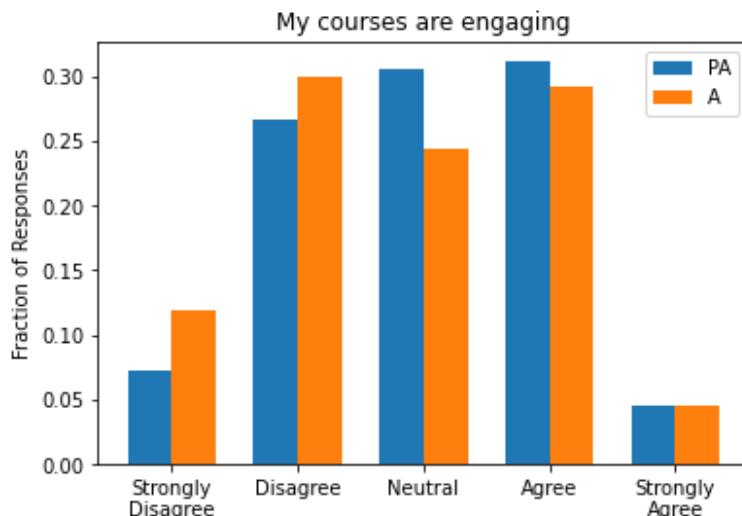
PA shape: (835, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=136913.5, pvalue=0.141825583
 23252661)
 PA median: 3.0
 A median: 2.0
 cohens d: 0.0998
 f: 0.527



PA shape: (835, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=138792.5, pvalue=0.060971154
 36590952)
 PA median: 2.0
 A median: 2.0
 cohens d: 0.123
 f: 0.534



PA shape: (835, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=145556.0, pvalue=0.001039406
 0682541297)
 PA median: 3.0
 A median: 3.0
 cohens d: 0.225
 f: 0.561



PA shape: (835, 43), A shape: (311, 43)

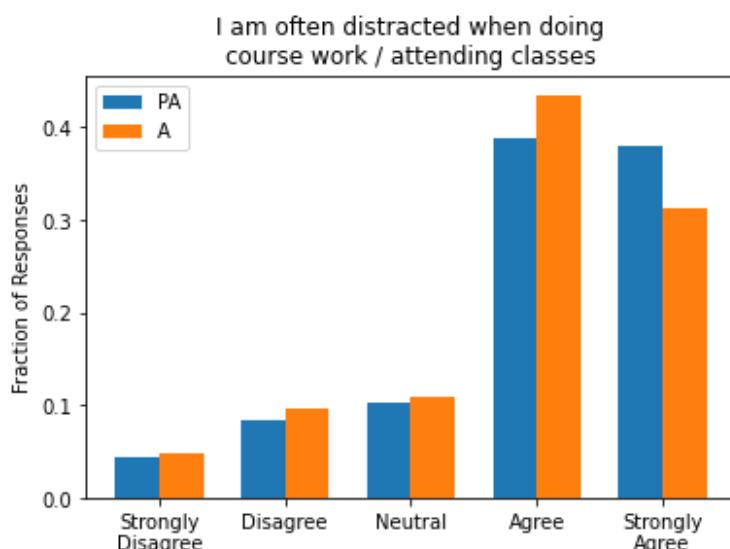
MWU results: MannwhitneyuResult(statistic=139429.0, pvalue=0.045522009
1028771)

PA median: 3.0

A median: 3.0

cohens d: 0.141

f: 0.537



PA shape: (835, 43), A shape: (311, 43)

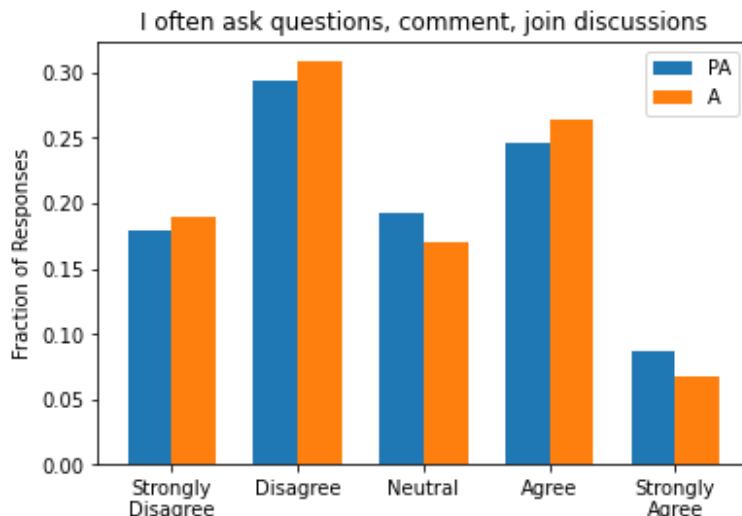
MWU results: MannwhitneyuResult(statistic=138534.5, pvalue=0.063869935
62665302)

PA median: 4.0

A median: 4.0

cohens d: 0.101

f: 0.533



PA shape: (835, 43), A shape: (311, 43)

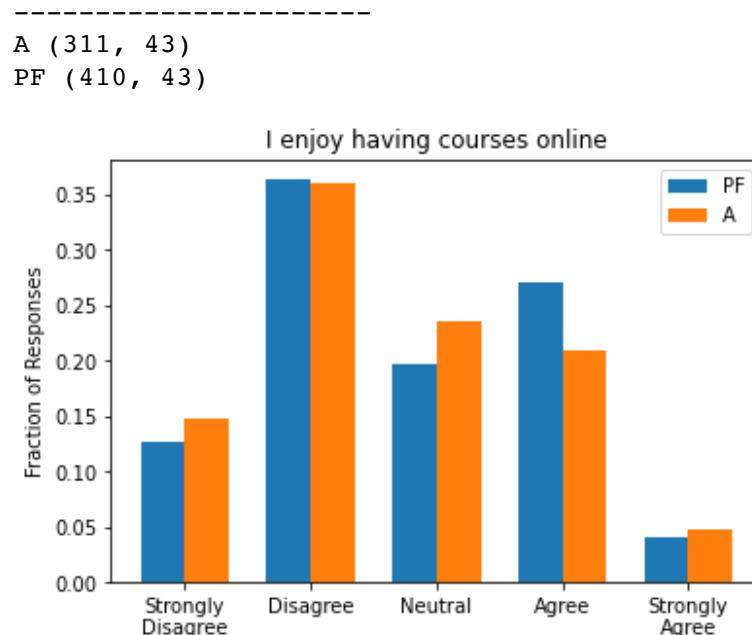
MWU results: MannwhitneyuResult(statistic=132898.5, pvalue=0.527991661
0121218)

PA median: 3.0

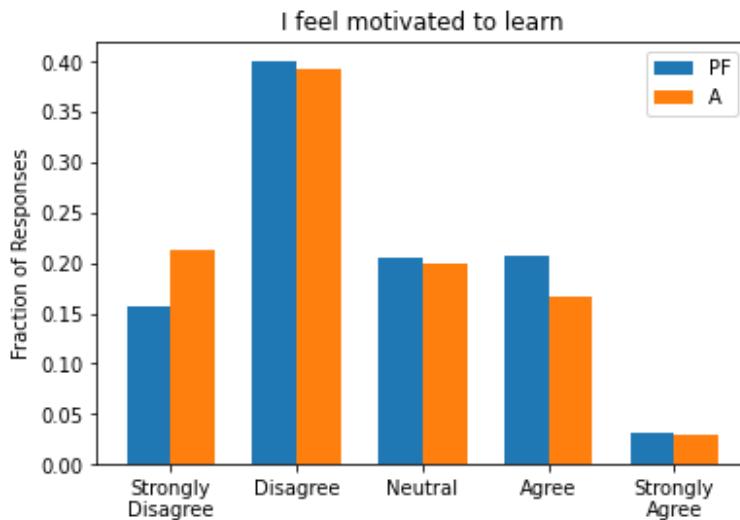
A median: 3.0

cohens d: 0.044

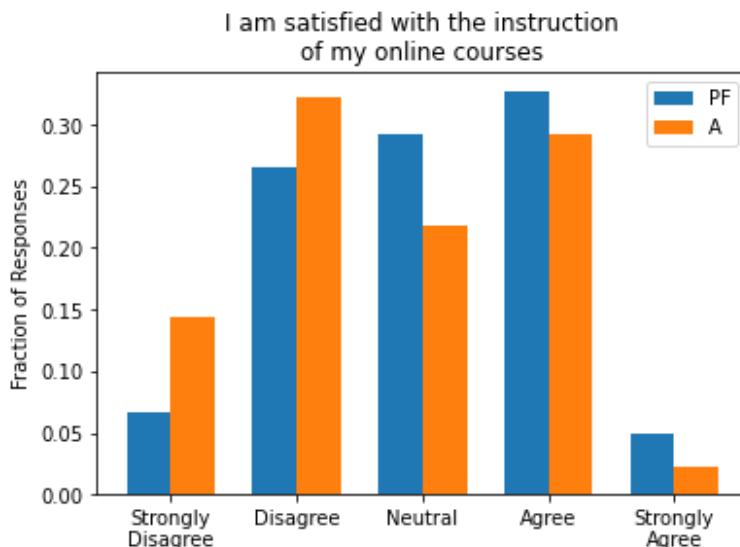
f: 0.512



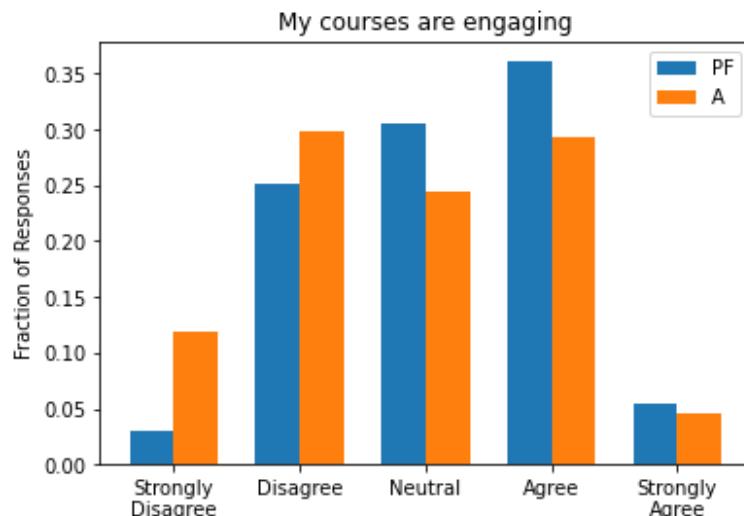
PF shape: (410, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=66556.5, pvalue=0.2932244489
 072563)
 PF median: 3.0
 A median: 2.0
 cohens d: 0.0782
 f: 0.522



PF shape: (410, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=68780.5, pvalue=0.0580907484
 3676206)
 PF median: 2.0
 A median: 2.0
 cohens d: 0.139
 f: 0.539



PF shape: (410, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=73231.5, pvalue=0.0003789442
 130922306)
 PF median: 3.0
 A median: 3.0
 cohens d: 0.283
 f: 0.574



PF shape: (410, 43), A shape: (311, 43)

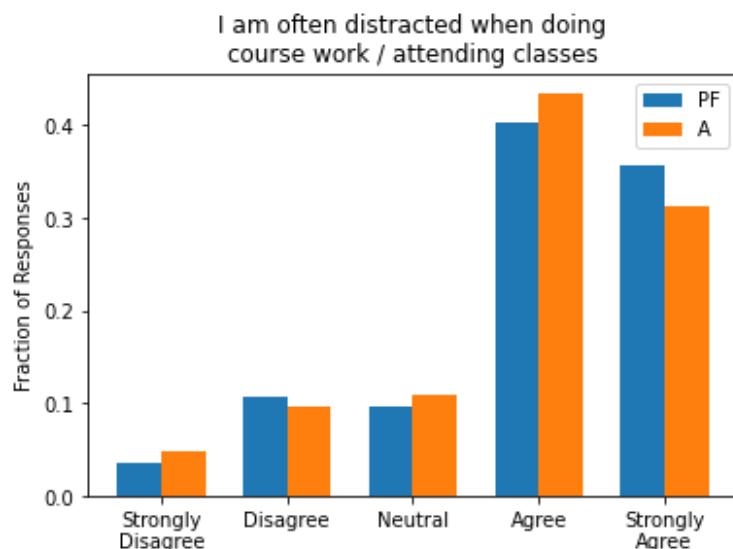
MWU results: MannwhitneyuResult(statistic=73732.5, pvalue=0.0001750264873936679)

PF median: 3.0

A median: 3.0

cohens d: 0.305

f: 0.578



PF shape: (410, 43), A shape: (311, 43)

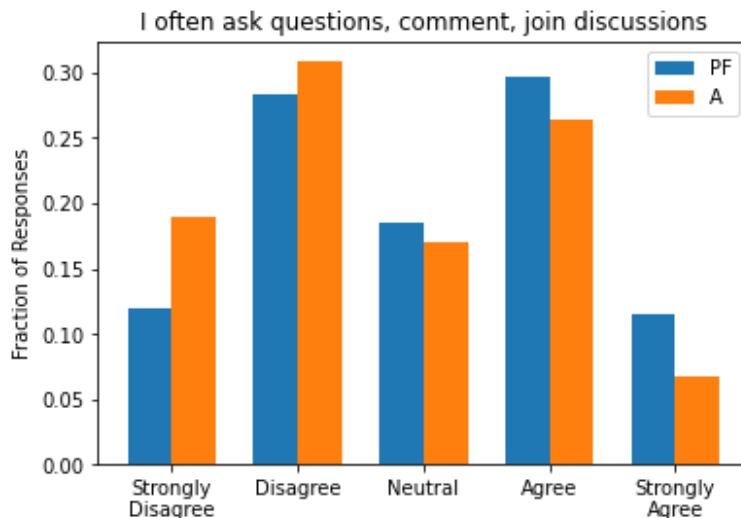
MWU results: MannwhitneyuResult(statistic=66410.0, pvalue=0.30899677257774216)

PF median: 4.0

A median: 4.0

cohens d: 0.0627

f: 0.521



PF shape: (410, 43), A shape: (311, 43)

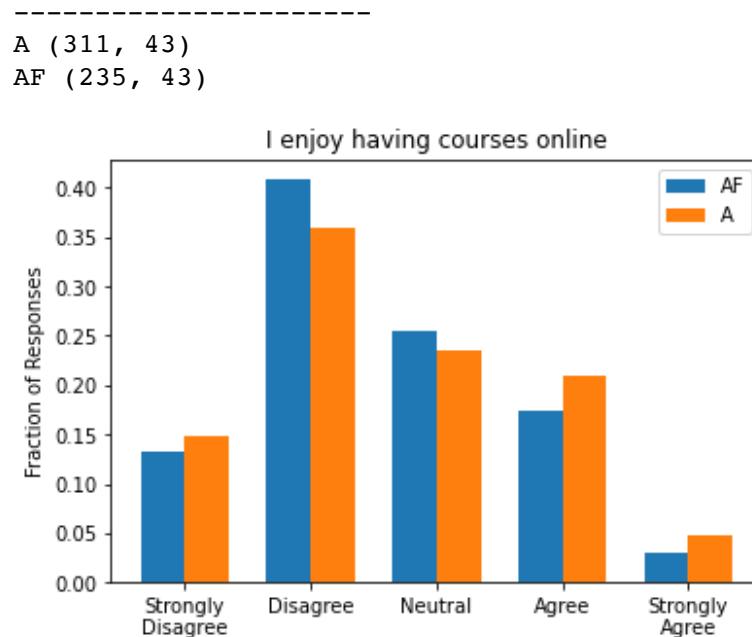
MWU results: MannwhitneyuResult(statistic=72153.0, pvalue=0.0017857204
129171805)

PF median: 3.0

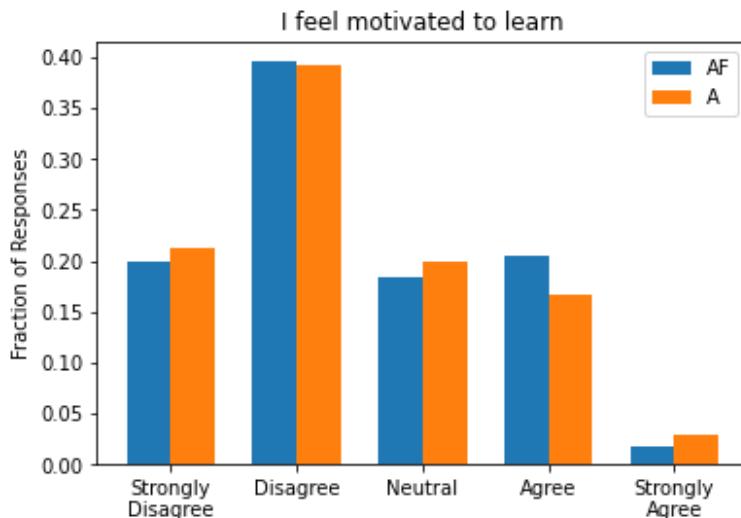
A median: 3.0

cohens d: 0.239

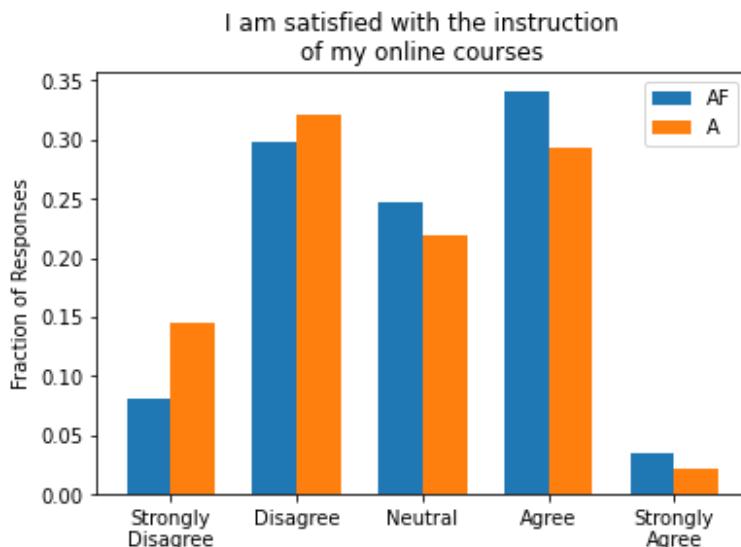
f: 0.566



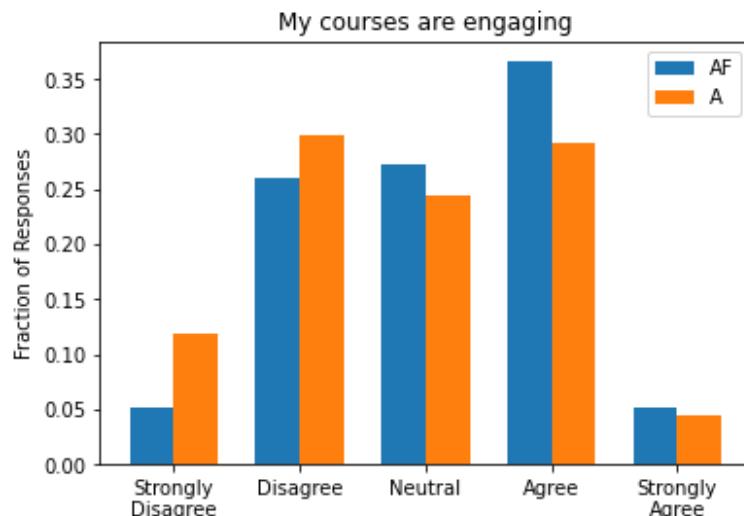
AF shape: (235, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=35103.0, pvalue=0.4111201734
 56326)
 AF median: 2.0
 A median: 2.0
 cohens d: -0.0818
 f: 0.48



AF shape: (235, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=37253.0, pvalue=0.6845536804
 871708)
 AF median: 2.0
 A median: 2.0
 cohens d: 0.0316
 f: 0.51



AF shape: (235, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=40599.5, pvalue=0.0208559890
 8556707)
 AF median: 3.0
 A median: 3.0
 cohens d: 0.206
 f: 0.556



AF shape: (235, 43), A shape: (311, 43)

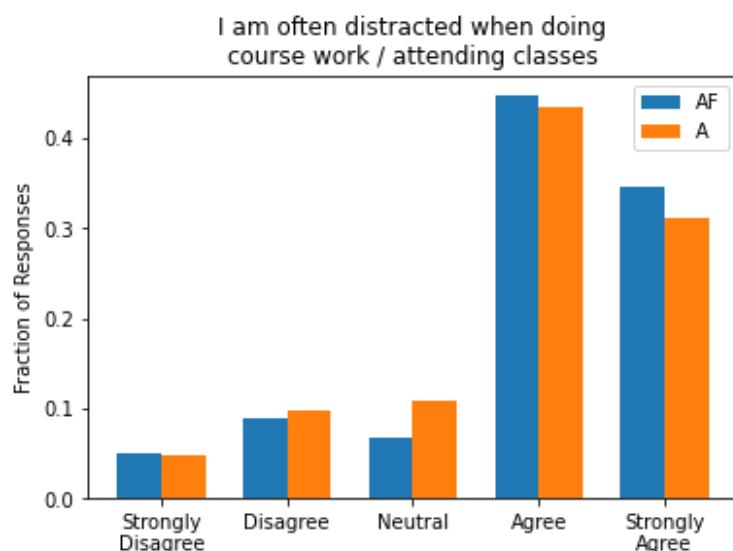
MWU results: MannwhitneyuResult(statistic=41344.5, pvalue=0.0062569293
60262087)

AF median: 3.0

A median: 3.0

cohens d: 0.244

f: 0.566



AF shape: (235, 43), A shape: (311, 43)

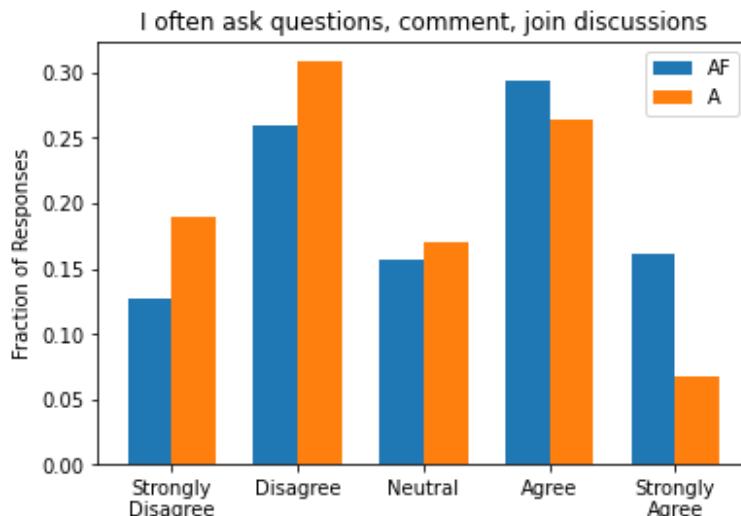
MWU results: MannwhitneyuResult(statistic=38357.0, pvalue=0.2890462884
794427)

AF median: 4.0

A median: 4.0

cohens d: 0.0719

f: 0.525



AF shape: (235, 43), A shape: (311, 43)

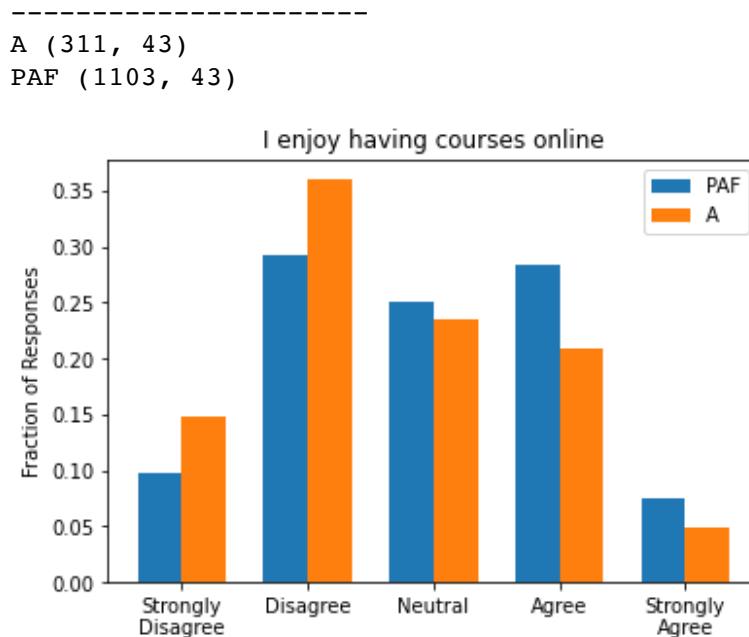
MWU results: MannwhitneyuResult(statistic=42727.5, pvalue=0.0004911389
293302866)

AF median: 3.0

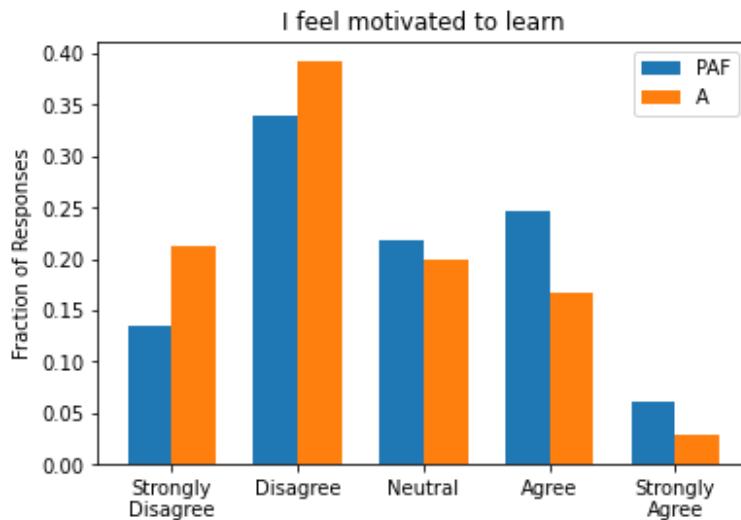
A median: 3.0

cohens d: 0.309

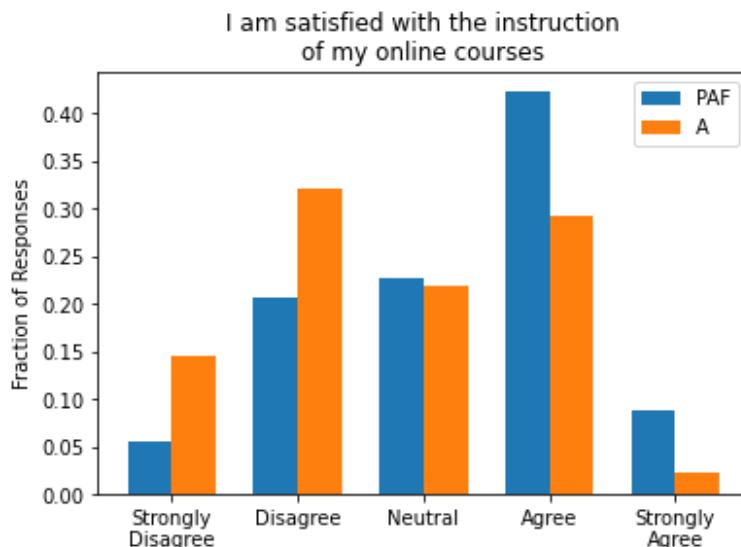
f: 0.585



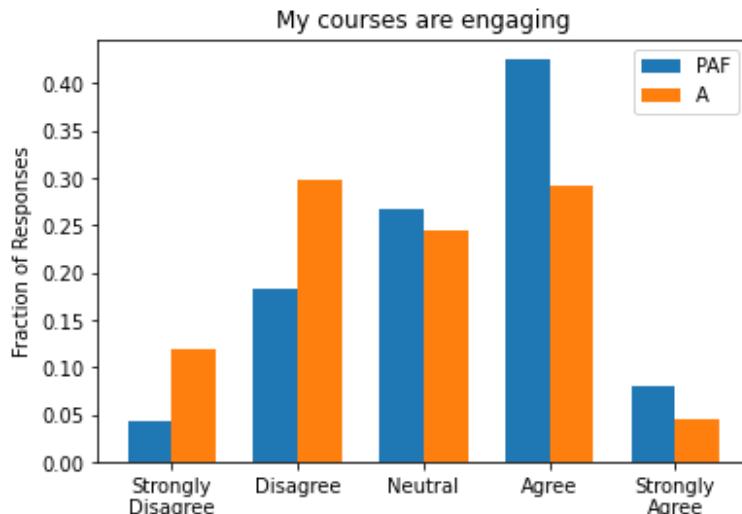
PAF shape: (1103, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=196738.0, pvalue=4.110975165
 098522e-05)
 PAF median: 3.0
 A median: 2.0
 cohens d: 0.263
 f: 0.574



PAF shape: (1103, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=200926.0, pvalue=1.652295003
 3453968e-06)
 PAF median: 3.0
 A median: 2.0
 cohens d: 0.311
 f: 0.586



PAF shape: (1103, 43), A shape: (311, 43)
 MWU results: MannwhitneyuResult(statistic=218250.0, pvalue=1.523821492
 8120452e-14)
 PAF median: 4.0
 A median: 3.0
 cohens d: 0.518
 f: 0.636



PAF shape: (1103, 43), A shape: (311, 43)

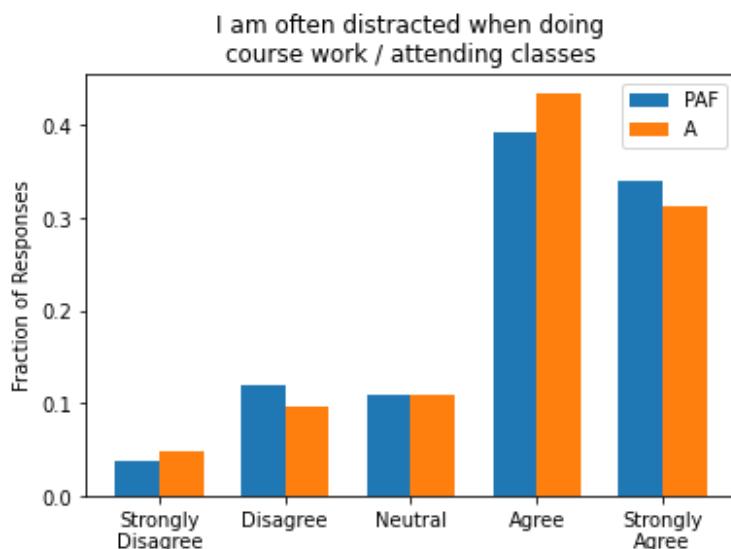
MWU results: MannwhitneyuResult(statistic=212389.5, pvalue=1.621001356
905355e-11)

PAF median: 4.0

A median: 3.0

cohens d: 0.46

f: 0.619



PAF shape: (1103, 43), A shape: (311, 43)

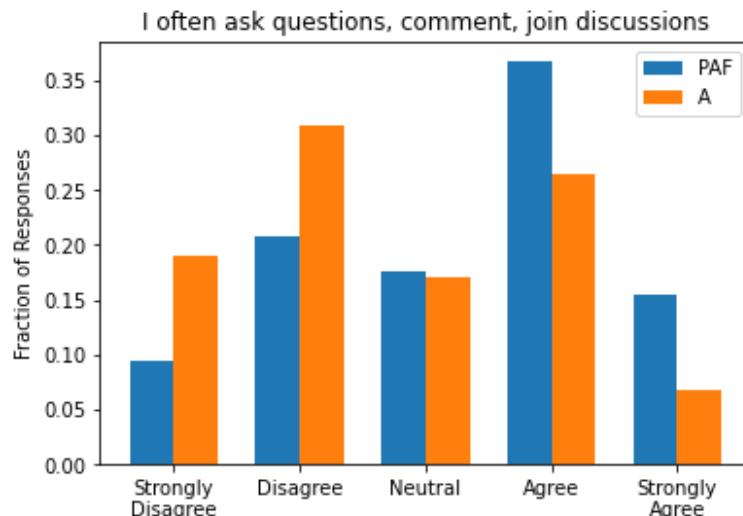
MWU results: MannwhitneyuResult(statistic=173394.0, pvalue=0.755116045
0507546)

PAF median: 4.0

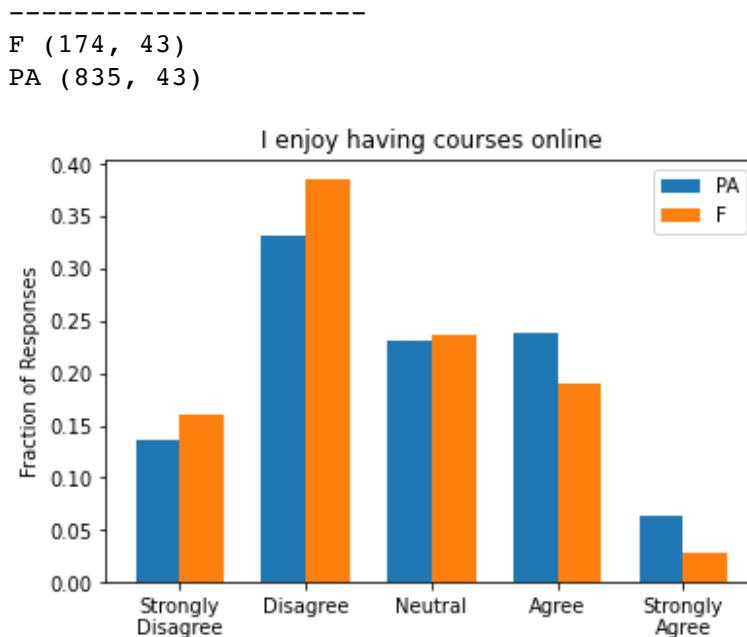
A median: 4.0

cohens d: 0.00725

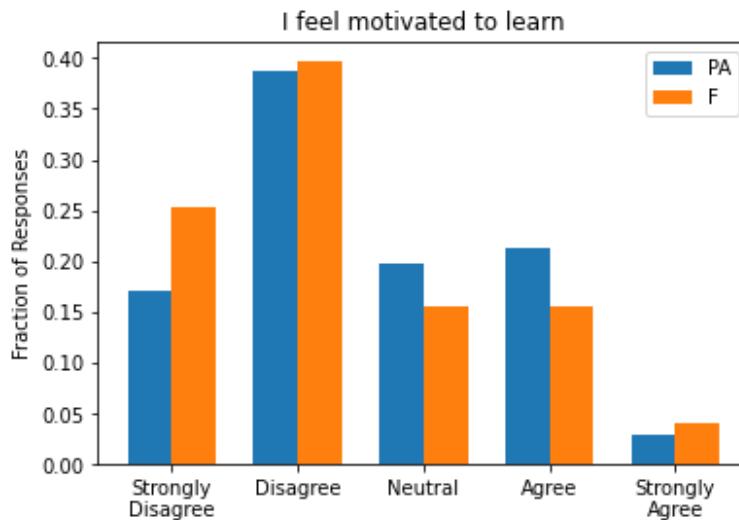
f: 0.505



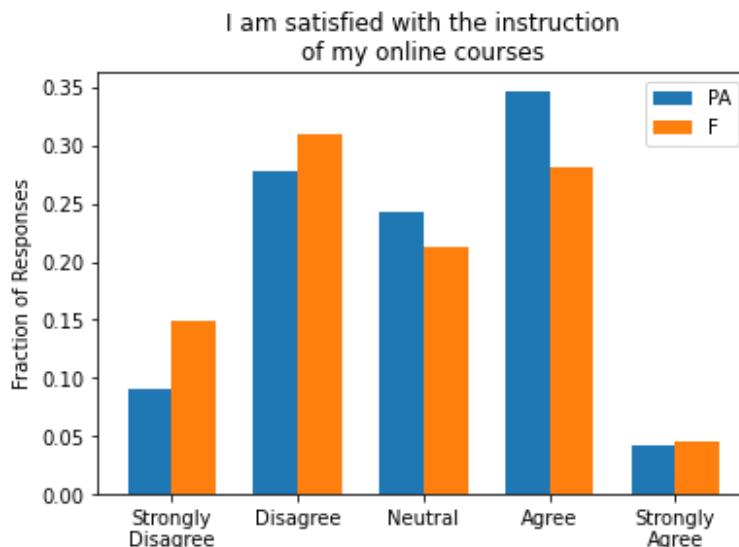
PAF shape: (1103, 43), A shape: (311, 43)
MWU results: MannwhitneyuResult(statistic=215012.5, pvalue=1.632907917
1053864e-12)
PAF median: 4.0
A median: 3.0
cohens d: 0.466
f: 0.627



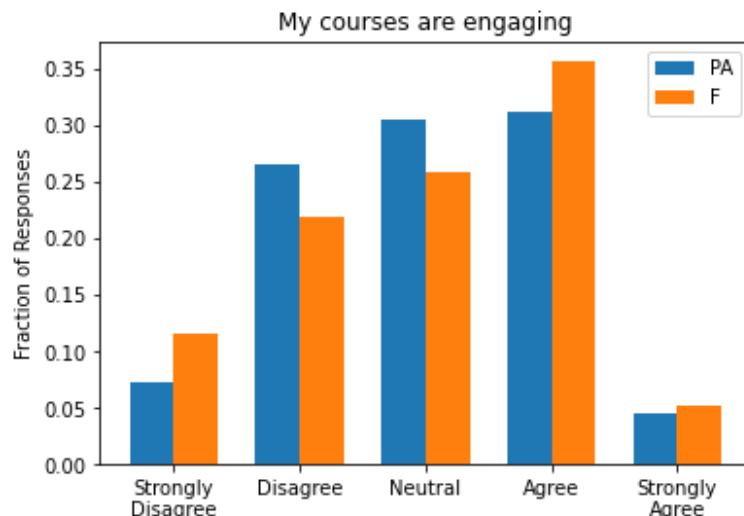
PA shape: (835, 43), F shape: (174, 43)
 MWU results: MannwhitneyuResult(statistic=80346.0, pvalue=0.0226089175
 33716175)
 PA median: 3.0
 F median: 2.0
 cohens d: 0.197
 f: 0.553



PA shape: (835, 43), F shape: (174, 43)
 MWU results: MannwhitneyuResult(statistic=81038.0, pvalue=0.0123088103
 74683257)
 PA median: 2.0
 F median: 2.0
 cohens d: 0.19
 f: 0.558



PA shape: (835, 43), F shape: (174, 43)
 MWU results: MannwhitneyuResult(statistic=80123.0, pvalue=0.0262013554
 67904648)
 PA median: 3.0
 F median: 3.0
 cohens d: 0.189
 f: 0.551



PA shape: (835, 43), F shape: (174, 43)

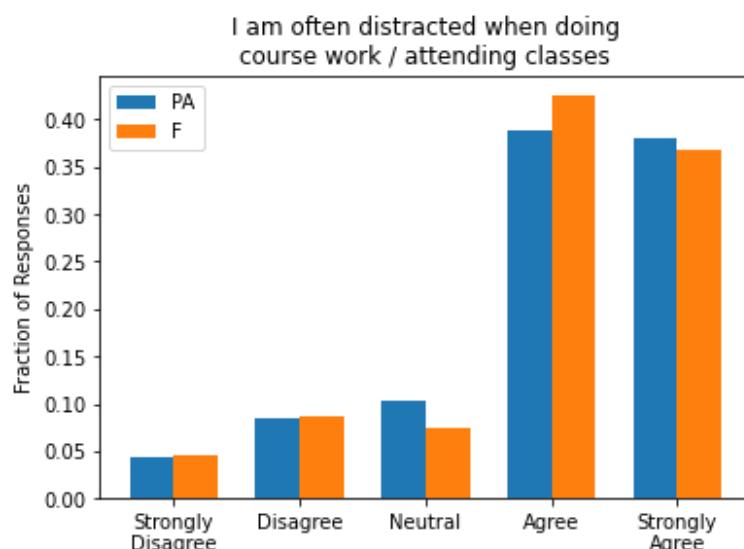
MWU results: MannwhitneyuResult(statistic=71066.5, pvalue=0.6386632847
827738)

PA median: 3.0

F median: 3.0

cohens d: -0.018

f: 0.489



PA shape: (835, 43), F shape: (174, 43)

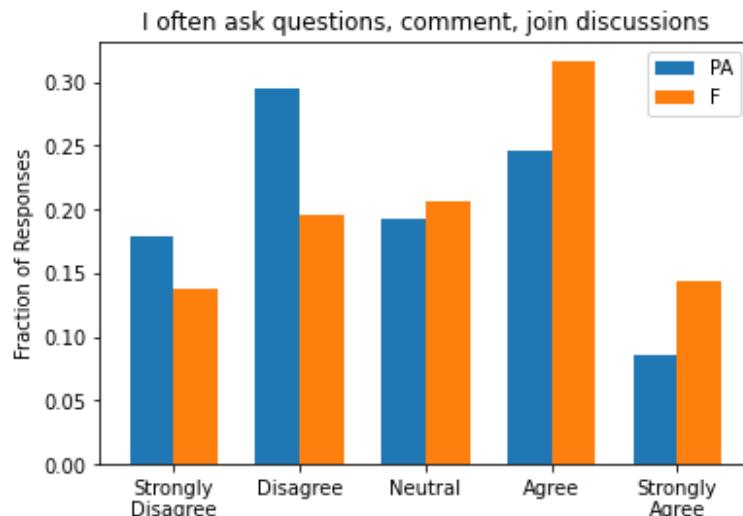
MWU results: MannwhitneyuResult(statistic=72509.0, pvalue=0.9671024677
62766)

PA median: 4.0

F median: 4.0

cohens d: -0.00609

f: 0.499



PA shape: (835, 43), F shape: (174, 43)

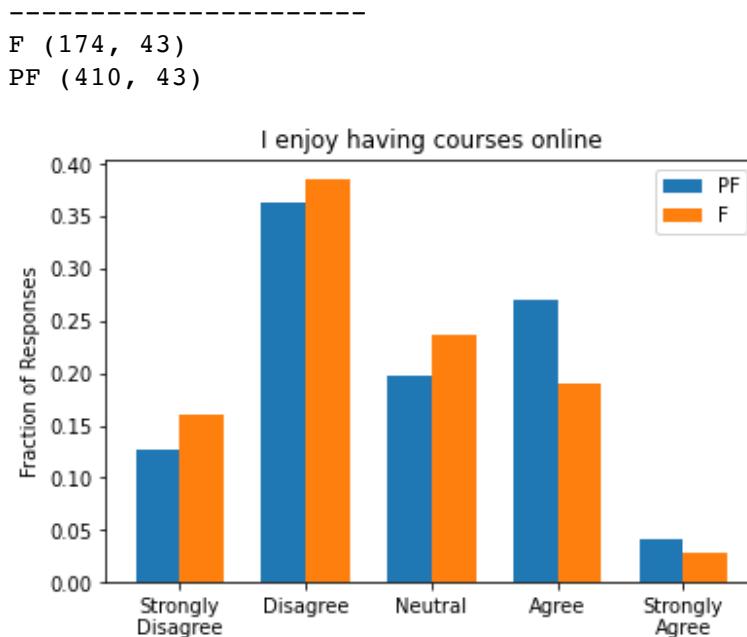
MWU results: MannwhitneyuResult(statistic=60779.0, pvalue=0.0004918066
630161392)

PA median: 3.0

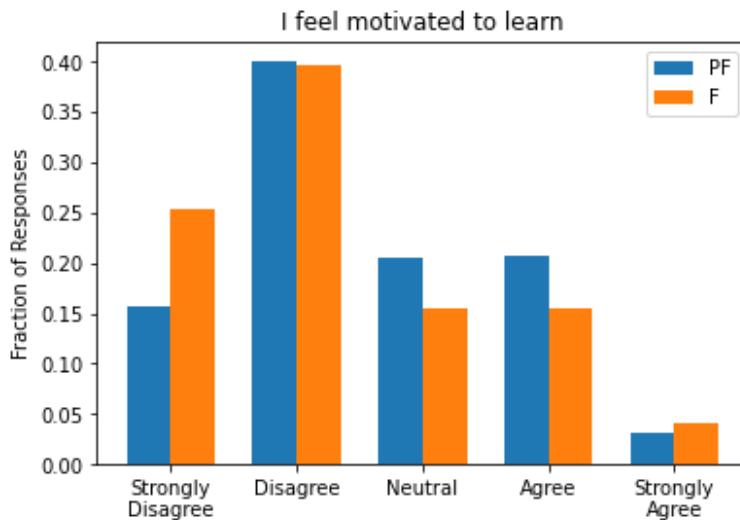
F median: 3.0

cohens d: -0.293

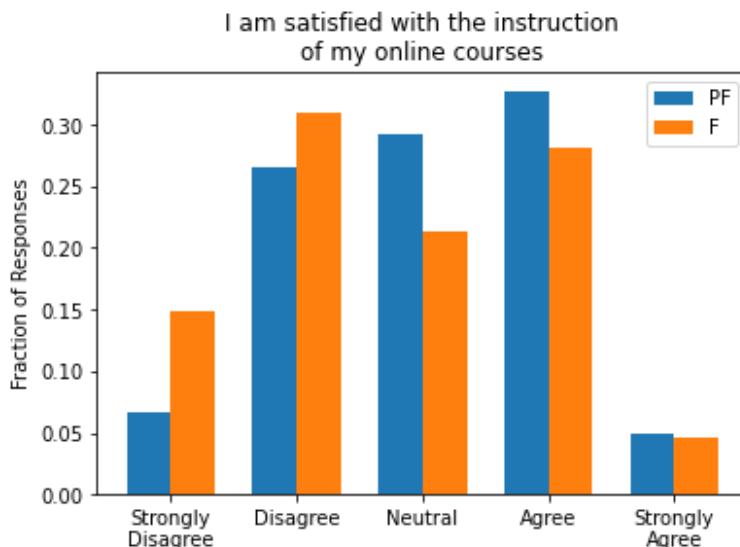
f: 0.418



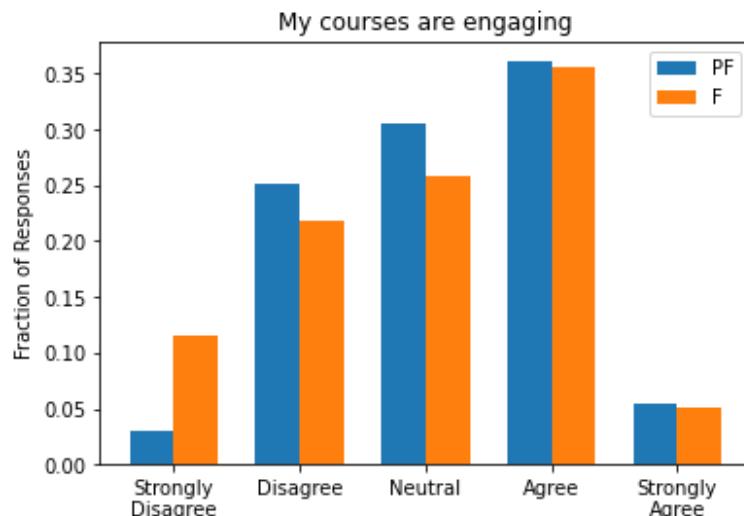
PF shape: (410, 43), F shape: (174, 43)
 MWU results: MannwhitneyuResult(statistic=39090.0, pvalue=0.0562741176
 5014383)
 PF median: 3.0
 F median: 2.0
 cohens d: 0.179
 f: 0.548



PF shape: (410, 43), F shape: (174, 43)
 MWU results: MannwhitneyuResult(statistic=40172.0, pvalue=0.0116765117
 4785875)
 PF median: 2.0
 F median: 2.0
 cohens d: 0.205
 f: 0.563



PF shape: (410, 43), F shape: (174, 43)
 MWU results: MannwhitneyuResult(statistic=40309.0, pvalue=0.0097925371
 63196863)
 PF median: 3.0
 F median: 3.0
 cohens d: 0.246
 f: 0.565



PF shape: (410, 43), F shape: (174, 43)

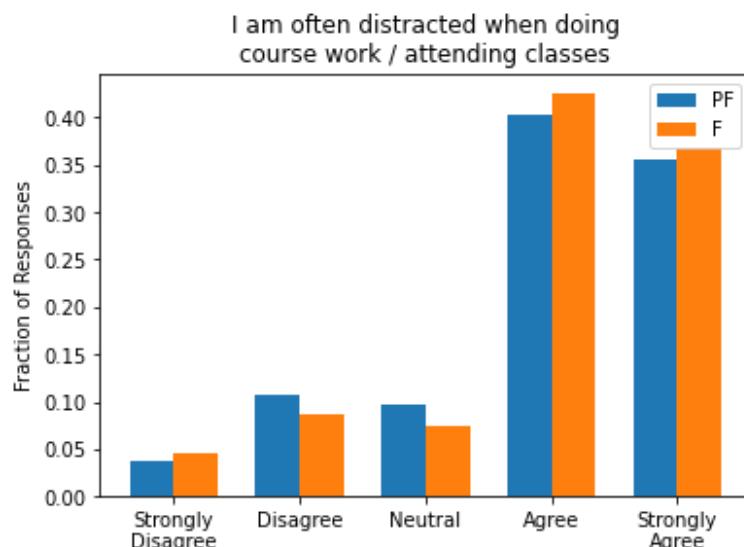
MWU results: MannwhitneyuResult(statistic=37760.5, pvalue=0.2412139073
3283476)

PF median: 3.0

F median: 3.0

cohens d: 0.146

f: 0.529



PF shape: (410, 43), F shape: (174, 43)

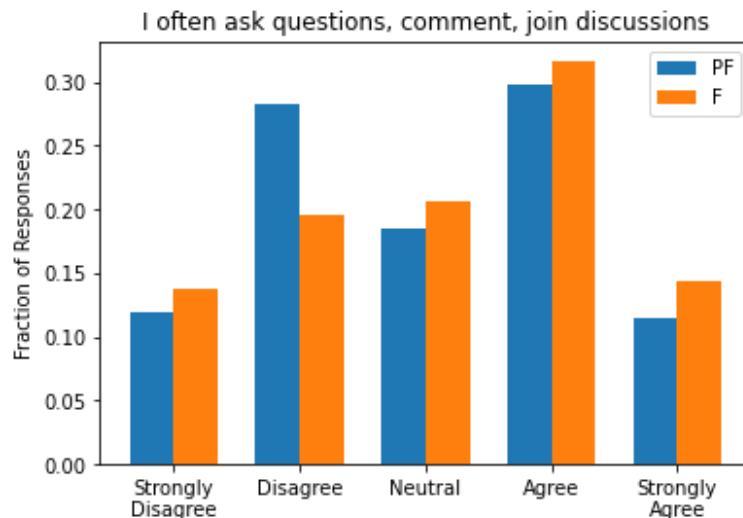
MWU results: MannwhitneyuResult(statistic=34699.0, pvalue=0.5797351941
391374)

PF median: 4.0

F median: 4.0

cohens d: -0.0442

f: 0.486



PF shape: (410, 43), F shape: (174, 43)

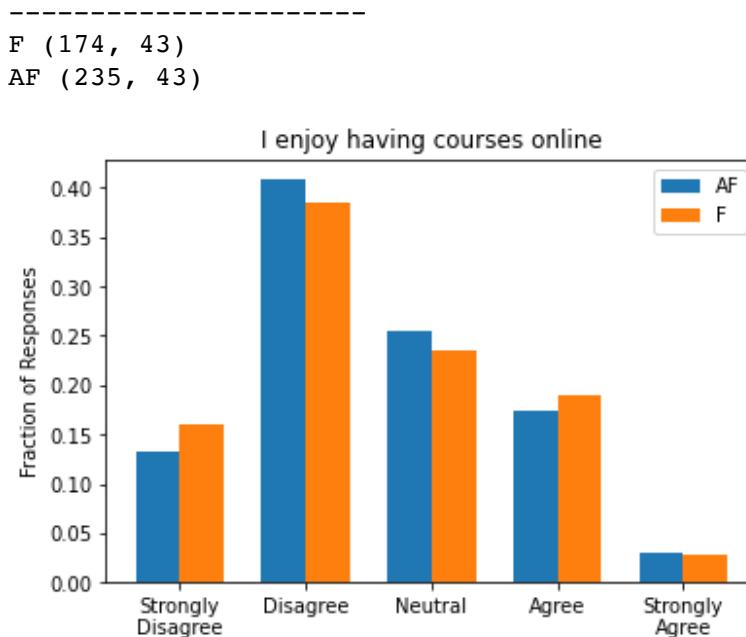
MWU results: MannwhitneyuResult(statistic=33533.5, pvalue=0.2385385032
6762005)

PF median: 3.0

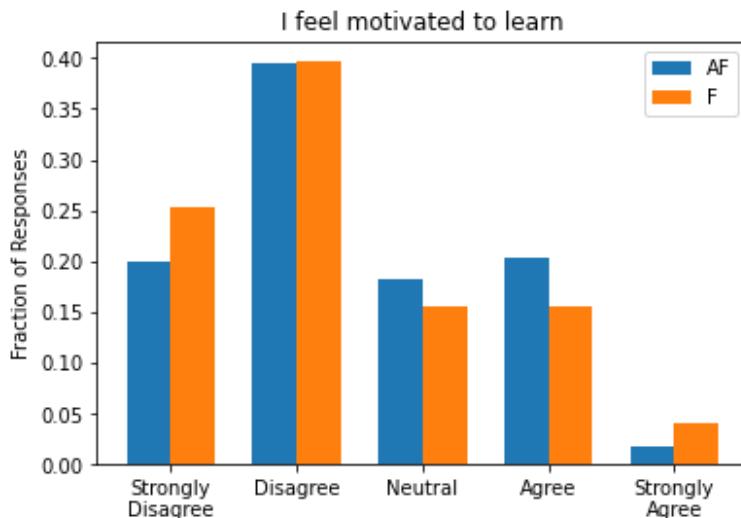
F median: 3.0

cohens d: -0.102

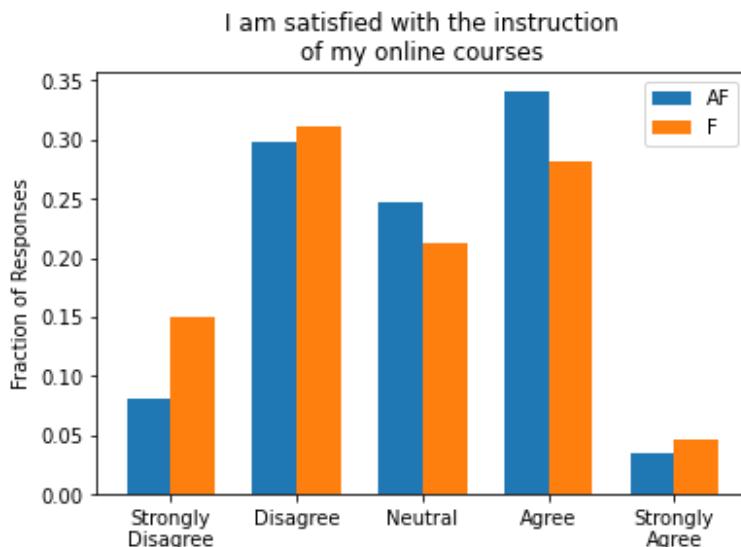
f: 0.47



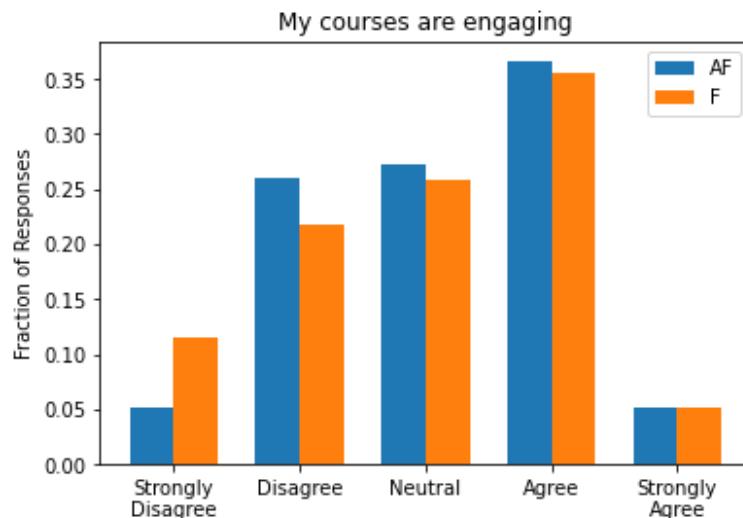
AF shape: (235, 43), F shape: (174, 43)
 MWU results: MannwhitneyuResult(statistic=20721.0, pvalue=0.8072489595
 982968)
 AF median: 2.0
 F median: 2.0
 cohens d: 0.0207
 f: 0.507



AF shape: (235, 43), F shape: (174, 43)
 MWU results: MannwhitneyuResult(statistic=21824.0, pvalue=0.2229208656
 4652502)
 AF median: 2.0
 F median: 2.0
 cohens d: 0.0991
 f: 0.534



AF shape: (235, 43), F shape: (174, 43)
 MWU results: MannwhitneyuResult(statistic=22350.0, pvalue=0.0941961134
 3290996)
 AF median: 3.0
 F median: 3.0
 cohens d: 0.169
 f: 0.547



AF shape: (235, 43), F shape: (174, 43)

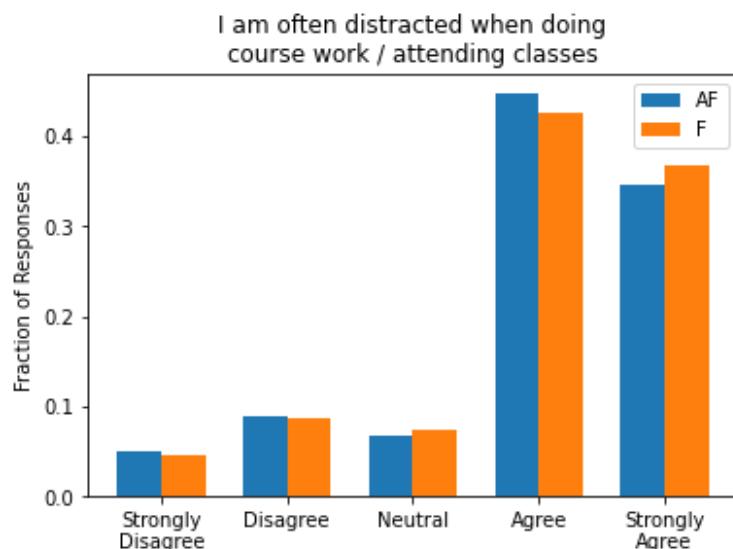
MWU results: MannwhitneyuResult(statistic=21209.0, pvalue=0.5004046155
280903)

AF median: 3.0

F median: 3.0

cohens d: 0.0896

f: 0.519



AF shape: (235, 43), F shape: (174, 43)

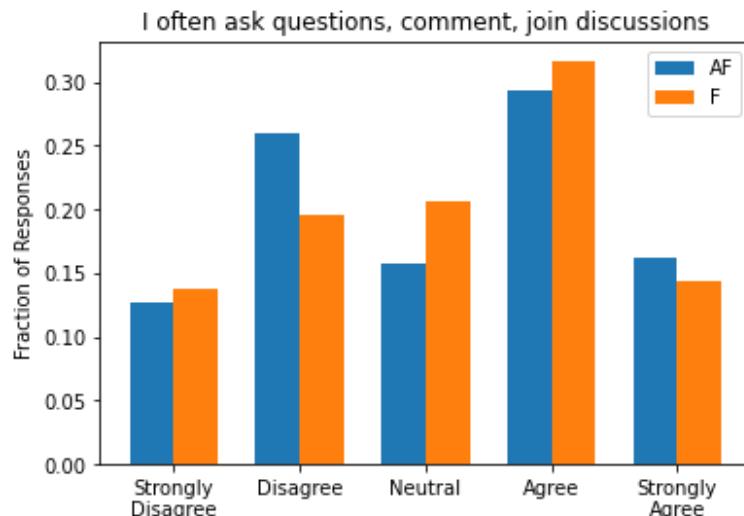
MWU results: MannwhitneyuResult(statistic=20012.5, pvalue=0.6952497929
121485)

AF median: 4.0

F median: 4.0

cohens d: -0.0345

f: 0.489



AF shape: (235, 43), F shape: (174, 43)

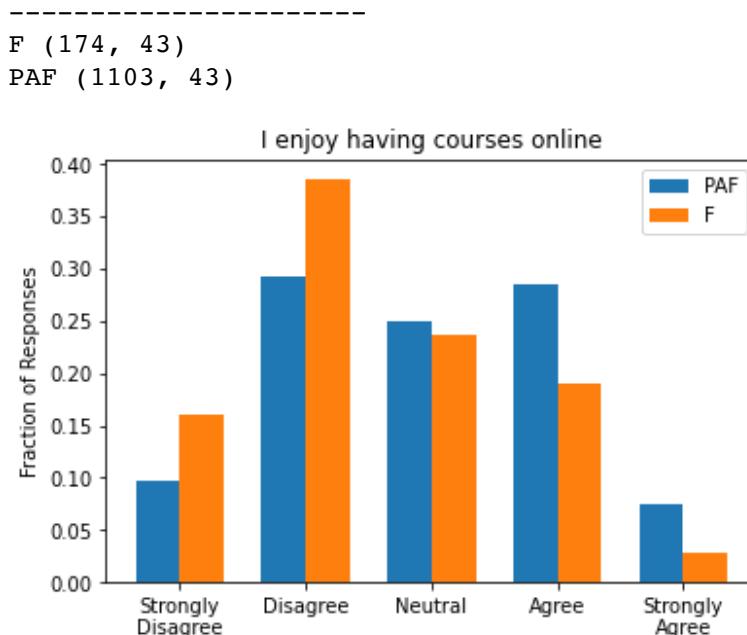
MWU results: MannwhitneyuResult(statistic=20193.5, pvalue=0.8273464687
246039)

AF median: 3.0

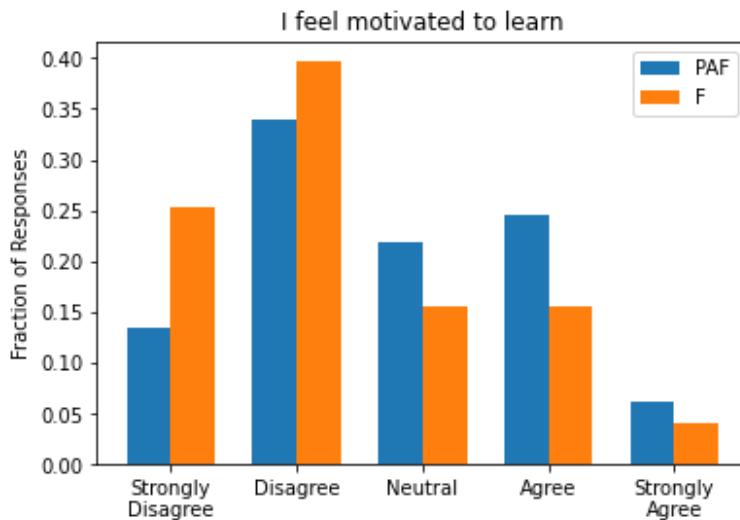
F median: 3.0

cohens d: -0.0232

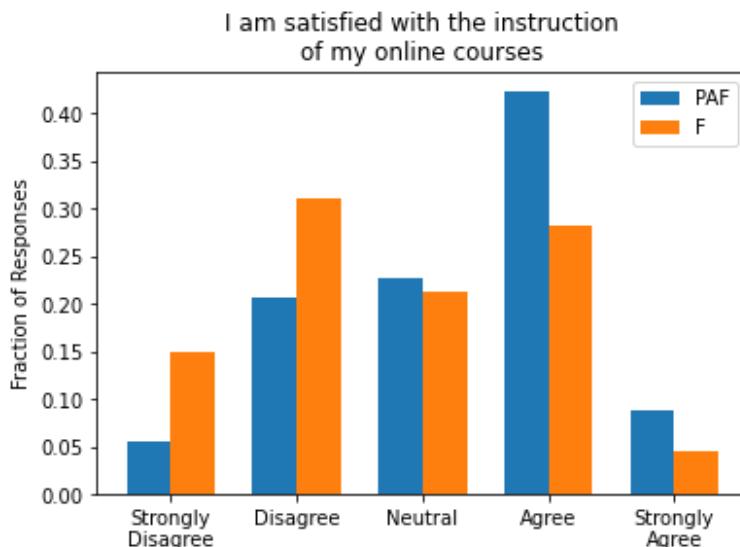
f: 0.494



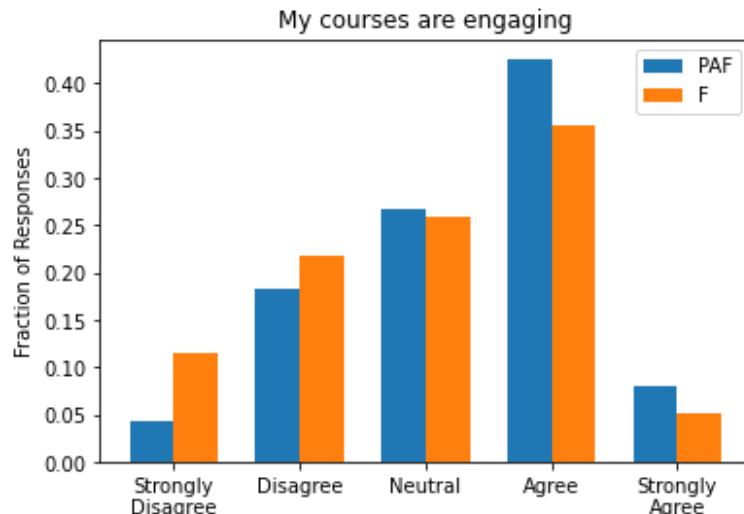
PAF shape: (1103, 43), F shape: (174, 43)
 MWU results: MannwhitneyuResult(statistic=115202.5, pvalue=1.071548199
 2667863e-05)
 PAF median: 3.0
 F median: 2.0
 cohens d: 0.362
 f: 0.6



PAF shape: (1103, 43), F shape: (174, 43)
 MWU results: MannwhitneyuResult(statistic=116372.5, pvalue=2.933283797
 0753206e-06)
 PAF median: 3.0
 F median: 2.0
 cohens d: 0.373
 f: 0.606



PAF shape: (1103, 43), F shape: (174, 43)
 MWU results: MannwhitneyuResult(statistic=120029.5, pvalue=2.452027711
 6694217e-08)
 PAF median: 4.0
 F median: 3.0
 cohens d: 0.481
 f: 0.625



PAF shape: (1103, 43), F shape: (174, 43)

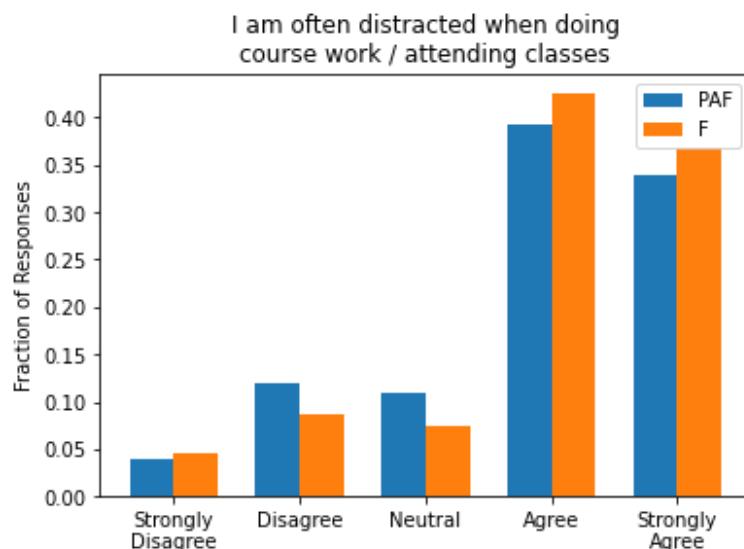
MWU results: MannwhitneyuResult(statistic=110066.0, pvalue=0.001019736
458926667)

PAF median: 4.0

F median: 3.0

cohens d: 0.3

f: 0.573



PAF shape: (1103, 43), F shape: (174, 43)

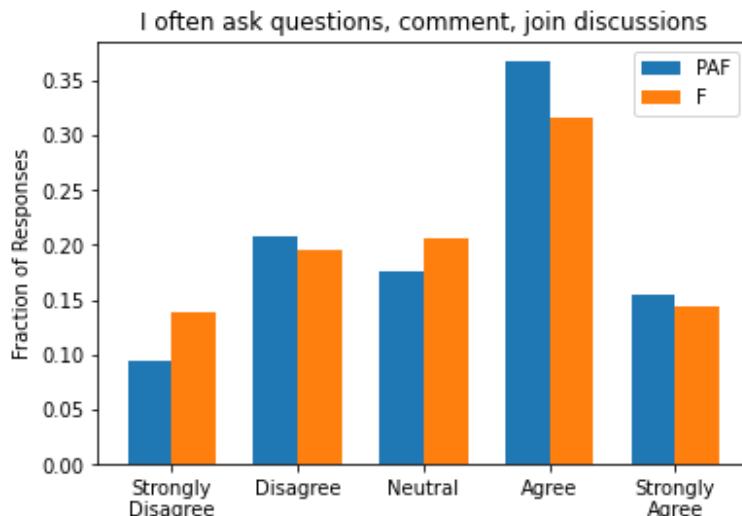
MWU results: MannwhitneyuResult(statistic=90504.5, pvalue=0.2019147553
888292)

PAF median: 4.0

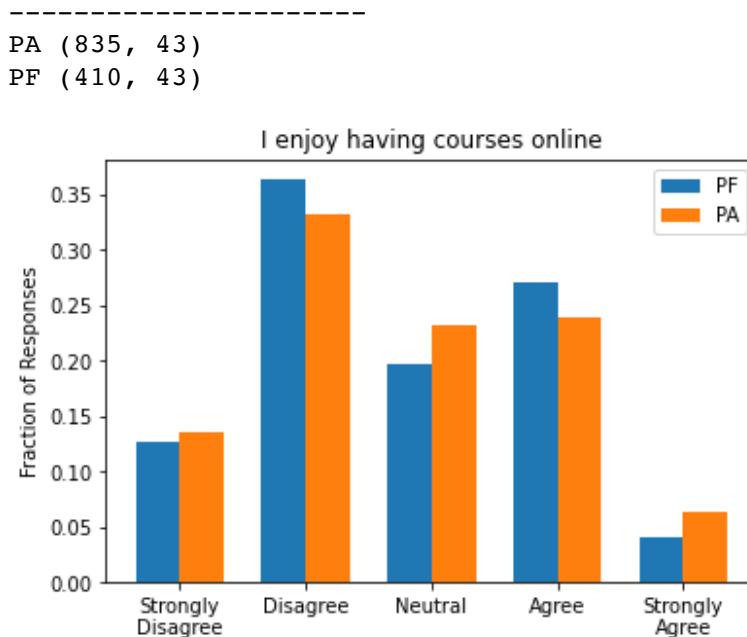
F median: 4.0

cohens d: -0.0979

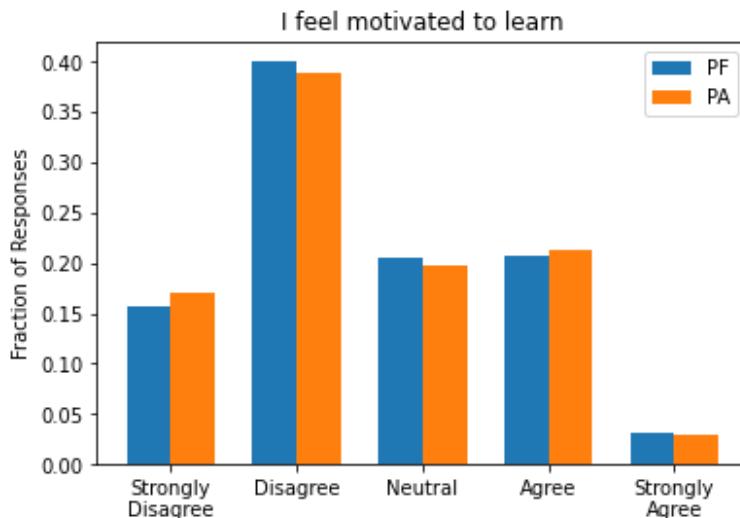
f: 0.472



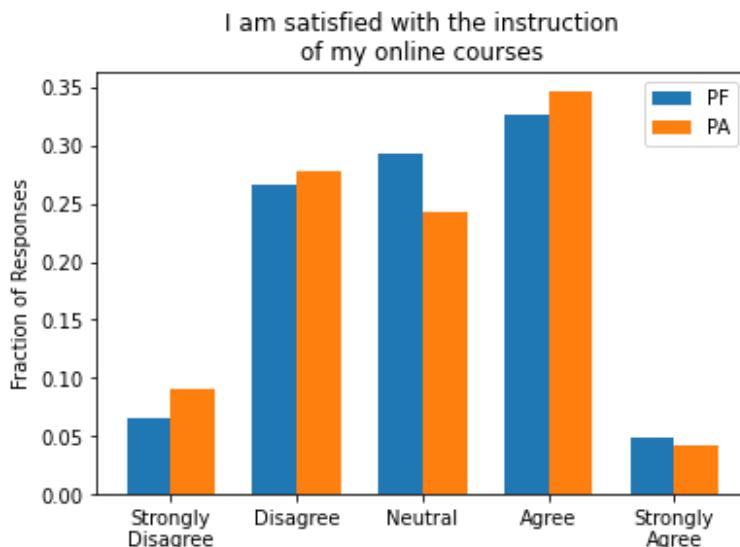
```
PAF shape: (1103, 43), F shape: (174, 43)
MWU results: MannwhitneyuResult(statistic=102205.0, pvalue=0.153030961
8044678)
PAF median: 4.0
F median: 3.0
cohens d: 0.121
f: 0.533
```



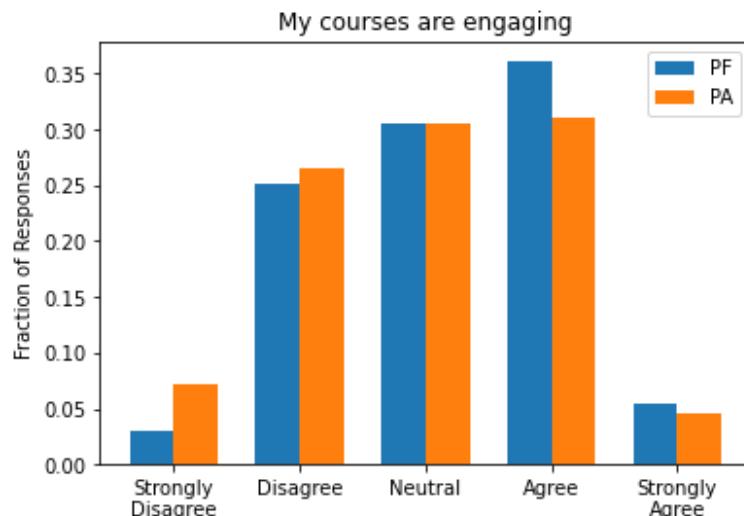
PF shape: (410, 43), PA shape: (835, 43)
 MWU results: MannwhitneyuResult(statistic=169320.0, pvalue=0.747220070
 0992984)
 PF median: 3.0
 PA median: 3.0
 cohens d: -0.0232
 f: 0.495



PF shape: (410, 43), PA shape: (835, 43)
 MWU results: MannwhitneyuResult(statistic=172731.5, pvalue=0.785294221
 2990239)
 PF median: 2.0
 PA median: 2.0
 cohens d: 0.0147
 f: 0.505



PF shape: (410, 43), PA shape: (835, 43)
 MWU results: MannwhitneyuResult(statistic=175281.0, pvalue=0.473323097
 83122595)
 PF median: 3.0
 PA median: 3.0
 cohens d: 0.0536
 f: 0.512



PF shape: (410, 43), PA shape: (835, 43)

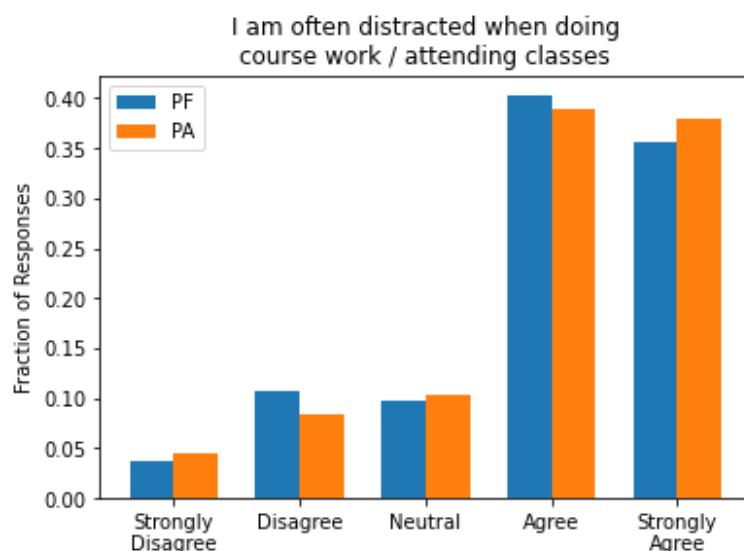
MWU results: MannwhitneyuResult(statistic=185828.5, pvalue=0.010326624
193020072)

PF median: 3.0

PA median: 3.0

cohens d: 0.165

f: 0.543



PF shape: (410, 43), PA shape: (835, 43)

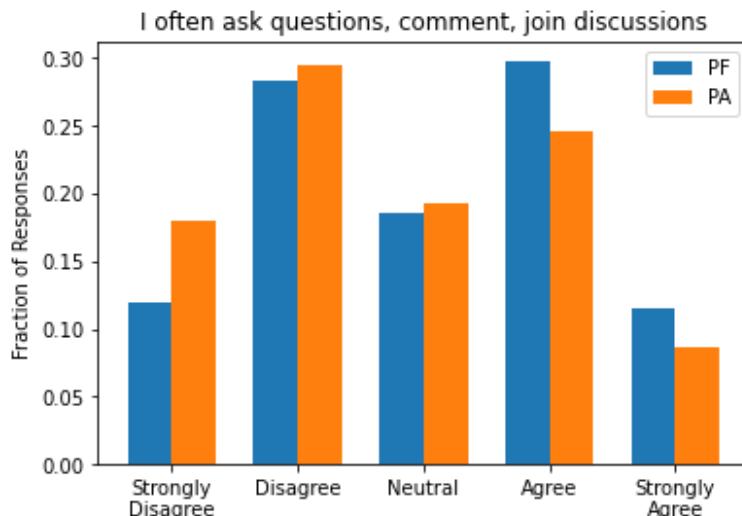
MWU results: MannwhitneyuResult(statistic=166872.0, pvalue=0.443215717
13920693)

PF median: 4.0

PA median: 4.0

cohens d: -0.038

f: 0.487



PF shape: (410, 43), PA shape: (835, 43)

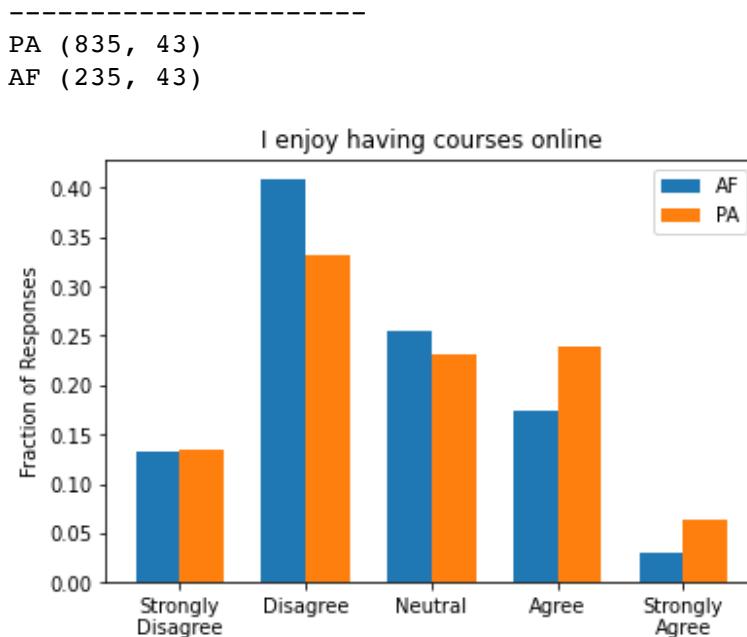
MWU results: MannwhitneyuResult(statistic=189630.0, pvalue=0.001454539
3581893037)

PF median: 3.0

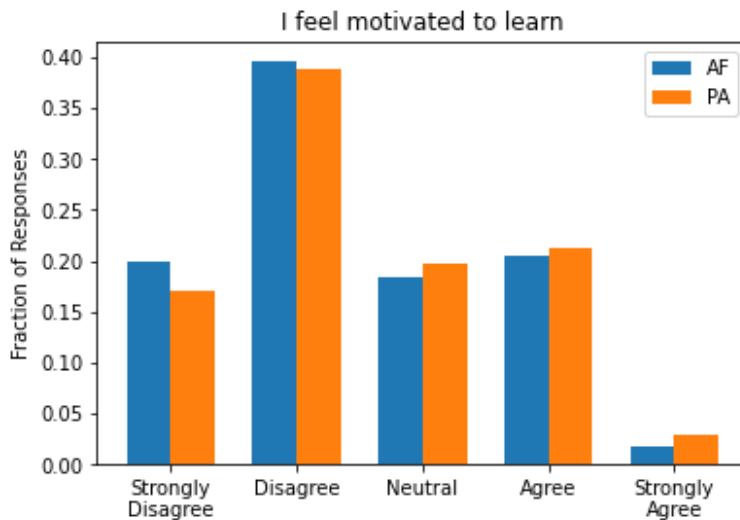
PA median: 3.0

cohens d: 0.193

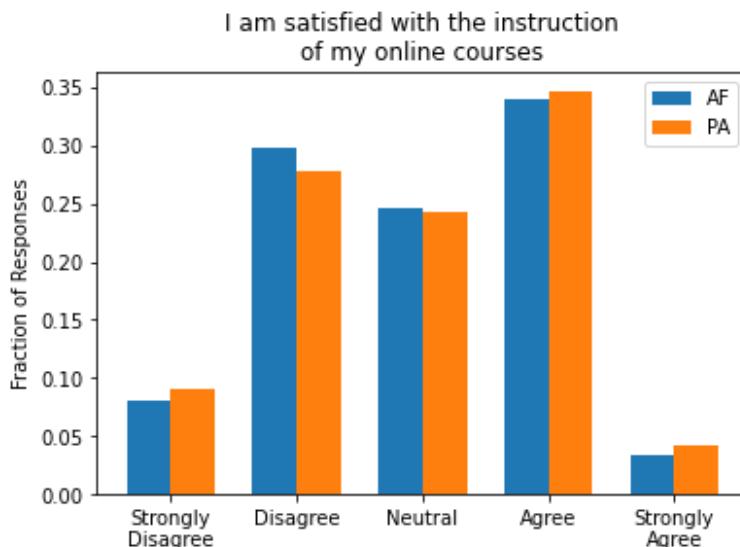
f: 0.554



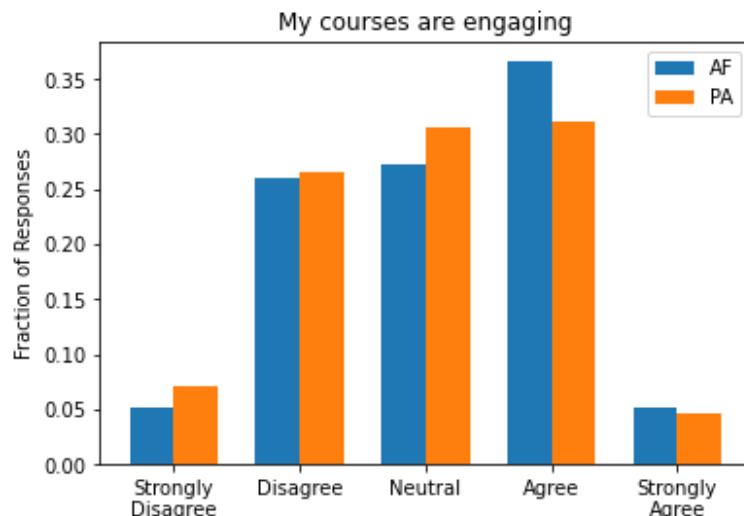
AF shape: (235, 43), PA shape: (835, 43)
 MWU results: MannwhitneyuResult(statistic=88727.5, pvalue=0.0200880703
 12130148)
 AF median: 2.0
 PA median: 3.0
 cohens d: -0.18
 f: 0.452



AF shape: (235, 43), PA shape: (835, 43)
 MWU results: MannwhitneyuResult(statistic=93252.0, pvalue=0.2255859216
 758923)
 AF median: 2.0
 PA median: 2.0
 cohens d: -0.0916
 f: 0.475



AF shape: (235, 43), PA shape: (835, 43)
 MWU results: MannwhitneyuResult(statistic=96893.0, pvalue=0.7615190605
 851319)
 AF median: 3.0
 PA median: 3.0
 cohens d: -0.0198
 f: 0.494



AF shape: (235, 43), PA shape: (835, 43)

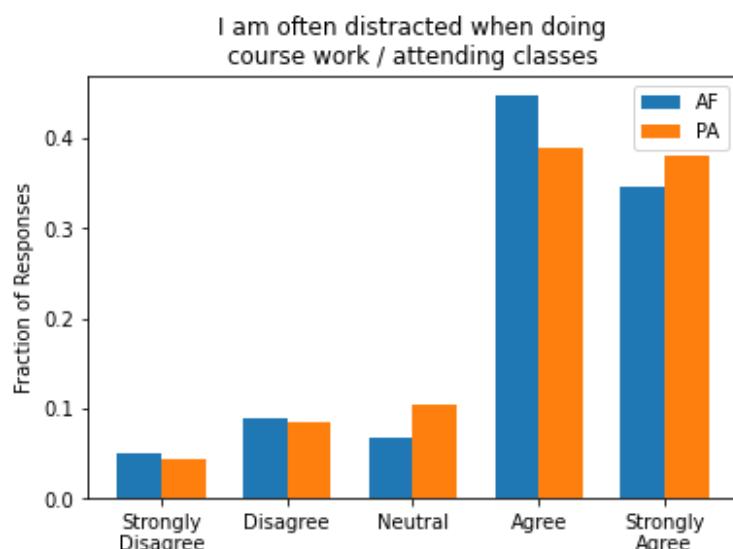
MWU results: MannwhitneyuResult(statistic=104153.0, pvalue=0.132555058
88282618)

AF median: 3.0

PA median: 3.0

cohens d: 0.111

f: 0.531



AF shape: (235, 43), PA shape: (835, 43)

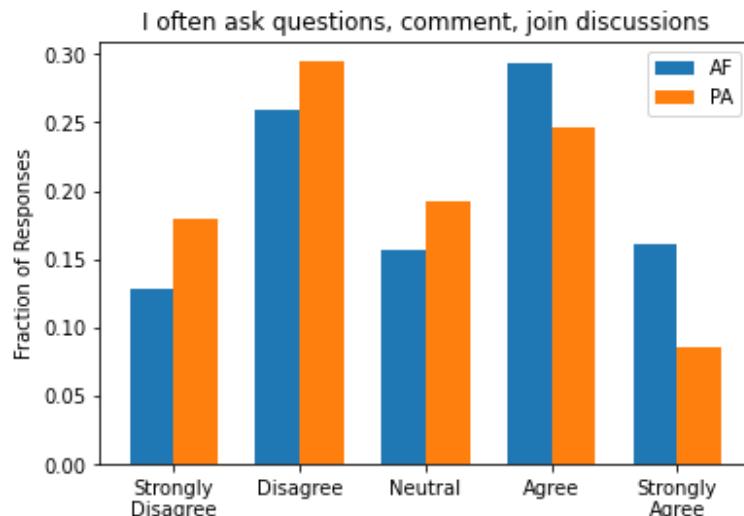
MWU results: MannwhitneyuResult(statistic=96258.0, pvalue=0.6371301975
006516)

AF median: 4.0

PA median: 4.0

cohens d: -0.0284

f: 0.491



AF shape: (235, 43), PA shape: (835, 43)

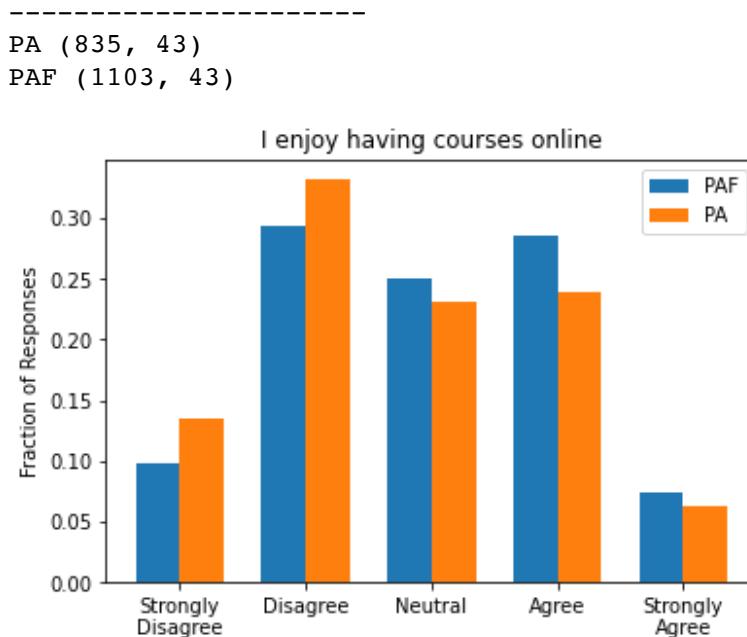
MWU results: MannwhitneyuResult(statistic=112435.5, pvalue=0.000437261
85082986857)

AF median: 3.0

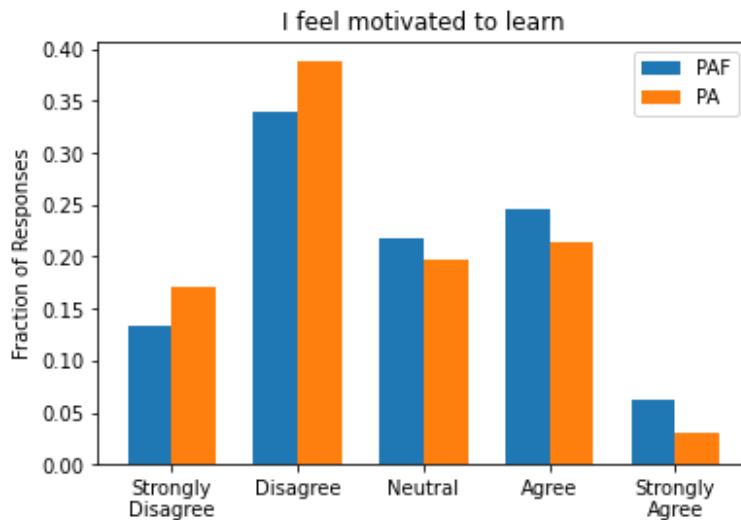
PA median: 3.0

cohens d: 0.268

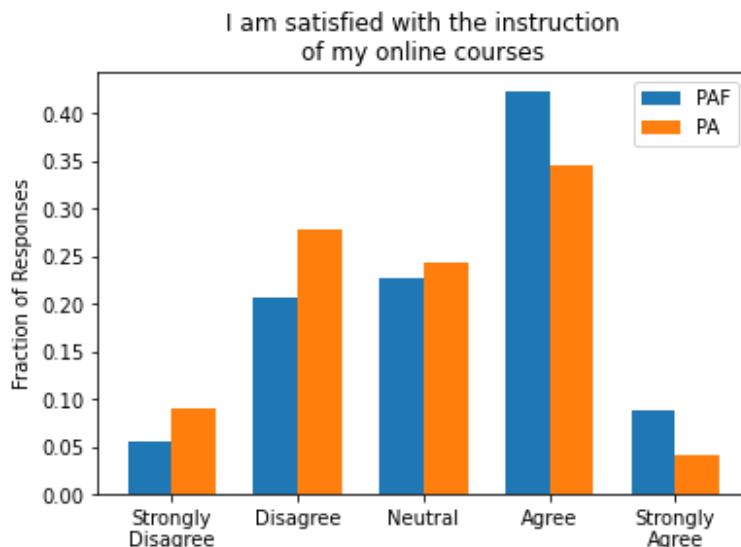
f: 0.573



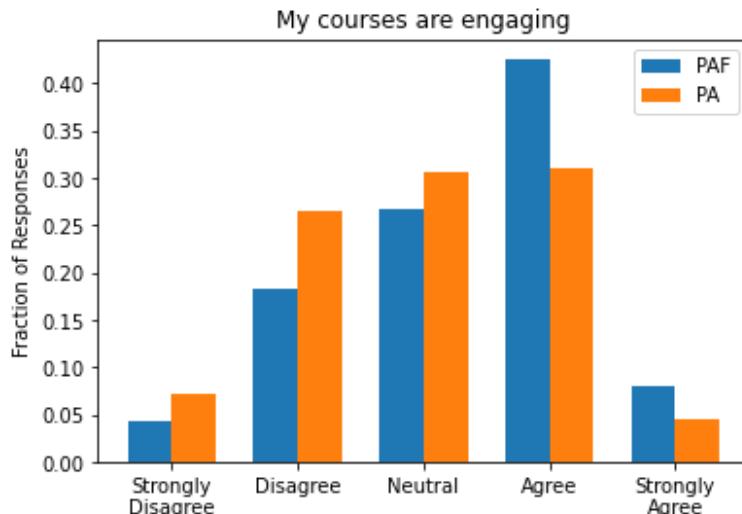
PAF shape: (1103, 43), PA shape: (835, 43)
 MWU results: MannwhitneyuResult(statistic=502212.5, pvalue=0.000408673
 2351882714)
 PAF median: 3.0
 PA median: 3.0
 cohens d: 0.16
 f: 0.545



PAF shape: (1103, 43), PA shape: (835, 43)
 MWU results: MannwhitneyuResult(statistic=508707.5, pvalue=4.095991157
 598609e-05)
 PAF median: 3.0
 PA median: 2.0
 cohens d: 0.194
 f: 0.552



PAF shape: (1103, 43), PA shape: (835, 43)
 MWU results: MannwhitneyuResult(statistic=533639.0, pvalue=3.588149303
 813958e-10)
 PAF median: 4.0
 PA median: 3.0
 cohens d: 0.292
 f: 0.579



PAF shape: (1103, 43), PA shape: (835, 43)

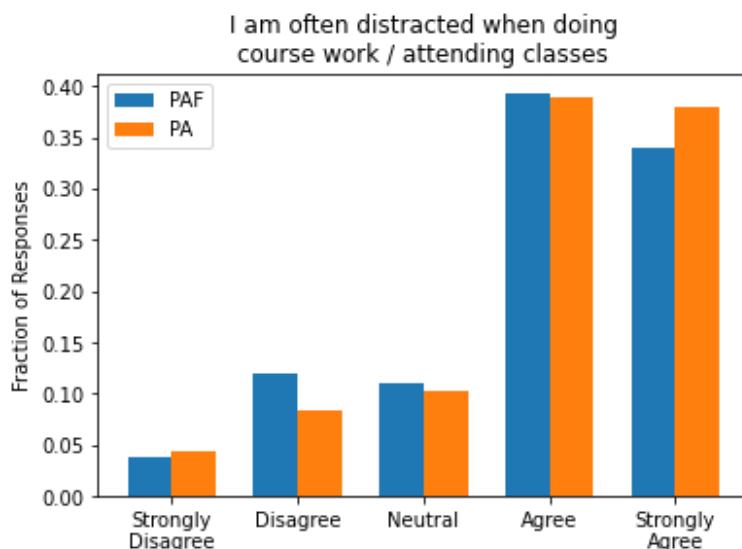
MWU results: MannwhitneyuResult(statistic=542372.5, pvalue=2.158107126
3323536e-12)

PAF median: 4.0

PA median: 3.0

cohens d: 0.321

f: 0.589



PAF shape: (1103, 43), PA shape: (835, 43)

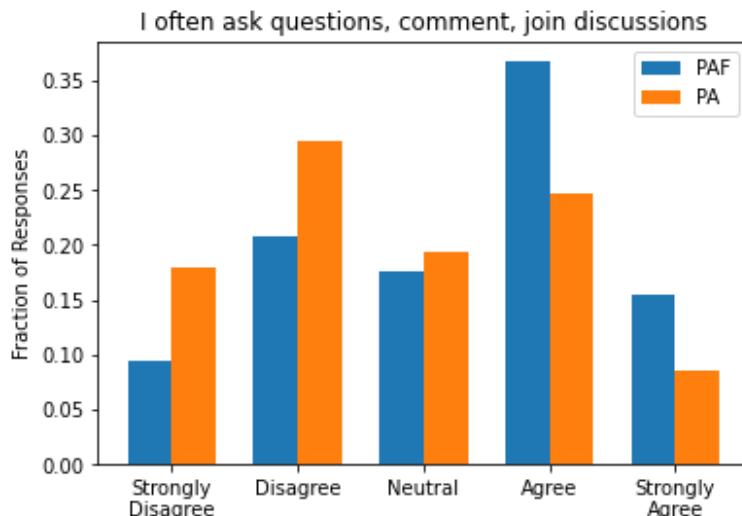
MWU results: MannwhitneyuResult(statistic=435392.0, pvalue=0.029340464
180300733)

PAF median: 4.0

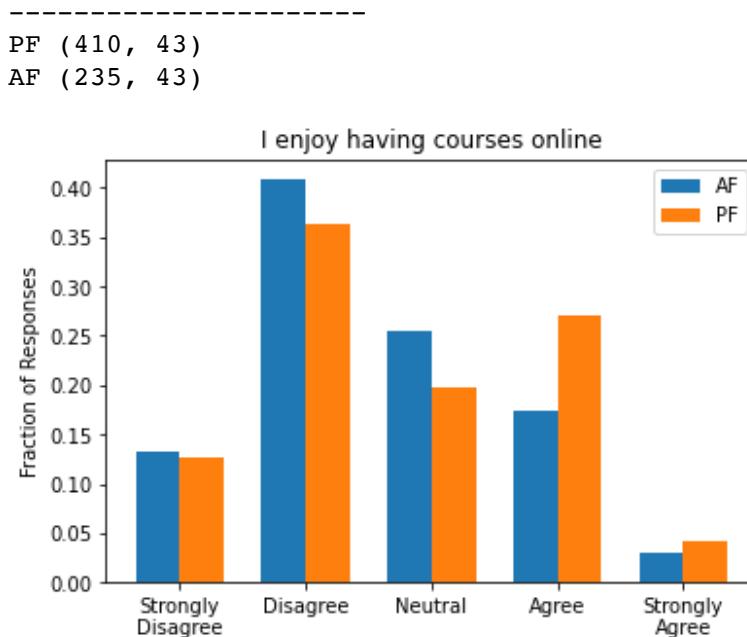
PA median: 4.0

cohens d: -0.0923

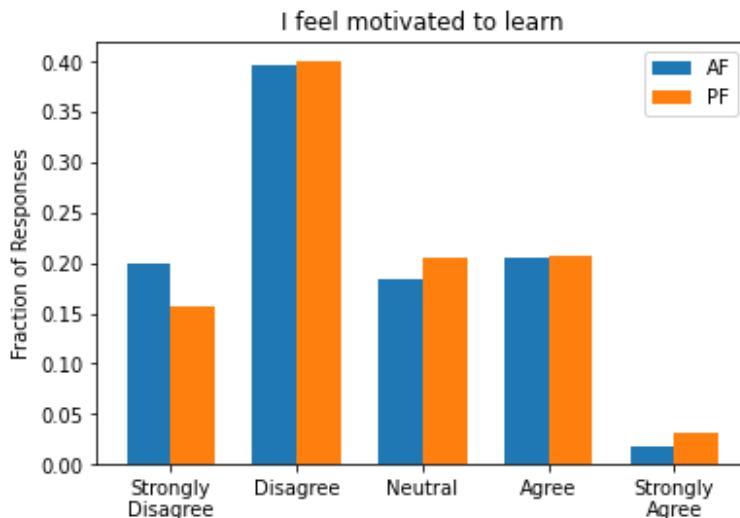
f: 0.473



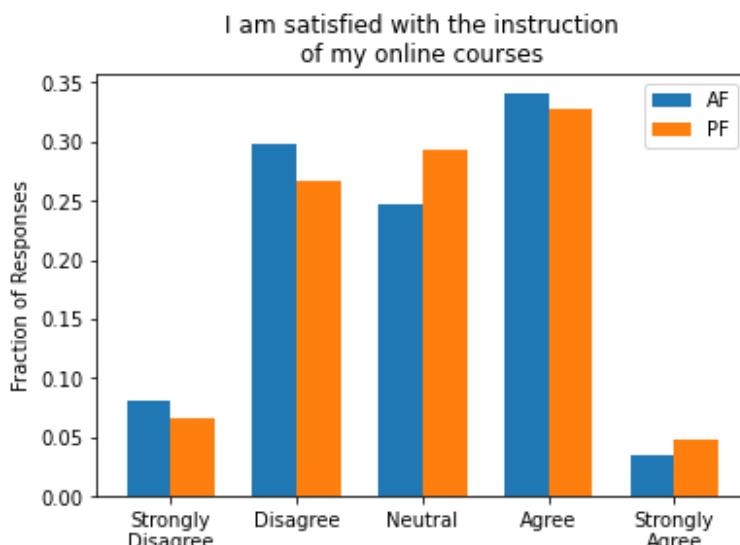
PAF shape: (1103, 43), PA shape: (835, 43)
MWU results: MannwhitneyuResult(statistic=566687.0, pvalue=3.225752514
3585234e-19)
PAF median: 4.0
PA median: 3.0
cohens d: 0.418
f: 0.615



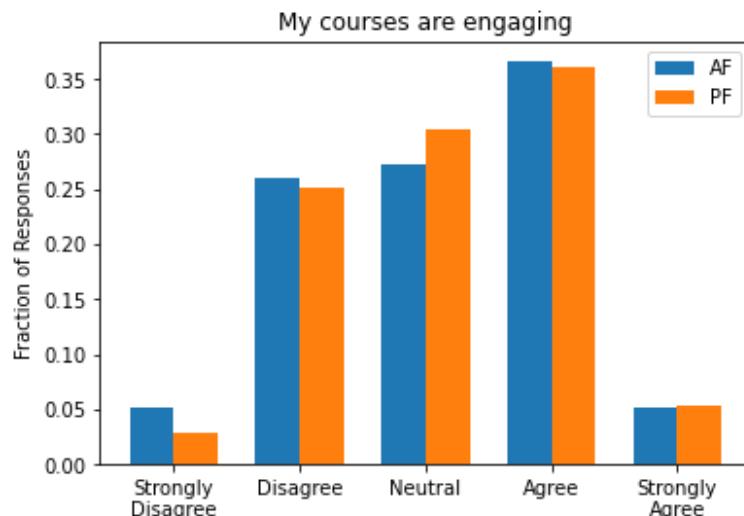
AF shape: (235, 43), PF shape: (410, 43)
 MWU results: MannwhitneyuResult(statistic=44088.0, pvalue=0.0613123306
 5678164)
 AF median: 2.0
 PF median: 3.0
 cohens d: -0.162
 f: 0.458



AF shape: (235, 43), PF shape: (410, 43)
 MWU results: MannwhitneyuResult(statistic=45322.0, pvalue=0.1904628676
 011556)
 AF median: 2.0
 PF median: 2.0
 cohens d: -0.107
 f: 0.47



AF shape: (235, 43), PF shape: (410, 43)
 MWU results: MannwhitneyuResult(statistic=46369.5, pvalue=0.4088042625
 221866)
 AF median: 3.0
 PF median: 3.0
 cohens d: -0.0753
 f: 0.481



AF shape: (235, 43), PF shape: (410, 43)

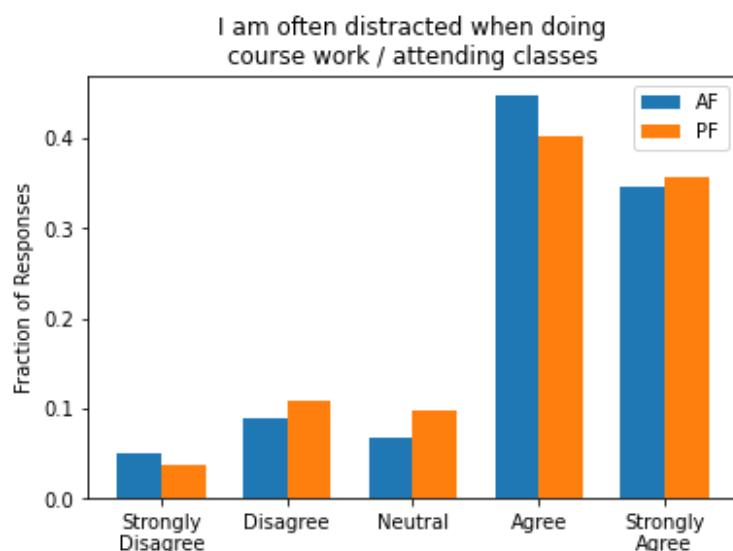
MWU results: MannwhitneyuResult(statistic=47097.5, pvalue=0.6201740577
01798)

AF median: 3.0

PF median: 3.0

cohens d: -0.0532

f: 0.489



AF shape: (235, 43), PF shape: (410, 43)

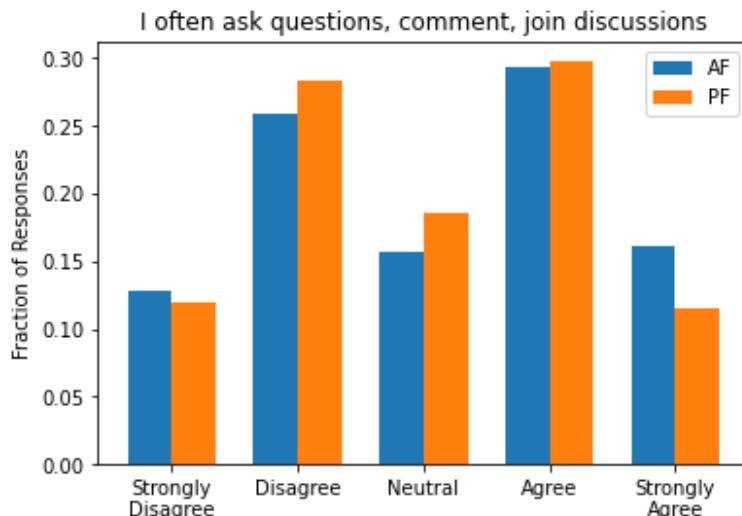
MWU results: MannwhitneyuResult(statistic=48485.5, pvalue=0.8847165603
077515)

AF median: 4.0

PF median: 4.0

cohens d: 0.00954

f: 0.503



AF shape: (235, 43), PF shape: (410, 43)

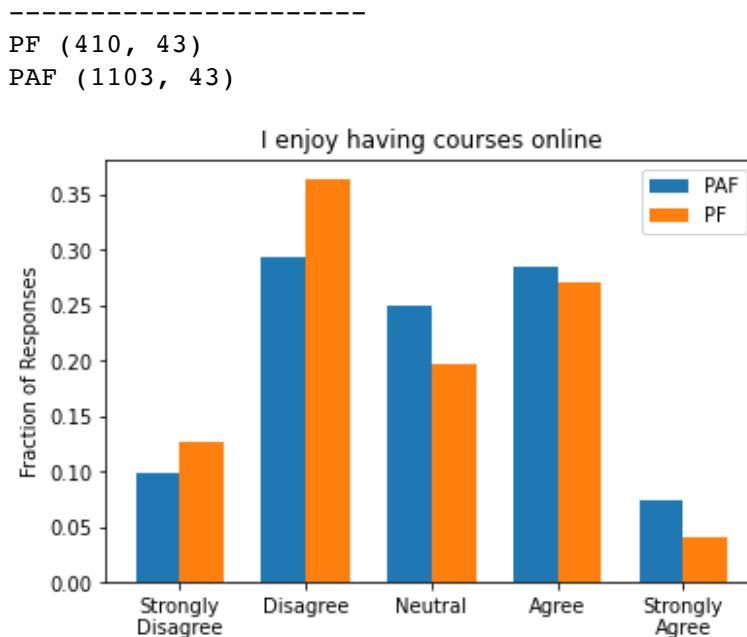
MWU results: MannwhitneyuResult(statistic=50298.0, pvalue=0.3374227691
1061664)

AF median: 3.0

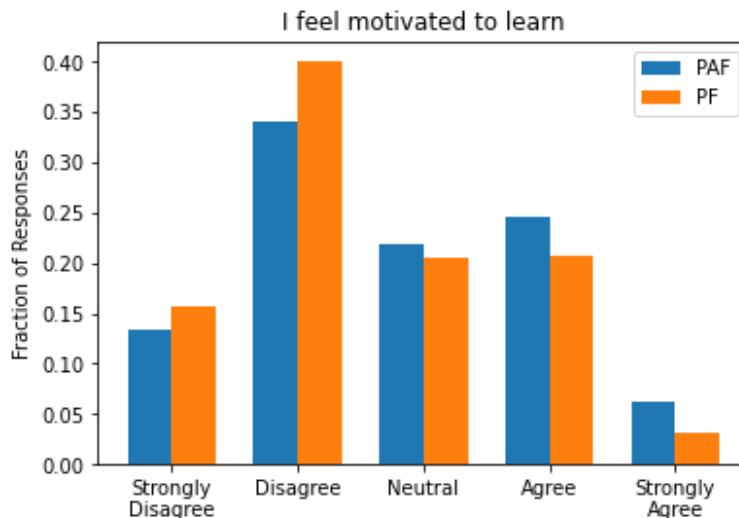
PF median: 3.0

cohens d: 0.0772

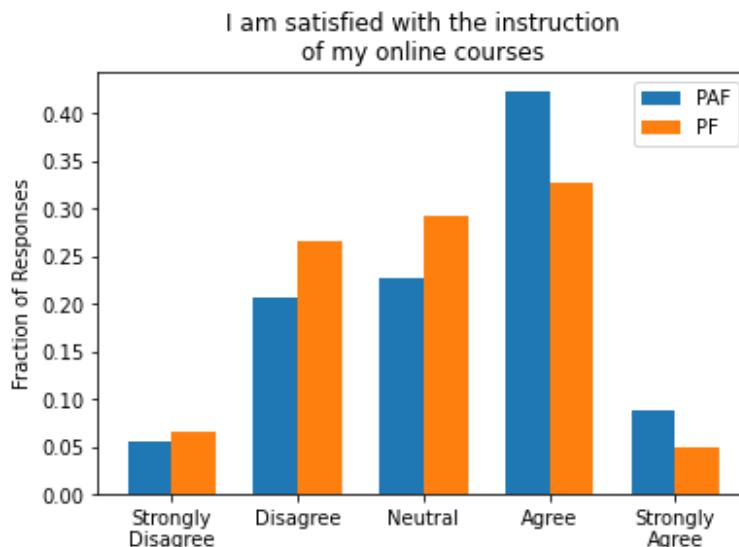
f: 0.522



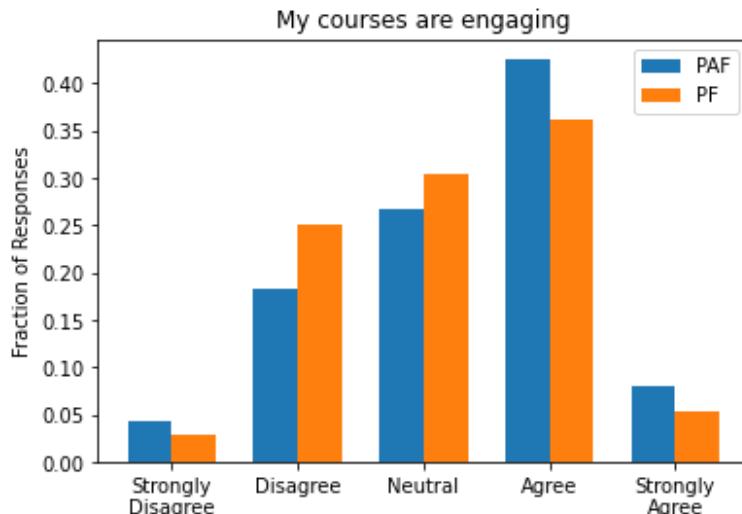
PAF shape: (1103, 43), PF shape: (410, 43)
 MWU results: MannwhitneyuResult(statistic=249219.5, pvalue=0.001541165
 6016868502)
 PAF median: 3.0
 PF median: 3.0
 cohens d: 0.186
 f: 0.551



PAF shape: (1103, 43), PF shape: (410, 43)
 MWU results: MannwhitneyuResult(statistic=248063.5, pvalue=0.002572127
 804793461)
 PAF median: 3.0
 PF median: 2.0
 cohens d: 0.179
 f: 0.549



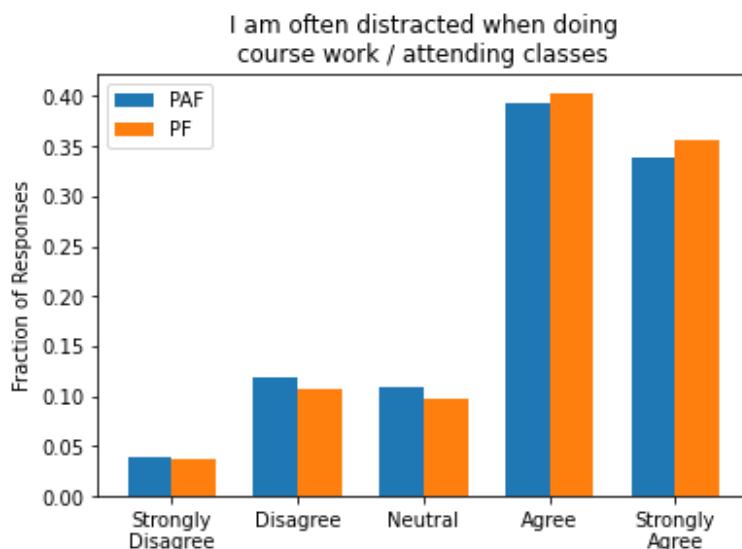
PAF shape: (1103, 43), PF shape: (410, 43)
 MWU results: MannwhitneyuResult(statistic=257919.5, pvalue=1.029430063
 7757825e-05)
 PAF median: 4.0
 PF median: 3.0
 cohens d: 0.242
 f: 0.57



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PAF shape: (1103, 43), PF shape: (410, 43)
MWU results: MannwhitneyuResult(statistic=248312.0, pvalue=0.001975099
5542634833)
PAF median: 4.0
PF median: 3.0
cohens d: 0.16
f: 0.549

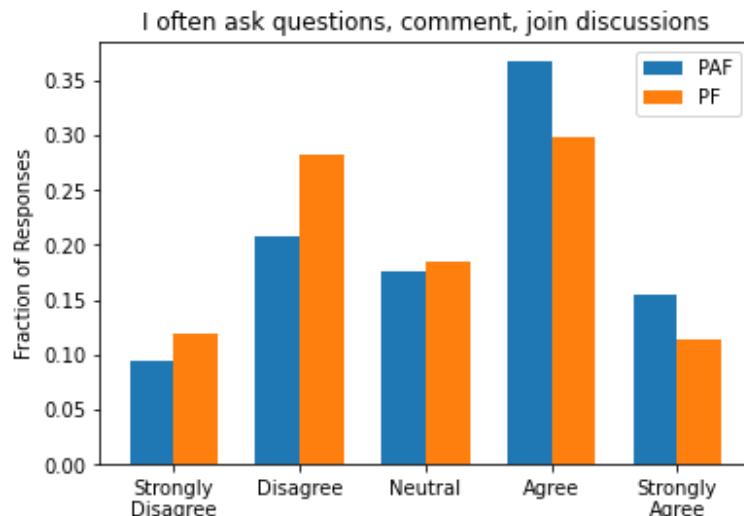
```



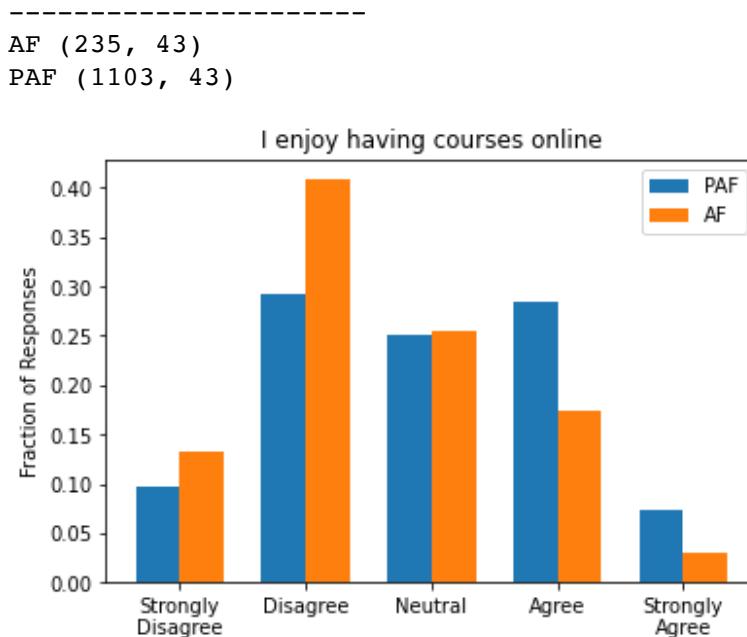
```

PAF shape: (1103, 43), PF shape: (410, 43)
MWU results: MannwhitneyuResult(statistic=219393.0, pvalue=0.346865348
28806415)
PAF median: 4.0
PF median: 4.0
cohens d: -0.0546
f: 0.485

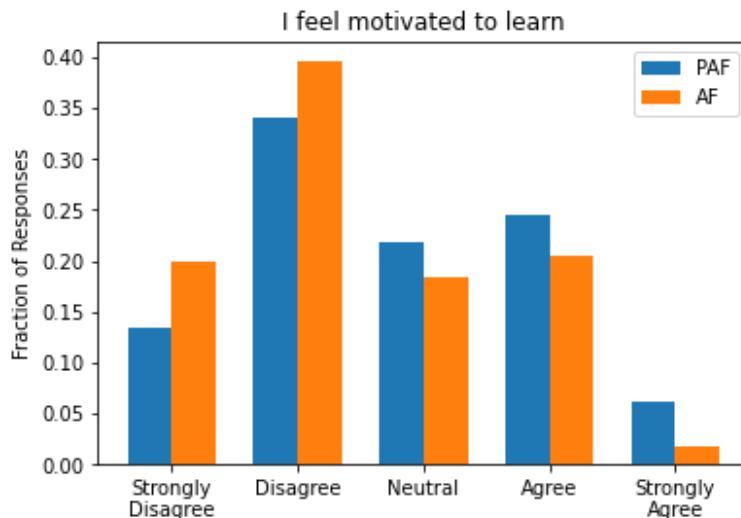
```



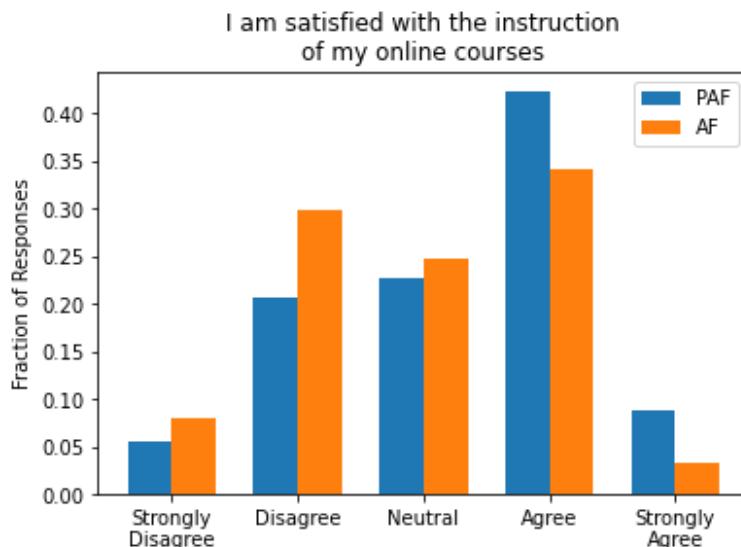
PAF shape: (1103, 43), PF shape: (410, 43)
MWU results: MannwhitneyuResult(statistic=254834.5, pvalue=8.511968970
023839e-05)
PAF median: 4.0
PF median: 3.0
cohens d: 0.225
f: 0.564



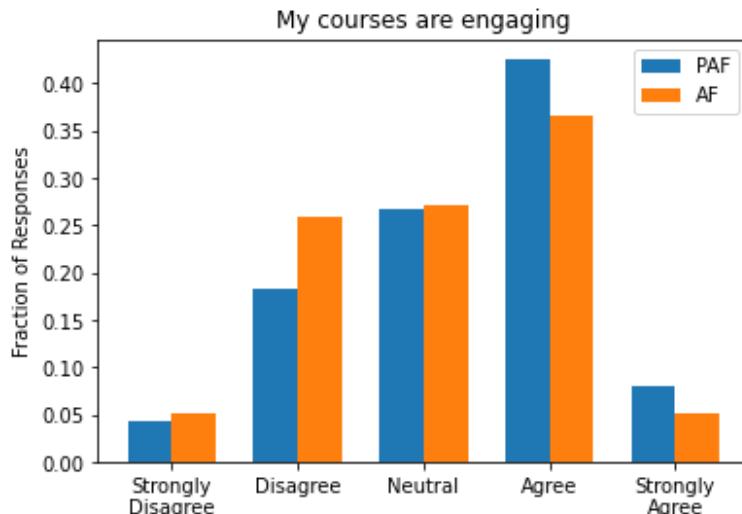
PAF shape: (1103, 43), AF shape: (235, 43)
 MWU results: MannwhitneyuResult(statistic=154661.0, pvalue=1.415508643
 671886e-06)
 PAF median: 3.0
 AF median: 2.0
 cohens d: 0.346
 f: 0.597



PAF shape: (1103, 43), AF shape: (235, 43)
 MWU results: MannwhitneyuResult(statistic=149403.0, pvalue=0.000135644
 26263207402)
 PAF median: 3.0
 AF median: 2.0
 cohens d: 0.28
 f: 0.576



PAF shape: (1103, 43), AF shape: (235, 43)
 MWU results: MannwhitneyuResult(statistic=152058.5, pvalue=1.176515672
 8606383e-05)
 PAF median: 4.0
 AF median: 3.0
 cohens d: 0.314
 f: 0.587



PAF shape: (1103, 43), AF shape: (235, 43)

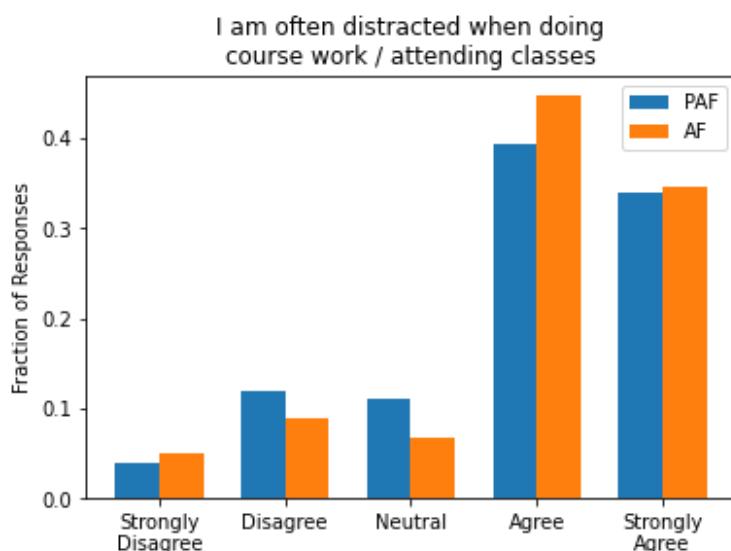
MWU results: MannwhitneyuResult(statistic=144685.5, pvalue=0.003133341
2100188955)

PAF median: 4.0

AF median: 3.0

cohens d: 0.21

f: 0.558



PAF shape: (1103, 43), AF shape: (235, 43)

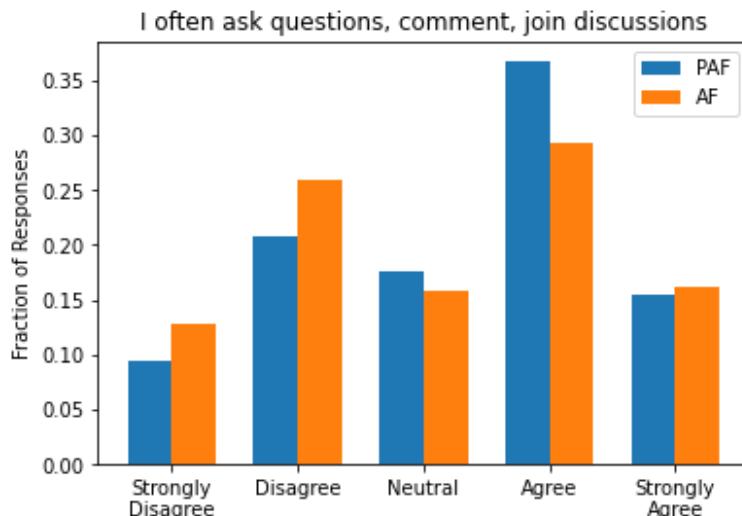
MWU results: MannwhitneyuResult(statistic=124881.5, pvalue=0.352979508
04871925)

PAF median: 4.0

AF median: 4.0

cohens d: -0.0638

f: 0.482



PAF shape: (1103, 43), AF shape: (235, 43)
MWU results: MannwhitneyuResult(statistic=139406.0, pvalue=0.059471889
79275522)
PAF median: 4.0
AF median: 3.0
cohens d: 0.145
f: 0.538

```
In [ ]: types_undergrad[0]
```

```
Out[ ]:
```

	question	A median (n = 311)	P median (n = 759)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	0.0677	0.522	0.242
1	remote_motivated	2.0	2.0	0.0155	0.506	0.763
2	remote_satisfied	3.0	3.0	0.0865	0.526	0.169
3	remote_engaging	3.0	3.0	0.146	0.54	0.0334
4	remote_distracted	4.0	4.0	-0.0432	0.484	0.385
5	remote_questions	3.0	2.0	0.142	0.538	0.0457

In []: types_undergrad[1]

Out[]:

	question	F median (n = 174)	P median (n = 759)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	-0.0276	0.498	0.918
1	remote_motivated	2.0	2.0	-0.0522	0.481	0.423
2	remote_satisfied	3.0	3.0	0.119	0.532	0.166
3	remote_engaging	3.0	3.0	0.3	0.585	0.000294
4	remote_distracted	4.0	4.0	0.0627	0.519	0.407
5	remote_questions	3.0	2.0	0.491	0.63	3.33e-08

In []: types_undergrad[2]

Out[]:

	question	PA median (n = 835)	P median (n = 759)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.166	0.548	0.000646
1	remote_motivated	2.0	2.0	0.138	0.54	0.00433
2	remote_satisfied	3.0	3.0	0.311	0.587	5.25e-10
3	remote_engaging	3.0	3.0	0.291	0.58	1.08e-08
4	remote_distracted	4.0	4.0	0.0568	0.518	0.193
5	remote_questions	3.0	2.0	0.185	0.549	0.000468

In []: types_undergrad[3]

Out[]:

	question	PF median (n = 410)	P median (n = 759)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.144	0.543	0.012
1	remote_motivated	2.0	2.0	0.153	0.545	0.00867
2	remote_satisfied	3.0	3.0	0.367	0.602	2.58e-09
3	remote_engaging	3.0	3.0	0.455	0.622	7.06e-13
4	remote_distracted	4.0	4.0	0.019	0.505	0.757
5	remote_questions	3.0	2.0	0.386	0.604	1.55e-09

In []: types_undergrad[4]

Out[]:

	question	AF median (n = 235)	P median (n = 759)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	-0.00894	0.504	0.838
1	remote_motivated	2.0	2.0	0.0467	0.515	0.461
2	remote_satisfied	3.0	3.0	0.291	0.582	7.65e-05
3	remote_engaging	3.0	3.0	0.396	0.609	1.76e-07
4	remote_distracted	4.0	4.0	0.0284	0.509	0.674
5	remote_questions	3.0	2.0	0.462	0.621	7.67e-09

In []: types_undergrad[5]

Out[]:

	question	PAF median (n = 1103)	P median (n = 759)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.327	0.592	2.6e-12
1	remote_motivated	3.0	2.0	0.327	0.59	6.96e-12
2	remote_satisfied	4.0	3.0	0.602	0.661	1.4e-34
3	remote_engaging	4.0	3.0	0.611	0.662	3.46e-35
4	remote_distracted	4.0	4.0	-0.0357	0.49	0.445
5	remote_questions	4.0	2.0	0.613	0.665	1.42e-35

In []: types_undergrad[6]

Out[]:

	question	F median (n = 174)	A median (n = 311)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	-0.0999	0.474	0.329
1	remote_motivated	2.0	2.0	-0.068	0.475	0.348
2	remote_satisfied	3.0	3.0	0.0337	0.508	0.776
3	remote_engaging	3.0	3.0	0.149	0.544	0.0966
4	remote_distracted	4.0	4.0	0.107	0.535	0.172
5	remote_questions	3.0	3.0	0.337	0.593	0.000478

In []: types_undergrad[7]

Out[]:

	question	PA median (n = 835)	A median (n = 311)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.0998	0.527	0.142
1	remote_motivated	2.0	2.0	0.123	0.534	0.061
2	remote_satisfied	3.0	3.0	0.225	0.561	0.00104
3	remote_engaging	3.0	3.0	0.141	0.537	0.0455
4	remote_distracted	4.0	4.0	0.101	0.533	0.0639
5	remote_questions	3.0	3.0	0.044	0.512	0.528

In []: types_undergrad[8]

Out[]:

	question	PF median (n = 410)	A median (n = 311)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.0782	0.522	0.293
1	remote_motivated	2.0	2.0	0.139	0.539	0.0581
2	remote_satisfied	3.0	3.0	0.283	0.574	0.000379
3	remote_engaging	3.0	3.0	0.305	0.578	0.000175
4	remote_distracted	4.0	4.0	0.0627	0.521	0.309
5	remote_questions	3.0	3.0	0.239	0.566	0.00179

In []: types_undergrad[9]

Out[]:

	question	AF median (n = 235)	A median (n = 311)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	-0.0818	0.48	0.411
1	remote_motivated	2.0	2.0	0.0316	0.51	0.685
2	remote_satisfied	3.0	3.0	0.206	0.556	0.0209
3	remote_engaging	3.0	3.0	0.244	0.566	0.00626
4	remote_distracted	4.0	4.0	0.0719	0.525	0.289
5	remote_questions	3.0	3.0	0.309	0.585	0.000491

In []: types_undergrad[10]

Out[]:

	question	PAF median (n = 1103)	A median (n = 311)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.263	0.574	4.11e-05
1	remote_motivated	3.0	2.0	0.311	0.586	1.65e-06
2	remote_satisfied	4.0	3.0	0.518	0.636	1.52e-14
3	remote_engaging	4.0	3.0	0.46	0.619	1.62e-11
4	remote_distracted	4.0	4.0	0.00725	0.505	0.755
5	remote_questions	4.0	3.0	0.466	0.627	1.63e-12

In []: types_undergrad[11]

Out[]:

	question	PA median (n = 835)	F median (n = 174)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.197	0.553	0.0226
1	remote_motivated	2.0	2.0	0.19	0.558	0.0123
2	remote_satisfied	3.0	3.0	0.189	0.551	0.0262
3	remote_engaging	3.0	3.0	-0.018	0.489	0.639
4	remote_distracted	4.0	4.0	-0.00609	0.499	0.967
5	remote_questions	3.0	3.0	-0.293	0.418	0.000492

In []: types_undergrad[12]

Out[]:

	question	PF median (n = 410)	F median (n = 174)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.179	0.548	0.0563
1	remote_motivated	2.0	2.0	0.205	0.563	0.0117
2	remote_satisfied	3.0	3.0	0.246	0.565	0.00979
3	remote_engaging	3.0	3.0	0.146	0.529	0.241
4	remote_distracted	4.0	4.0	-0.0442	0.486	0.58
5	remote_questions	3.0	3.0	-0.102	0.47	0.239

In []: types_undergrad[13]

Out[]:

	question	AF median (n = 235)	F median (n = 174)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	0.0207	0.507	0.807
1	remote_motivated	2.0	2.0	0.0991	0.534	0.223
2	remote_satisfied	3.0	3.0	0.169	0.547	0.0942
3	remote_engaging	3.0	3.0	0.0896	0.519	0.5
4	remote_distracted	4.0	4.0	-0.0345	0.489	0.695
5	remote_questions	3.0	3.0	-0.0232	0.494	0.827

In []: types_undergrad[14]

Out[]:

	question	PAF median (n = 1103)	F median (n = 174)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.362	0.6	1.07e-05
1	remote_motivated	3.0	2.0	0.373	0.606	2.93e-06
2	remote_satisfied	4.0	3.0	0.481	0.625	2.45e-08
3	remote_engaging	4.0	3.0	0.3	0.573	0.00102
4	remote_distracted	4.0	4.0	-0.0979	0.472	0.202
5	remote_questions	4.0	3.0	0.121	0.533	0.153

In []: types_undergrad[15]

Out[]:

	question	PF median (n = 410)	PA median (n = 835)	cohens d	f	p-value
0	remote_enjoy	3.0	3.0	-0.0232	0.495	0.747
1	remote_motivated	2.0	2.0	0.0147	0.505	0.785
2	remote_satisfied	3.0	3.0	0.0536	0.512	0.473
3	remote_engaging	3.0	3.0	0.165	0.543	0.0103
4	remote_distracted	4.0	4.0	-0.038	0.487	0.443
5	remote_questions	3.0	3.0	0.193	0.554	0.00145

In []: types_undergrad[16]

Out[]:

	question	AF median (n = 235)	PA median (n = 835)	cohens d	f	p-value
0	remote_enjoy	2.0	3.0	-0.18	0.452	0.0201
1	remote_motivated	2.0	2.0	-0.0916	0.475	0.226
2	remote_satisfied	3.0	3.0	-0.0198	0.494	0.762
3	remote_engaging	3.0	3.0	0.111	0.531	0.133
4	remote_distracted	4.0	4.0	-0.0284	0.491	0.637
5	remote_questions	3.0	3.0	0.268	0.573	0.000437

In []: types_undergrad[17]

Out[]:

	question	PAF median (n = 1103)	PA median (n = 835)	cohens d	f	p-value
0	remote_enjoy	3.0	3.0	0.16	0.545	0.000409
1	remote_motivated	3.0	2.0	0.194	0.552	4.1e-05
2	remote_satisfied	4.0	3.0	0.292	0.579	3.59e-10
3	remote_engaging	4.0	3.0	0.321	0.589	2.16e-12
4	remote_distracted	4.0	4.0	-0.0923	0.473	0.0293
5	remote_questions	4.0	3.0	0.418	0.615	3.23e-19

In []: types_undergrad[18]

Out[]:

	question	AF median (n = 235)	PF median (n = 410)	cohens d	f	p-value
0	remote_enjoy	2.0	3.0	-0.162	0.458	0.0613
1	remote_motivated	2.0	2.0	-0.107	0.47	0.19
2	remote_satisfied	3.0	3.0	-0.0753	0.481	0.409
3	remote_engaging	3.0	3.0	-0.0532	0.489	0.62
4	remote_distracted	4.0	4.0	0.00954	0.503	0.885
5	remote_questions	3.0	3.0	0.0772	0.522	0.337

In []: types_undergrad[19]

Out[]:

	question	PAF median (n = 1103)	PF median (n = 410)	cohens d	f	p-value
0	remote_enjoy	3.0	3.0	0.186	0.551	0.00154
1	remote_motivated	3.0	2.0	0.179	0.549	0.00257
2	remote_satisfied	4.0	3.0	0.242	0.57	1.03e-05
3	remote_engaging	4.0	3.0	0.16	0.549	0.00198
4	remote_distracted	4.0	4.0	-0.0546	0.485	0.347
5	remote_questions	4.0	3.0	0.225	0.564	8.51e-05

In []: types_undergrad[20]

Out[]:

	question	PAF median (n = 1103)	AF median (n = 235)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.346	0.597	1.42e-06
1	remote_motivated	3.0	2.0	0.28	0.576	0.000136
2	remote_satisfied	4.0	3.0	0.314	0.587	1.18e-05
3	remote_engaging	4.0	3.0	0.21	0.558	0.00313
4	remote_distracted	4.0	4.0	-0.0638	0.482	0.353
5	remote_questions	4.0	3.0	0.145	0.538	0.0595

Discussion/Chat Forums Video lectures Video content Posted readings/study material Assignments/un-proctored exams Live office hours Email Q&A with instructors

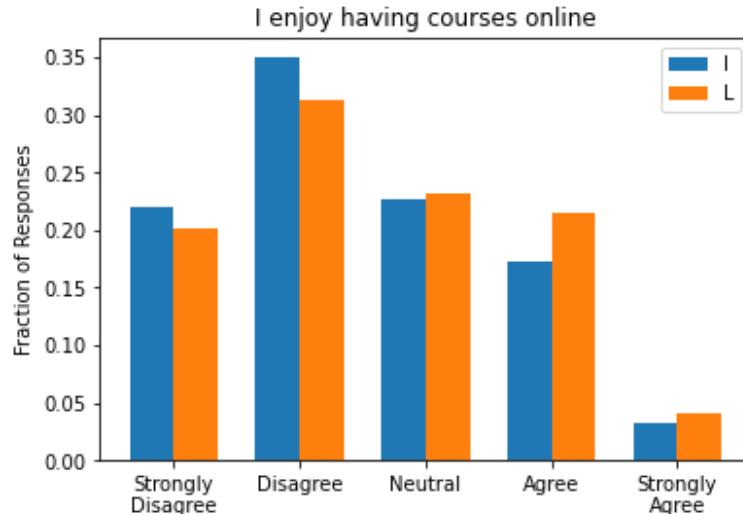
Techniques used outside of class

```
In [ ]: ugcat1_o = ug[(ug['outside_passive']==True) & (ug['outside_interactive']==False) & (ug['outside_assignments']==False)]
ugcat2_o = ug[(ug['outside_passive']==False) & (ug['outside_interactive']==True) & (ug['outside_assignments']==False)]
ugcat3_o = ug[(ug['outside_passive']==False) & (ug['outside_interactive']==False) & (ug['outside_assignments']==True)]
ugcat4_o = ug[(ug['outside_passive']==True) & (ug['outside_interactive']==True) & (ug['outside_assignments']==False)]
ugcat5_o = ug[(ug['outside_passive']==True) & (ug['outside_interactive']==False) & (ug['outside_assignments']==True)]
ugcat6_o = ug[(ug['outside_passive']==False) & (ug['outside_interactive']==True) & (ug['outside_assignments']==True)]
ugcat7_o = ug[(ug['outside_passive']==True) & (ug['outside_interactive']==True) & (ug['outside_assignments']==True)]
ugcats_o = [ugcat1_o, ugcats_o[1], ugcats_o[2], ugcats_o[3], ugcats_o[4], ugcats_o[5], ugcats_o[6], ugcats_o[7]]
```

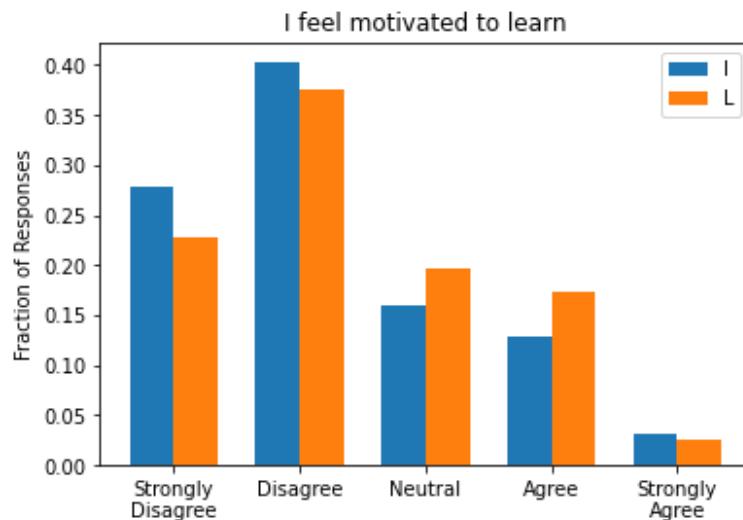
```
In [ ]: names_o = ['L', 'I', 'A', 'LI', 'LA', 'IA', 'LIA']
for i in range(len(ugcats_o)):
    subset_ls.append(ugcats_o[i])
    subset_name.append(names_o[i])
    ugcats_o[i].name = names_o[i]
```

```
In [ ]: techniques_undergrad = []
for i in range(len(ugcats_o)-1):
    for j in range(i+1, len(ugcats_o)):
        print('-----')
        print(ugcats_o[i].name, ugcats_o[i].shape)
        print(ugcats_o[j].name, ugcats_o[j].shape)
        techniques_undergrad.append(mwu_comparison(ugcats_o[j], ugcats_o
[i]))
```

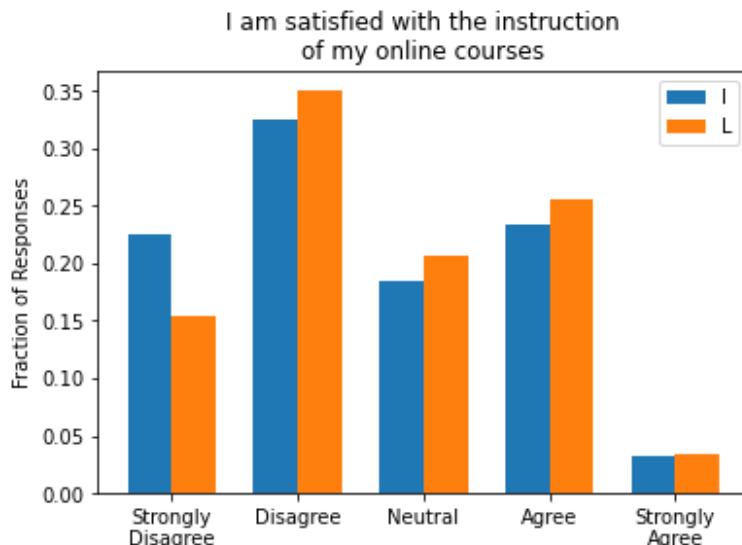
L (583, 43)
I (569, 43)



I shape: (569, 43), L shape: (583, 43)
MWU results: MannwhitneyuResult(statistic=154918.0, pvalue=0.044997281
186781965)
I median: 2.0
L median: 2.0
cohens d: -0.121
f: 0.467



I shape: (569, 43), L shape: (583, 43)
MWU results: MannwhitneyuResult(statistic=151440.5, pvalue=0.007599691
800724201)
I median: 2.0
L median: 2.0
cohens d: -0.146
f: 0.457



I shape: (569, 43), L shape: (583, 43)

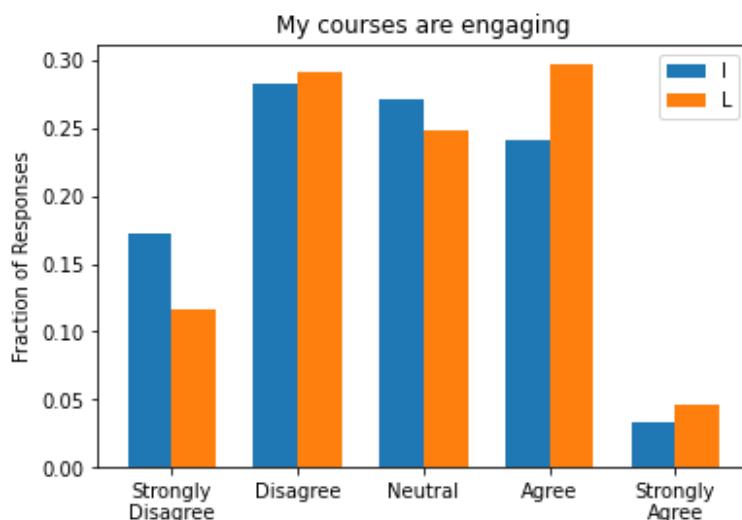
MWU results: MannwhitneyuResult(statistic=153734.5, pvalue=0.026107804
343559977)

I median: 2.0

L median: 2.0

cohens d: -0.126

f: 0.463



I shape: (569, 43), L shape: (583, 43)

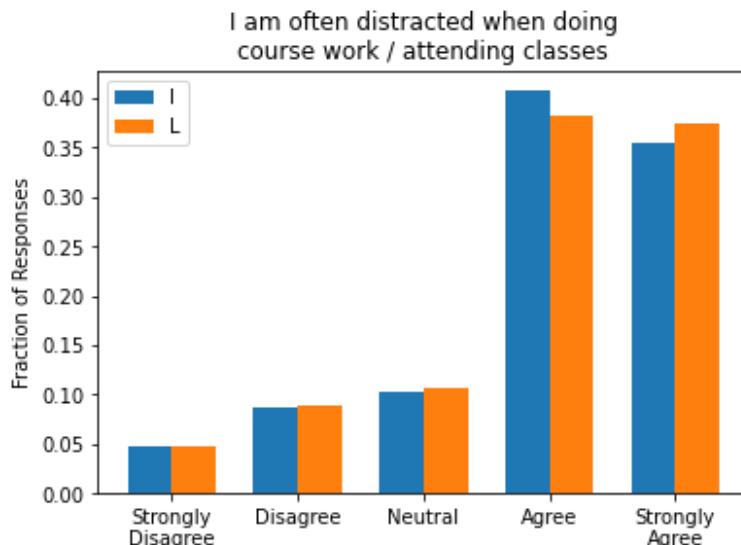
MWU results: MannwhitneyuResult(statistic=150924.0, pvalue=0.006243635
818250912)

I median: 3.0

L median: 3.0

cohens d: -0.166

f: 0.455



I shape: (569, 43), L shape: (583, 43)

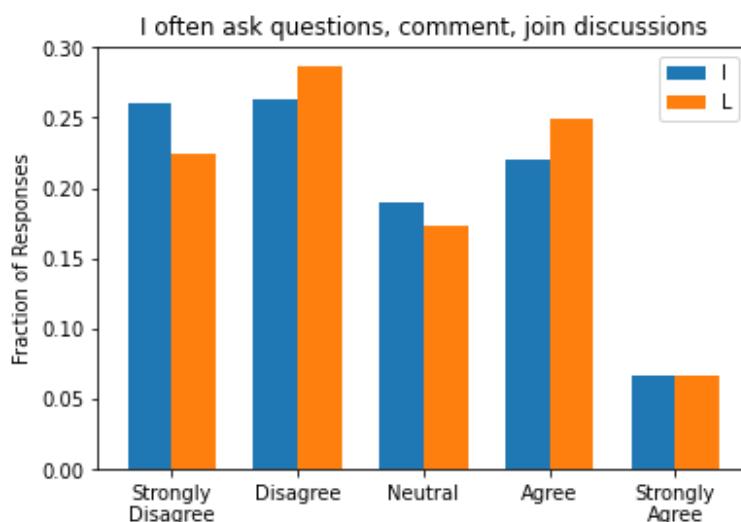
MWU results: MannwhitneyuResult(statistic=164076.0, pvalue=0.736949000
2968031)

I median: 4.0

L median: 4.0

cohens d: -0.00906

f: 0.495



I shape: (569, 43), L shape: (583, 43)

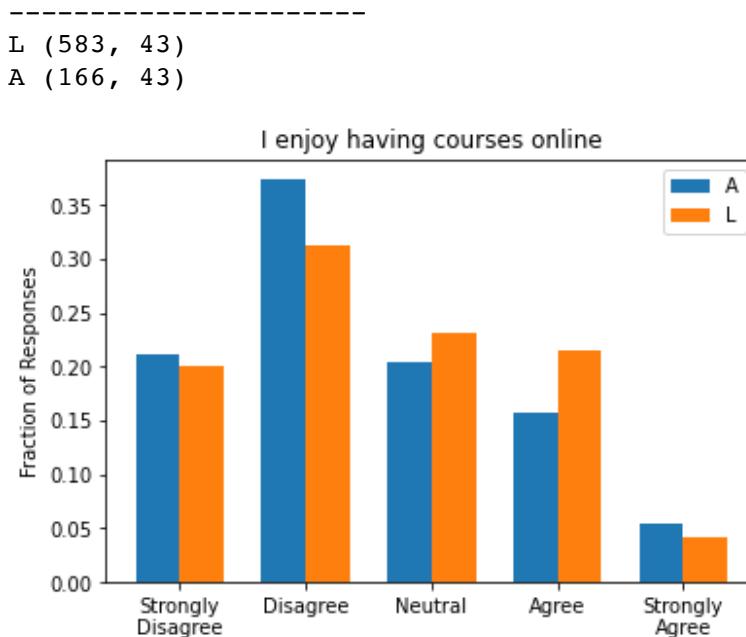
MWU results: MannwhitneyuResult(statistic=159857.5, pvalue=0.274049467
3719127)

I median: 2.0

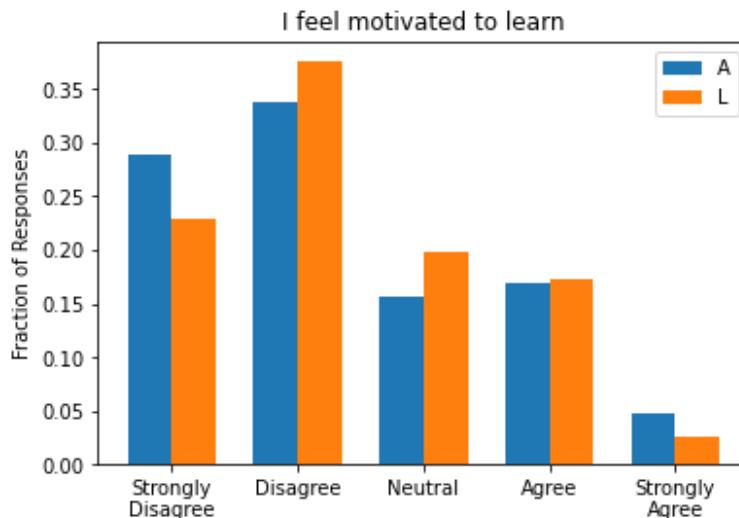
L median: 2.0

cohens d: -0.0612

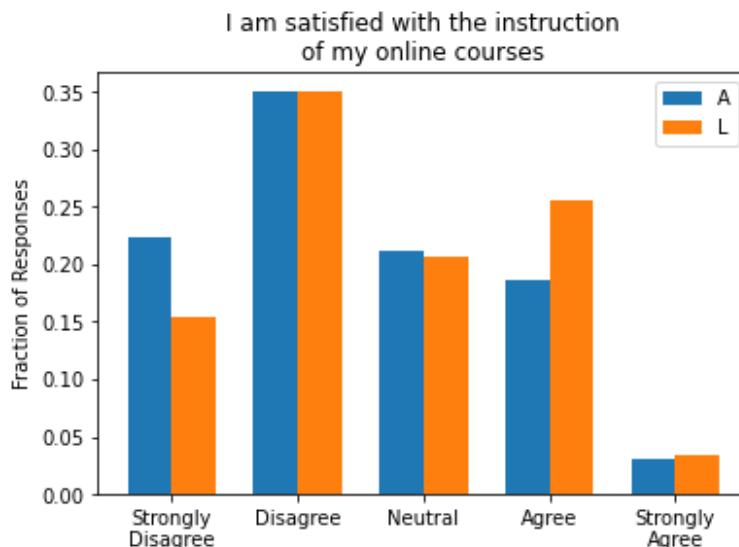
f: 0.482



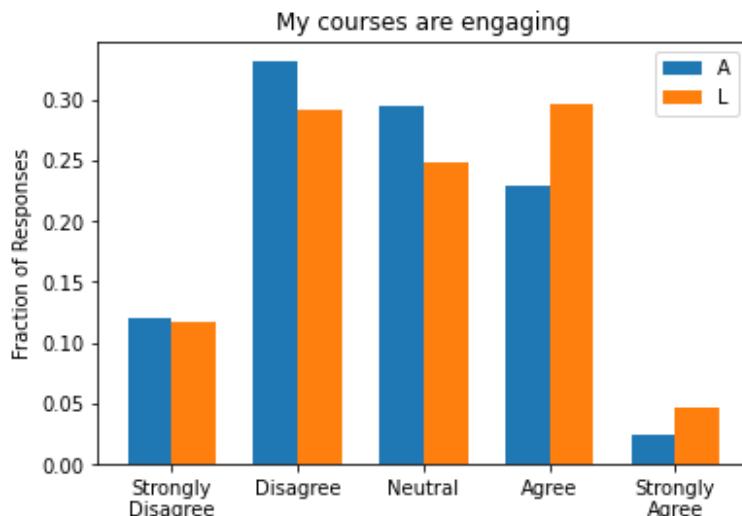
A shape: (166, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=45452.5, pvalue=0.2175502769
 411385)
 A median: 2.0
 L median: 2.0
 cohens d: -0.0986
 f: 0.47



A shape: (166, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=46513.0, pvalue=0.4277333654
 435045)
 A median: 2.0
 L median: 2.0
 cohens d: -0.0388
 f: 0.481



A shape: (166, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=43199.5, pvalue=0.0286430025
 7114009)
 A median: 2.0
 L median: 2.0
 cohens d: -0.191
 f: 0.446



A shape: (166, 43), L shape: (583, 43)

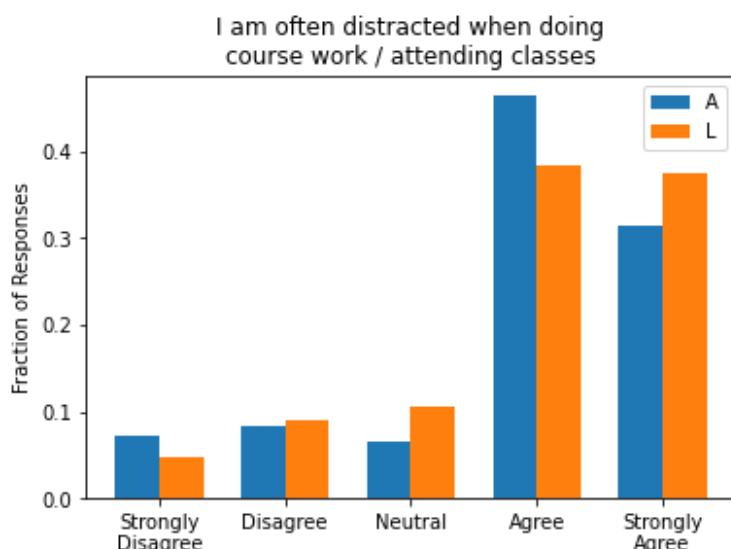
MWU results: MannwhitneyuResult(statistic=44428.5, pvalue=0.0952495034
217887)

A median: 3.0

L median: 3.0

cohens d: -0.147

f: 0.459



A shape: (166, 43), L shape: (583, 43)

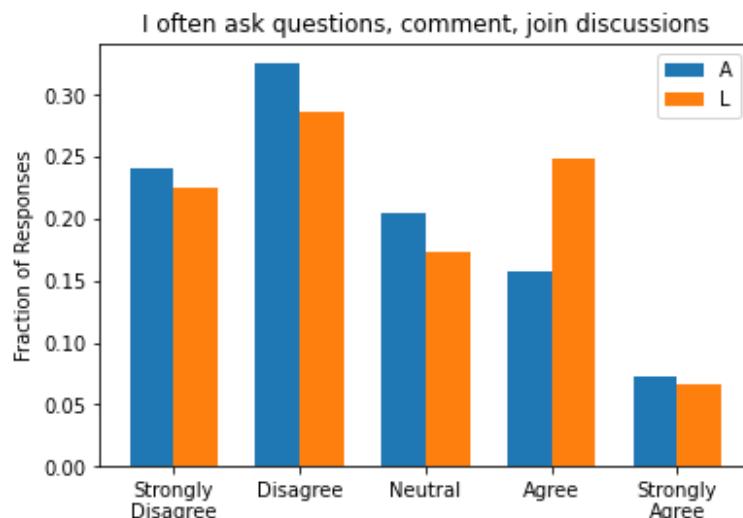
MWU results: MannwhitneyuResult(statistic=46312.5, pvalue=0.3701480110
2855643)

A median: 4.0

L median: 4.0

cohens d: -0.0737

f: 0.479



A shape: (166, 43), L shape: (583, 43)

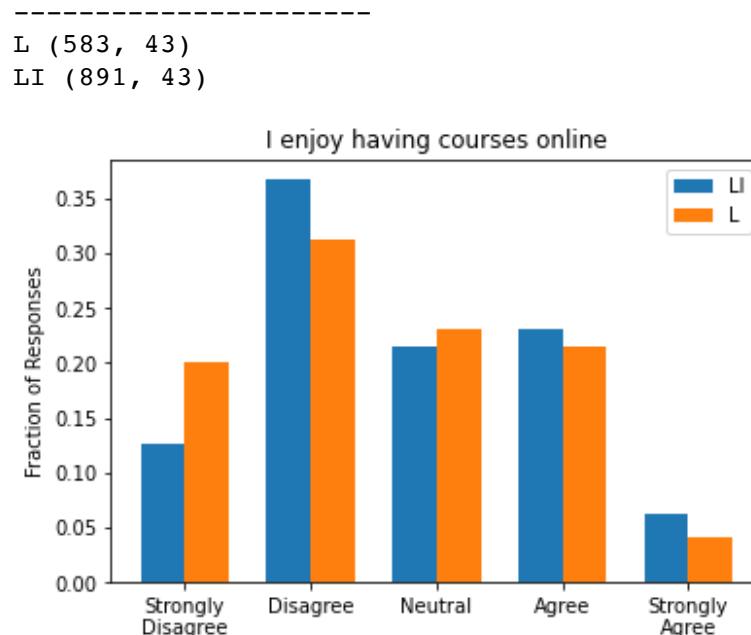
MWU results: MannwhitneyuResult(statistic=45073.0, pvalue=0.1653644326
4345801)

A median: 2.0

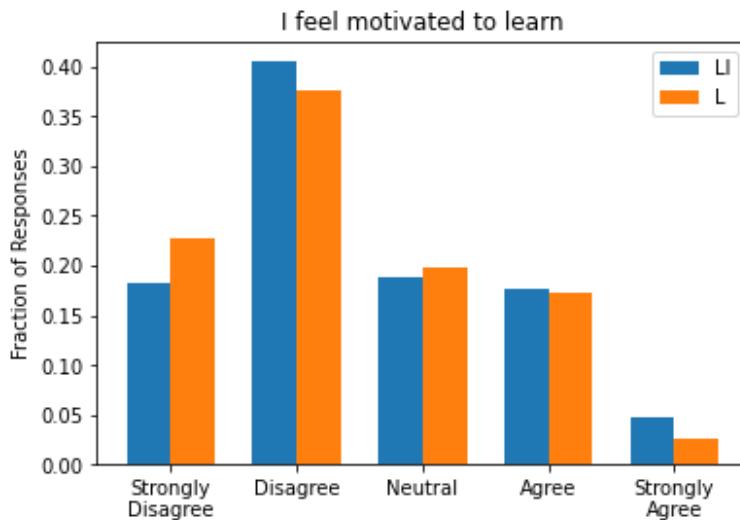
L median: 2.0

cohens d: -0.122

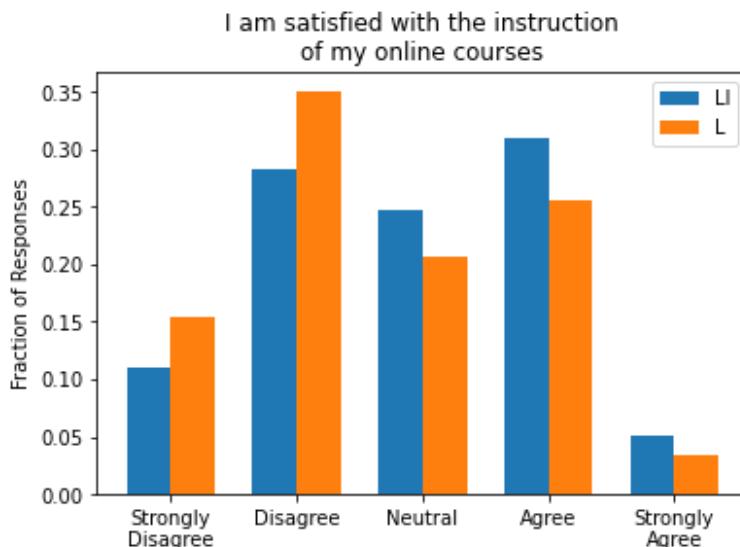
f: 0.466



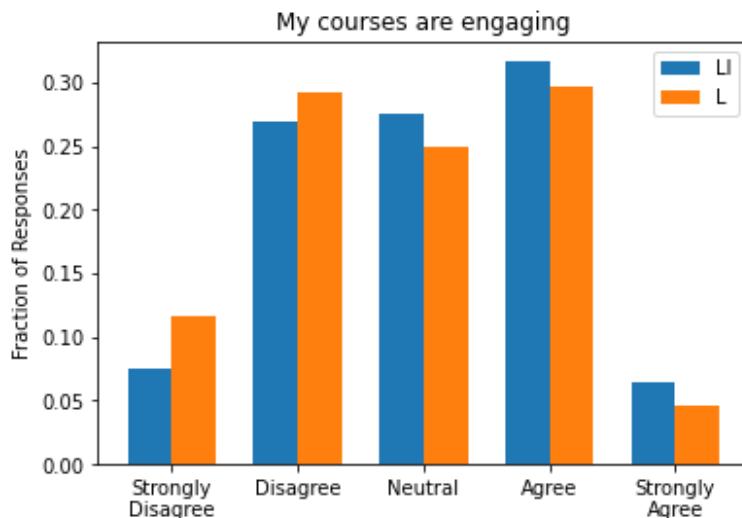
LI shape: (891, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=278328.0, pvalue=0.015945388
 973397607)
 LI median: 3.0
 L median: 2.0
 cohens d: 0.135
 f: 0.536



LI shape: (891, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=272762.5, pvalue=0.088727629
 83769765)
 LI median: 2.0
 L median: 2.0
 cohens d: 0.098
 f: 0.525



LI shape: (891, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=291666.0, pvalue=3.474114555
 051115e-05)
 LI median: 3.0
 L median: 2.0
 cohens d: 0.221
 f: 0.561



LI shape: (891, 43), L shape: (583, 43)

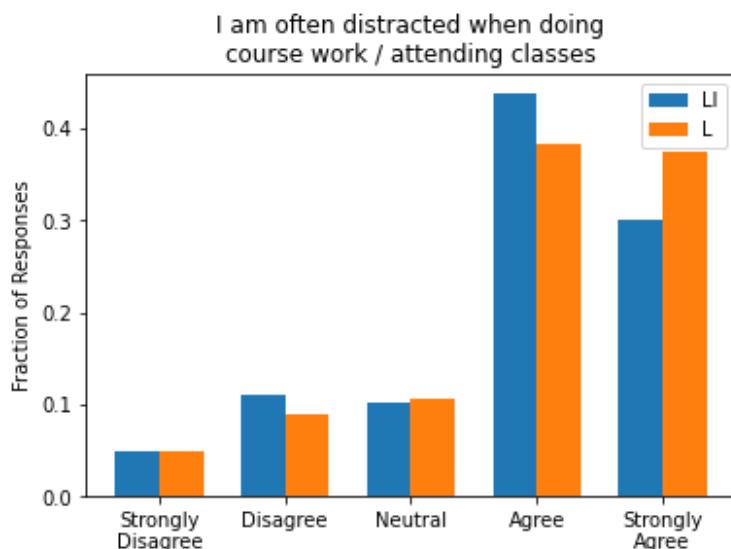
MWU results: MannwhitneyuResult(statistic=279931.0, pvalue=0.008729112
91913485)

LI median: 3.0

L median: 3.0

cohens d: 0.148

f: 0.539



LI shape: (891, 43), L shape: (583, 43)

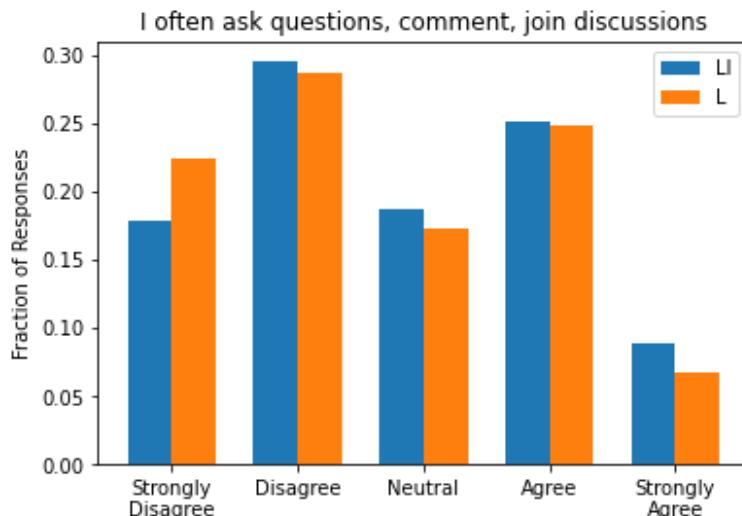
MWU results: MannwhitneyuResult(statistic=241849.0, pvalue=0.017712849
840275963)

LI median: 4.0

L median: 4.0

cohens d: -0.103

f: 0.466



LI shape: (891, 43), L shape: (583, 43)

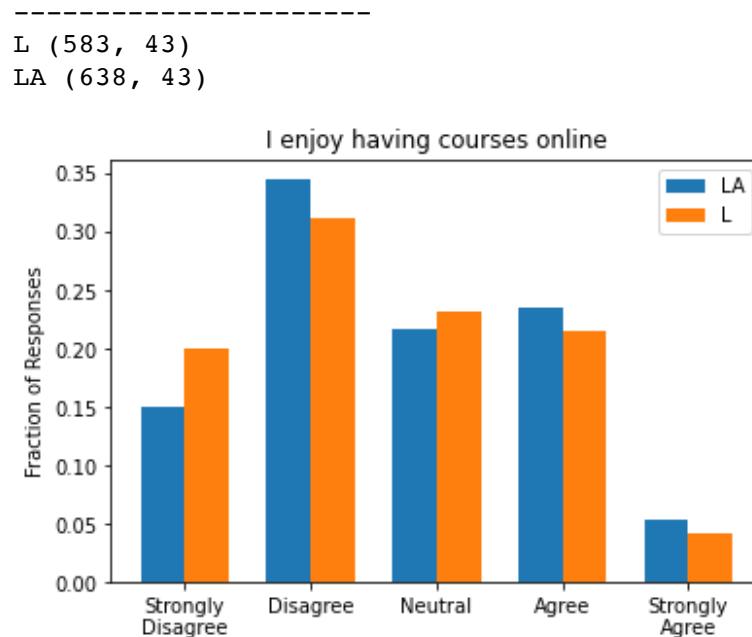
MWU results: MannwhitneyuResult(statistic=274811.5, pvalue=0.052195410
2321188)

LI median: 3.0

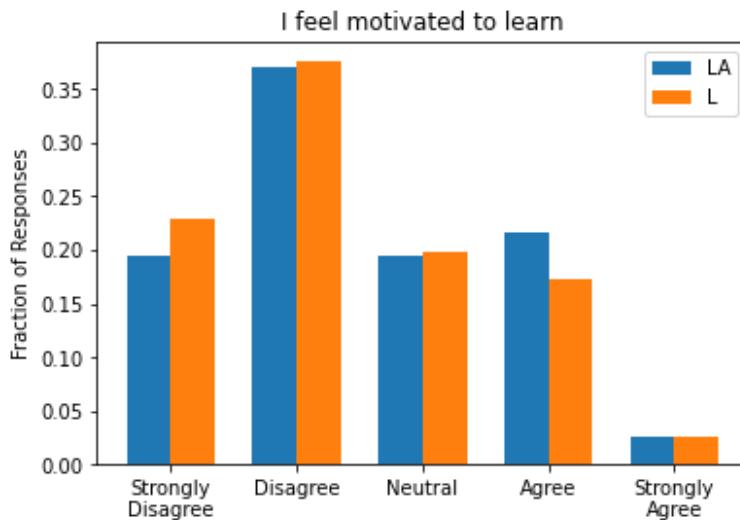
L median: 2.0

cohens d: 0.104

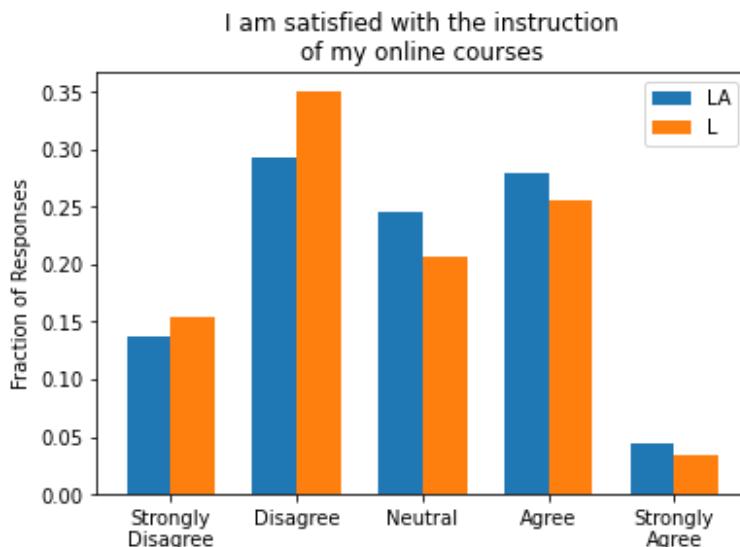
f: 0.529



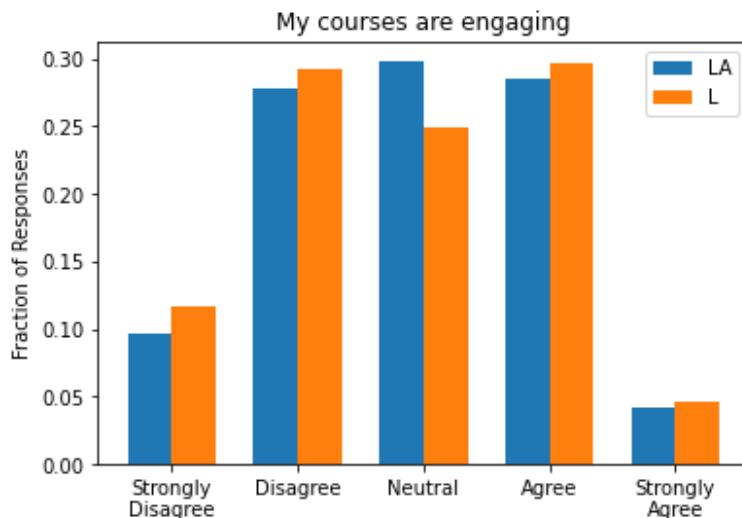
LA shape: (638, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=195842.0, pvalue=0.097629873
 33466559)
 LA median: 3.0
 L median: 2.0
 cohens d: 0.0984
 f: 0.527



LA shape: (638, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=196877.0, pvalue=0.065405719
 92465968)
 LA median: 2.0
 L median: 2.0
 cohens d: 0.105
 f: 0.529



LA shape: (638, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=198439.0, pvalue=0.036073188
 077163185)
 LA median: 3.0
 L median: 2.0
 cohens d: 0.118
 f: 0.534



LA shape: (638, 43), L shape: (583, 43)

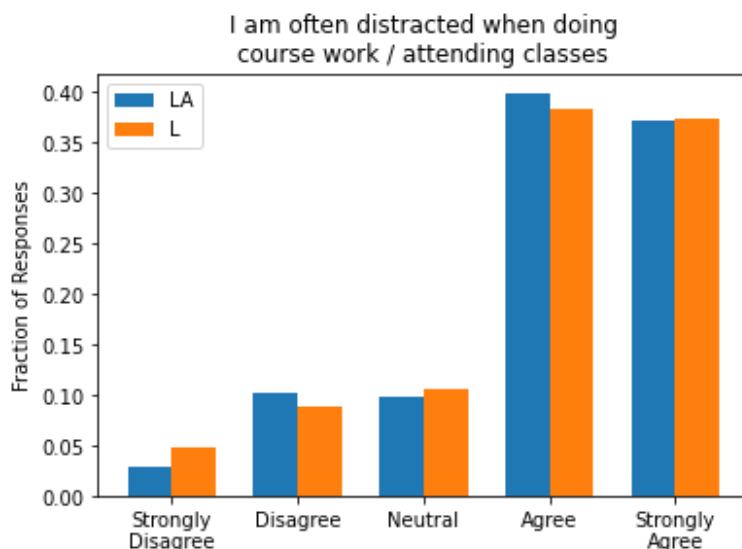
MWU results: MannwhitneyuResult(statistic=189009.5, pvalue=0.609552820
7814769)

LA median: 3.0

L median: 3.0

cohens d: 0.0311

f: 0.508



LA shape: (638, 43), L shape: (583, 43)

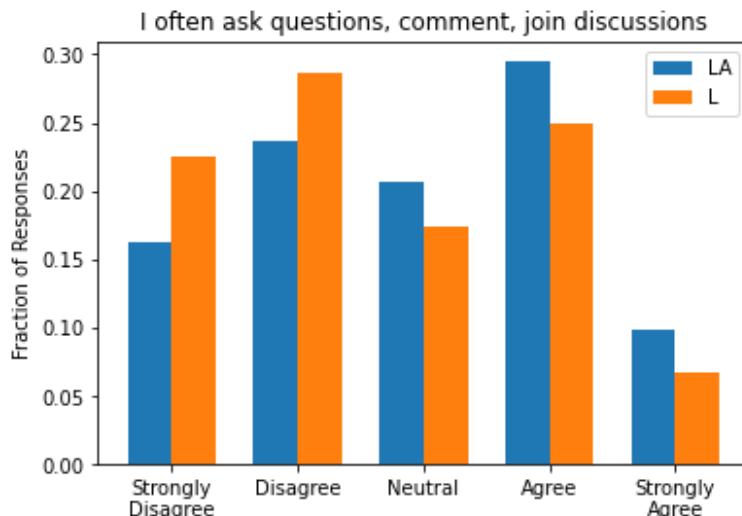
MWU results: MannwhitneyuResult(statistic=187496.0, pvalue=0.793295938
1931491)

LA median: 4.0

L median: 4.0

cohens d: 0.0314

f: 0.504



LA shape: (638, 43), L shape: (583, 43)

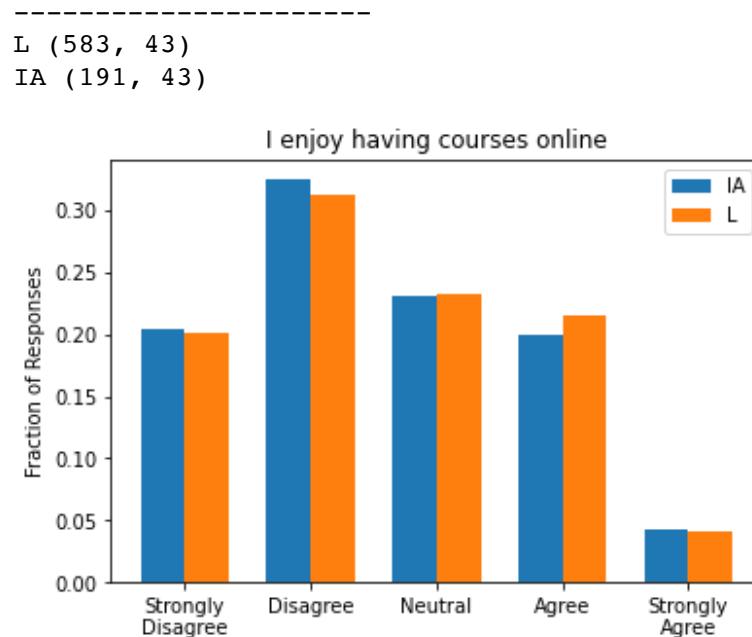
MWU results: MannwhitneyuResult(statistic=209346.0, pvalue=9.579125396
817596e-05)

LA median: 3.0

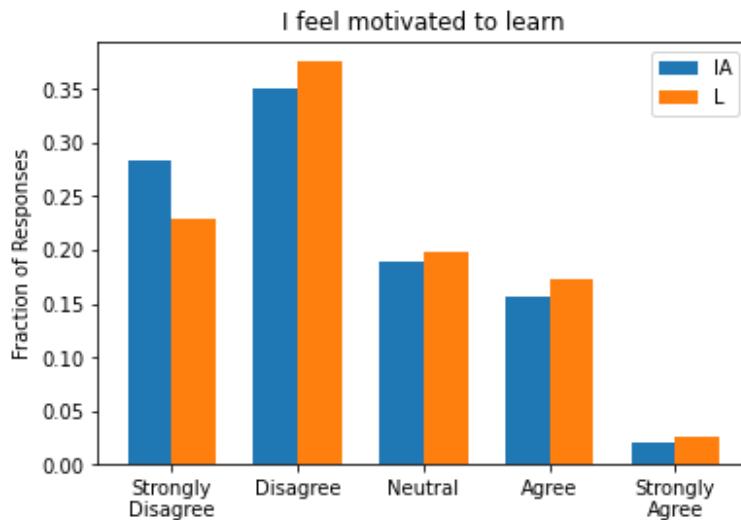
L median: 2.0

cohens d: 0.225

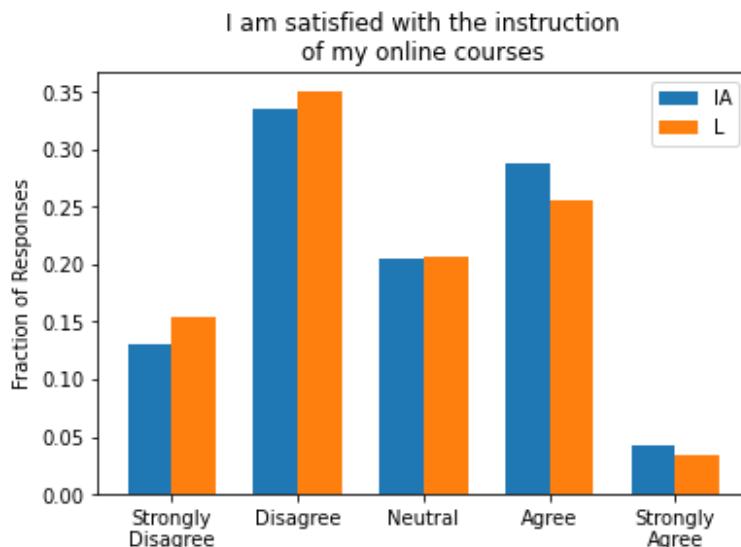
f: 0.563



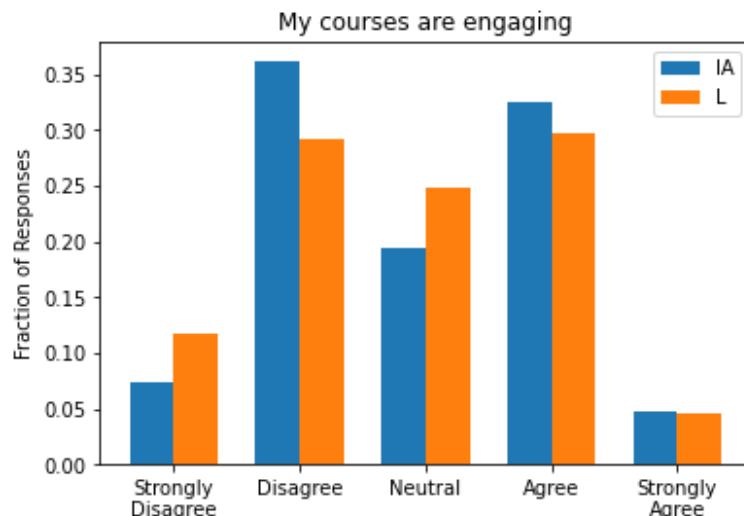
IA shape: (191, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=54738.5, pvalue=0.7182310276
 348818)
 IA median: 2.0
 L median: 2.0
 cohens d: -0.0291
 f: 0.492



IA shape: (191, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=52407.5, pvalue=0.2046104915
 811161)
 IA median: 2.0
 L median: 2.0
 cohens d: -0.1
 f: 0.471



IA shape: (191, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=58670.5, pvalue=0.2466000576
 5067217)
 IA median: 3.0
 L median: 2.0
 cohens d: 0.0976
 f: 0.527



IA shape: (191, 43), L shape: (583, 43)

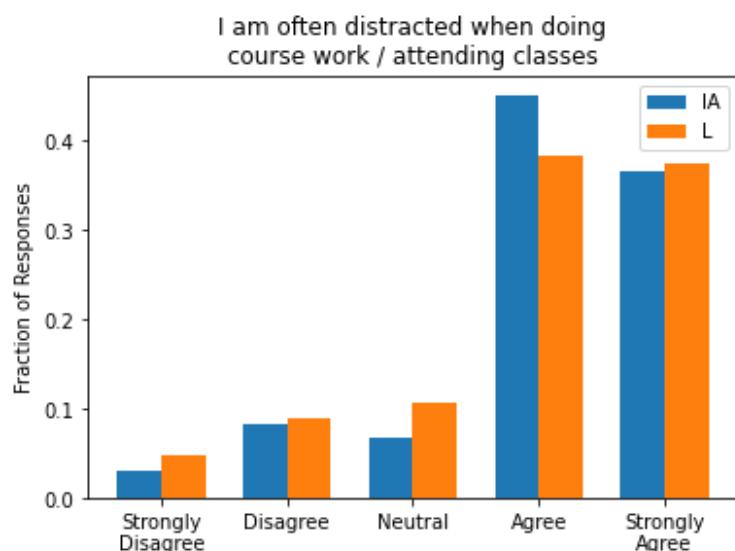
MWU results: MannwhitneyuResult(statistic=56756.0, pvalue=0.6762323082
123508)

IA median: 3.0

L median: 3.0

cohens d: 0.0423

f: 0.51



IA shape: (191, 43), L shape: (583, 43)

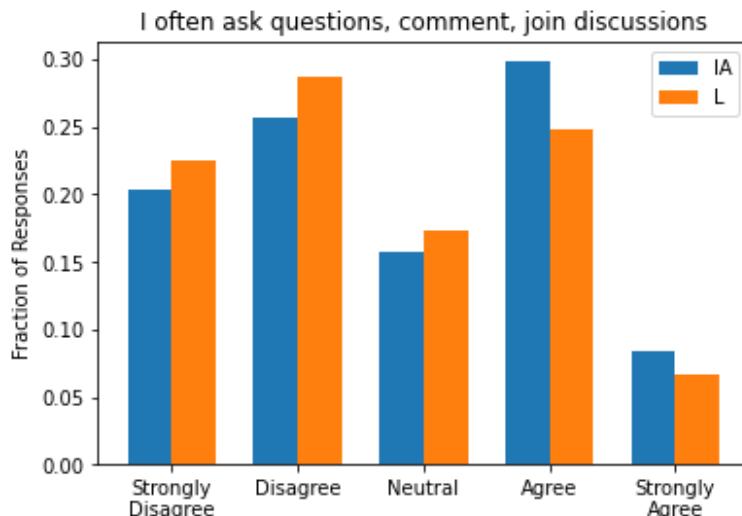
MWU results: MannwhitneyuResult(statistic=57372.0, pvalue=0.5012250762
218587)

IA median: 4.0

L median: 4.0

cohens d: 0.083

f: 0.515



IA shape: (191, 43), L shape: (583, 43)

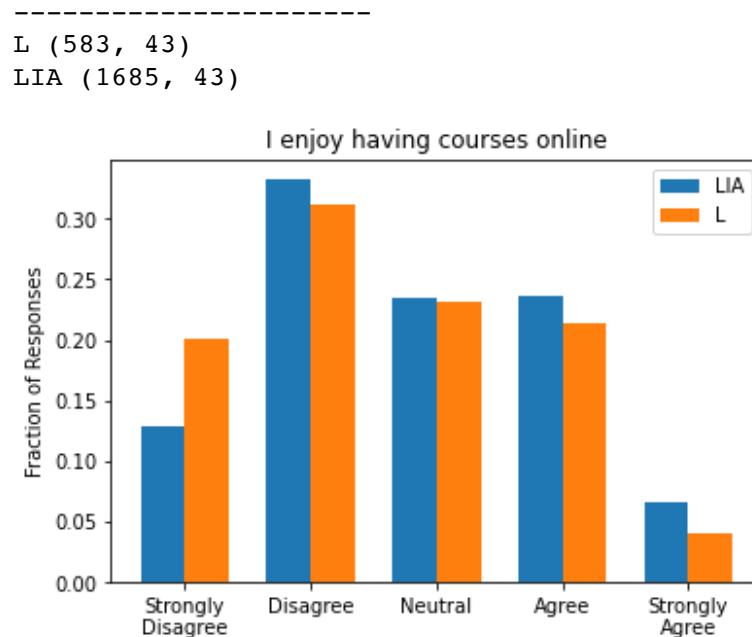
MWU results: MannwhitneyuResult(statistic=59411.5, pvalue=0.1519232475
2412323)

IA median: 3.0

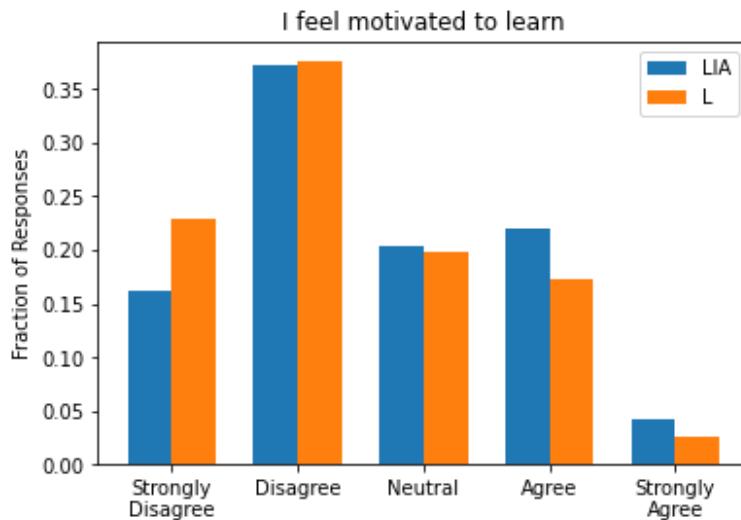
L median: 2.0

cohens d: 0.122

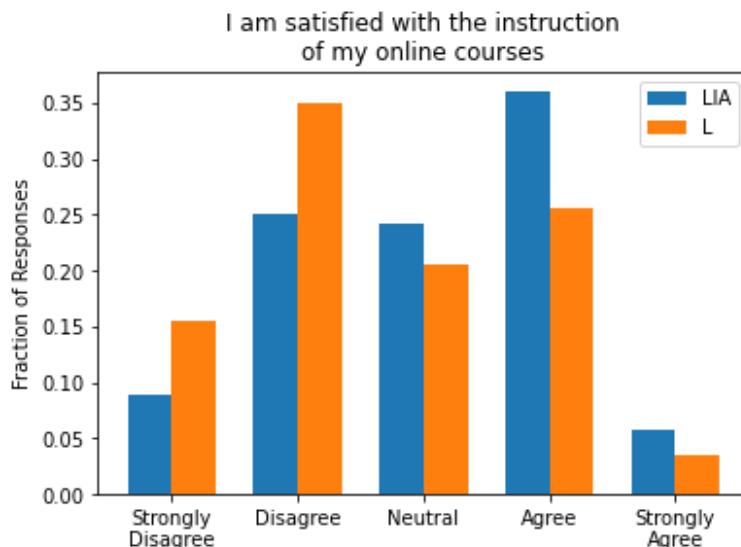
f: 0.534



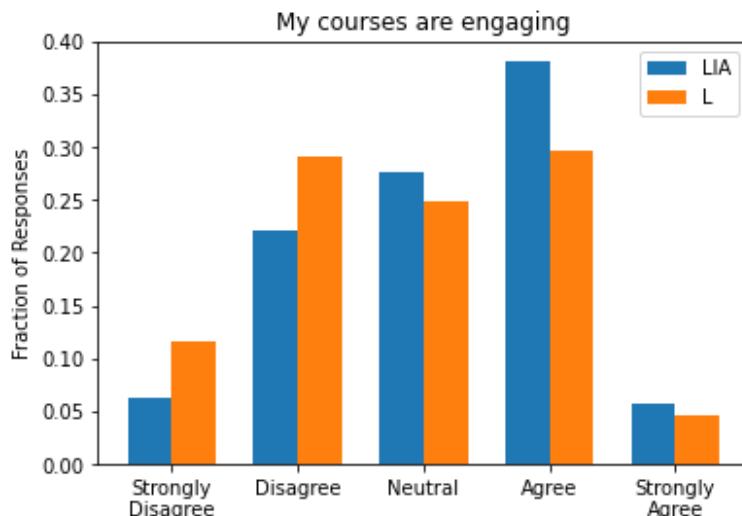
LIA shape: (1685, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=536422.5, pvalue=0.000602085
 7609650657)
 LIA median: 3.0
 L median: 2.0
 cohens d: 0.171
 f: 0.546



LIA shape: (1685, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=543523.5, pvalue=6.504010496
 990435e-05)
 LIA median: 2.0
 L median: 2.0
 cohens d: 0.193
 f: 0.553



LIA shape: (1685, 43), L shape: (583, 43)
 MWU results: MannwhitneyuResult(statistic=585026.5, pvalue=8.773550369
 72246e-13)
 LIA median: 3.0
 L median: 2.0
 cohens d: 0.348
 f: 0.596



LIA shape: (1685, 43), L shape: (583, 43)

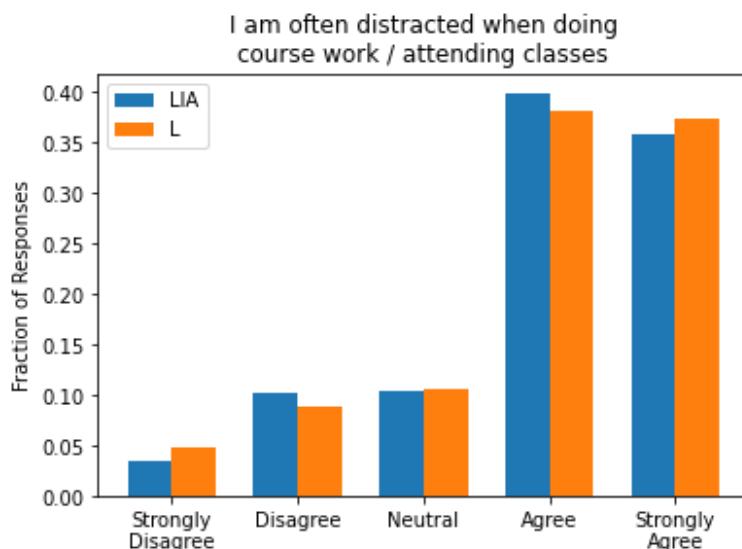
MWU results: MannwhitneyuResult(statistic=561920.5, pvalue=6.199224588
56903e-08)

LIA median: 3.0

L median: 3.0

cohens d: 0.269

f: 0.572



LIA shape: (1685, 43), L shape: (583, 43)

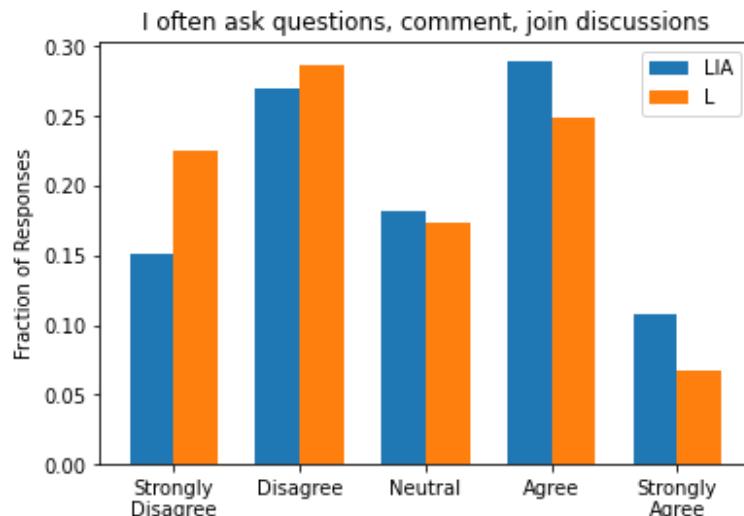
MWU results: MannwhitneyuResult(statistic=486866.0, pvalue=0.737201360
2928558)

LIA median: 4.0

L median: 4.0

cohens d: -0.000277

f: 0.496



LIA shape: (1685, 43), L shape: (583, 43)

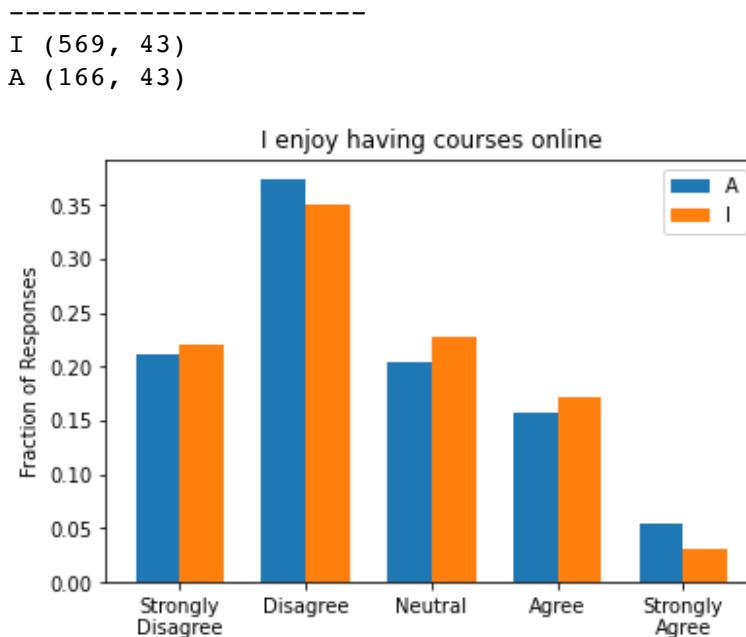
MWU results: MannwhitneyuResult(statistic=553252.5, pvalue=2.835024723
0659178e-06)

LIA median: 3.0

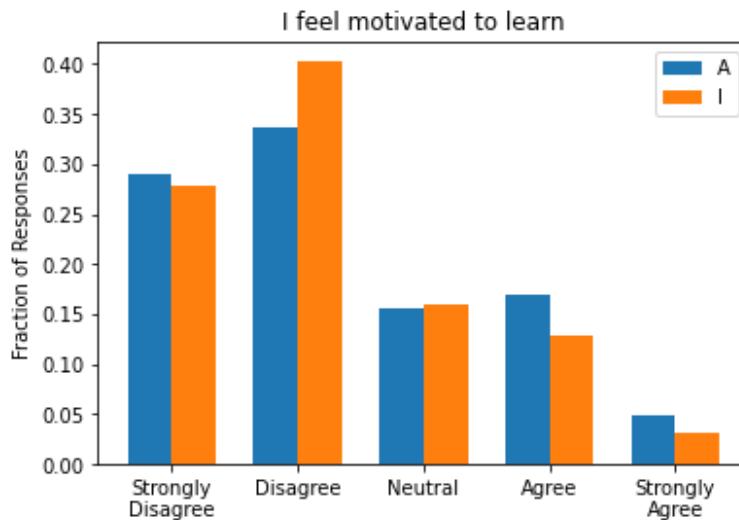
L median: 2.0

cohens d: 0.227

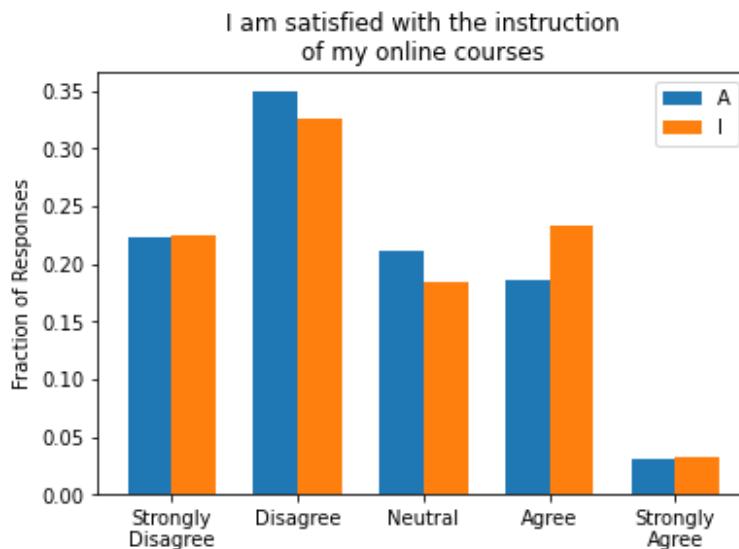
f: 0.563



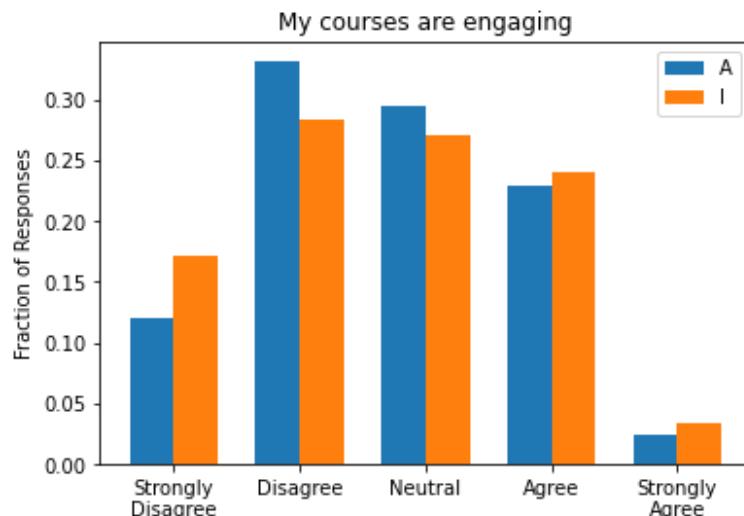
A shape: (166, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=47407.5, pvalue=0.9381591286
 167598)
 A median: 2.0
 I median: 2.0
 cohens d: 0.0211
 f: 0.502



A shape: (166, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=49183.0, pvalue=0.3951704619
 921108)
 A median: 2.0
 I median: 2.0
 cohens d: 0.104
 f: 0.521



A shape: (166, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=45769.0, pvalue=0.5310445612
 142085)
 A median: 2.0
 I median: 2.0
 cohens d: -0.0607
 f: 0.485



A shape: (166, 43), I shape: (569, 43)

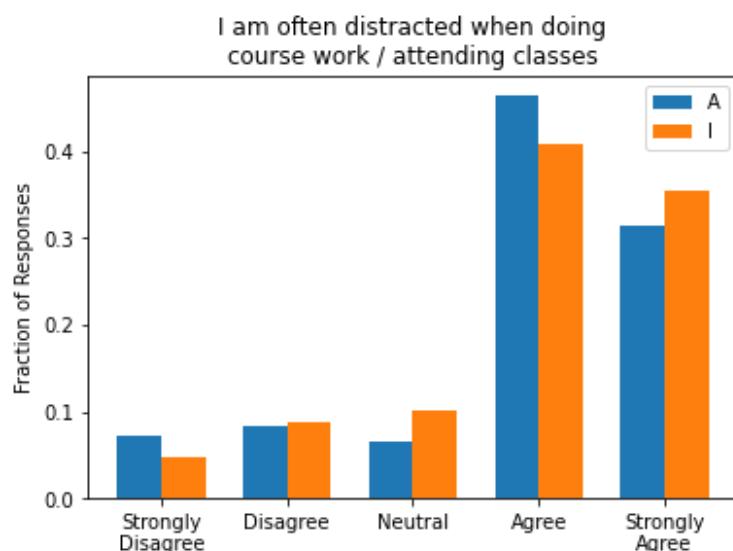
MWU results: MannwhitneyuResult(statistic=47796.5, pvalue=0.8069468085
78338)

A median: 3.0

I median: 3.0

cohens d: 0.0225

f: 0.506



A shape: (166, 43), I shape: (569, 43)

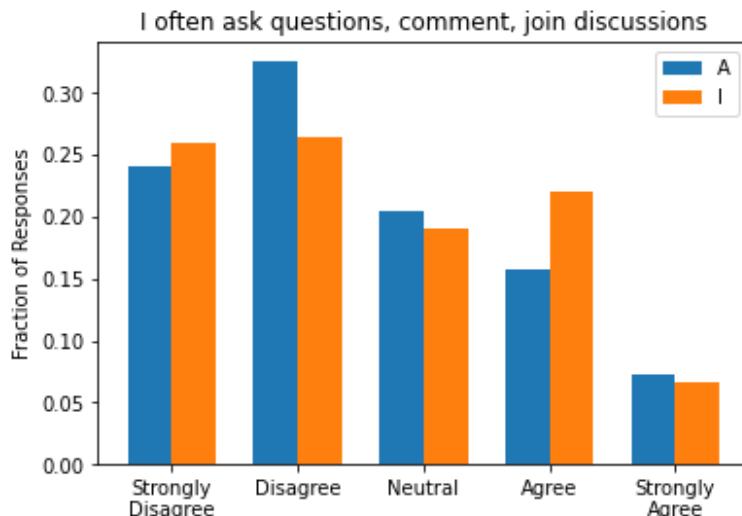
MWU results: MannwhitneyuResult(statistic=45719.0, pvalue=0.5050229250
615191)

A median: 4.0

I median: 4.0

cohens d: -0.0655

f: 0.484



A shape: (166, 43), I shape: (569, 43)

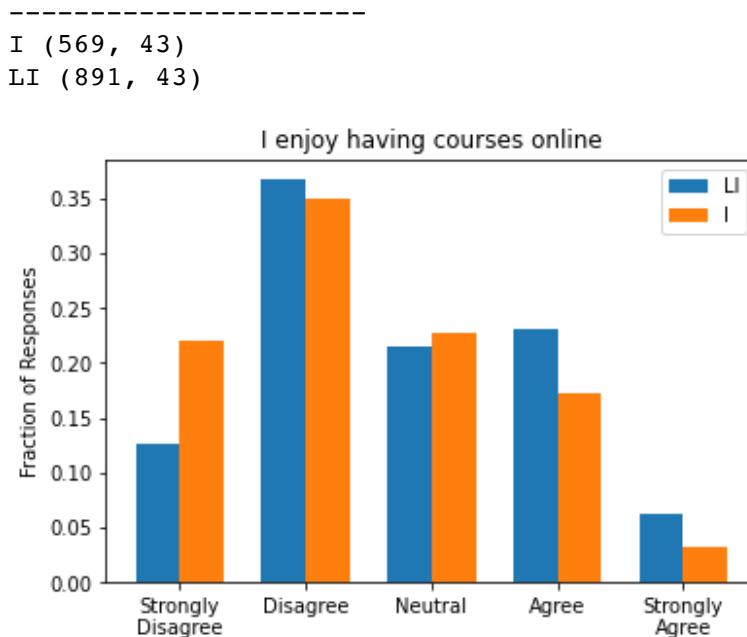
MWU results: MannwhitneyuResult(statistic=45751.0, pvalue=0.5284421208
641286)

A median: 2.0

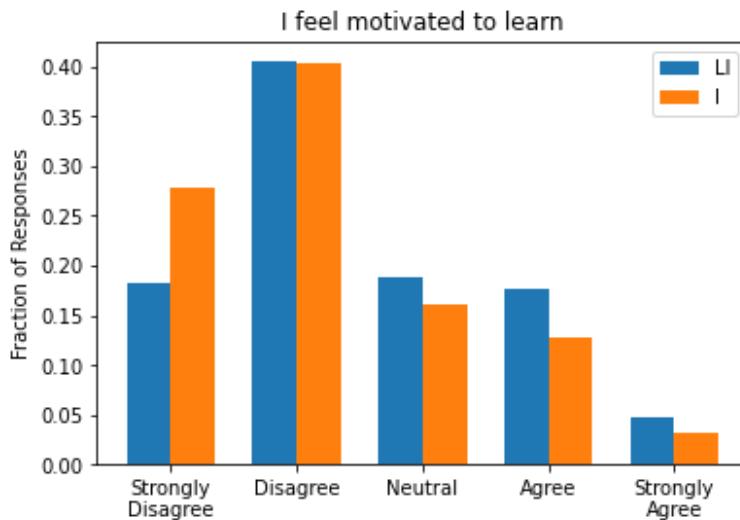
I median: 2.0

cohens d: -0.06

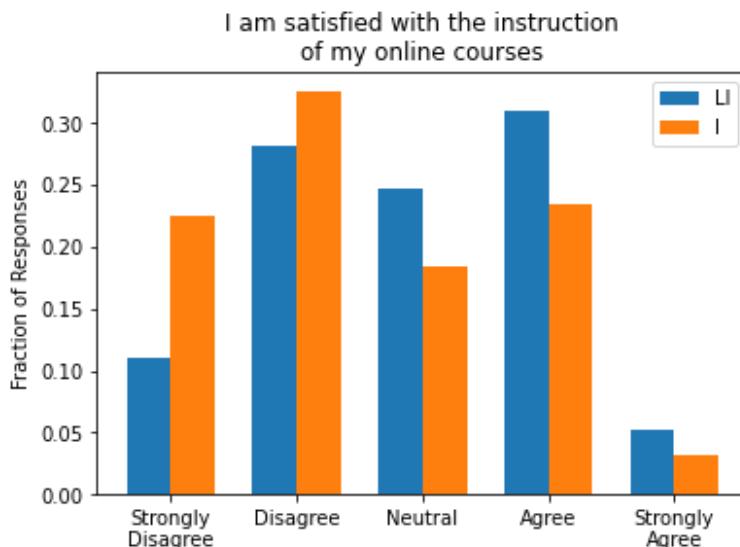
f: 0.484



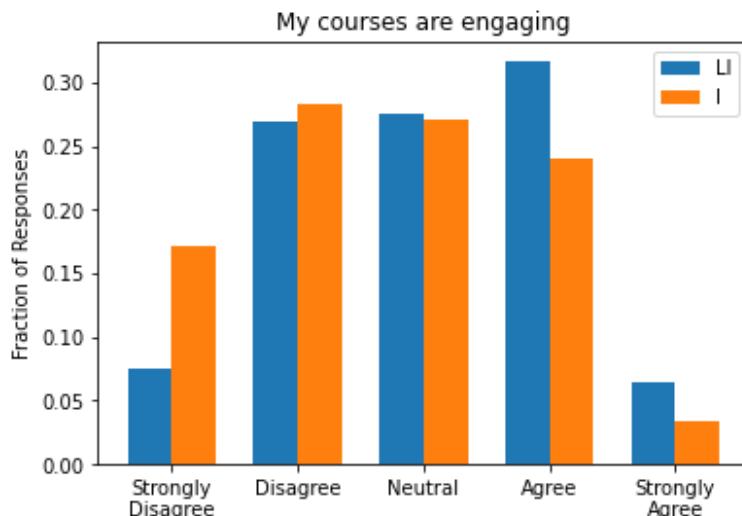
LI shape: (891, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=288885.0, pvalue=2.964570327
 $172383e-06$)
 LI median: 3.0
 I median: 2.0
 cohens d: 0.259
 f: 0.57



LI shape: (891, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=288333.5, pvalue=3.496711843
 $2164764e-06$)
 LI median: 2.0
 I median: 2.0
 cohens d: 0.242
 f: 0.569



LI shape: (891, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=301509.5, pvalue=2.689738009
 $6258437e-10$)
 LI median: 3.0
 I median: 2.0
 cohens d: 0.344
 f: 0.595



LI shape: (891, 43), I shape: (569, 43)

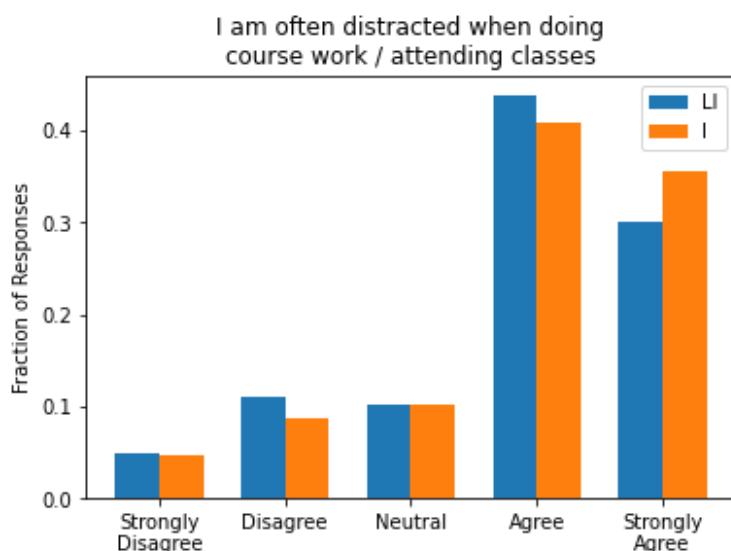
MWU results: MannwhitneyuResult(statistic=296117.5, pvalue=1.962871598
649389e-08)

LI median: 3.0

I median: 3.0

cohens d: 0.317

f: 0.584



LI shape: (891, 43), I shape: (569, 43)

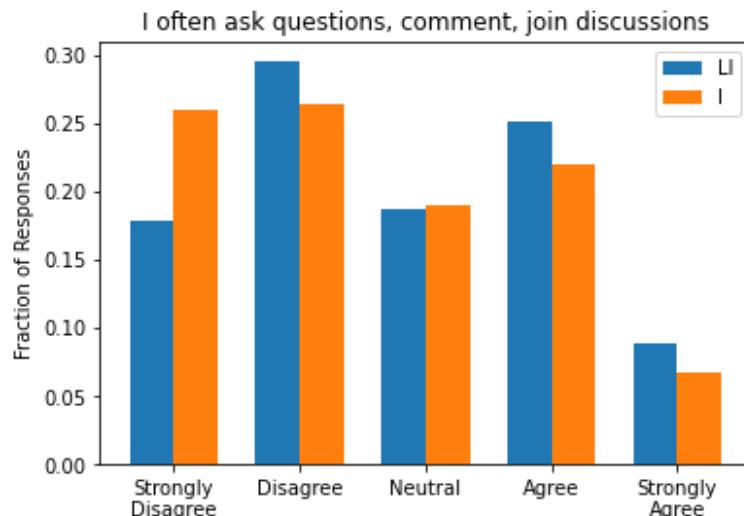
MWU results: MannwhitneyuResult(statistic=238596.0, pvalue=0.044151930
66142487)

LI median: 4.0

I median: 4.0

cohens d: -0.0944

f: 0.471



LI shape: (891, 43), I shape: (569, 43)

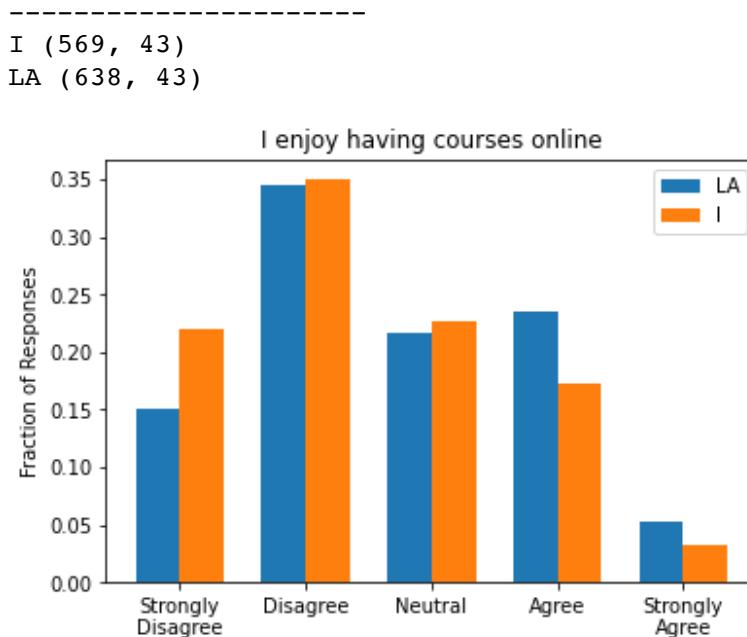
MWU results: MannwhitneyuResult(statistic=277241.0, pvalue=0.001895869
4010115919)

LI median: 3.0

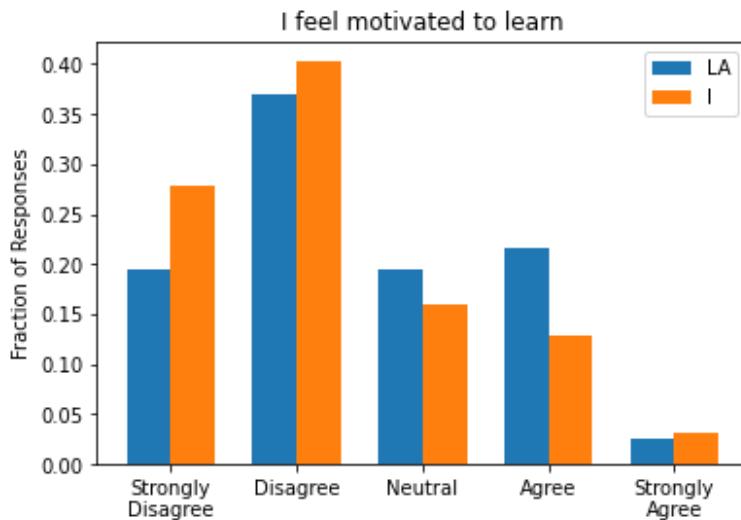
I median: 2.0

cohens d: 0.165

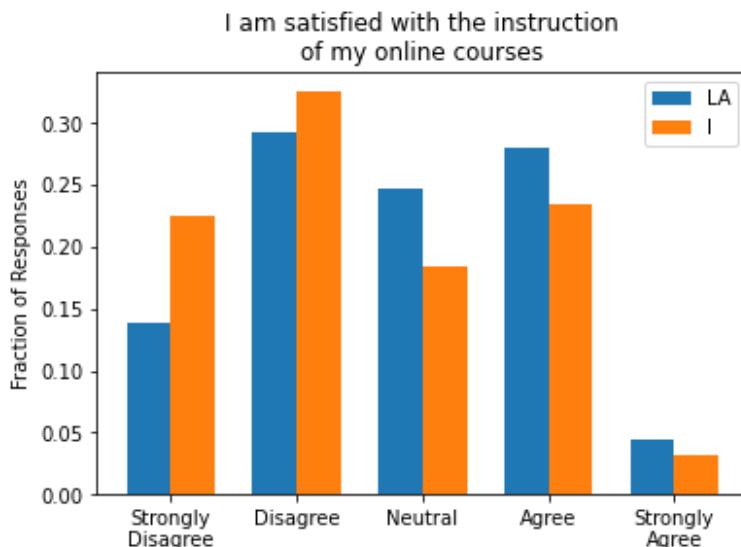
f: 0.547



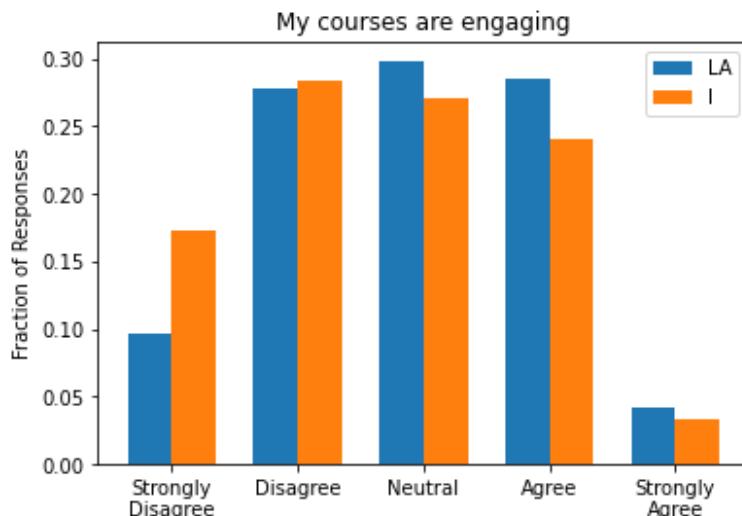
LA shape: (638, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=203343.0, pvalue=0.000184084
 47476518793)
 LA median: 3.0
 I median: 2.0
 cohens d: 0.222
 f: 0.56



LA shape: (638, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=207697.0, pvalue=6.231813526
 823682e-06)
 LA median: 2.0
 I median: 2.0
 cohens d: 0.25
 f: 0.572



LA shape: (638, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=206170.0, pvalue=2.524768727
 8587246e-05)
 LA median: 3.0
 I median: 2.0
 cohens d: 0.241
 f: 0.568



LA shape: (638, 43), I shape: (569, 43)

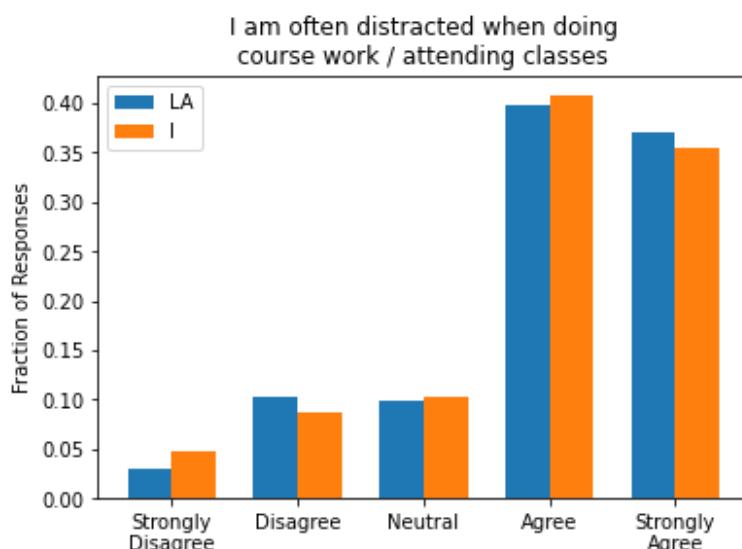
MWU results: MannwhitneyuResult(statistic=201212.0, pvalue=0.0007463198126897641)

LA median: 3.0

I median: 3.0

cohens d: 0.201

f: 0.554



LA shape: (638, 43), I shape: (569, 43)

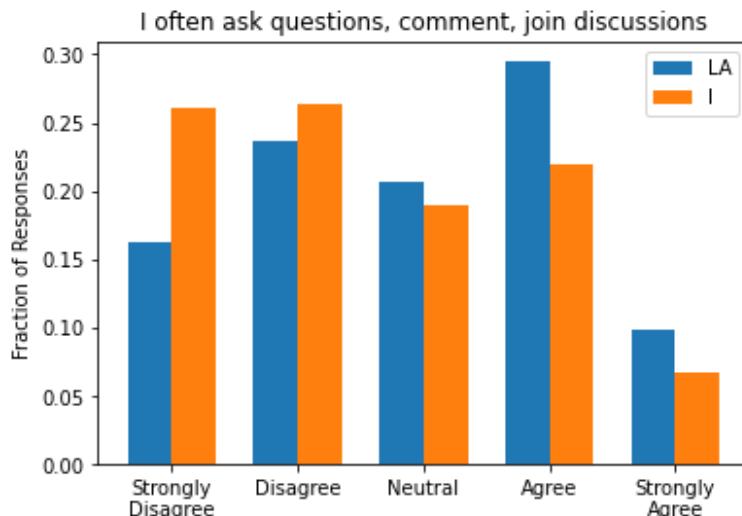
MWU results: MannwhitneyuResult(statistic=184984.5, pvalue=0.5413283873637316)

LA median: 4.0

I median: 4.0

cohens d: 0.041

f: 0.51



LA shape: (638, 43), I shape: (569, 43)

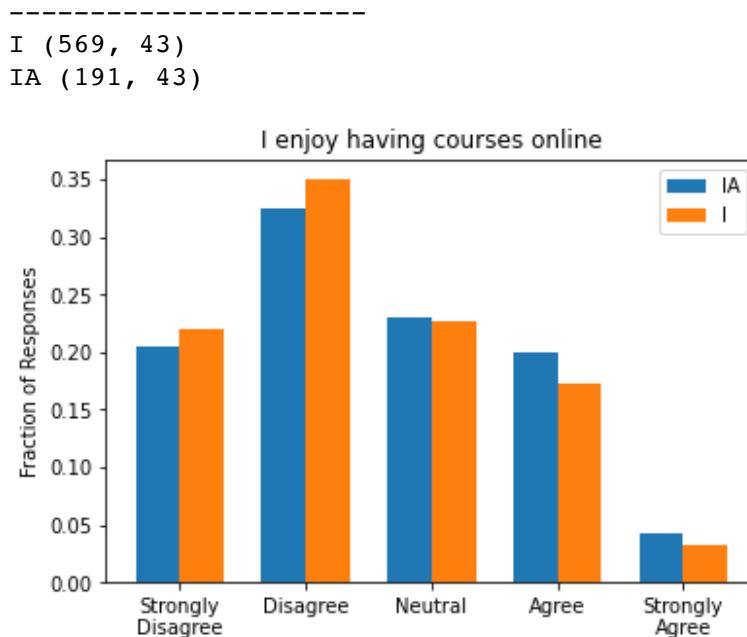
MWU results: MannwhitneyuResult(statistic=210561.0, pvalue=8.159253345
114519e-07)

LA median: 3.0

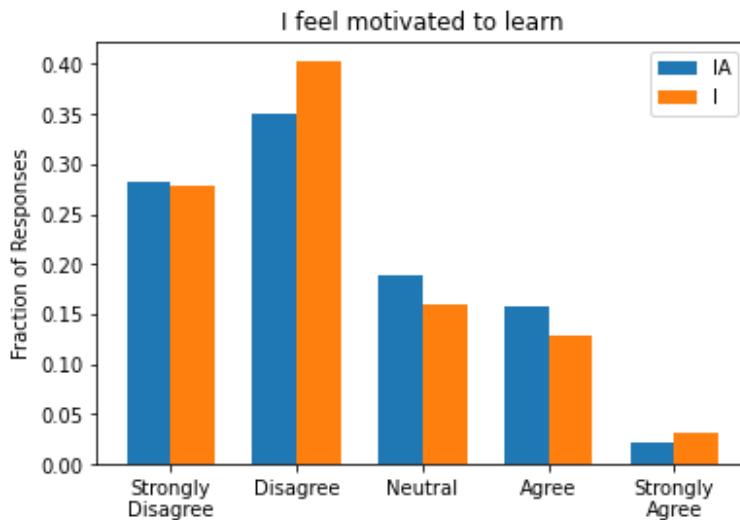
I median: 2.0

cohens d: 0.285

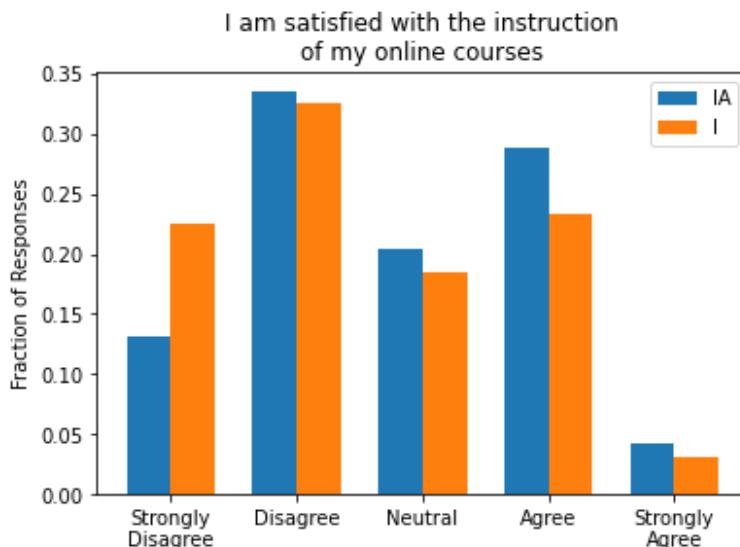
f: 0.58



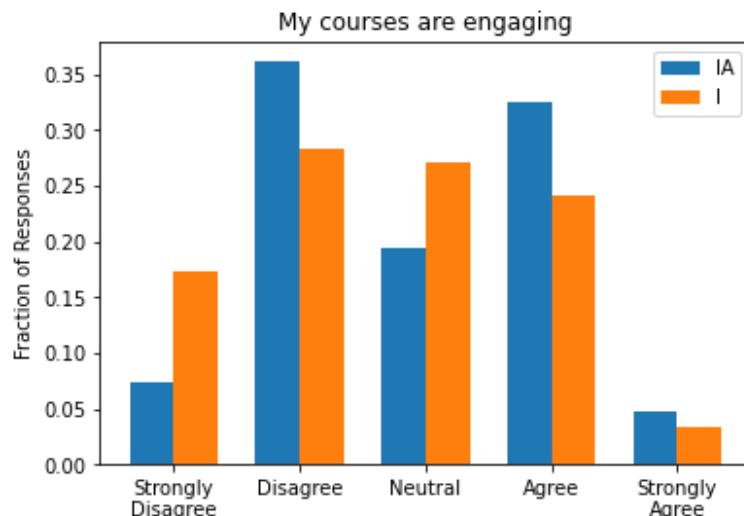
IA shape: (191, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=57006.5, pvalue=0.2927217392
 653809)
 IA median: 2.0
 I median: 2.0
 cohens d: 0.0926
 f: 0.525



IA shape: (191, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=55768.5, pvalue=0.5688338374
 824744)
 IA median: 2.0
 I median: 2.0
 cohens d: 0.0449
 f: 0.513



IA shape: (191, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=61094.0, pvalue=0.0077899443
 975537495)
 IA median: 3.0
 I median: 2.0
 cohens d: 0.219
 f: 0.562



IA shape: (191, 43), I shape: (569, 43)

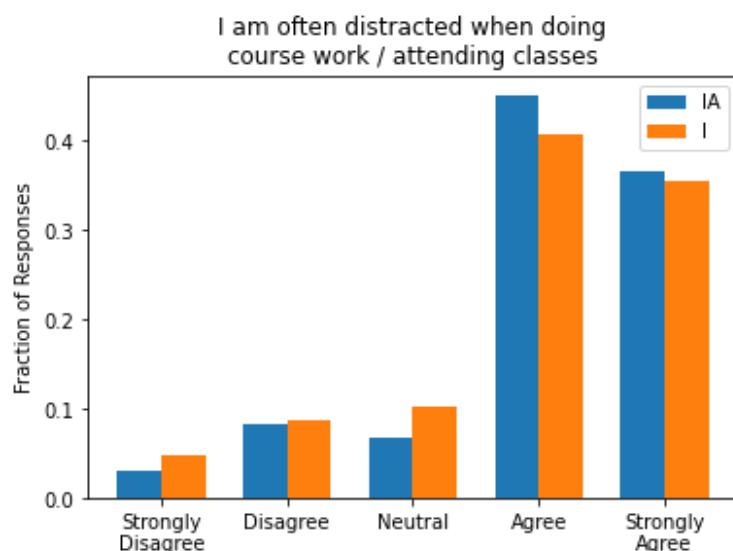
MWU results: MannwhitneyuResult(statistic=60323.0, pvalue=0.0184419587
73056006)

IA median: 3.0

I median: 3.0

cohens d: 0.208

f: 0.555



IA shape: (191, 43), I shape: (569, 43)

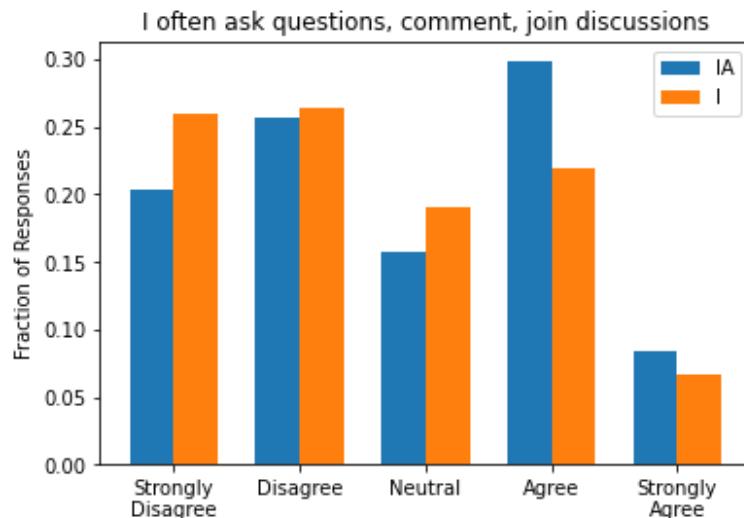
MWU results: MannwhitneyuResult(statistic=56637.0, pvalue=0.3507938439
02949)

IA median: 4.0

I median: 4.0

cohens d: 0.0932

f: 0.521



IA shape: (191, 43), I shape: (569, 43)

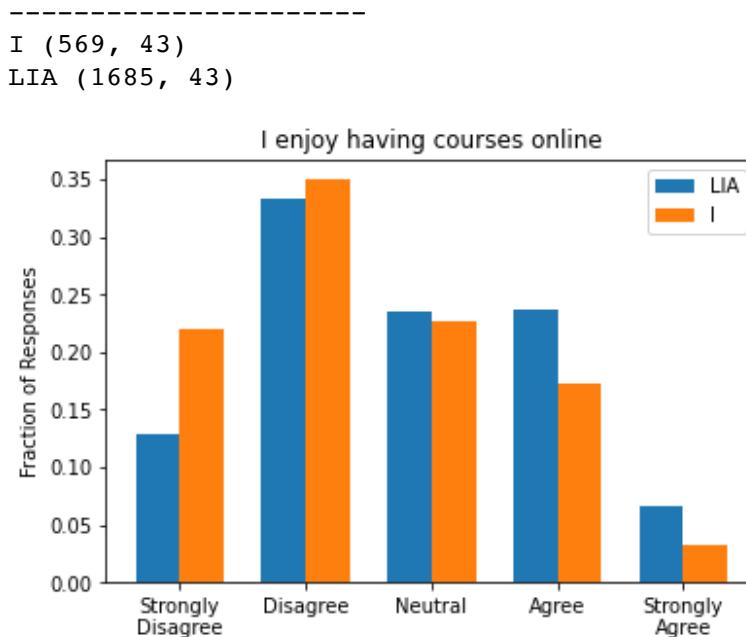
MWU results: MannwhitneyuResult(statistic=59877.5, pvalue=0.0302012645
57608385)

IA median: 3.0

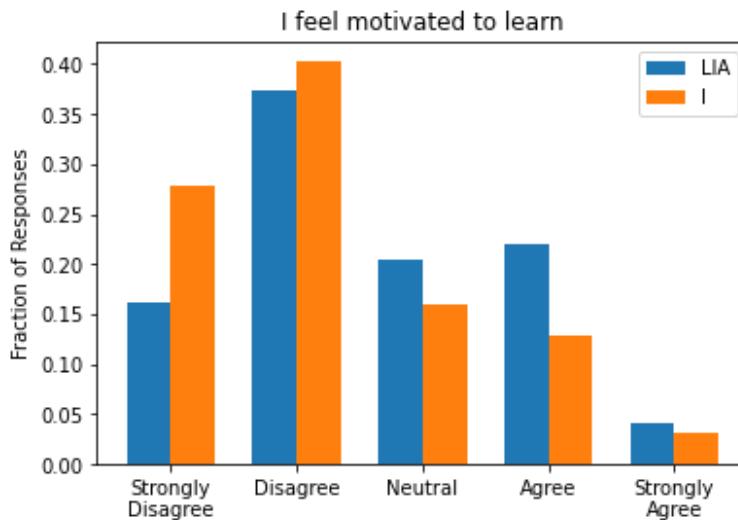
I median: 2.0

cohens d: 0.182

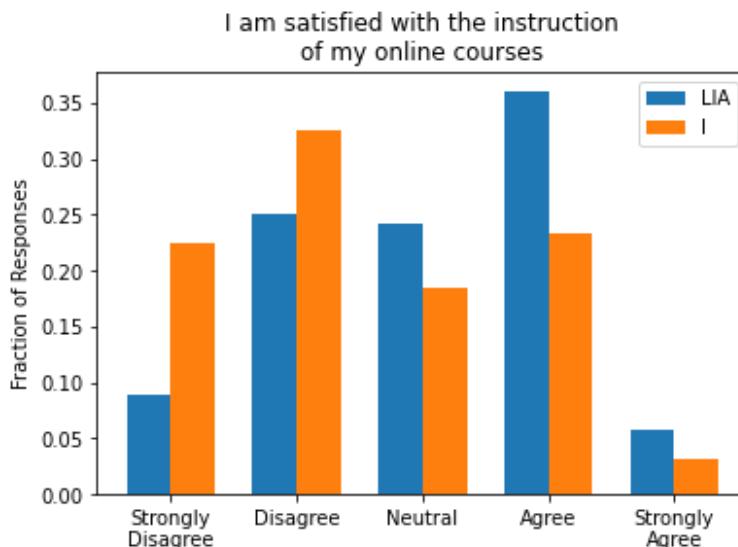
f: 0.551



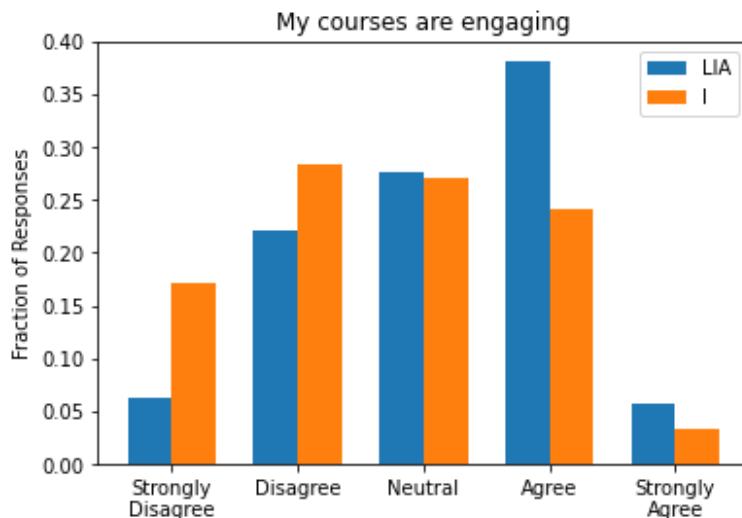
LIA shape: (1685, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=556209.0, pvalue=3.219127152
 $2171494e-09$)
 LIA median: 3.0
 I median: 2.0
 cohens d: 0.293
 f: 0.58



LIA shape: (1685, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=571477.5, pvalue=9.279250626
 $548811e-13$)
 LIA median: 2.0
 I median: 2.0
 cohens d: 0.337
 f: 0.596



LIA shape: (1685, 43), I shape: (569, 43)
 MWU results: MannwhitneyuResult(statistic=600903.0, pvalue=6.485498635
 $822107e-21$)
 LIA median: 3.0
 I median: 2.0
 cohens d: 0.474
 f: 0.627



LIA shape: (1685, 43), I shape: (569, 43)

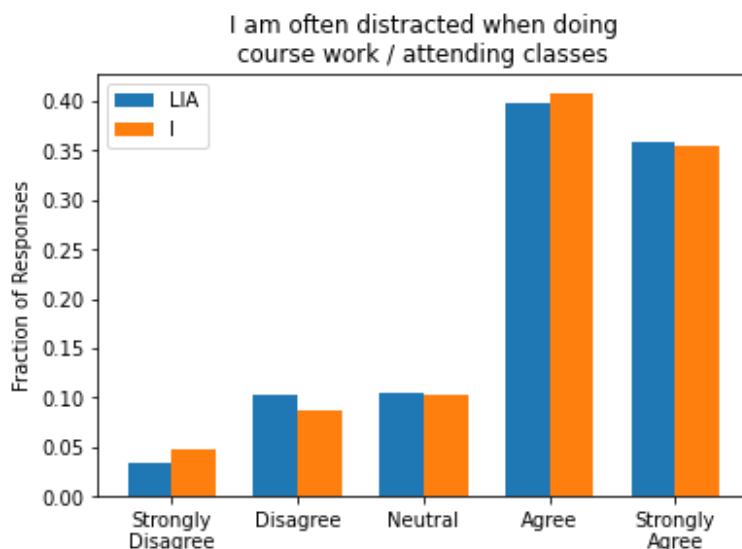
MWU results: MannwhitneyuResult(statistic=591700.0, pvalue=3.117115383
5798343e-18)

LIA median: 3.0

I median: 3.0

cohens d: 0.444

f: 0.617



LIA shape: (1685, 43), I shape: (569, 43)

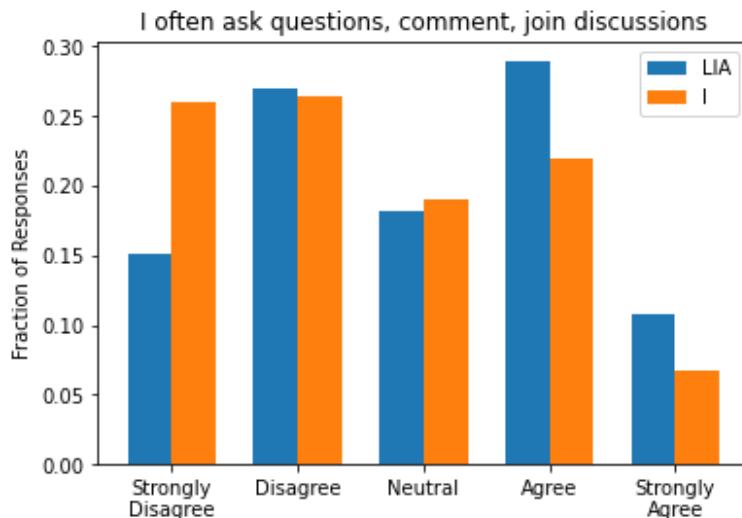
MWU results: MannwhitneyuResult(statistic=480299.0, pvalue=0.942250566
3258677)

LIA median: 4.0

I median: 4.0

cohens d: 0.00899

f: 0.501



LIA shape: (1685, 43), I shape: (569, 43)

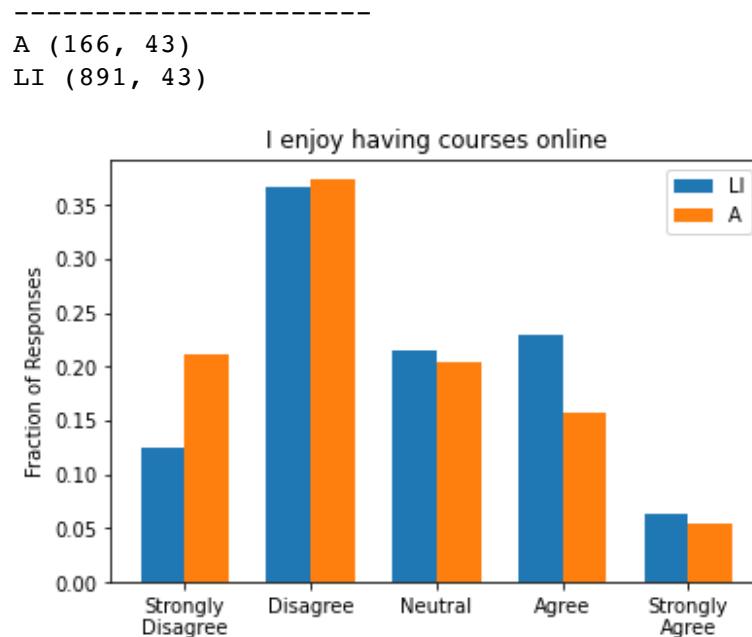
MWU results: MannwhitneyuResult(statistic=556435.5, pvalue=3.718187000
3034746e-09)

LIA median: 3.0

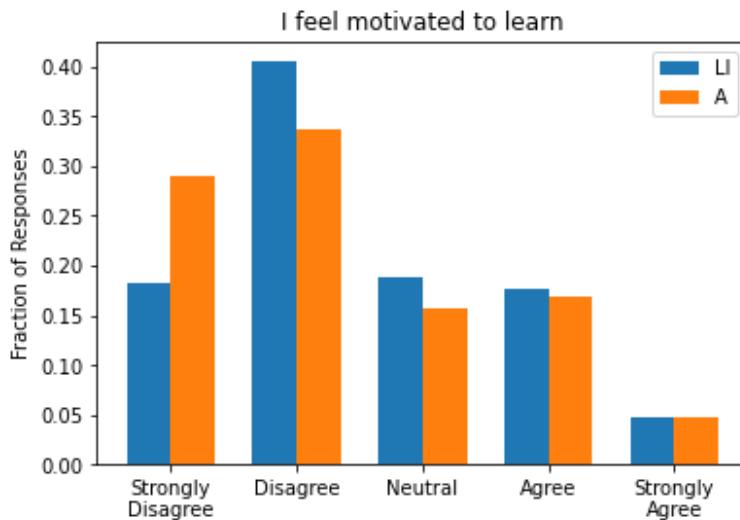
I median: 2.0

cohens d: 0.288

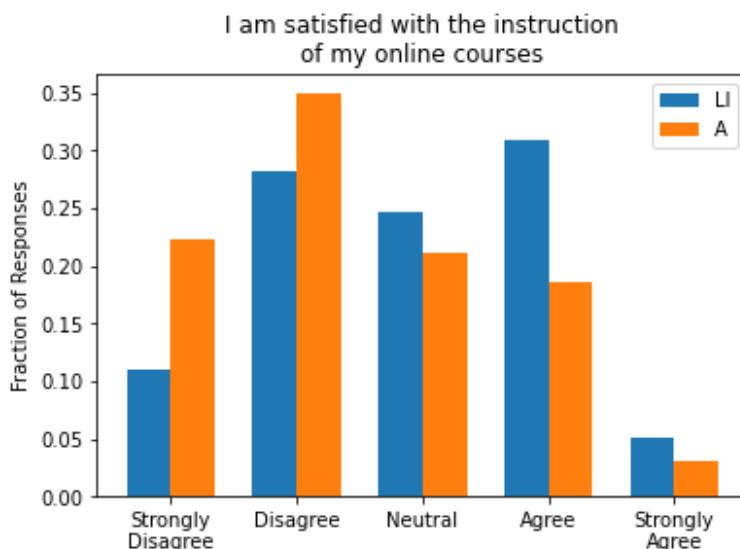
f: 0.58



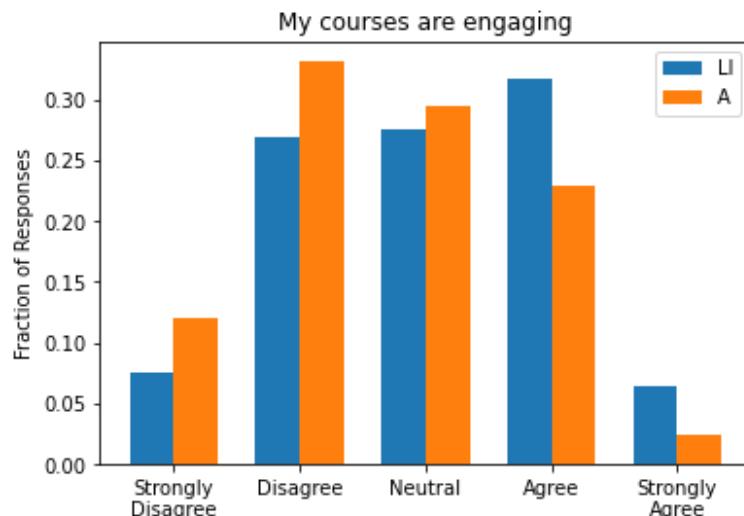
LI shape: (891, 43), A shape: (166, 43)
 MWU results: MannwhitneyuResult(statistic=83880.0, pvalue=0.0043063600
 67748402)
 LI median: 3.0
 A median: 2.0
 cohens d: 0.236
 f: 0.567



LI shape: (891, 43), A shape: (166, 43)
 MWU results: MannwhitneyuResult(statistic=80461.0, pvalue=0.0601470485
 8744517)
 LI median: 2.0
 A median: 2.0
 cohens d: 0.134
 f: 0.544



LI shape: (891, 43), A shape: (166, 43)
 MWU results: MannwhitneyuResult(statistic=90808.0, pvalue=1.3741085671
 981974e-06)
 LI median: 3.0
 A median: 2.0
 cohens d: 0.413
 f: 0.614



LI shape: (891, 43), A shape: (166, 43)

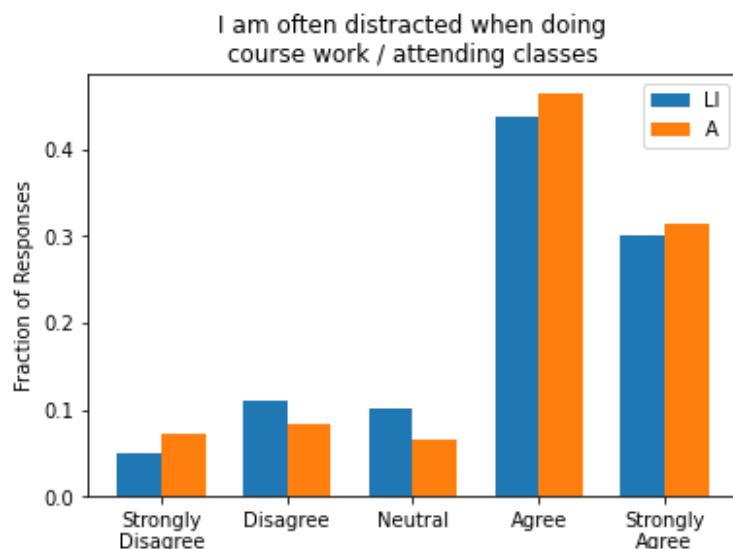
MWU results: MannwhitneyuResult(statistic=86121.5, pvalue=0.0004698546
143205069)

LI median: 3.0

A median: 3.0

cohens d: 0.301

f: 0.582



LI shape: (891, 43), A shape: (166, 43)

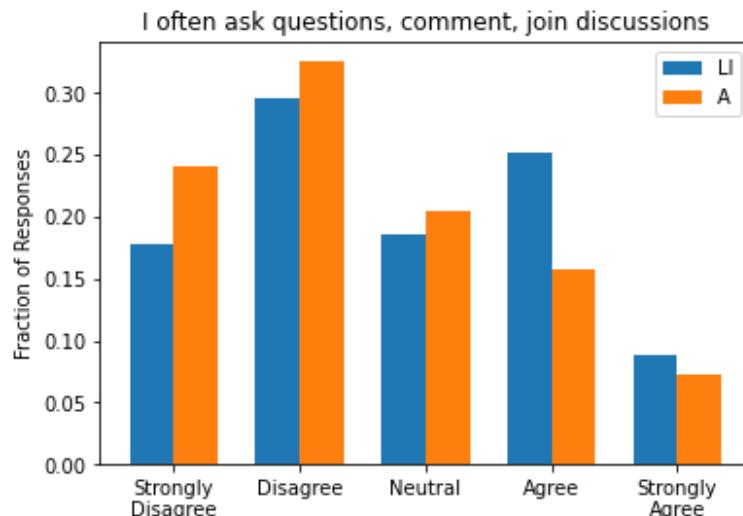
MWU results: MannwhitneyuResult(statistic=71945.0, pvalue=0.5542886828
238842)

LI median: 4.0

A median: 4.0

cohens d: -0.0283

f: 0.486



LI shape: (891, 43), A shape: (166, 43)

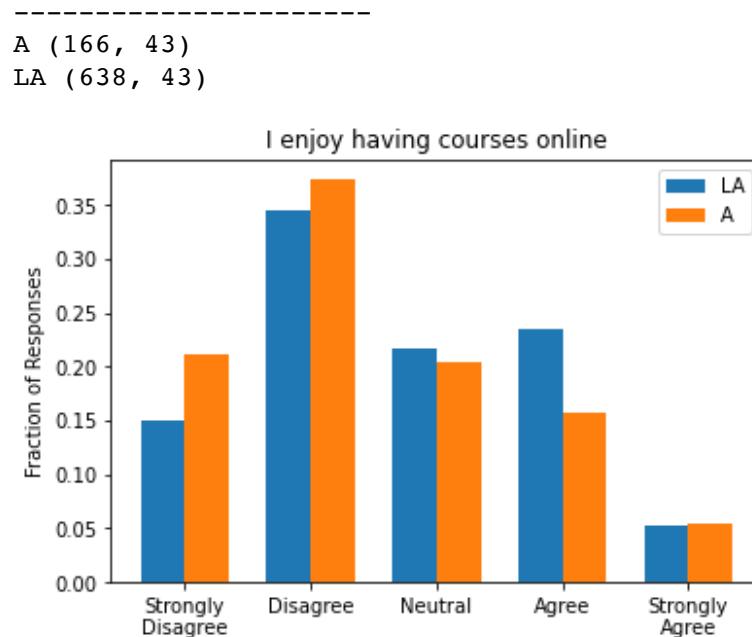
MWU results: MannwhitneyuResult(statistic=83451.0, pvalue=0.0068409460
04350345)

LI median: 3.0

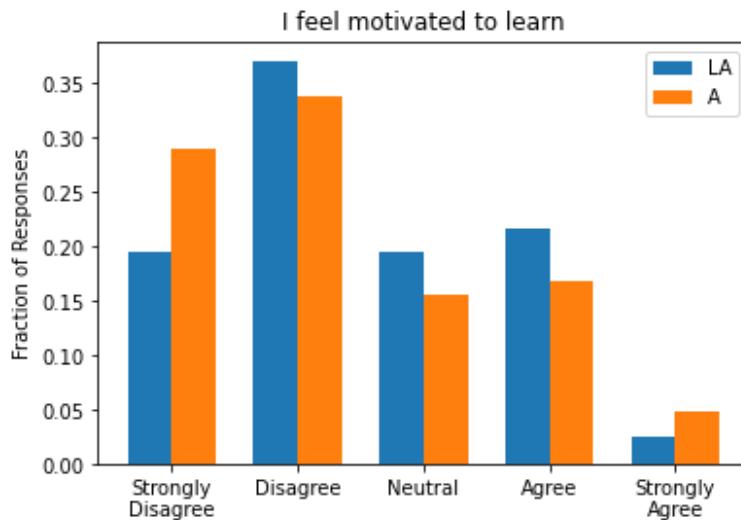
A median: 2.0

cohens d: 0.227

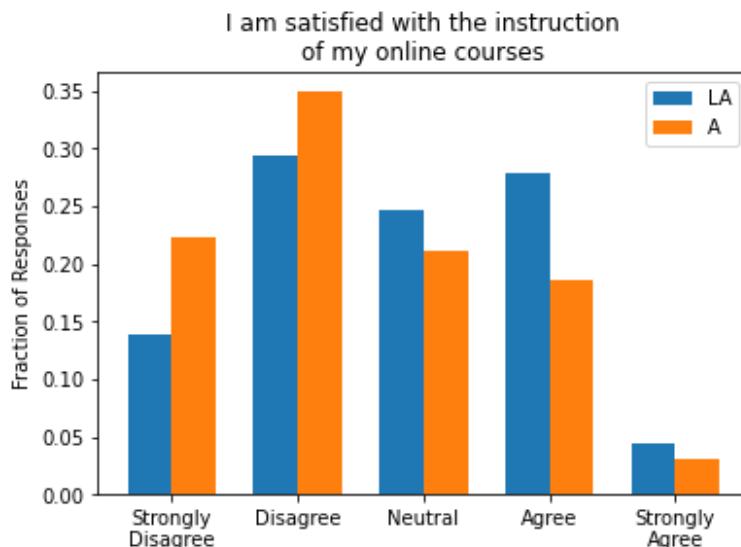
f: 0.564



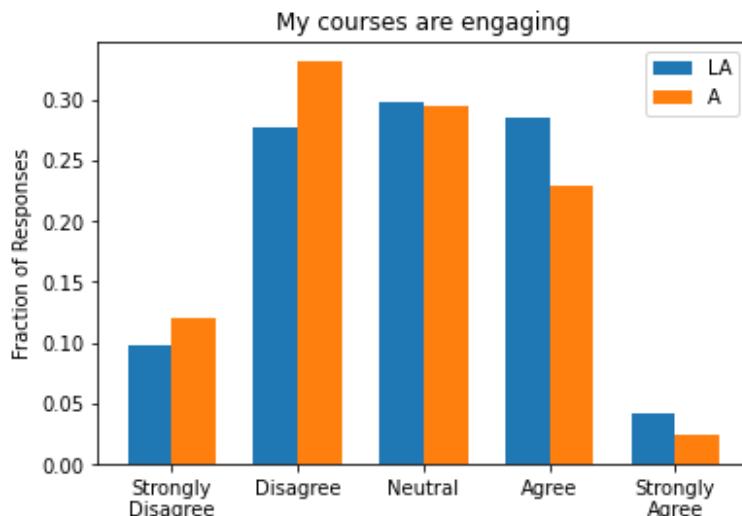
LA shape: (638, 43), A shape: (166, 43)
 MWU results: MannwhitneyuResult(statistic=59023.0, pvalue=0.0183639196
 49367323)
 LA median: 3.0
 A median: 2.0
 cohens d: 0.198
 f: 0.557



LA shape: (638, 43), A shape: (166, 43)
 MWU results: MannwhitneyuResult(statistic=57884.0, pvalue=0.0547496917
 19294405)
 LA median: 2.0
 A median: 2.0
 cohens d: 0.141
 f: 0.547



LA shape: (638, 43), A shape: (166, 43)
 MWU results: MannwhitneyuResult(statistic=62109.5, pvalue=0.0003869138
 9597725275)
 LA median: 3.0
 A median: 2.0
 cohens d: 0.308
 f: 0.586



LA shape: (638, 43), A shape: (166, 43)

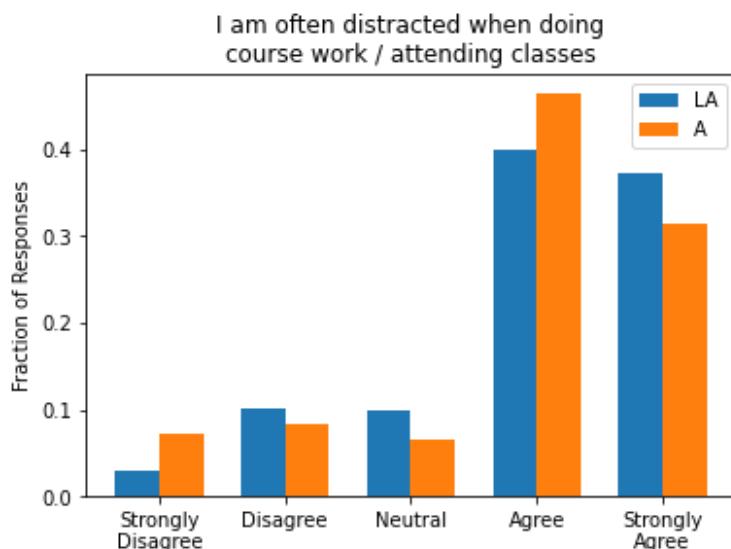
MWU results: MannwhitneyuResult(statistic=58386.5, pvalue=0.0343966751
9718849)

LA median: 3.0

A median: 3.0

cohens d: 0.184

f: 0.551



LA shape: (638, 43), A shape: (166, 43)

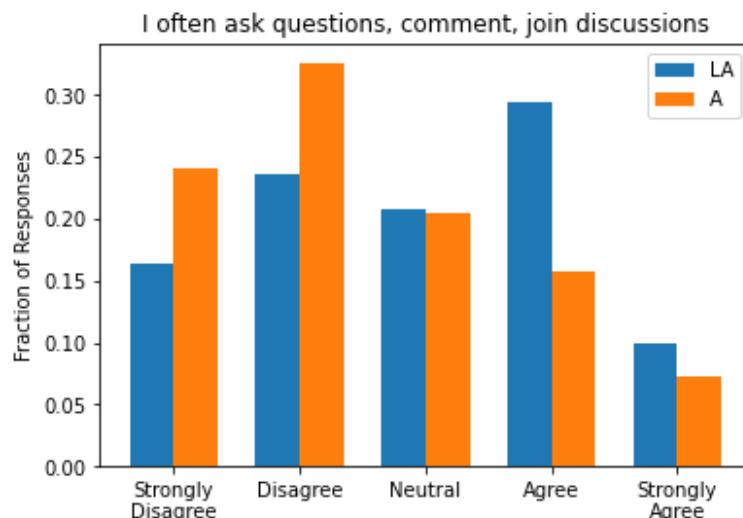
MWU results: MannwhitneyuResult(statistic=55690.5, pvalue=0.2744034389
065242)

LA median: 4.0

A median: 4.0

cohens d: 0.108

f: 0.526



LA shape: (638, 43), A shape: (166, 43)

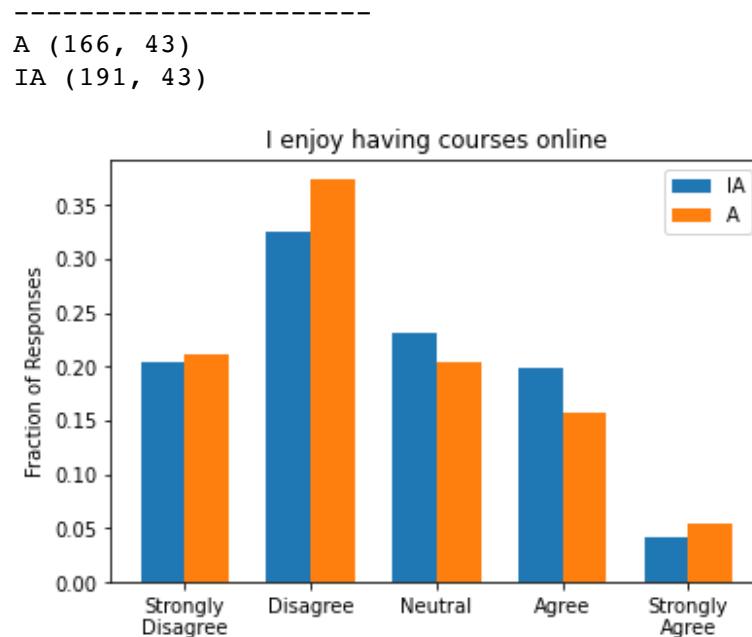
MWU results: MannwhitneyuResult(statistic=63437.0, pvalue=5.4239017000
31071e-05)

LA median: 3.0

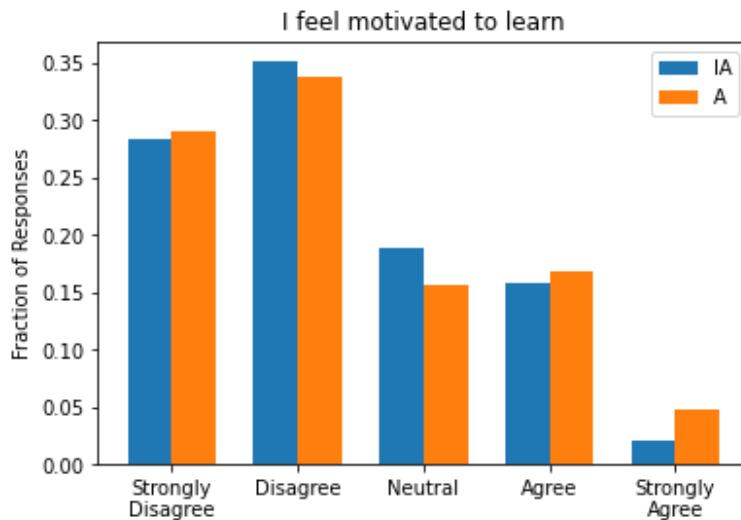
A median: 2.0

cohens d: 0.349

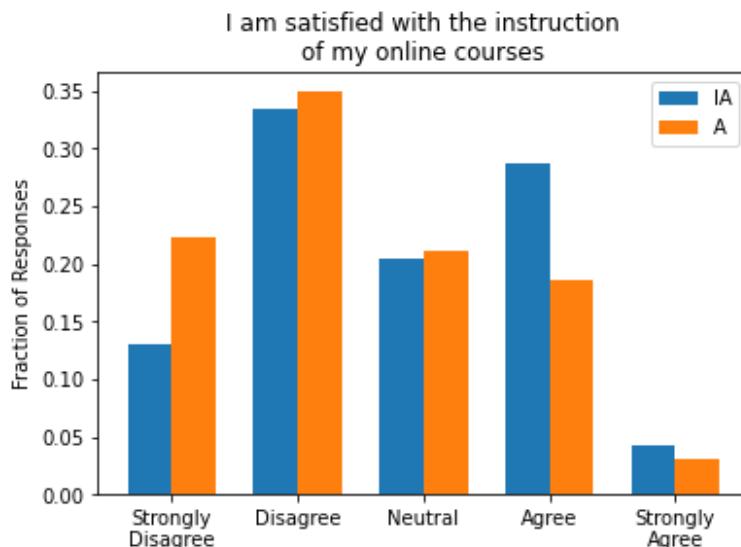
f: 0.599



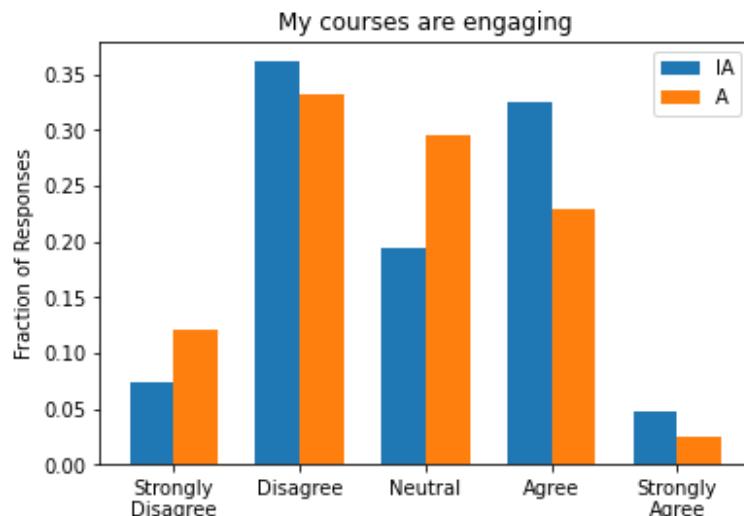
IA shape: (191, 43), A shape: (166, 43)
 MWU results: MannwhitneyuResult(statistic=16554.5, pvalue=0.4555214628
 958878)
 IA median: 2.0
 A median: 2.0
 cohens d: 0.0697
 f: 0.522



IA shape: (191, 43), A shape: (166, 43)
 MWU results: MannwhitneyuResult(statistic=15568.0, pvalue=0.7611652929
 255229)
 IA median: 2.0
 A median: 2.0
 cohens d: -0.058
 f: 0.491



IA shape: (191, 43), A shape: (166, 43)
 MWU results: MannwhitneyuResult(statistic=18384.5, pvalue=0.0070230084
 29104956)
 IA median: 3.0
 A median: 2.0
 cohens d: 0.287
 f: 0.58



IA shape: (191, 43), A shape: (166, 43)

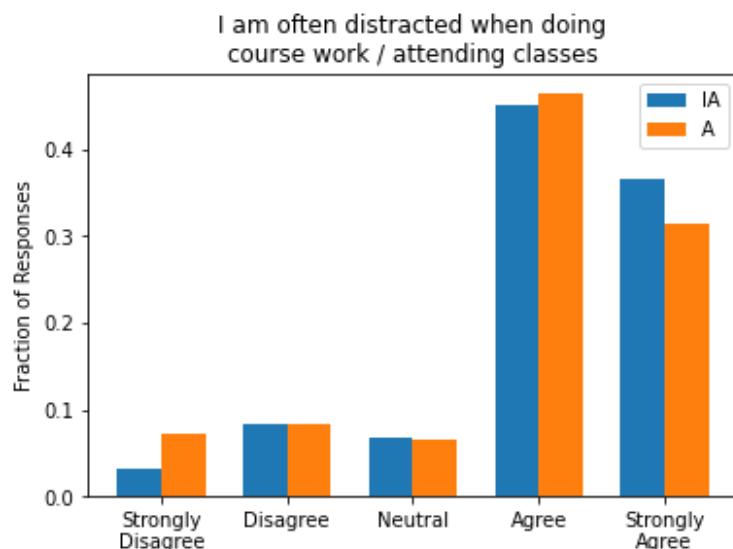
MWU results: MannwhitneyuResult(statistic=17441.0, pvalue=0.0890142640
8876344)

IA median: 3.0

A median: 3.0

cohens d: 0.195

f: 0.55



IA shape: (191, 43), A shape: (166, 43)

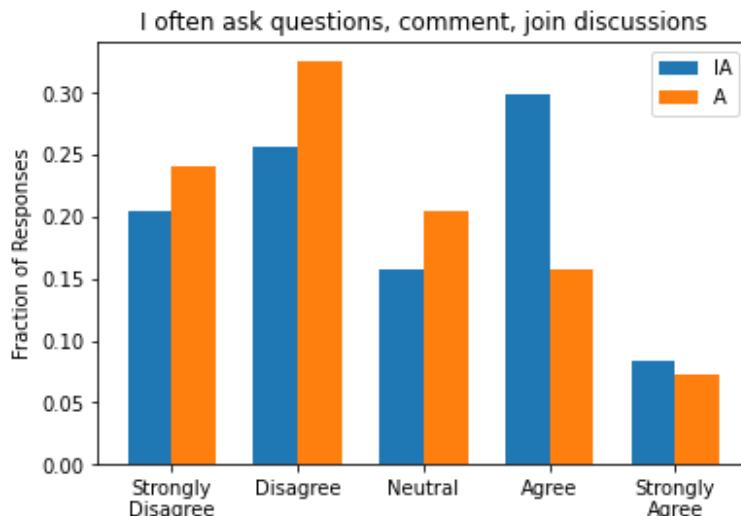
MWU results: MannwhitneyuResult(statistic=17042.5, pvalue=0.1884026068
6091204)

IA median: 4.0

A median: 4.0

cohens d: 0.16

f: 0.538



IA shape: (191, 43), A shape: (166, 43)

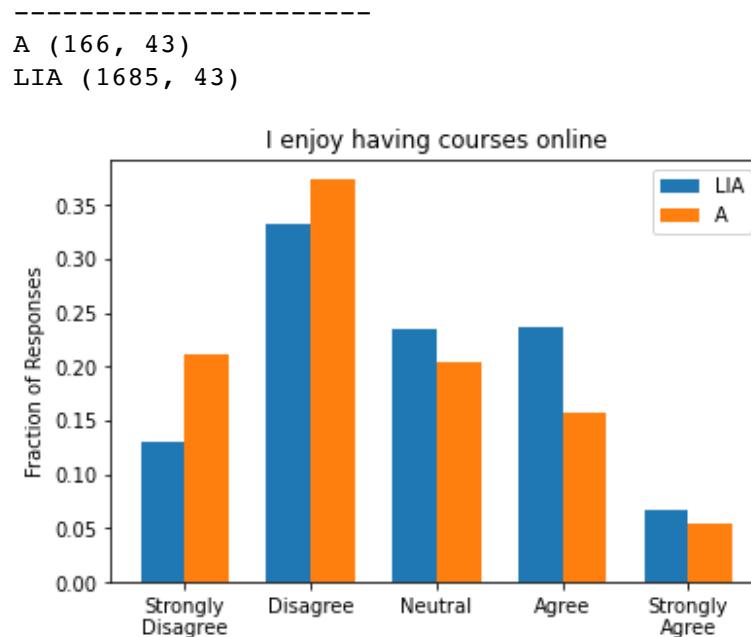
MWU results: MannwhitneyuResult(statistic=17990.0, pvalue=0.0239350191
65148157)

IA median: 3.0

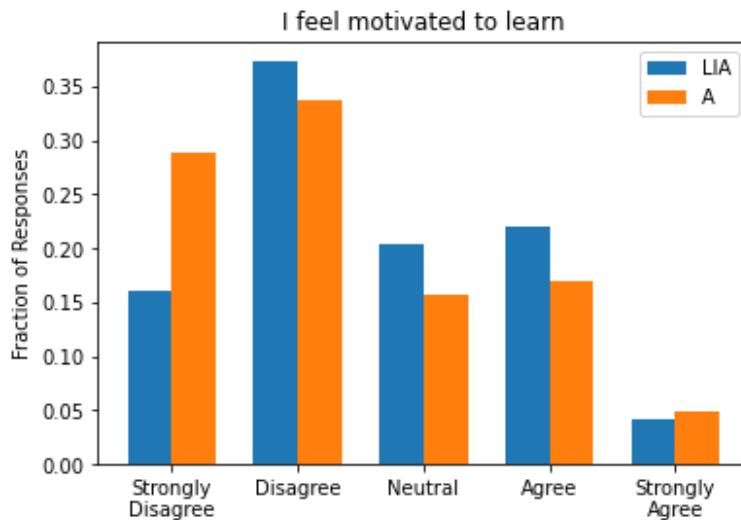
A median: 2.0

cohens d: 0.244

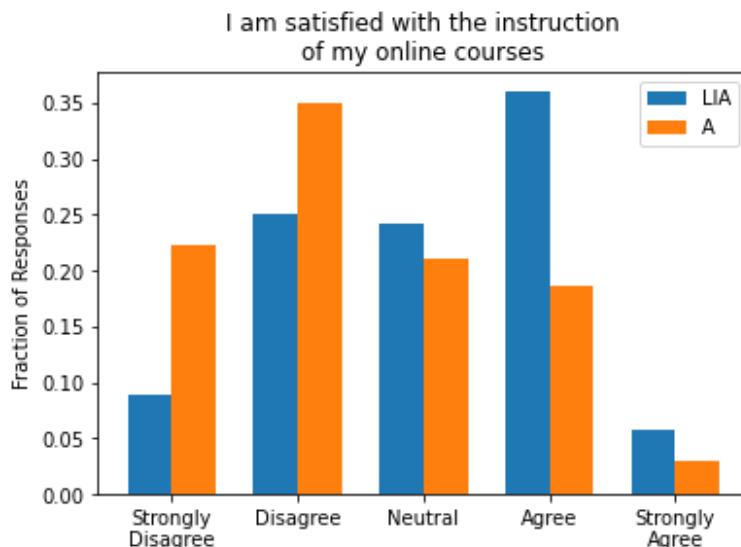
f: 0.567



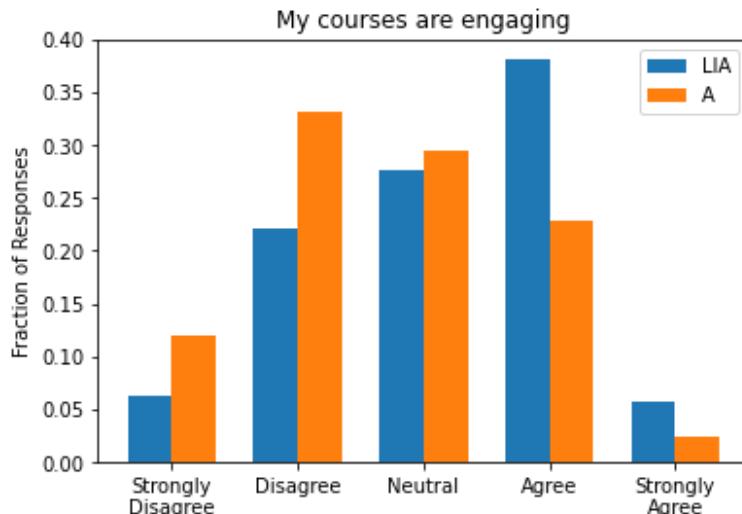
LIA shape: (1685, 43), A shape: (166, 43)
 MWU results: MannwhitneyuResult(statistic=161463.0, pvalue=0.000669372
 1799212551)
 LIA median: 3.0
 A median: 2.0
 cohens d: 0.27
 f: 0.577



LIA shape: (1685, 43), A shape: (166, 43)
 MWU results: MannwhitneyuResult(statistic=159268.0, pvalue=0.002141371
 627255481)
 LIA median: 2.0
 A median: 2.0
 cohens d: 0.229
 f: 0.569



LIA shape: (1685, 43), A shape: (166, 43)
 MWU results: MannwhitneyuResult(statistic=180916.0, pvalue=8.458855261
 686396e-11)
 LIA median: 3.0
 A median: 2.0
 cohens d: 0.545
 f: 0.647



LIA shape: (1685, 43), A shape: (166, 43)

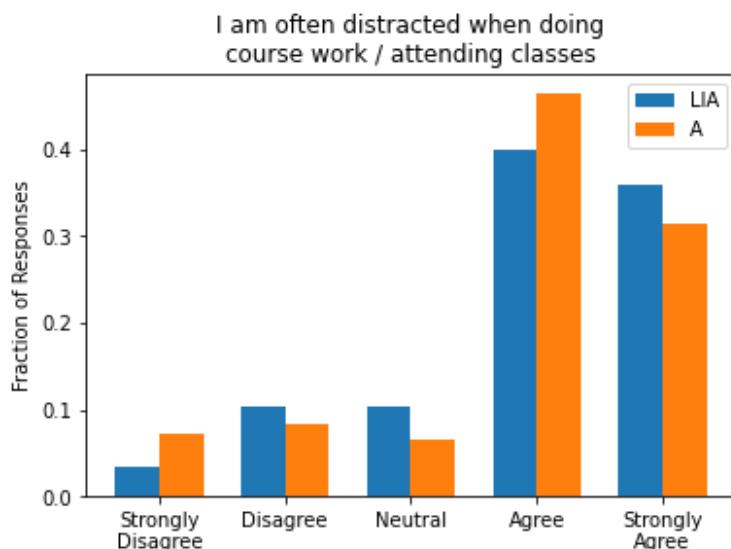
MWU results: MannwhitneyuResult(statistic=172841.5, pvalue=1.553439456
120628e-07)

LIA median: 3.0

A median: 3.0

cohens d: 0.429

f: 0.618



LIA shape: (1685, 43), A shape: (166, 43)

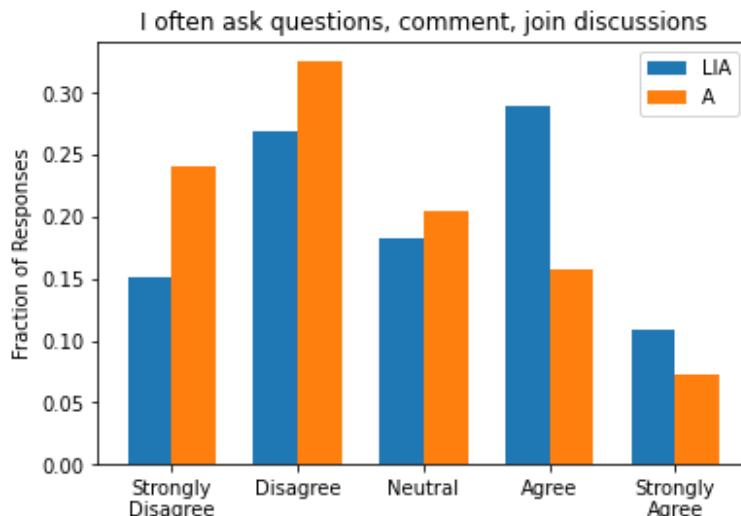
MWU results: MannwhitneyuResult(statistic=144634.0, pvalue=0.439951616
5143721)

LIA median: 4.0

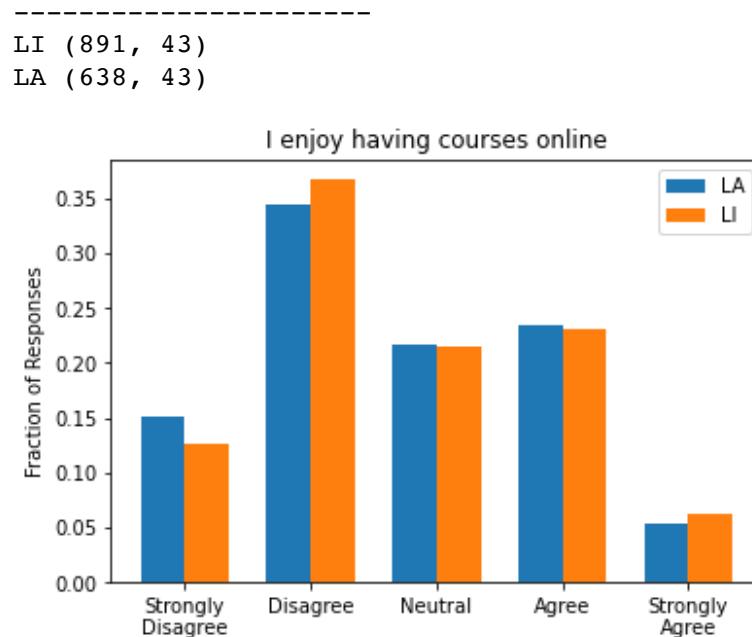
A median: 4.0

cohens d: 0.0761

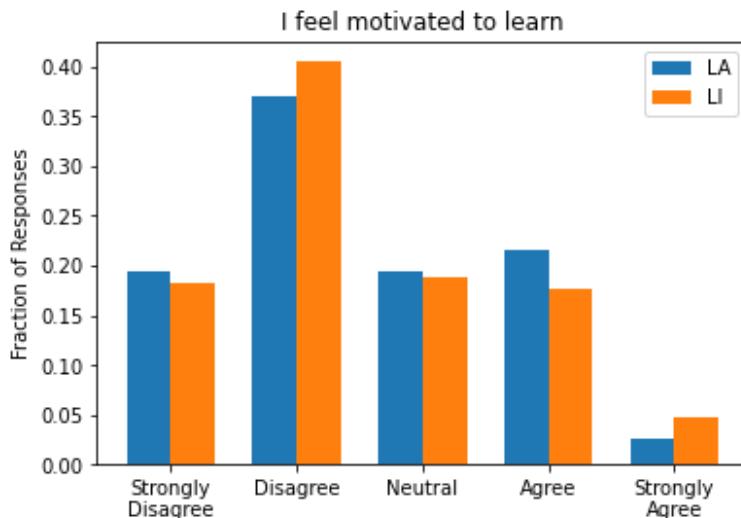
f: 0.517



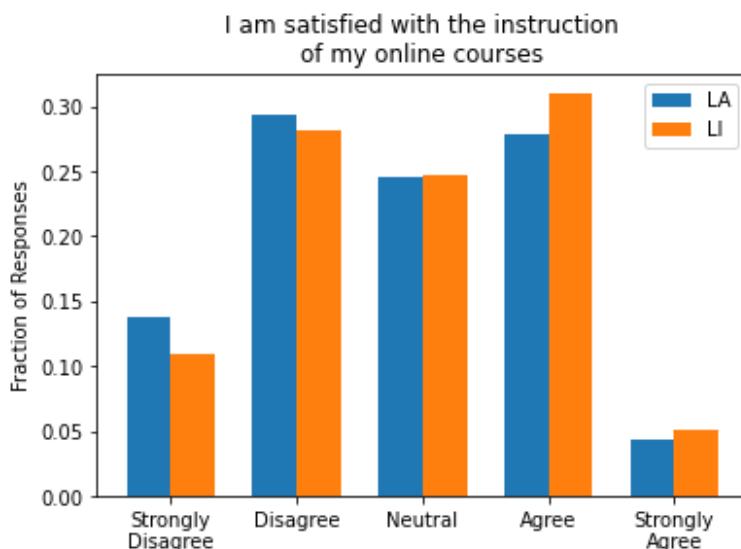
LIA shape: (1685, 43), A shape: (166, 43)
MWU results: MannwhitneyuResult(statistic=167382.0, pvalue=1.661411991
4726786e-05)
LIA median: 3.0
A median: 2.0
cohens d: 0.349
f: 0.598



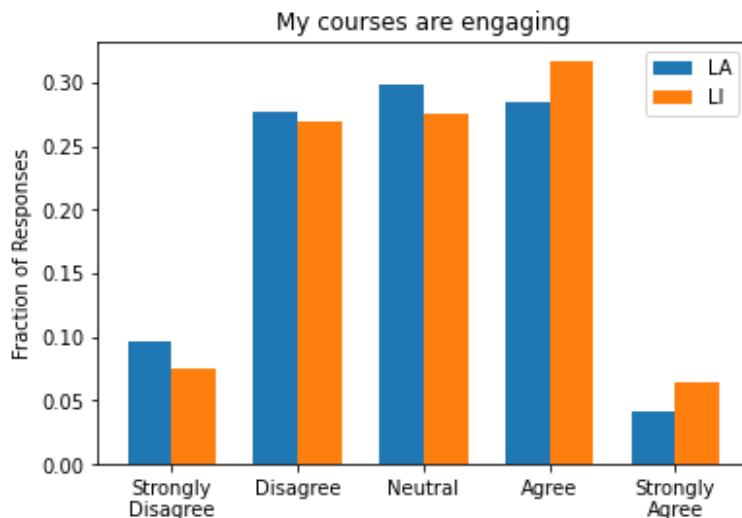
LA shape: (638, 43), LI shape: (891, 43)
 MWU results: MannwhitneyuResult(statistic=278964.0, pvalue=0.521154632
 0963696)
 LA median: 3.0
 LI median: 3.0
 cohens d: -0.0365
 f: 0.491



LA shape: (638, 43), LI shape: (891, 43)
 MWU results: MannwhitneyuResult(statistic=286605.0, pvalue=0.771088265
 3168312)
 LA median: 2.0
 LI median: 2.0
 cohens d: 0.00552
 f: 0.504



LA shape: (638, 43), LI shape: (891, 43)
 MWU results: MannwhitneyuResult(statistic=268319.5, pvalue=0.053088149
 638486966)
 LA median: 3.0
 LI median: 3.0
 cohens d: -0.102
 f: 0.472



LA shape: (638, 43), LI shape: (891, 43)

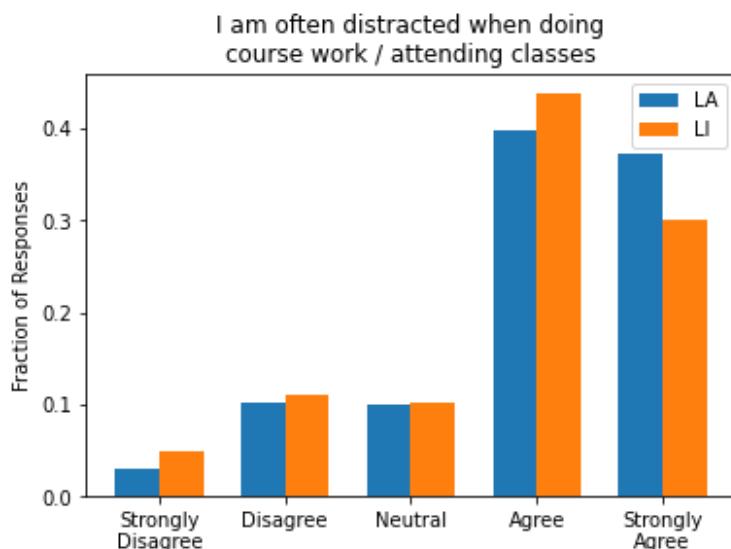
MWU results: MannwhitneyuResult(statistic=266194.5, pvalue=0.027879879
220322243)

LA median: 3.0

LI median: 3.0

cohens d: -0.119

f: 0.468



LA shape: (638, 43), LI shape: (891, 43)

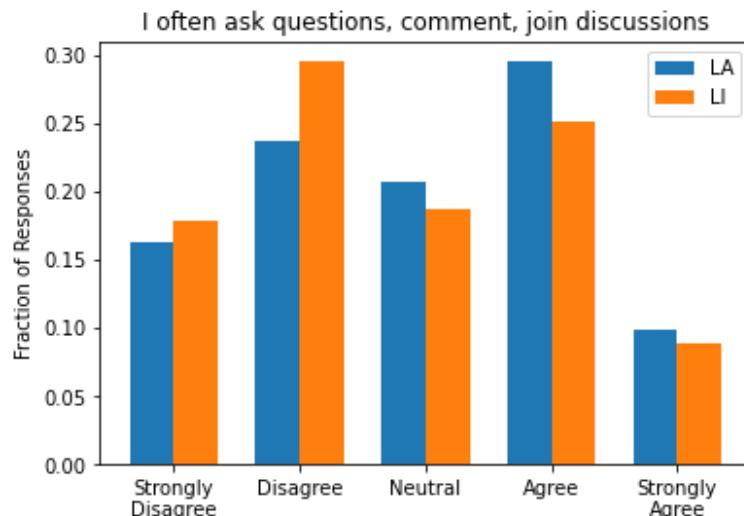
MWU results: MannwhitneyuResult(statistic=306460.5, pvalue=0.005558976
148792147)

LA median: 4.0

LI median: 4.0

cohens d: 0.136

f: 0.539



LA shape: (638, 43), LI shape: (891, 43)

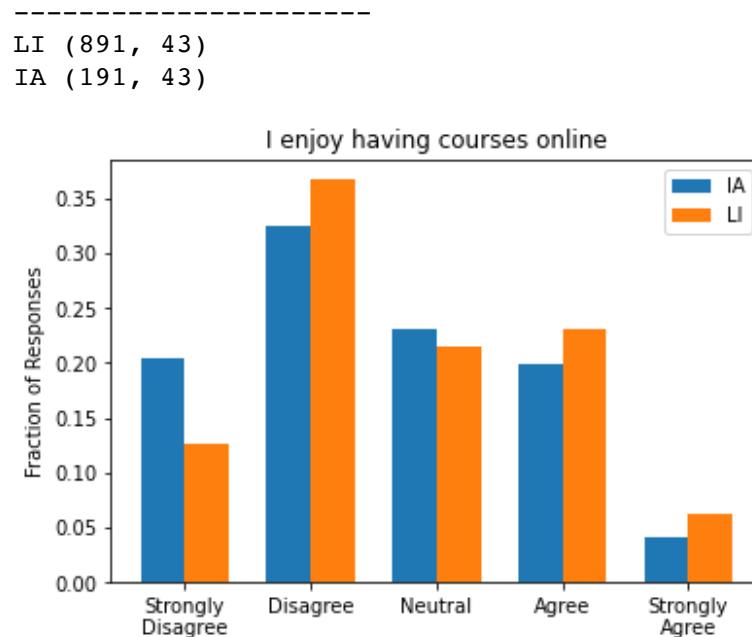
MWU results: MannwhitneyuResult(statistic=304038.0, pvalue=0.016821232
75841356)

LA median: 3.0

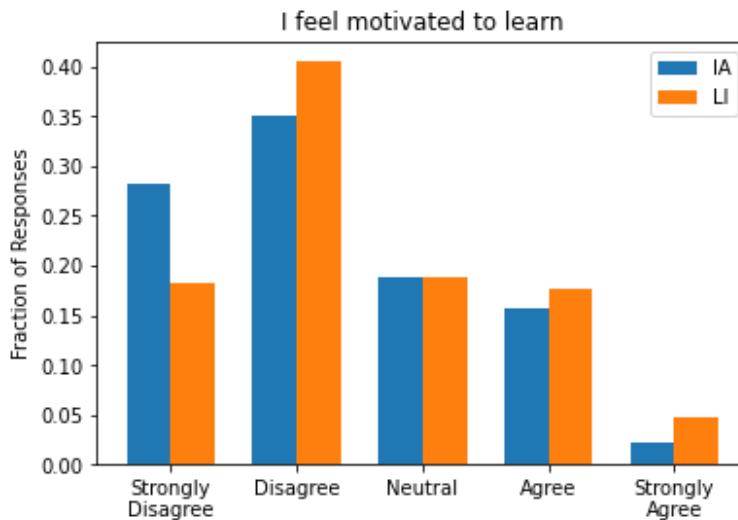
LI median: 3.0

cohens d: 0.122

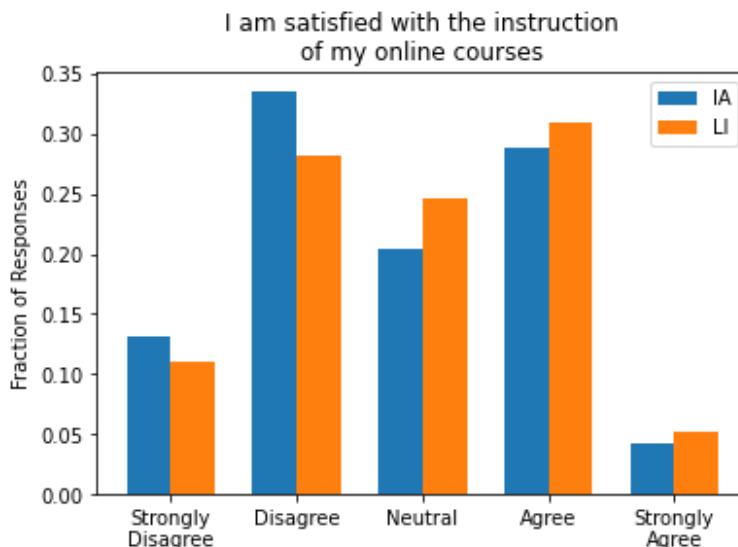
f: 0.535



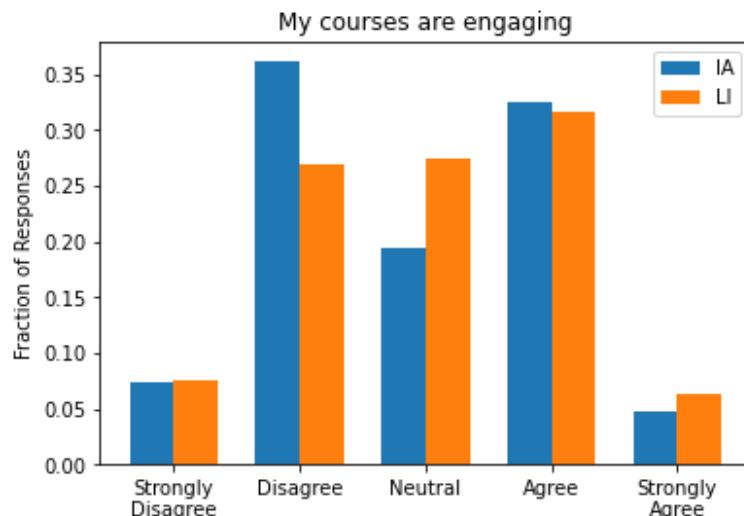
IA shape: (191, 43), LI shape: (891, 43)
 MWU results: MannwhitneyuResult(statistic=77522.0, pvalue=0.0451251738
 2944939)
 IA median: 2.0
 LI median: 3.0
 cohens d: -0.165
 f: 0.456



IA shape: (191, 43), LI shape: (891, 43)
 MWU results: MannwhitneyuResult(statistic=75848.5, pvalue=0.0138583107
 88958392)
 IA median: 2.0
 LI median: 2.0
 cohens d: -0.196
 f: 0.446



IA shape: (191, 43), LI shape: (891, 43)
 MWU results: MannwhitneyuResult(statistic=79259.0, pvalue=0.1231477143
 8349588)
 IA median: 3.0
 LI median: 3.0
 cohens d: -0.123
 f: 0.466



IA shape: (191, 43), LI shape: (891, 43)

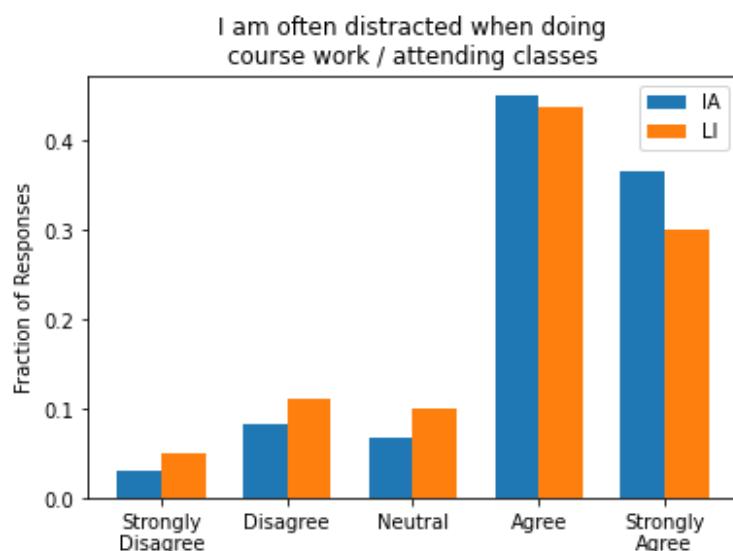
MWU results: MannwhitneyuResult(statistic=79992.0, pvalue=0.1764886658
0717903)

IA median: 3.0

LI median: 3.0

cohens d: -0.106

f: 0.47



IA shape: (191, 43), LI shape: (891, 43)

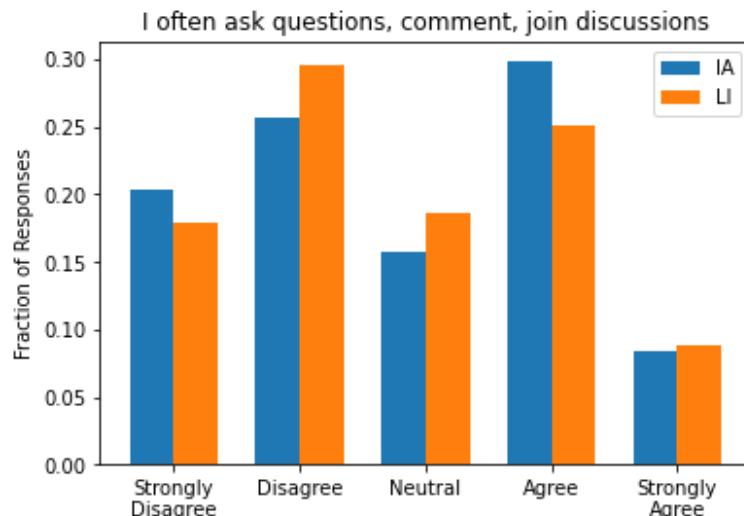
MWU results: MannwhitneyuResult(statistic=93870.0, pvalue=0.0170815294
41797968)

IA median: 4.0

LI median: 4.0

cohens d: 0.187

f: 0.552



IA shape: (191, 43), LI shape: (891, 43)

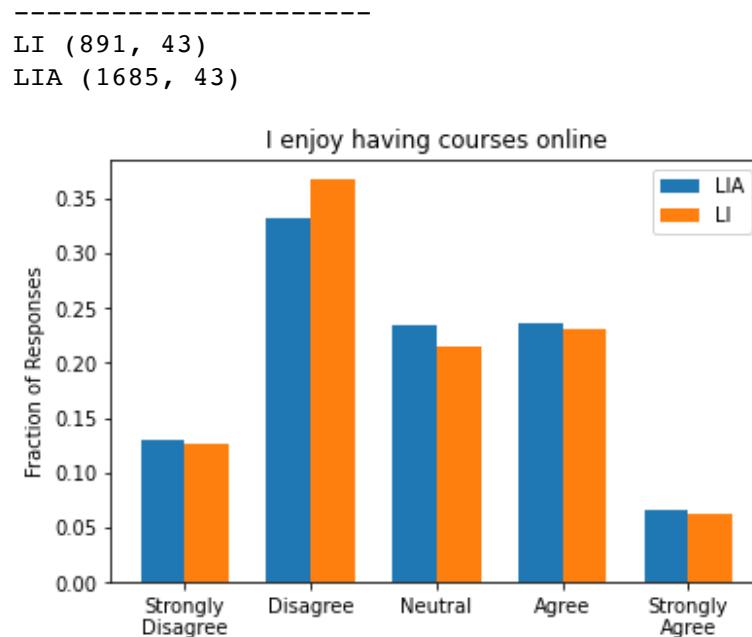
MWU results: MannwhitneyuResult(statistic=86009.0, pvalue=0.8096599749
032504)

IA median: 3.0

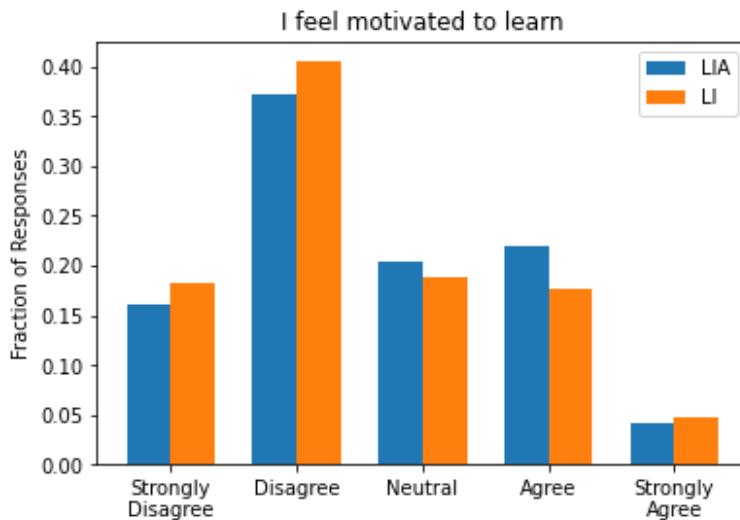
LI median: 3.0

cohens d: 0.0194

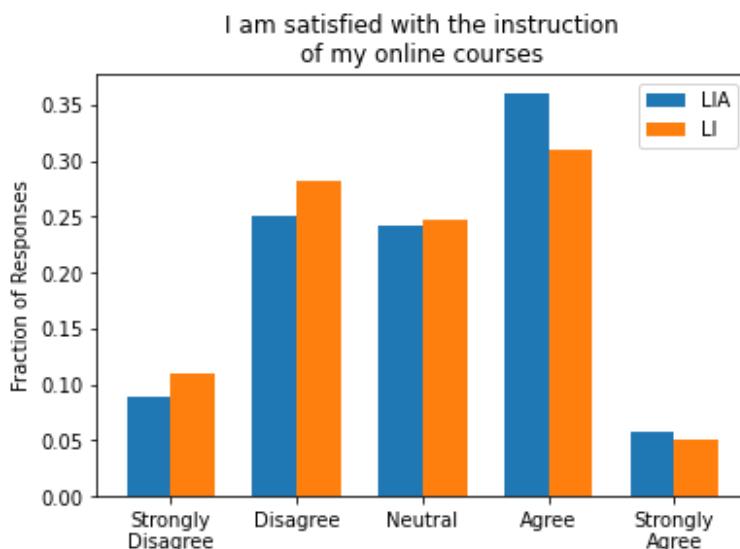
f: 0.505



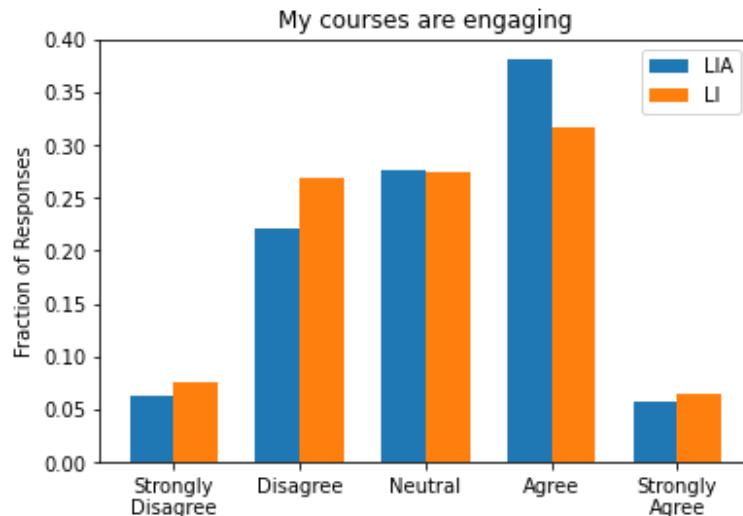
LIA shape: (1685, 43), LI shape: (891, 43)
 MWU results: MannwhitneyuResult(statistic=767073.5, pvalue=0.343961599
 87340724)
 LIA median: 3.0
 LI median: 3.0
 cohens d: 0.0362
 f: 0.511



LIA shape: (1685, 43), LI shape: (891, 43)
 MWU results: MannwhitneyuResult(statistic=793215.5, pvalue=0.013600745
 65362596)
 LIA median: 2.0
 LI median: 2.0
 cohens d: 0.0947
 f: 0.528



LIA shape: (1685, 43), LI shape: (891, 43)
 MWU results: MannwhitneyuResult(statistic=803326.5, pvalue=0.002310161
 7321273984)
 LIA median: 3.0
 LI median: 3.0
 cohens d: 0.125
 f: 0.535



LIA shape: (1685, 43), LI shape: (891, 43)

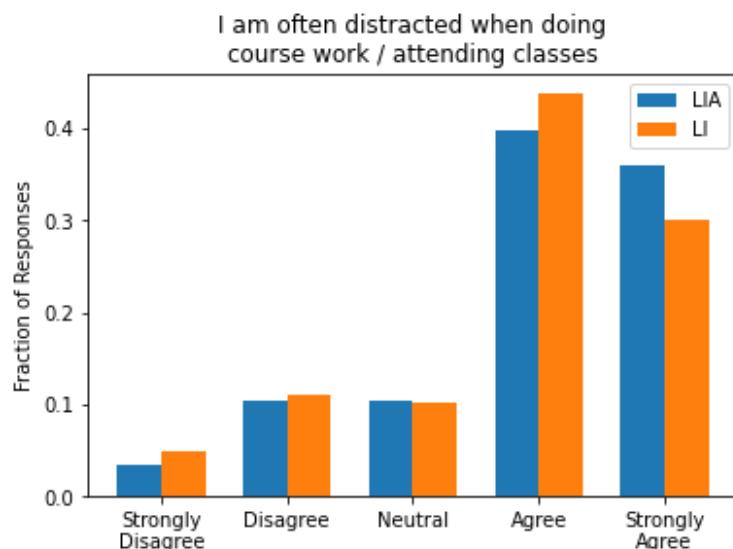
MWU results: MannwhitneyuResult(statistic=801771.5, pvalue=0.002984188
633486901)

LIA median: 3.0

LI median: 3.0

cohens d: 0.117

f: 0.534



LIA shape: (1685, 43), LI shape: (891, 43)

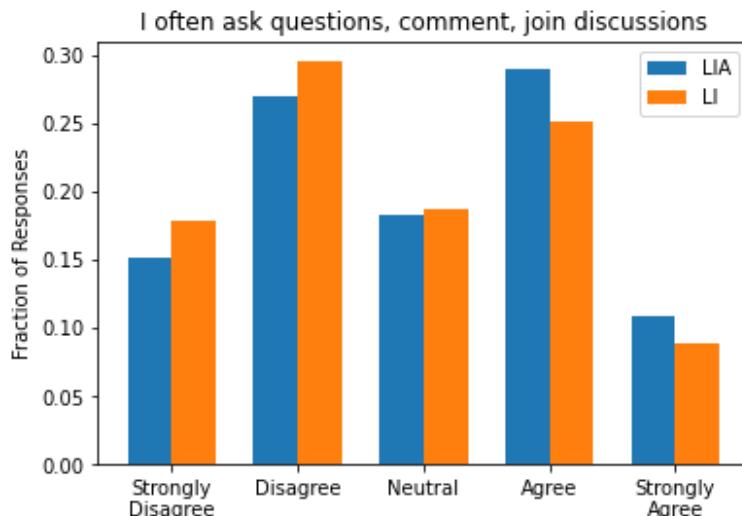
MWU results: MannwhitneyuResult(statistic=796234.0, pvalue=0.007103246
3270015635)

LIA median: 4.0

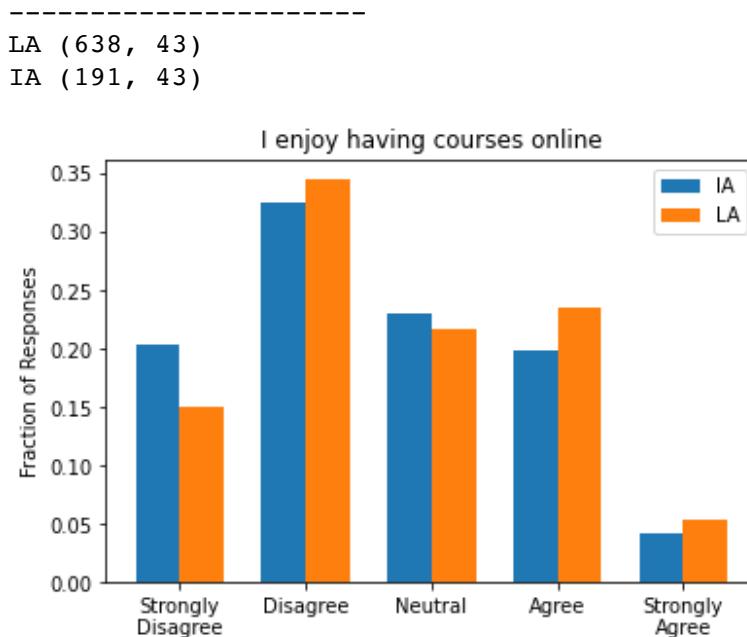
LI median: 4.0

cohens d: 0.105

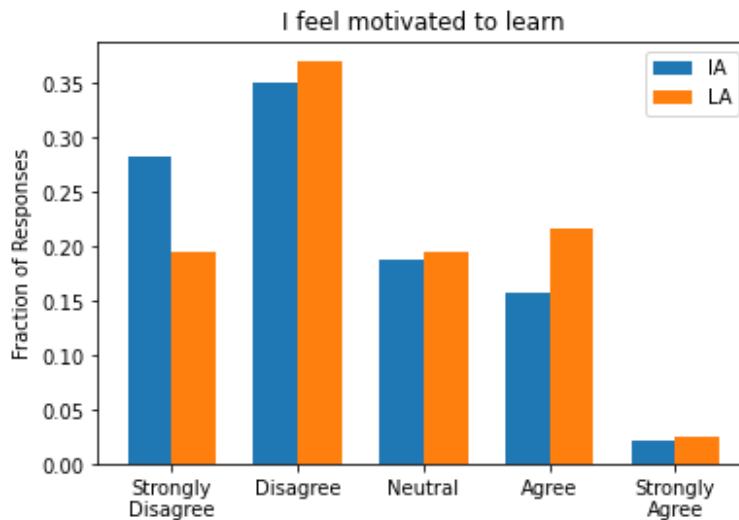
f: 0.53



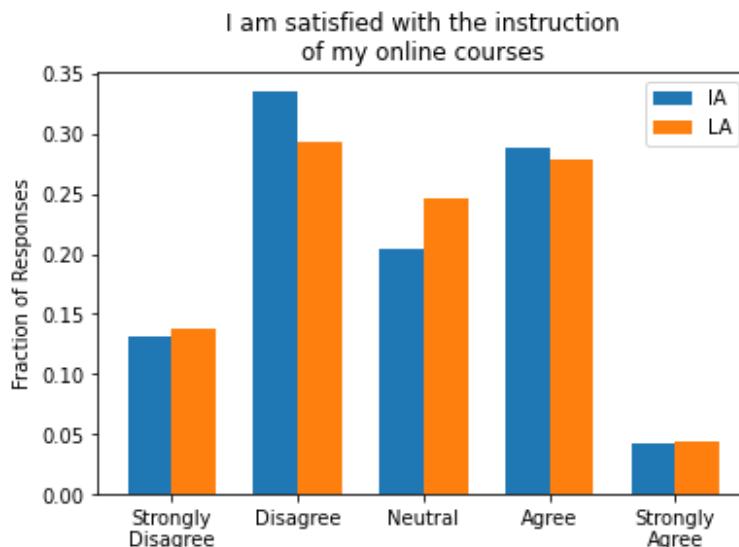
LIA shape: (1685, 43), LI shape: (891, 43)
MWU results: MannwhitneyuResult(statistic=803067.5, pvalue=0.002696826
2244605776)
LIA median: 3.0
LI median: 3.0
cohens d: 0.124
f: 0.535



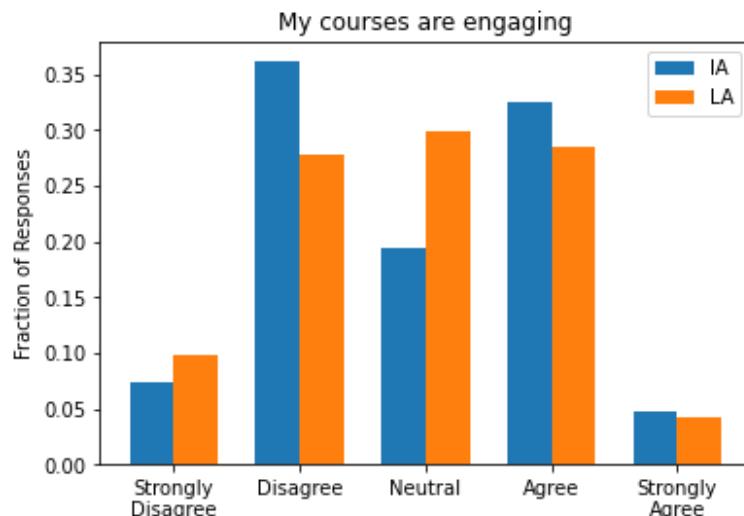
IA shape: (191, 43), LA shape: (638, 43)
 MWU results: MannwhitneyuResult(statistic=56654.0, pvalue=0.1276278495
 4654605)
 IA median: 2.0
 LA median: 3.0
 cohens d: -0.128
 f: 0.465



IA shape: (191, 43), LA shape: (638, 43)
 MWU results: MannwhitneyuResult(statistic=53864.0, pvalue=0.0114367846
 85742078)
 IA median: 2.0
 LA median: 2.0
 cohens d: -0.204
 f: 0.442



IA shape: (191, 43), LA shape: (638, 43)
 MWU results: MannwhitneyuResult(statistic=60149.5, pvalue=0.7813097053
 516191)
 IA median: 3.0
 LA median: 3.0
 cohens d: -0.0204
 f: 0.494



IA shape: (191, 43), LA shape: (638, 43)

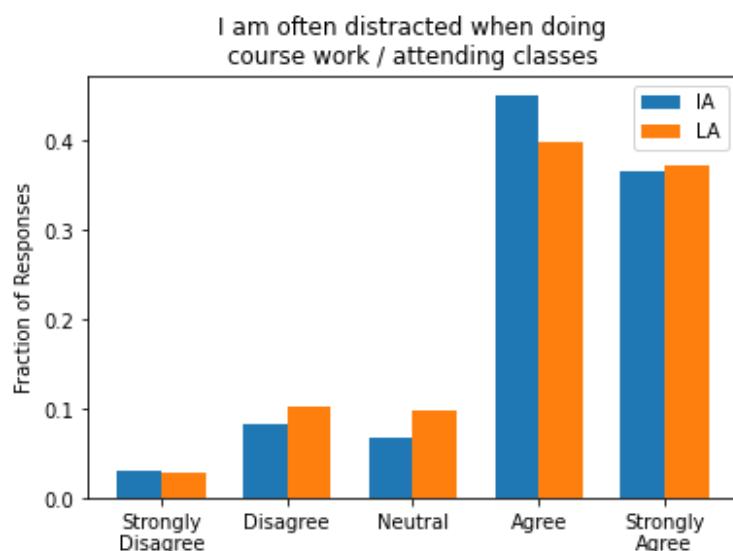
MWU results: MannwhitneyuResult(statistic=61037.0, pvalue=0.9693218906
674117)

IA median: 3.0

LA median: 3.0

cohens d: 0.0121

f: 0.501



IA shape: (191, 43), LA shape: (638, 43)

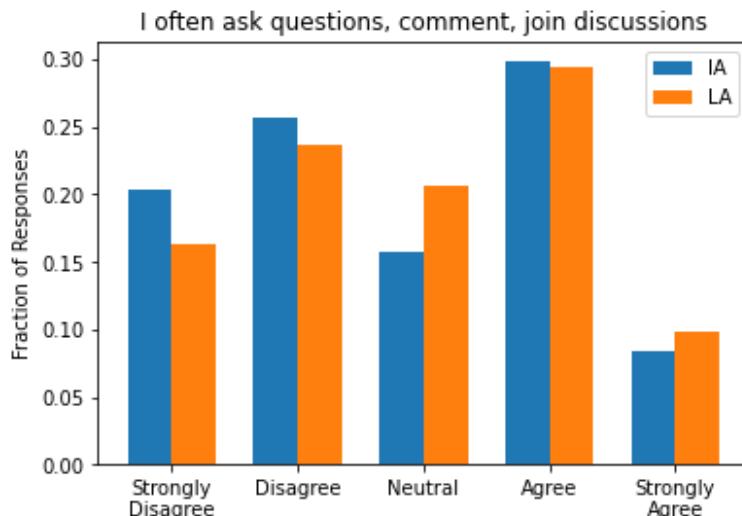
MWU results: MannwhitneyuResult(statistic=62311.5, pvalue=0.6115361393
524705)

IA median: 4.0

LA median: 4.0

cohens d: 0.0537

f: 0.511



IA shape: (191, 43), LA shape: (638, 43)

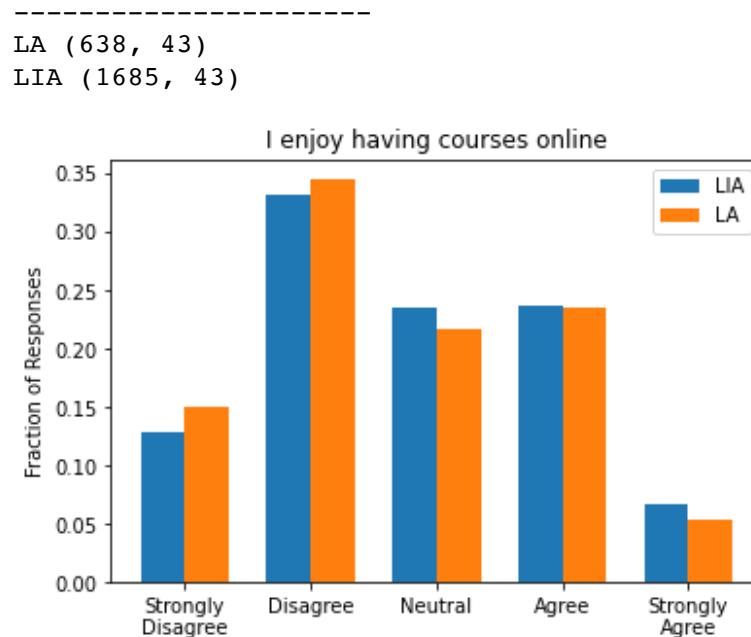
MWU results: MannwhitneyuResult(statistic=57574.5, pvalue=0.2350832946
0752309)

IA median: 3.0

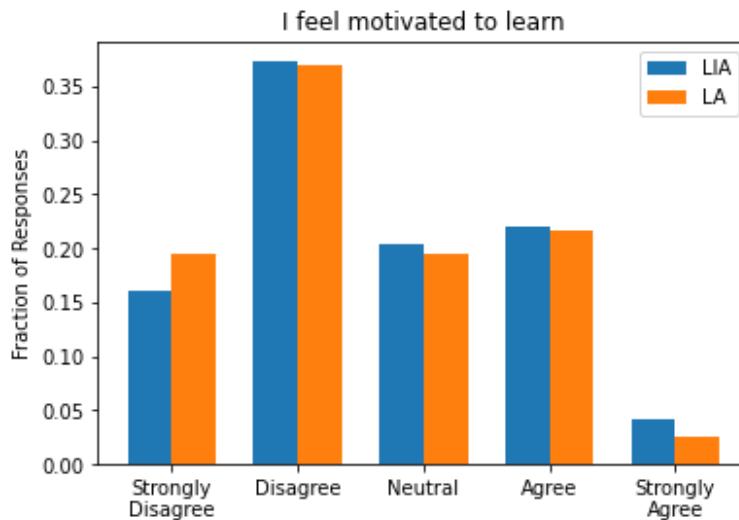
LA median: 3.0

cohens d: -0.102

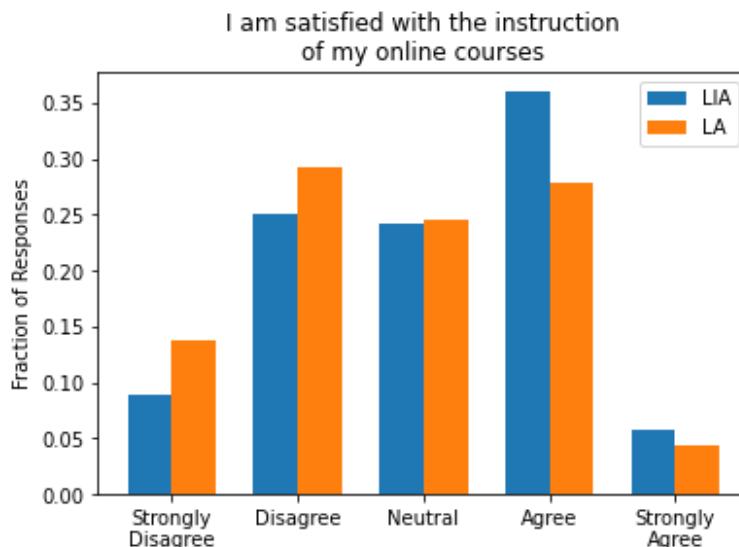
f: 0.472



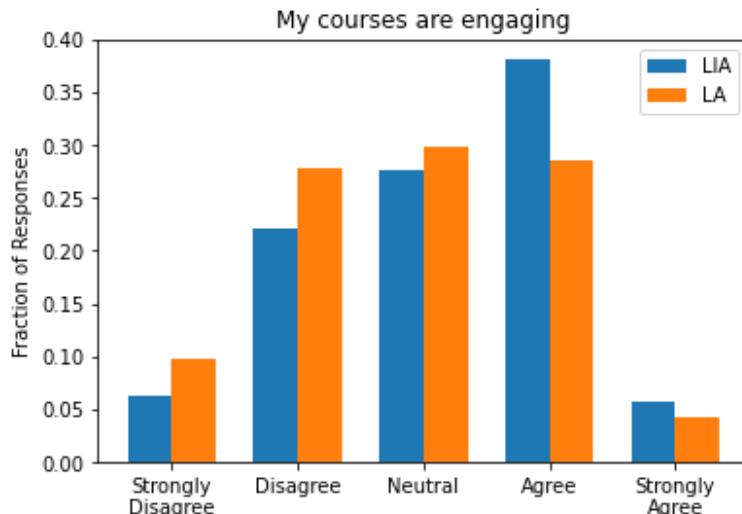
LIA shape: (1685, 43), LA shape: (638, 43)
 MWU results: MannwhitneyuResult(statistic=558907.0, pvalue=0.125041527
 1245378)
 LIA median: 3.0
 LA median: 3.0
 cohens d: 0.0724
 f: 0.52



LIA shape: (1685, 43), LA shape: (638, 43)
 MWU results: MannwhitneyuResult(statistic=563271.0, pvalue=0.063441920
 5792903)
 LIA median: 2.0
 LA median: 2.0
 cohens d: 0.0896
 f: 0.524



LIA shape: (1685, 43), LA shape: (638, 43)
 MWU results: MannwhitneyuResult(statistic=604957.5, pvalue=1.217463831
 1774314e-06)
 LIA median: 3.0
 LA median: 3.0
 cohens d: 0.228
 f: 0.563



LIA shape: (1685, 43), LA shape: (638, 43)

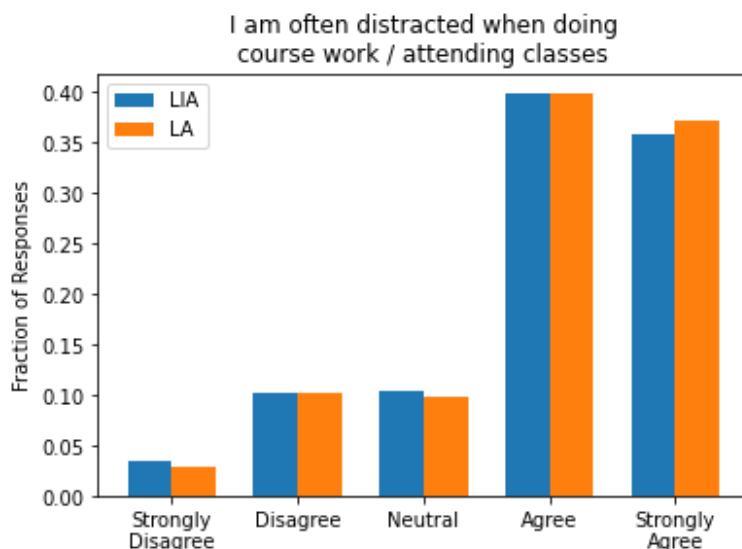
MWU results: MannwhitneyuResult(statistic=609343.0, pvalue=2.068466227
6870808e-07)

LIA median: 3.0

LA median: 3.0

cohens d: 0.24

f: 0.567



LIA shape: (1685, 43), LA shape: (638, 43)

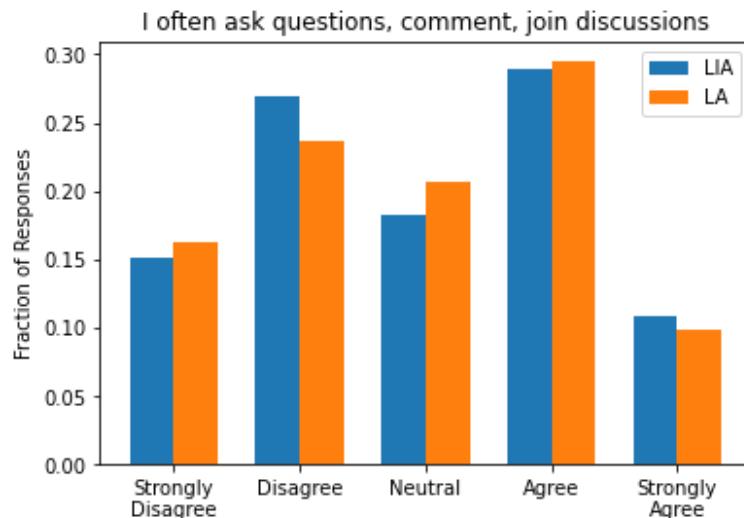
MWU results: MannwhitneyuResult(statistic=528265.5, pvalue=0.496078781
14839365)

LIA median: 4.0

LA median: 4.0

cohens d: -0.0321

f: 0.491



LIA shape: (1685, 43), LA shape: (638, 43)

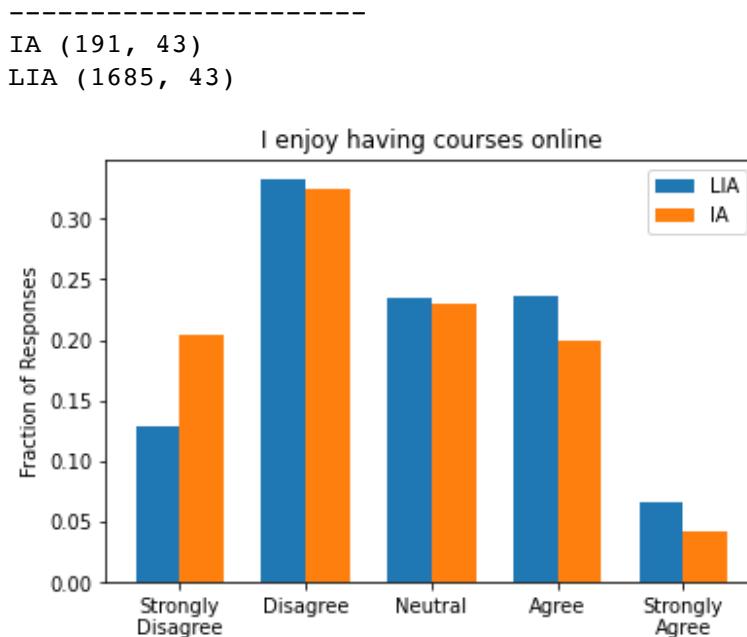
MWU results: MannwhitneyuResult(statistic=537930.0, pvalue=0.976440015
177333)

LIA median: 3.0

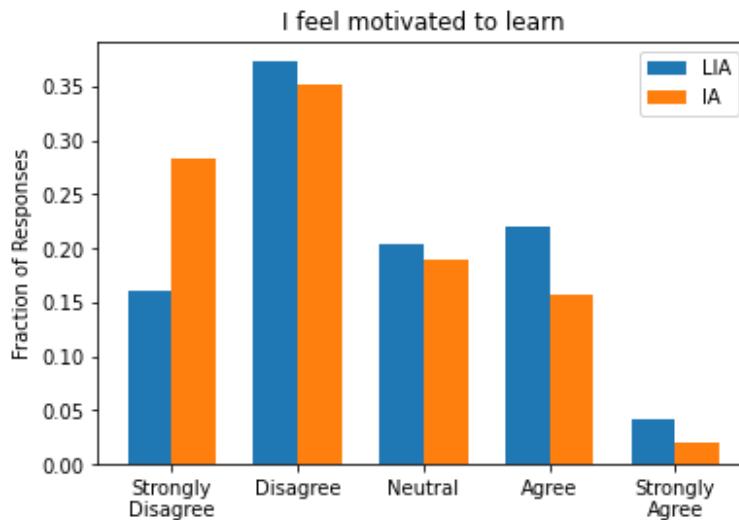
LA median: 3.0

cohens d: 0.00275

f: 0.5



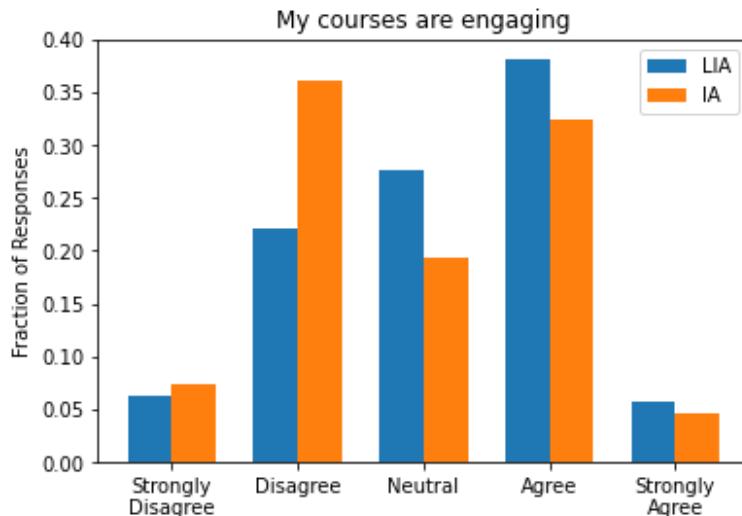
LIA shape: (1685, 43), IA shape: (191, 43)
 MWU results: MannwhitneyuResult(statistic=178539.0, pvalue=0.010223423
 840839005)
 LIA median: 3.0
 IA median: 2.0
 cohens d: 0.2
 f: 0.555



LIA shape: (1685, 43), IA shape: (191, 43)
 MWU results: MannwhitneyuResult(statistic=187152.0, pvalue=0.000121605
 77760724913)
 LIA median: 2.0
 IA median: 2.0
 cohens d: 0.291
 f: 0.582



LIA shape: (1685, 43), IA shape: (191, 43)
 MWU results: MannwhitneyuResult(statistic=182956.0, pvalue=0.001232703
 6624662422)
 LIA median: 3.0
 IA median: 3.0
 cohens d: 0.25
 f: 0.568



LIA shape: (1685, 43), IA shape: (191, 43)

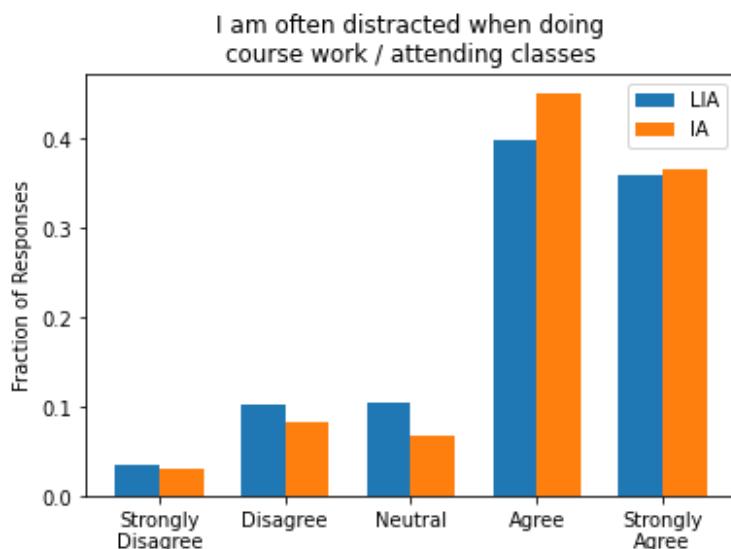
MWU results: MannwhitneyuResult(statistic=181127.5, pvalue=0.002890851
2377807476)

LIA median: 3.0

IA median: 3.0

cohens d: 0.228

f: 0.563



LIA shape: (1685, 43), IA shape: (191, 43)

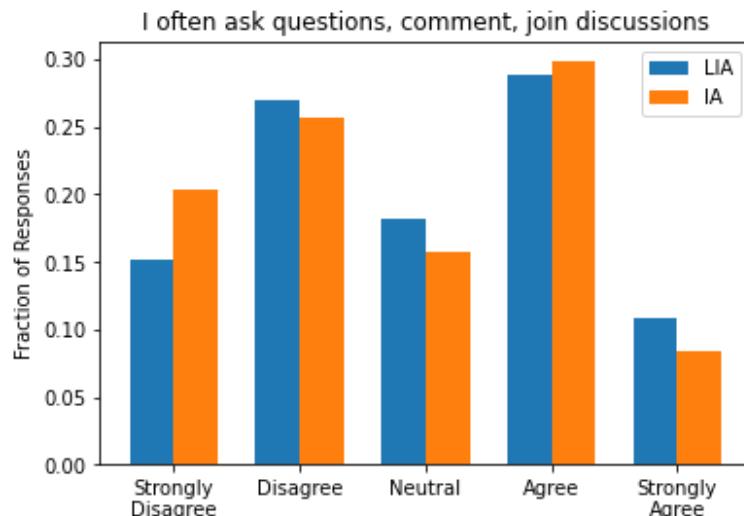
MWU results: MannwhitneyuResult(statistic=154422.0, pvalue=0.330609149
9267274)

LIA median: 4.0

IA median: 4.0

cohens d: -0.0849

f: 0.48



LIA shape: (1685, 43), IA shape: (191, 43)
MWU results: MannwhitneyuResult(statistic=170074.0, pvalue=0.184466807
76589963)
LIA median: 3.0
IA median: 3.0
cohens d: 0.104
f: 0.528

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In [ ]: techniques_undergrad[0]
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Out[ ]:
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	question	I median (n = 569)	L median (n = 583)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	-0.121	0.467	0.045
1	remote_motivated	2.0	2.0	-0.146	0.457	0.0076
2	remote_satisfied	2.0	2.0	-0.126	0.463	0.0261
3	remote_engaging	3.0	3.0	-0.166	0.455	0.00624
4	remote_distracted	4.0	4.0	-0.00906	0.495	0.737
5	remote_questions	2.0	2.0	-0.0612	0.482	0.274

In []: techniques_undergrad[1]

Out[]:

	question	A median (n = 166)	L median (n = 583)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	-0.0986	0.47	0.218
1	remote_motivated	2.0	2.0	-0.0388	0.481	0.428
2	remote_satisfied	2.0	2.0	-0.191	0.446	0.0286
3	remote_engaging	3.0	3.0	-0.147	0.459	0.0952
4	remote_distracted	4.0	4.0	-0.0737	0.479	0.37
5	remote_questions	2.0	2.0	-0.122	0.466	0.165

In []: techniques_undergrad[2]

Out[]:

	question	LI median (n = 891)	L median (n = 583)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.135	0.536	0.0159
1	remote_motivated	2.0	2.0	0.098	0.525	0.0887
2	remote_satisfied	3.0	2.0	0.221	0.561	3.47e-05
3	remote_engaging	3.0	3.0	0.148	0.539	0.00873
4	remote_distracted	4.0	4.0	-0.103	0.466	0.0177
5	remote_questions	3.0	2.0	0.104	0.529	0.0522

In []: techniques_undergrad[3]

Out[]:

	question	LA median (n = 638)	L median (n = 583)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.0984	0.527	0.0976
1	remote_motivated	2.0	2.0	0.105	0.529	0.0654
2	remote_satisfied	3.0	2.0	0.118	0.534	0.0361
3	remote_engaging	3.0	3.0	0.0311	0.508	0.61
4	remote_distracted	4.0	4.0	0.0314	0.504	0.793
5	remote_questions	3.0	2.0	0.225	0.563	9.58e-05

In []: techniques_undergrad[4]

Out[]:

	question	IA median (n = 191)	L median (n = 583)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	-0.0291	0.492	0.718
1	remote_motivated	2.0	2.0	-0.1	0.471	0.205
2	remote_satisfied	3.0	2.0	0.0976	0.527	0.247
3	remote_engaging	3.0	3.0	0.0423	0.51	0.676
4	remote_distracted	4.0	4.0	0.083	0.515	0.501
5	remote_questions	3.0	2.0	0.122	0.534	0.152

In []: techniques_undergrad[5]

Out[]:

	question	LIA median (n = 1685)	L median (n = 583)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.171	0.546	0.000602
1	remote_motivated	2.0	2.0	0.193	0.553	6.5e-05
2	remote_satisfied	3.0	2.0	0.348	0.596	8.77e-13
3	remote_engaging	3.0	3.0	0.269	0.572	6.2e-08
4	remote_distracted	4.0	4.0	-0.000277	0.496	0.737
5	remote_questions	3.0	2.0	0.227	0.563	2.84e-06

In []: techniques_undergrad[6]

Out[]:

	question	A median (n = 166)	I median (n = 569)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	0.0211	0.502	0.938
1	remote_motivated	2.0	2.0	0.104	0.521	0.395
2	remote_satisfied	2.0	2.0	-0.0607	0.485	0.531
3	remote_engaging	3.0	3.0	0.0225	0.506	0.807
4	remote_distracted	4.0	4.0	-0.0655	0.484	0.505
5	remote_questions	2.0	2.0	-0.06	0.484	0.528

In []: techniques_undergrad[7]

Out[]:

	question	LI median (n = 891)	I median (n = 569)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.259	0.57	2.96e-06
1	remote_motivated	2.0	2.0	0.242	0.569	3.5e-06
2	remote_satisfied	3.0	2.0	0.344	0.595	2.69e-10
3	remote_engaging	3.0	3.0	0.317	0.584	1.96e-08
4	remote_distracted	4.0	4.0	-0.0944	0.471	0.0442
5	remote_questions	3.0	2.0	0.165	0.547	0.0019

In []: techniques_undergrad[8]

Out[]:

	question	LA median (n = 638)	I median (n = 569)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.222	0.56	0.000184
1	remote_motivated	2.0	2.0	0.25	0.572	6.23e-06
2	remote_satisfied	3.0	2.0	0.241	0.568	2.52e-05
3	remote_engaging	3.0	3.0	0.201	0.554	0.000746
4	remote_distracted	4.0	4.0	0.041	0.51	0.541
5	remote_questions	3.0	2.0	0.285	0.58	8.16e-07

In []: techniques_undergrad[9]

Out[]:

	question	IA median (n = 191)	I median (n = 569)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	0.0926	0.525	0.293
1	remote_motivated	2.0	2.0	0.0449	0.513	0.569
2	remote_satisfied	3.0	2.0	0.219	0.562	0.00779
3	remote_engaging	3.0	3.0	0.208	0.555	0.0184
4	remote_distracted	4.0	4.0	0.0932	0.521	0.351
5	remote_questions	3.0	2.0	0.182	0.551	0.0302

In []: techniques_undergrad[10]

Out[]:

	question	LIA median (n = 1685)	I median (n = 569)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.293	0.58	3.22e-09
1	remote_motivated	2.0	2.0	0.337	0.596	9.28e-13
2	remote_satisfied	3.0	2.0	0.474	0.627	6.49e-21
3	remote_engaging	3.0	3.0	0.444	0.617	3.12e-18
4	remote_distracted	4.0	4.0	0.00899	0.501	0.942
5	remote_questions	3.0	2.0	0.288	0.58	3.72e-09

In []: techniques_undergrad[11]

Out[]:

	question	LI median (n = 891)	A median (n = 166)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.236	0.567	0.00431
1	remote_motivated	2.0	2.0	0.134	0.544	0.0601
2	remote_satisfied	3.0	2.0	0.413	0.614	1.37e-06
3	remote_engaging	3.0	3.0	0.301	0.582	0.00047
4	remote_distracted	4.0	4.0	-0.0283	0.486	0.554
5	remote_questions	3.0	2.0	0.227	0.564	0.00684

In []: techniques_undergrad[12]

Out[]:

	question	LA median (n = 638)	A median (n = 166)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.198	0.557	0.0184
1	remote_motivated	2.0	2.0	0.141	0.547	0.0547
2	remote_satisfied	3.0	2.0	0.308	0.586	0.000387
3	remote_engaging	3.0	3.0	0.184	0.551	0.0344
4	remote_distracted	4.0	4.0	0.108	0.526	0.274
5	remote_questions	3.0	2.0	0.349	0.599	5.42e-05

In []: techniques_undergrad[13]

Out[]:

	question	IA median (n = 191)	A median (n = 166)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	0.0697	0.522	0.456
1	remote_motivated	2.0	2.0	-0.058	0.491	0.761
2	remote_satisfied	3.0	2.0	0.287	0.58	0.00702
3	remote_engaging	3.0	3.0	0.195	0.55	0.089
4	remote_distracted	4.0	4.0	0.16	0.538	0.188
5	remote_questions	3.0	2.0	0.244	0.567	0.0239

In []: techniques_undergrad[14]

Out[]:

	question	LIA median (n = 1685)	A median (n = 166)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.27	0.577	0.000669
1	remote_motivated	2.0	2.0	0.229	0.569	0.00214
2	remote_satisfied	3.0	2.0	0.545	0.647	8.46e-11
3	remote_engaging	3.0	3.0	0.429	0.618	1.55e-07
4	remote_distracted	4.0	4.0	0.0761	0.517	0.44
5	remote_questions	3.0	2.0	0.349	0.598	1.66e-05

In []: techniques_undergrad[15]

Out[]:

	question	LA median (n = 638)	LI median (n = 891)	cohens d	f	p-value
0	remote_enjoy	3.0	3.0	-0.0365	0.491	0.521
1	remote_motivated	2.0	2.0	0.00552	0.504	0.771
2	remote_satisfied	3.0	3.0	-0.102	0.472	0.0531
3	remote_engaging	3.0	3.0	-0.119	0.468	0.0279
4	remote_distracted	4.0	4.0	0.136	0.539	0.00556
5	remote_questions	3.0	3.0	0.122	0.535	0.0168

In []: techniques_undergrad[16]

Out[]:

	question	IA median (n = 191)	LI median (n = 891)	cohens d	f	p-value
0	remote_enjoy	2.0	3.0	-0.165	0.456	0.0451
1	remote_motivated	2.0	2.0	-0.196	0.446	0.0139
2	remote_satisfied	3.0	3.0	-0.123	0.466	0.123
3	remote_engaging	3.0	3.0	-0.106	0.47	0.176
4	remote_distracted	4.0	4.0	0.187	0.552	0.0171
5	remote_questions	3.0	3.0	0.0194	0.505	0.81

In []: techniques_undergrad[17]

Out[]:

	question	LIA median (n = 1685)	LI median (n = 891)	cohens d	f	p-value
0	remote_enjoy	3.0	3.0	0.0362	0.511	0.344
1	remote_motivated	2.0	2.0	0.0947	0.528	0.0136
2	remote_satisfied	3.0	3.0	0.125	0.535	0.00231
3	remote_engaging	3.0	3.0	0.117	0.534	0.00298
4	remote_distracted	4.0	4.0	0.105	0.53	0.0071
5	remote_questions	3.0	3.0	0.124	0.535	0.0027

In []: techniques_undergrad[18]

Out[]:

	question	IA median (n = 191)	LA median (n = 638)	cohens d	f	p-value
0	remote_enjoy	2.0	3.0	-0.128	0.465	0.128
1	remote_motivated	2.0	2.0	-0.204	0.442	0.0114
2	remote_satisfied	3.0	3.0	-0.0204	0.494	0.781
3	remote_engaging	3.0	3.0	0.0121	0.501	0.969
4	remote_distracted	4.0	4.0	0.0537	0.511	0.612
5	remote_questions	3.0	3.0	-0.102	0.472	0.235

In []: techniques_undergrad[19]

Out[]:

	question	LIA median (n = 1685)	LA median (n = 638)	cohens d	f	p-value
0	remote_enjoy	3.0	3.0	0.0724	0.52	0.125
1	remote_motivated	2.0	2.0	0.0896	0.524	0.0634
2	remote_satisfied	3.0	3.0	0.228	0.563	1.22e-06
3	remote_engaging	3.0	3.0	0.24	0.567	2.07e-07
4	remote_distracted	4.0	4.0	-0.0321	0.491	0.496
5	remote_questions	3.0	3.0	0.00275	0.5	0.976

In []: techniques_undergrad[20]

Out[]:

	question	LIA median (n = 1685)	IA median (n = 191)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.2	0.555	0.0102
1	remote_motivated	2.0	2.0	0.291	0.582	0.000122
2	remote_satisfied	3.0	3.0	0.25	0.568	0.00123
3	remote_engaging	3.0	3.0	0.228	0.563	0.00289
4	remote_distracted	4.0	4.0	-0.0849	0.48	0.331
5	remote_questions	3.0	3.0	0.104	0.528	0.184

Effects of number of techniques and methods, controlling for types

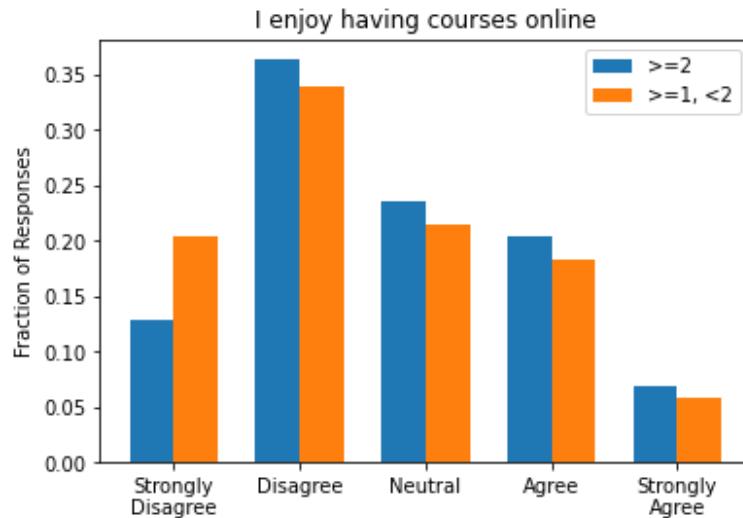
```
In [ ]: print(ug.shape)
print(ug.columns)
print(ug[ 'num_methods' ].value_counts(normalize=True))
print(ug[ 'num_techniques' ].value_counts(normalize=True))

(4789, 43)
Index(['index', 'level', 'country', 'is_online', 'first_survey',
       'primary_mode', 'preferred_mode', 'why_mode', 'platforms_used',
       'methods_used', 'techniques_outside', 'remote_enjoy',
       'remote_motivated', 'remote_satisfied', 'remote_engaging',
       'remote_distracted', 'remote_questions', 'remote_changes',
       'prior_enjoy', 'prior_motivated', 'prior_satisfied', 'prior_engaging',
       'prior_distracted', 'prior_questions', 'prior_changes', 'preference',
       'why_preference', 'change_enjoy', 'change_motivated',
       'change_satisfied', 'change_engaging', 'change_distracted',
       'change_questions', 'active', 'passive', 'fully_active',
       'partly_active', 'outside_passive', 'outside_interactive',
       'outside_assignments', 'is_online_short', 'num_methods',
       'num_techniques'],
      dtype='object')
1    0.228231
2    0.214032
0    0.193569
3    0.169138
4    0.107956
5    0.051994
6    0.022552
7    0.012111
9    0.000209
8    0.000209
Name: num_methods, dtype: float64
2    0.236793
3    0.224264
1    0.207768
4    0.153894
5    0.097933
6    0.050532
7    0.028190
8    0.000418
-1   0.000209
Name: num_techniques, dtype: float64
```

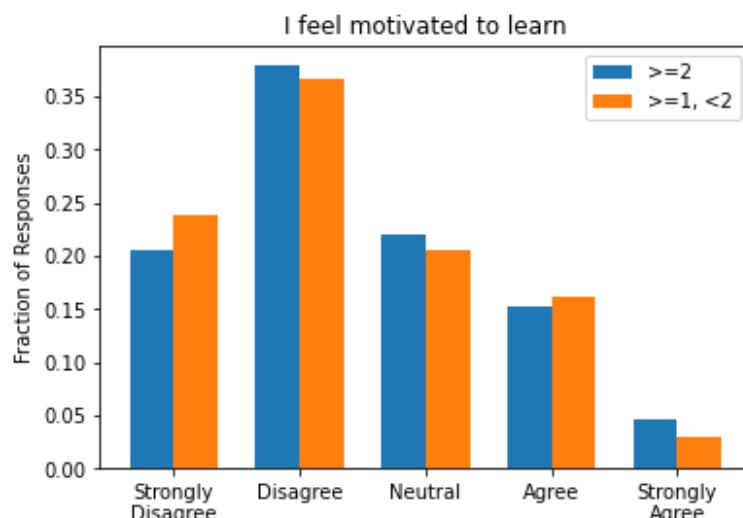
```
In [ ]: def num_diversity_controlled(cat, num):
    print(cat.name)
    if 0 in cat[num].unique():
        cat = cat.drop(cat[cat[num]==0].index, axis=0)
    proportion = cat[num].value_counts(normalize=True)
    print(proportion)
    least = min(cat[num].unique())
    #     if sum(proportion.iloc[:least+2]) < 0.8:
    #         return num_comp(cat, num, least, least+1), '-----', num_co
    #     else:
    #         return num_methods_comp(cat, least, least+1)
```

```
In [ ]: num_diversity_controlled_undergrad = []
for cat in ugcats:
    num_diversity_controlled_undergrad.append(num_diversity_controlled(cat,
'num_methods'))
print('-----')
```

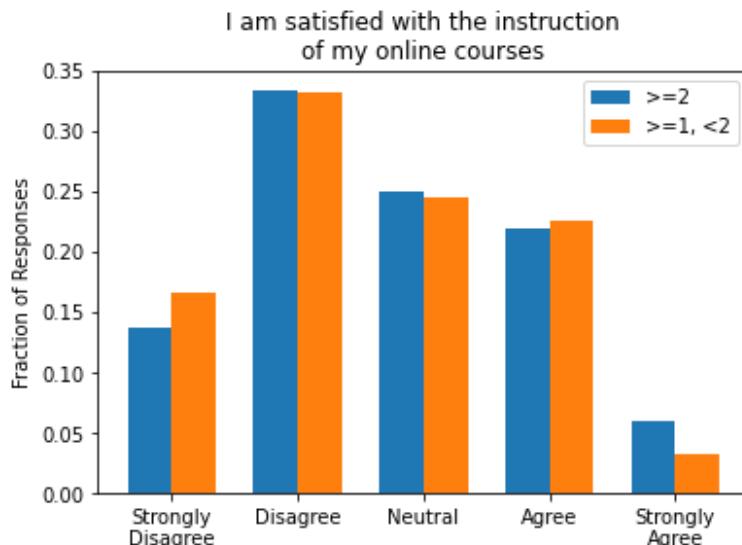
```
P
1    0.817427
2    0.175657
3    0.005533
4    0.001383
Name: num_methods, dtype: float64
```



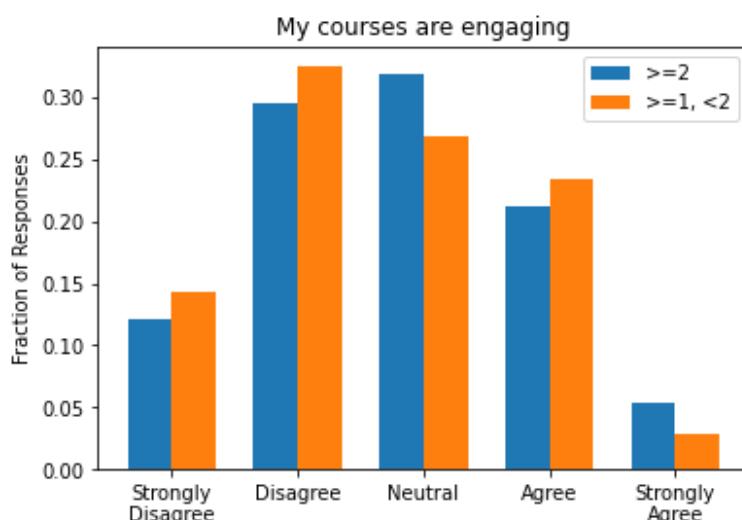
```
>=2 shape: (132, 43), >=1, <2 shape: (591, 43)
MWU results: MannwhitneyuResult(statistic=42358.0, pvalue=0.1101350698
9256931)
>=2 median: 3.0
>=1, <2 median: 2.0
cohens d: 0.147
f: 0.543
```



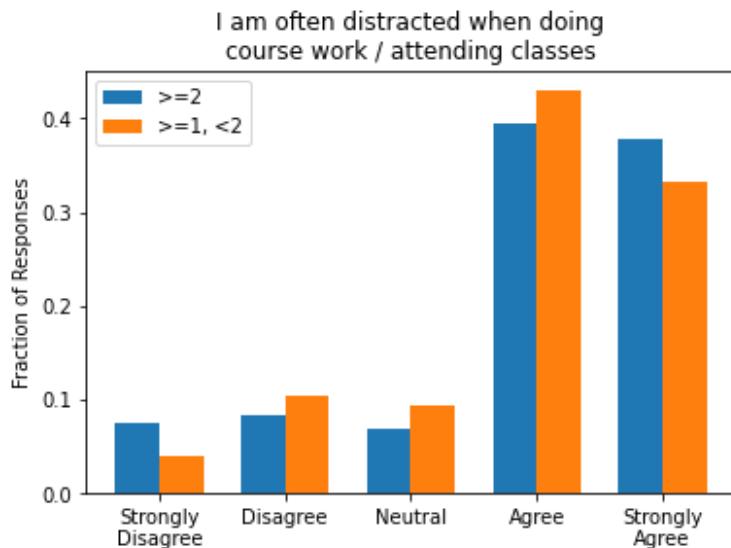
```
>=2 shape: (132, 43), >=1, <2 shape: (591, 43)
MWU results: MannwhitneyuResult(statistic=40463.0, pvalue=0.4850730609
178545)
>=2 median: 2.0
>=1, <2 median: 2.0
cohens d: 0.0683
f: 0.519
```



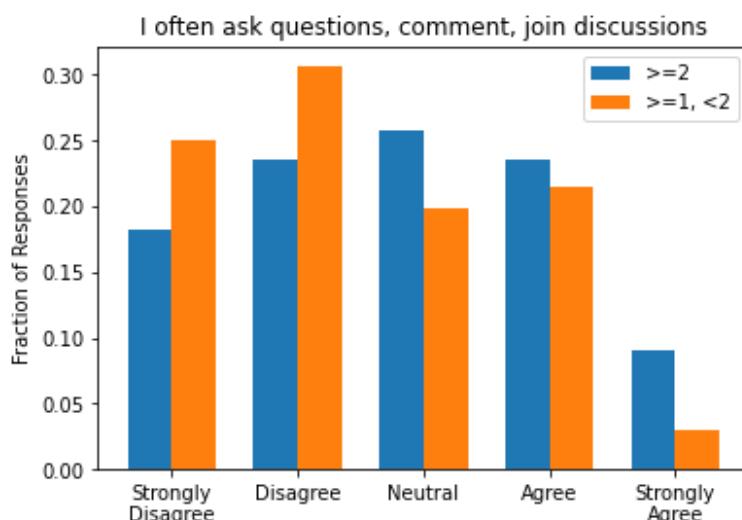
```
>=2 shape: (132, 43), >=1, <2 shape: (591, 43)
MWU results: MannwhitneyuResult(statistic=40912.0, pvalue=0.3632079669
96259)
>=2 median: 3.0
>=1, <2 median: 3.0
cohens d: 0.0984
f: 0.524
```



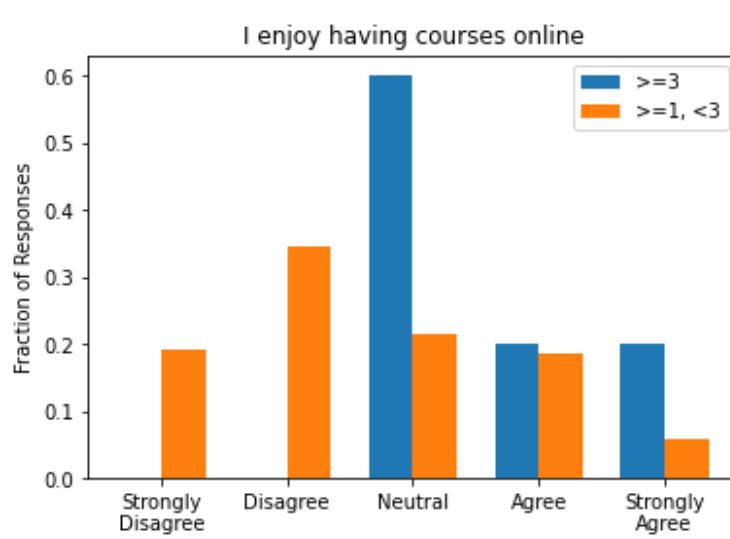
```
>=2 shape: (132, 43), >=1, <2 shape: (591, 43)
MWU results: MannwhitneyuResult(statistic=40929.5, pvalue=0.3582928405
509216)
>=2 median: 3.0
>=1, <2 median: 3.0
cohens d: 0.0949
f: 0.525
```



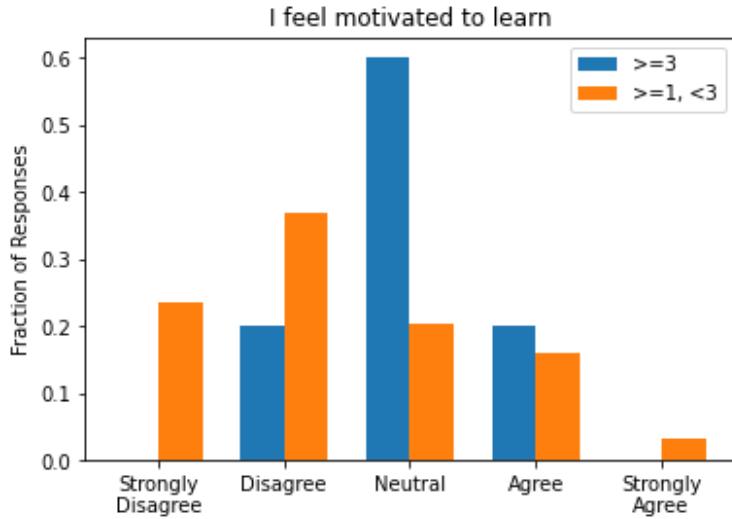
```
>=2 shape: (132, 43), >=1, <2 shape: (591, 43)
MWU results: MannwhitneyuResult(statistic=40230.5, pvalue=0.5481247495
663993)
>=2 median: 4.0
>=1, <2 median: 4.0
cohens d: 0.00266
f: 0.516
```



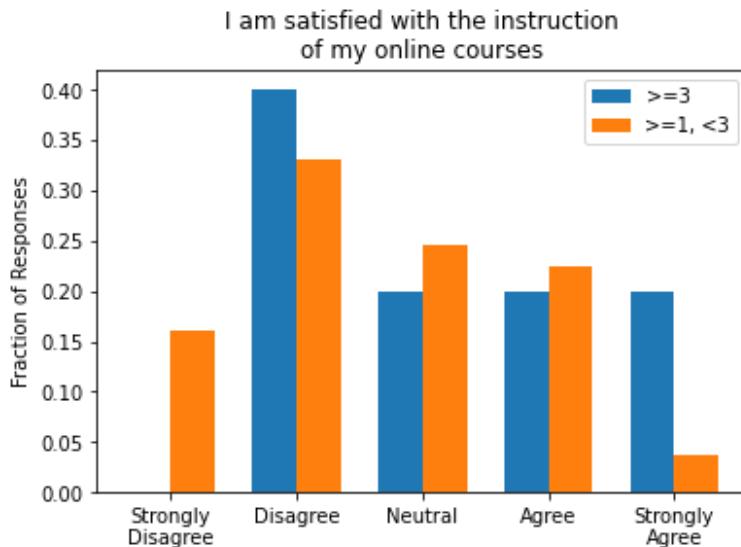
```
>=2 shape: (132, 43), >=1, <2 shape: (591, 43)
MWU results: MannwhitneyuResult(statistic=45123.0, pvalue=0.0036694589
713745745)
>=2 median: 3.0
>=1, <2 median: 2.0
cohens d: 0.296
f: 0.578
```



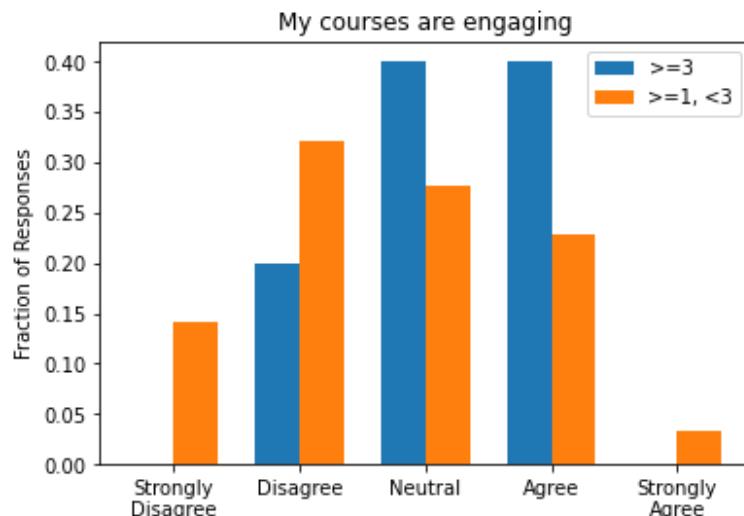
```
>=3 shape: (5, 43), >=1, <3 shape: (718, 43)
MWU results: MannwhitneyuResult(statistic=2699.5, pvalue=0.04456309596
611218)
>=3 median: 3.0
>=1, <3 median: 2.0
cohens d: 0.884
f: 0.752
```



```
>=3 shape: (5, 43), >=1, <3 shape: (718, 43)
MWU results: MannwhitneyuResult(statistic=2457.0, pvalue=0.13937368765
971317)
>=3 median: 3.0
>=1, <3 median: 2.0
cohens d: 0.553
f: 0.684
```



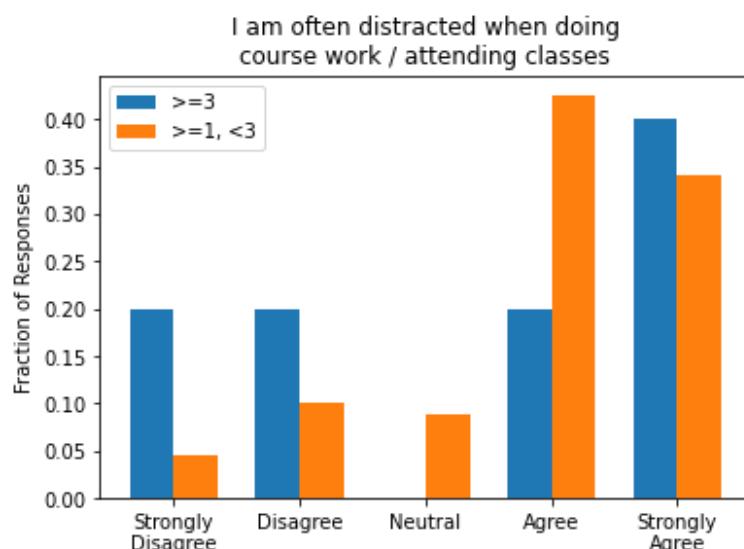
```
>=3 shape: (5, 43), >=1, <3 shape: (718, 43)
MWU results: MannwhitneyuResult(statistic=2229.0, pvalue=0.33490220253
240865)
>=3 median: 3.0
>=1, <3 median: 3.0
cohens d: 0.505
f: 0.621
```



```

>=3 shape: (5, 43), >=1, <3 shape: (718, 43)
MWU results: MannwhitneyuResult(statistic=2301.0, pvalue=0.26030353482
69489)
>=3 median: 3.0
>=1, <3 median: 3.0
cohens d: 0.472
f: 0.641

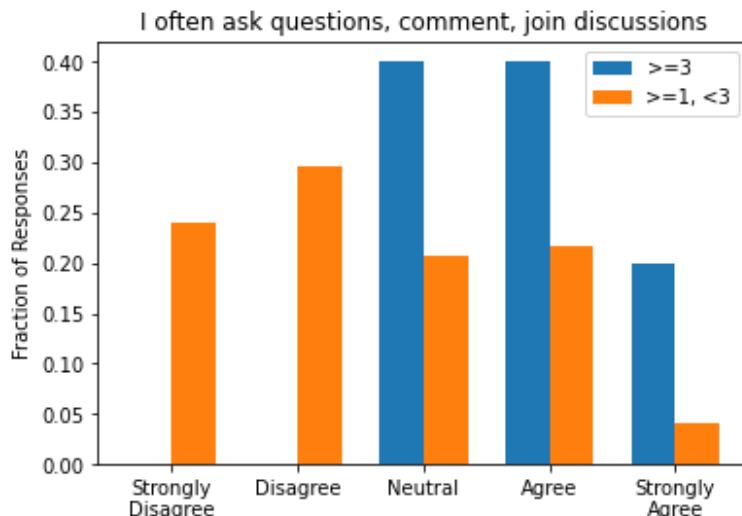
```



```

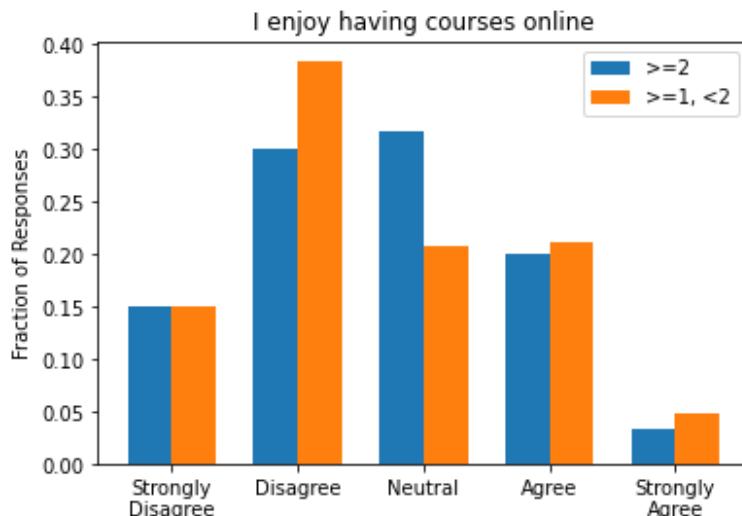
>=3 shape: (5, 43), >=1, <3 shape: (718, 43)
MWU results: MannwhitneyuResult(statistic=1595.5, pvalue=0.64898923163
34188)
>=3 median: 4.0
>=1, <3 median: 4.0
cohens d: -0.465
f: 0.444

```

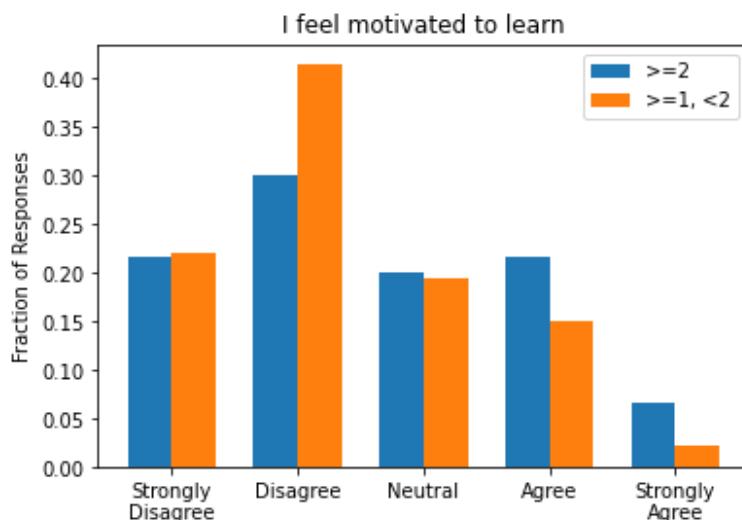


```
>=3 shape: (5, 43), >=1, <3 shape: (718, 43)
MWU results: MannwhitneyuResult(statistic=2842.5, pvalue=0.02043509847
498381)
>=3 median: 4.0
>=1, <3 median: 2.0
cohens d: 1.08
f: 0.792
```

```
-----  
A  
1    0.790941  
2    0.205575  
3    0.003484  
Name: num_methods, dtype: float64
```

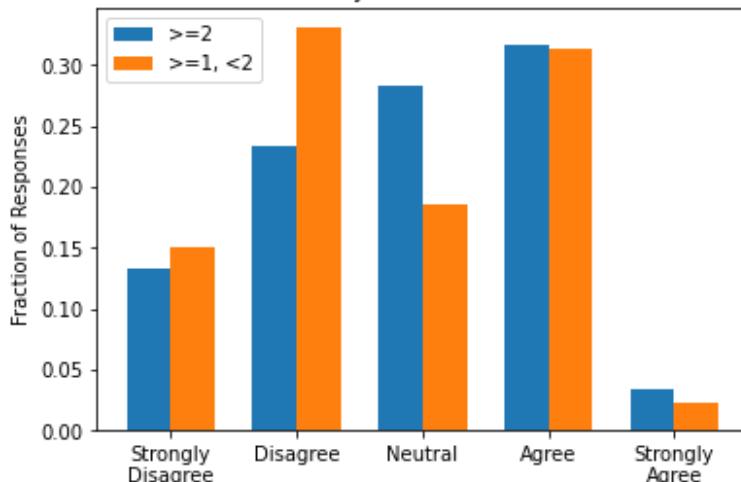


```
>=2 shape: (60, 43), >=1, <2 shape: (227, 43)
MWU results: MannwhitneyuResult(statistic=7040.5, pvalue=0.67595802048
22548)
>=2 median: 3.0
>=1, <2 median: 2.0
cohens d: 0.0371
f: 0.517
```



```
>=2 shape: (60, 43), >=1, <2 shape: (227, 43)
MWU results: MannwhitneyuResult(statistic=7626.0, pvalue=0.13659770711
117503)
>=2 median: 2.0
>=1, <2 median: 2.0
cohens d: 0.254
f: 0.56
```

**I am satisfied with the instruction
of my online courses**

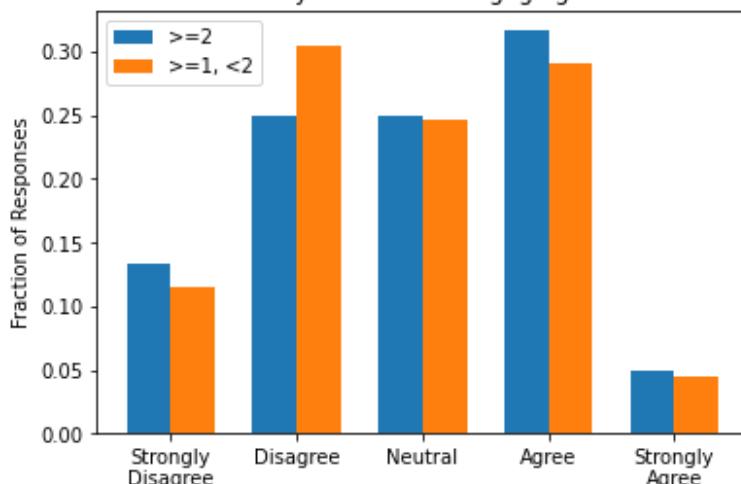


```

>=2 shape: (60, 43), >=1, <2 shape: (227, 43)
MWU results: MannwhitneyuResult(statistic=7339.5, pvalue=0.33668858715
686856)
>=2 median: 3.0
>=1, <2 median: 3.0
cohens d: 0.14
f: 0.539

```

My courses are engaging

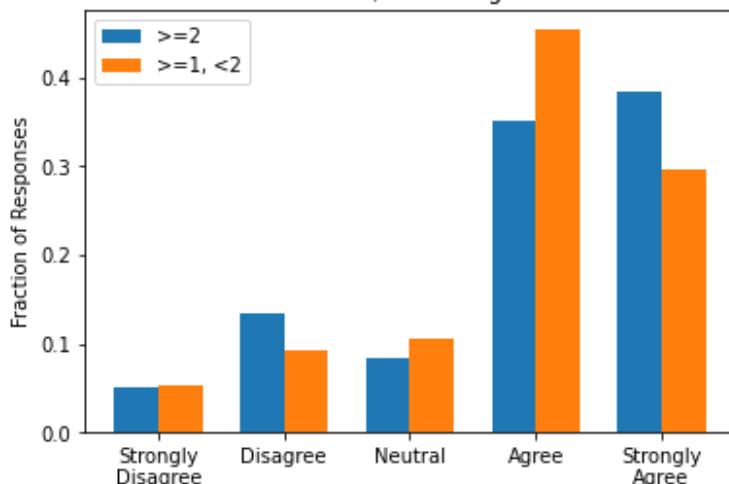


```

>=2 shape: (60, 43), >=1, <2 shape: (227, 43)
MWU results: MannwhitneyuResult(statistic=7018.5, pvalue=0.70629958527
17955)
>=2 median: 3.0
>=1, <2 median: 3.0
cohens d: 0.0488
f: 0.515

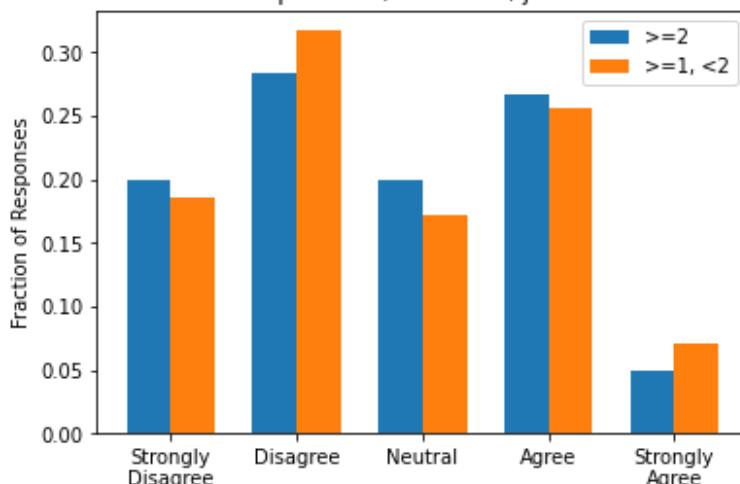
```

I am often distracted when doing
course work / attending classes

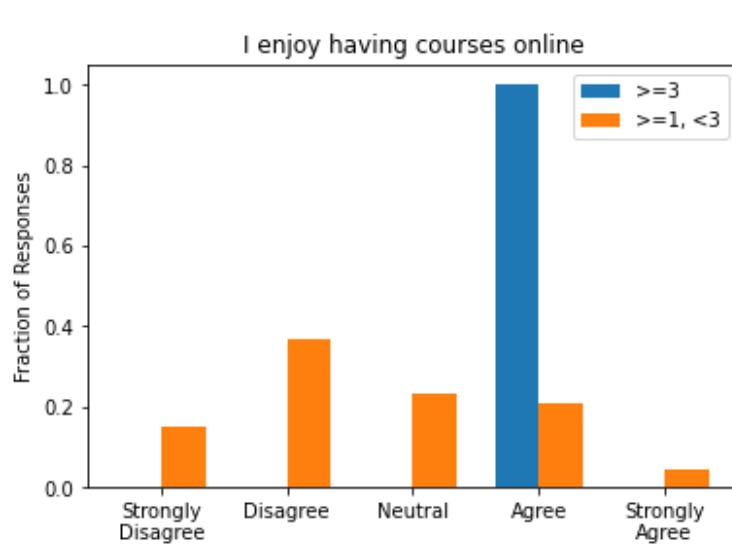


```
>=2 shape: (60, 43), >=1, <2 shape: (227, 43)
MWU results: MannwhitneyuResult(statistic=7152.0, pvalue=0.52578214388
18286)
>=2 median: 4.0
>=1, <2 median: 4.0
cohens d: 0.0332
f: 0.525
```

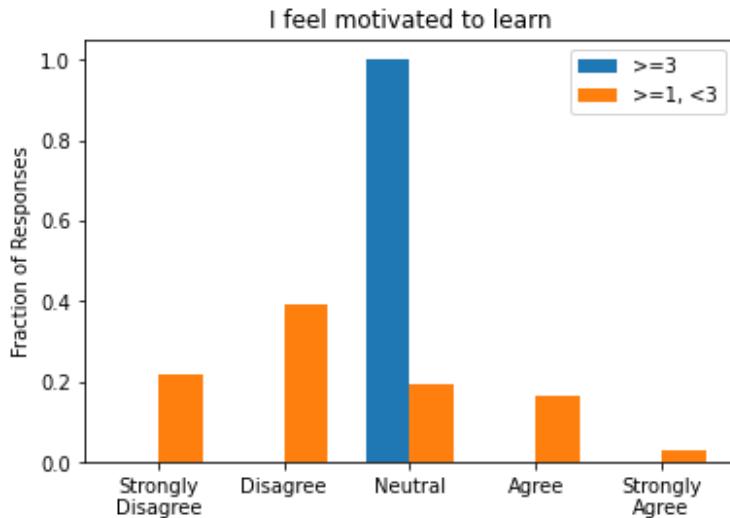
I often ask questions, comment, join discussions



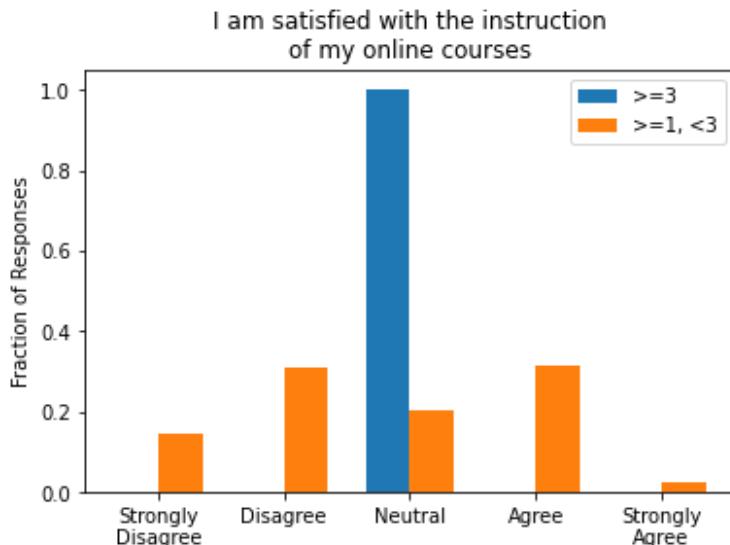
```
>=2 shape: (60, 43), >=1, <2 shape: (227, 43)
MWU results: MannwhitneyuResult(statistic=6749.0, pvalue=0.91311117874
73427)
>=2 median: 3.0
>=1, <2 median: 2.0
cohens d: -0.0211
f: 0.496
```



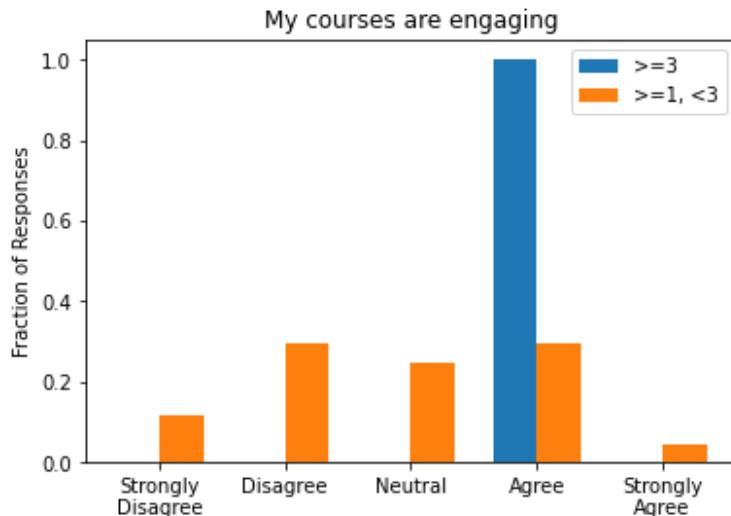
```
>=3 shape: (1, 43), >=1, <3 shape: (286, 43)
MWU results: MannwhitneyuResult(statistic=243.5, pvalue=0.209799026924
51968)
>=3 median: 4.0
>=1, <3 median: 2.0
cohens d: nan
f: 0.851
```



```
>=3 shape: (1, 43), >=1, <3 shape: (286, 43)
MWU results: MannwhitneyuResult(statistic=202.5, pvalue=0.457360201388
0842)
>=3 median: 3.0
>=1, <3 median: 2.0
cohens d: nan
f: 0.708
```



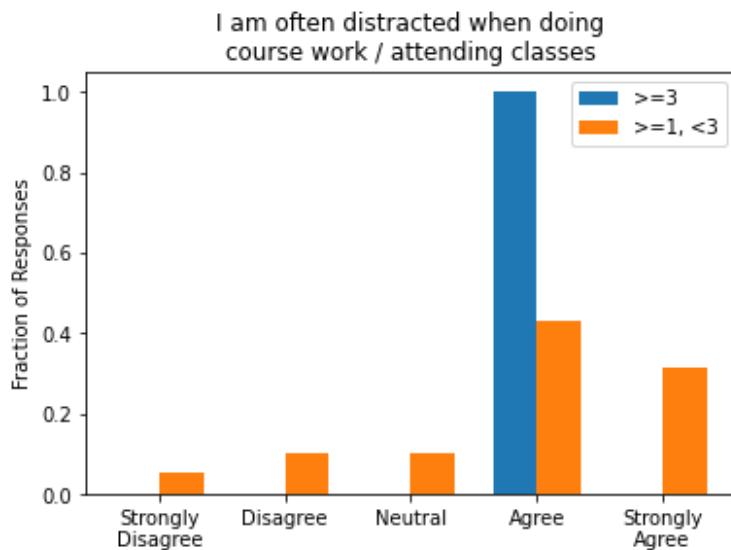
```
>=3 shape: (1, 43), >=1, <3 shape: (286, 43)
MWU results: MannwhitneyuResult(statistic=160.0, pvalue=0.836171988414
874)
>=3 median: 3.0
>=1, <3 median: 3.0
cohens d: nan
f: 0.559
```



```

>=3 shape: (1, 43), >=1, <3 shape: (286, 43)
MWU results: MannwhitneyuResult(statistic=231.0, pvalue=0.273978222288
90756)
>=3 median: 4.0
>=1, <3 median: 3.0
cohens d: nan
f: 0.808

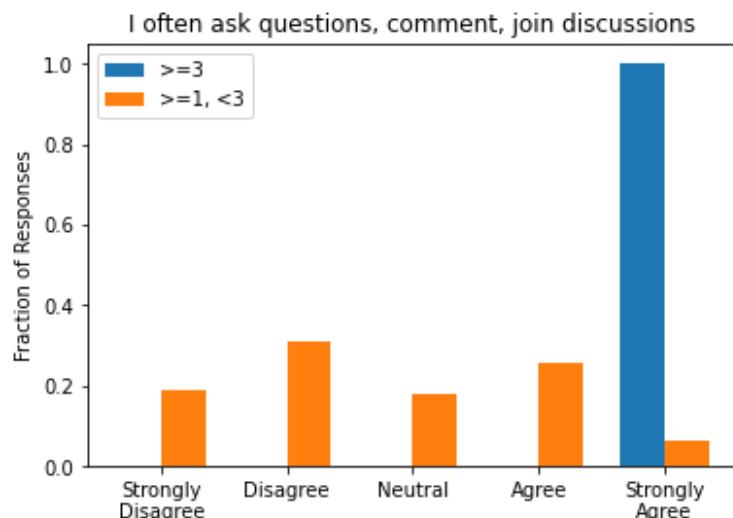
```



```

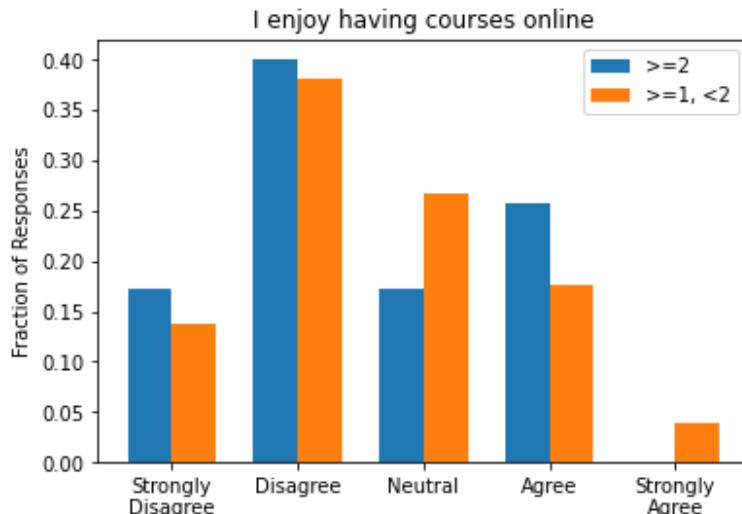
>=3 shape: (1, 43), >=1, <3 shape: (286, 43)
MWU results: MannwhitneyuResult(statistic=134.5, pvalue=0.918306661684
7249)
>=3 median: 4.0
>=1, <3 median: 4.0
cohens d: nan
f: 0.47

```

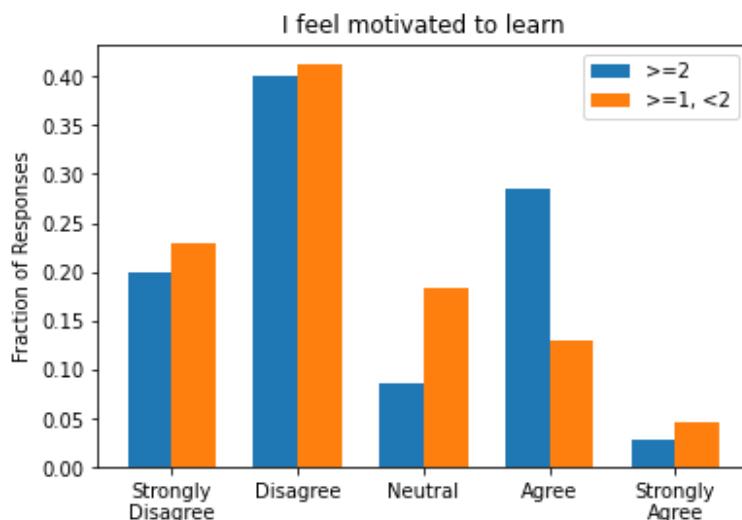


```
>=3 shape: (1, 43), >=1, <3 shape: (286, 43)
MWU results: MannwhitneyuResult(statistic=277.0, pvalue=0.096600758182
5257)
>=3 median: 5.0
>=1, <3 median: 2.5
cohens d: nan
f: 0.969
```

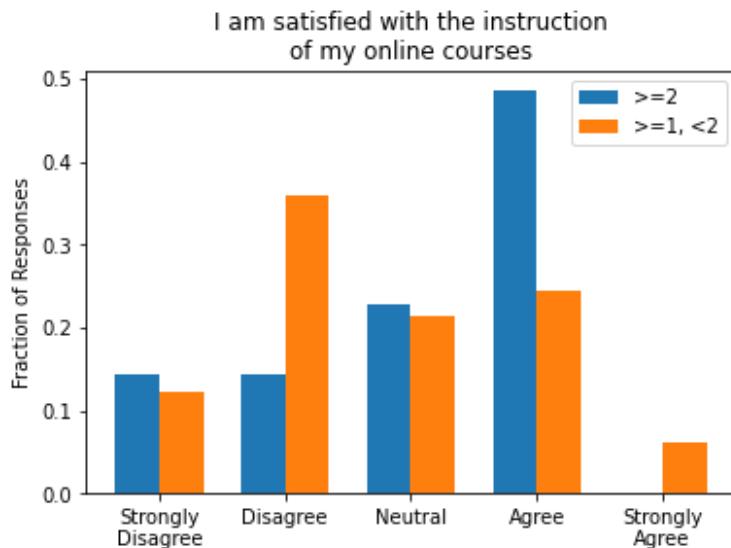
```
-----  
F  
1    0.789157  
2    0.186747  
3    0.018072  
4    0.006024  
Name: num_methods, dtype: float64
```



```
>=2 shape: (35, 43), >=1, <2 shape: (131, 43)
MWU results: MannwhitneyuResult(statistic=2199.5, pvalue=0.70223228306
9882)
>=2 median: 2.0
>=1, <2 median: 2.0
cohens d: -0.077
f: 0.48
```



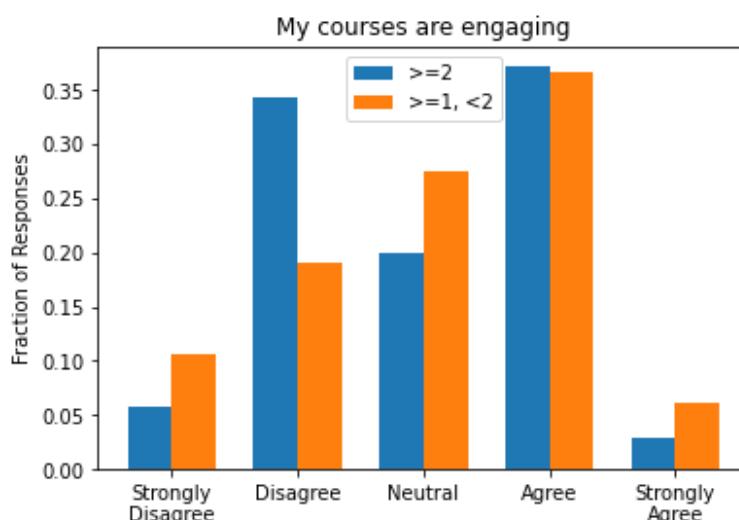
```
>=2 shape: (35, 43), >=1, <2 shape: (131, 43)
MWU results: MannwhitneyuResult(statistic=2484.0, pvalue=0.42837868742
86569)
>=2 median: 2.0
>=1, <2 median: 2.0
cohens d: 0.17
f: 0.542
```



```

>=2 shape: (35, 43), >=1, <2 shape: (131, 43)
MWU results: MannwhitneyuResult(statistic=2672.5, pvalue=0.11950860623
26365)
>=2 median: 3.0
>=1, <2 median: 3.0
cohens d: 0.26
f: 0.583

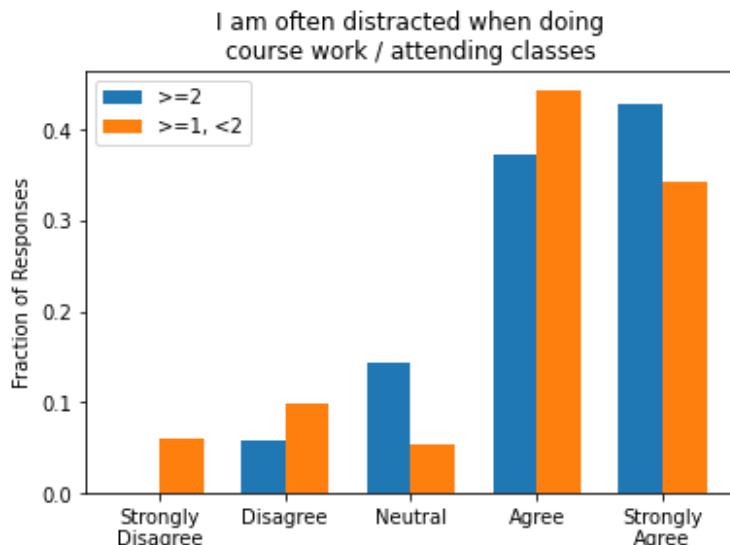
```



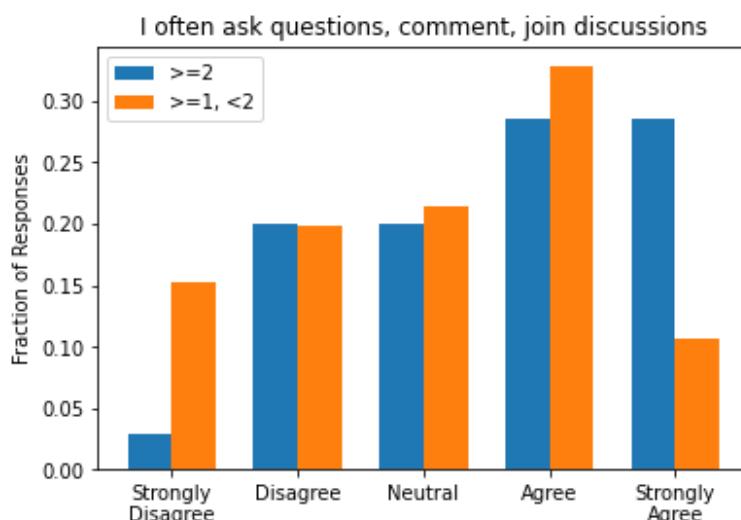
```

>=2 shape: (35, 43), >=1, <2 shape: (131, 43)
MWU results: MannwhitneyuResult(statistic=2145.0, pvalue=0.54423626704
14299)
>=2 median: 3.0
>=1, <2 median: 3.0
cohens d: -0.103
f: 0.468

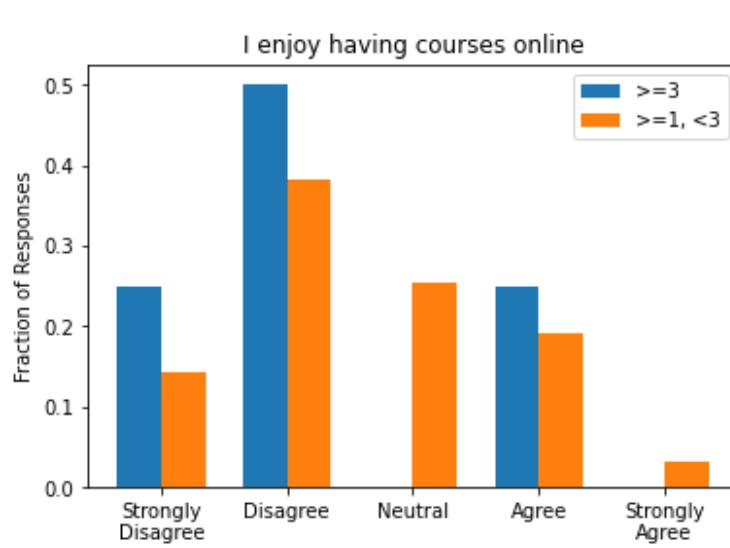
```



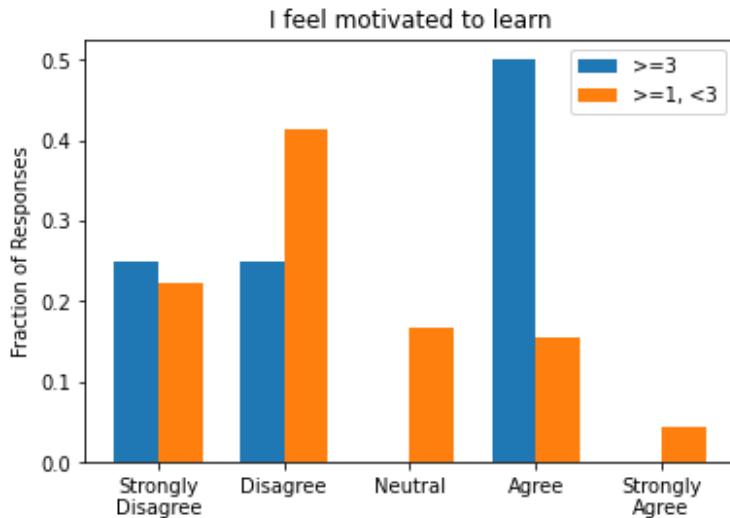
```
>=2 shape: (35, 43), >=1, <2 shape: (131, 43)
MWU results: MannwhitneyuResult(statistic=2520.0, pvalue=0.33624781011
59433)
>=2 median: 4.0
>=1, <2 median: 4.0
cohens d: 0.237
f: 0.55
```



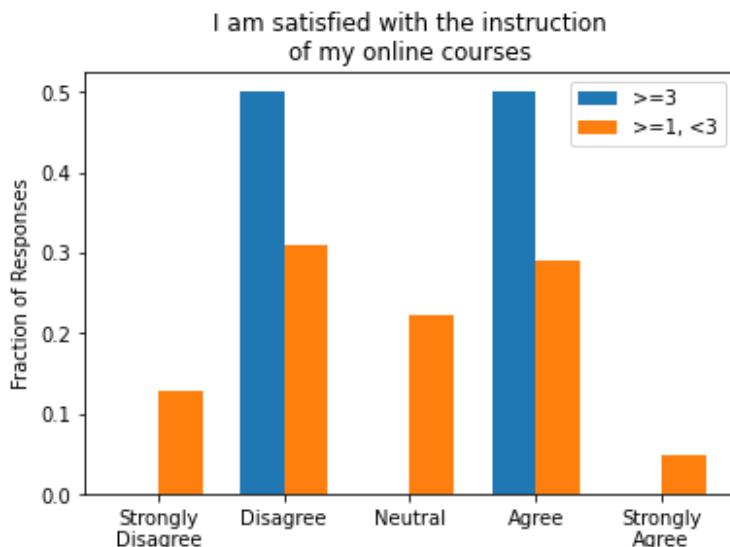
```
>=2 shape: (35, 43), >=1, <2 shape: (131, 43)
MWU results: MannwhitneyuResult(statistic=2856.0, pvalue=0.02187766462
5076915)
>=2 median: 4.0
>=1, <2 median: 3.0
cohens d: 0.452
f: 0.623
```



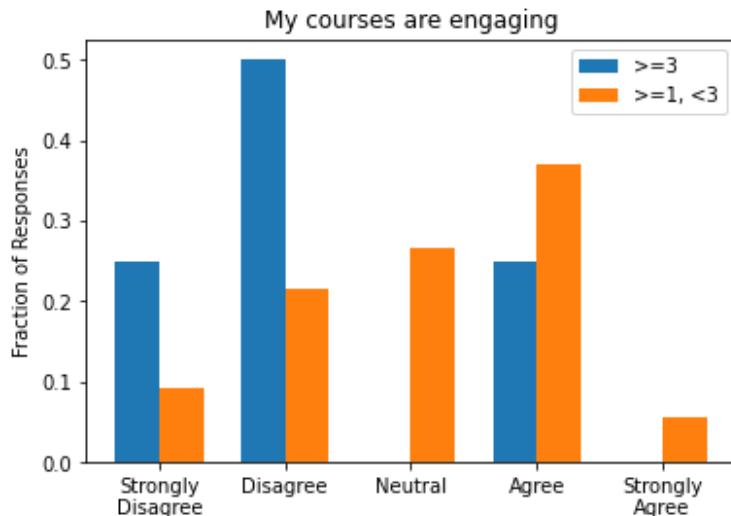
```
>=3 shape: (4, 43), >=1, <3 shape: (162, 43)
MWU results: MannwhitneyuResult(statistic=261.0, pvalue=0.492004893062
40913)
>=3 median: 2.0
>=1, <3 median: 2.0
cohens d: -0.319
f: 0.403
```



```
>=3 shape: (4, 43), >=1, <3 shape: (162, 43)
MWU results: MannwhitneyuResult(statistic=372.5, pvalue=0.596515871619
1423)
>=3 median: 3.0
>=1, <3 median: 2.0
cohens d: 0.325
f: 0.575
```



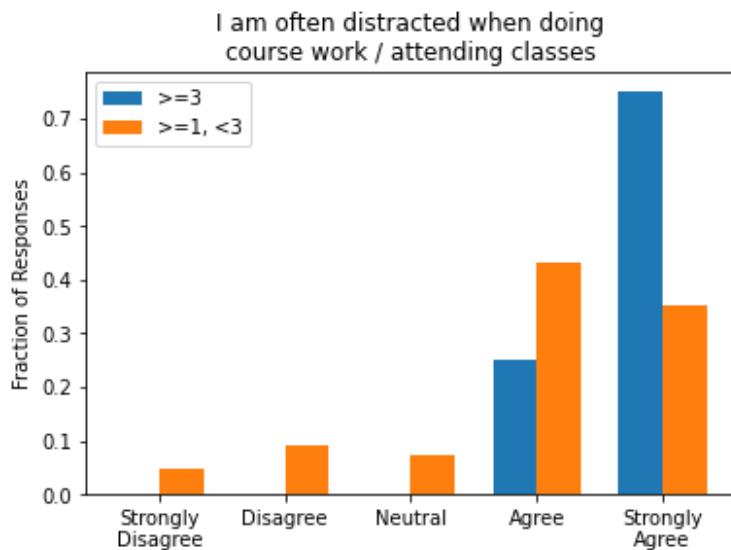
```
>=3 shape: (4, 43), >=1, <3 shape: (162, 43)
MWU results: MannwhitneyuResult(statistic=353.0, pvalue=0.755801335748
5425)
>=3 median: 3.0
>=1, <3 median: 3.0
cohens d: 0.158
f: 0.545
```



```

>=3 shape: (4, 43), >=1, <3 shape: (162, 43)
MWU results: MannwhitneyuResult(statistic=195.5, pvalue=0.160144829161
19988)
>=3 median: 2.0
>=1, <3 median: 3.0
cohens d: -0.762
f: 0.302

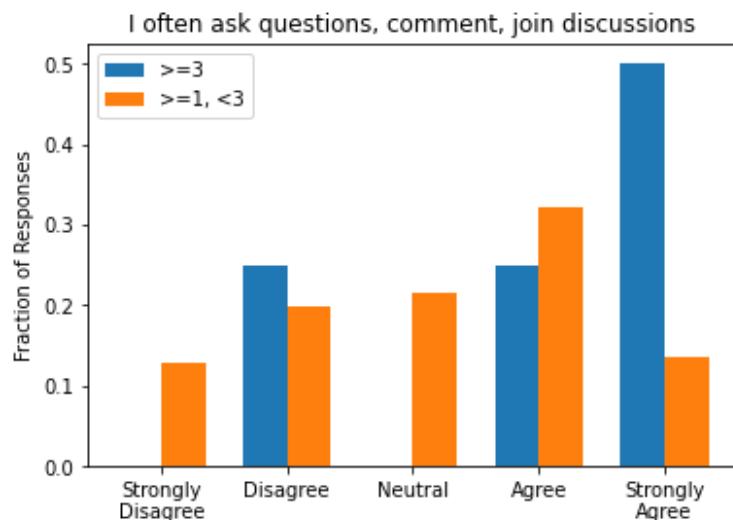
```



```

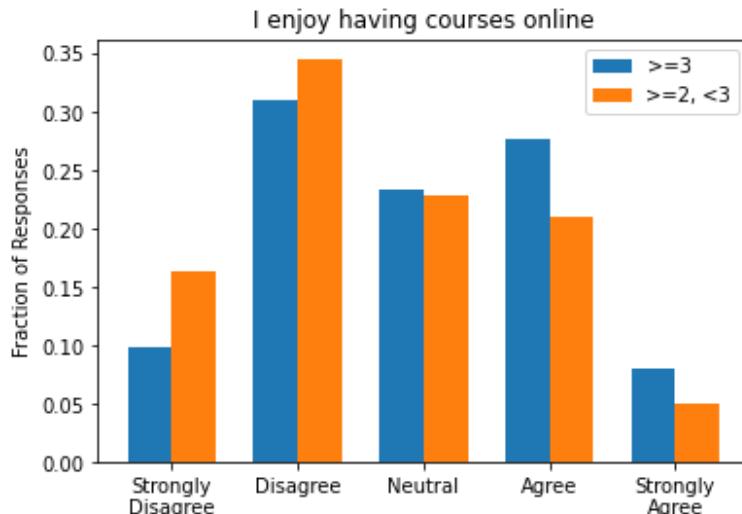
>=3 shape: (4, 43), >=1, <3 shape: (162, 43)
MWU results: MannwhitneyuResult(statistic=470.5, pvalue=0.099938412799
26884)
>=3 median: 5.0
>=1, <3 median: 4.0
cohens d: 0.727
f: 0.726

```



```
>=3 shape: (4, 43), >=1, <3 shape: (162, 43)
MWU results: MannwhitneyuResult(statistic=453.0, pvalue=0.163976567994
45282)
>=3 median: 4.5
>=1, <3 median: 3.0
cohens d: 0.688
f: 0.699
```

```
PA
2    0.528117
3    0.337408
4    0.119804
5    0.014670
Name: num_methods, dtype: float64
```



≥ 3 shape: (386, 43), $\geq 2, < 3$ shape: (432, 43)

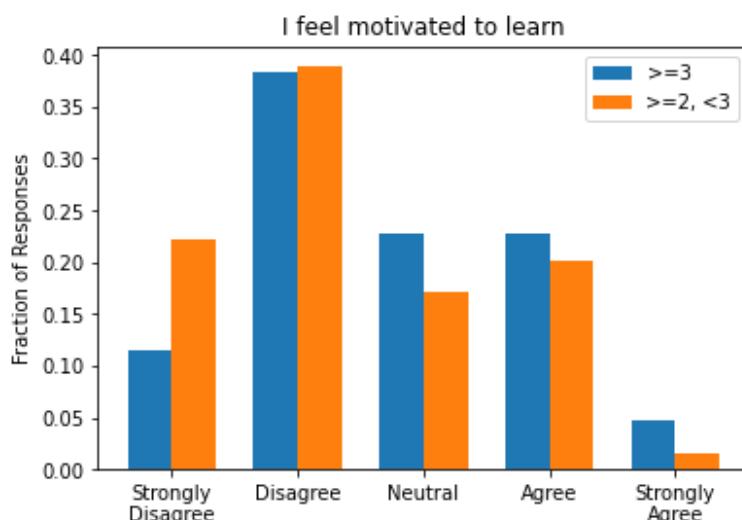
MWU results: MannwhitneyuResult(statistic=95116.5, pvalue=0.0003201802
330887062)

≥ 3 median: 3.0

$\geq 2, < 3$ median: 2.0

cohens d: 0.256

f: 0.57



≥ 3 shape: (386, 43), $\geq 2, < 3$ shape: (432, 43)

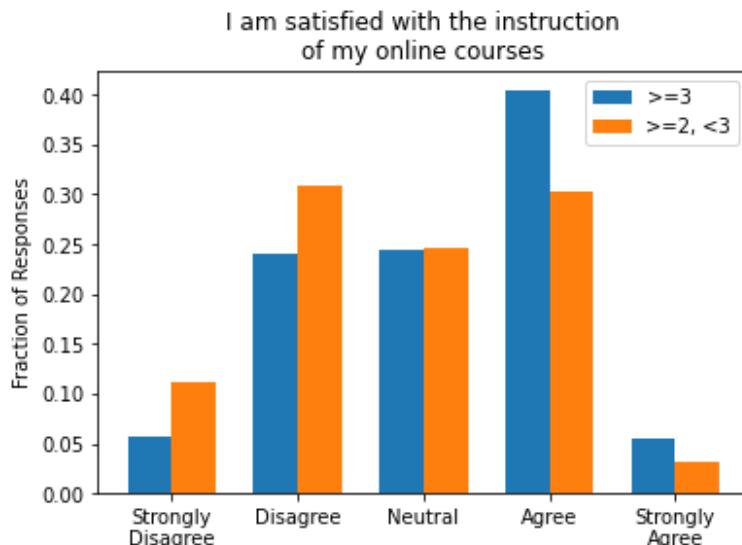
MWU results: MannwhitneyuResult(statistic=96525.0, pvalue=4.8237388183
52642e-05)

≥ 3 median: 3.0

$\geq 2, < 3$ median: 2.0

cohens d: 0.285

f: 0.579



`>=3 shape: (386, 43), >=2, <3 shape: (432, 43)`

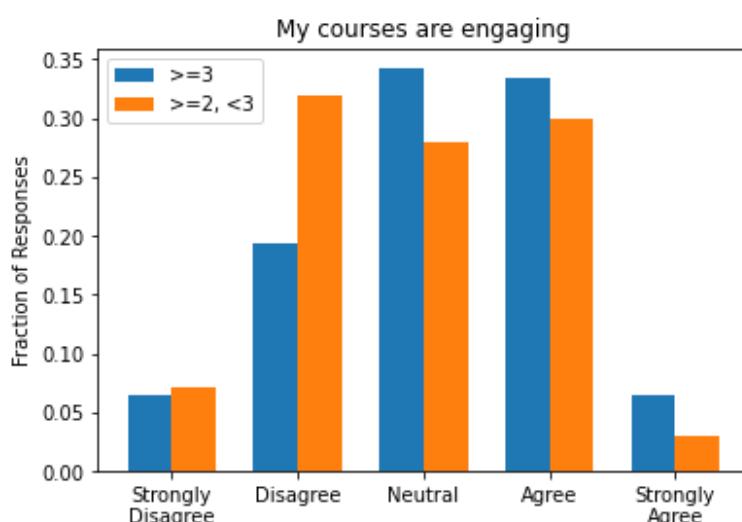
`MWU results: MannwhitneyuResult(statistic=97087.5, pvalue=2.2716289764993356e-05)`

`>=3 median: 3.0`

`>=2, <3 median: 3.0`

`cohens d: 0.303`

`f: 0.582`



`>=3 shape: (386, 43), >=2, <3 shape: (432, 43)`

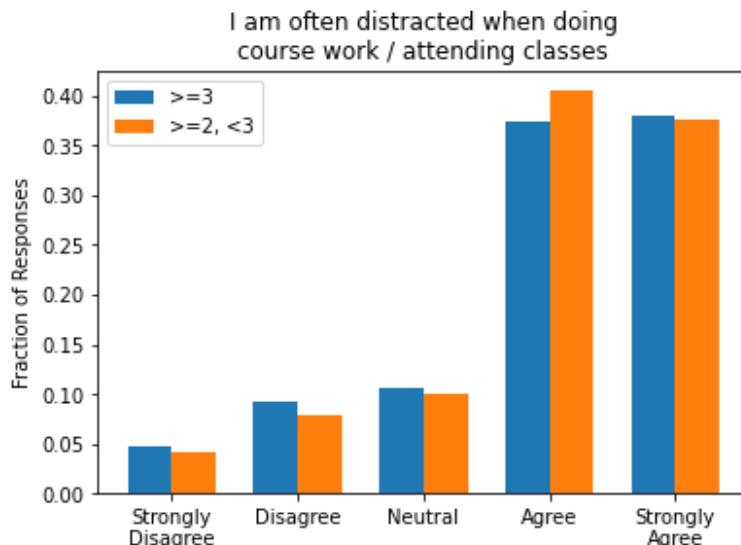
`MWU results: MannwhitneyuResult(statistic=94549.5, pvalue=0.0005582305900276735)`

`>=3 median: 3.0`

`>=2, <3 median: 3.0`

`cohens d: 0.241`

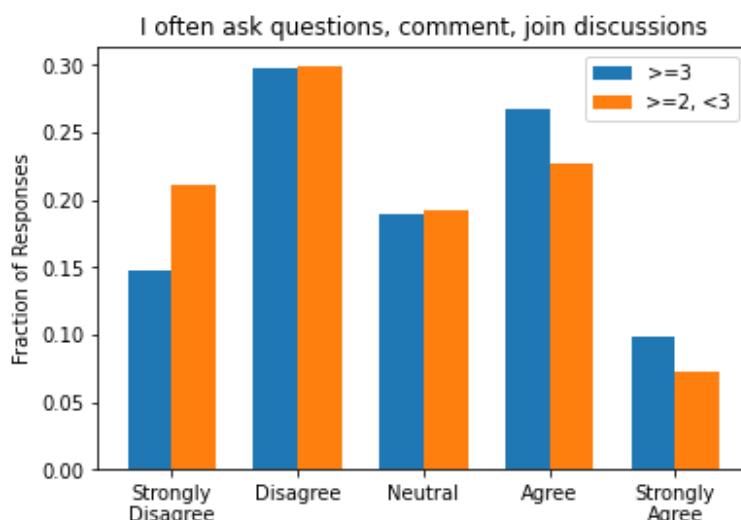
`f: 0.567`



```

>=3 shape: (386, 43), >=2, <3 shape: (432, 43)
MWU results: MannwhitneyuResult(statistic=82312.5, pvalue=0.7376651733
12102)
>=3 median: 4.0
>=2, <3 median: 4.0
cohens d: -0.0406
f: 0.494

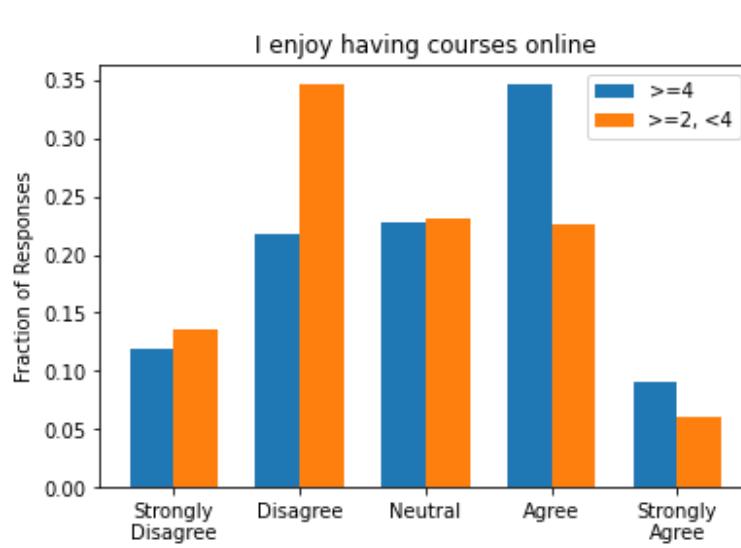
```



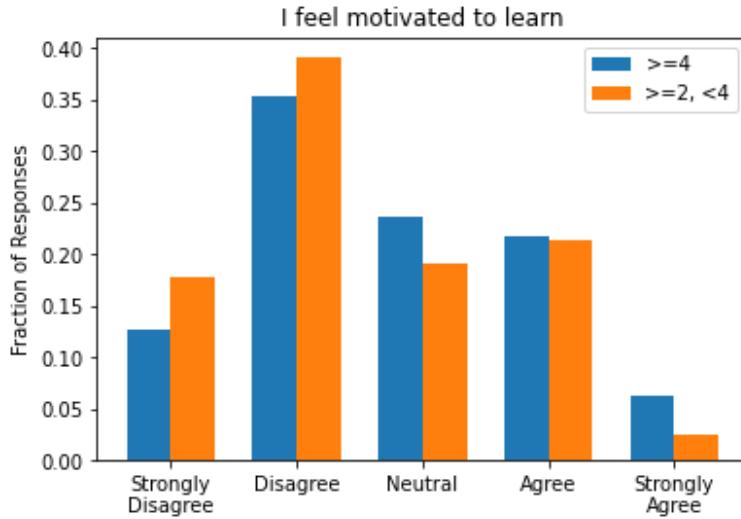
```

>=3 shape: (386, 43), >=2, <3 shape: (432, 43)
MWU results: MannwhitneyuResult(statistic=91648.5, pvalue=0.0116642191
64321154)
>=3 median: 3.0
>=2, <3 median: 2.0
cohens d: 0.177
f: 0.55

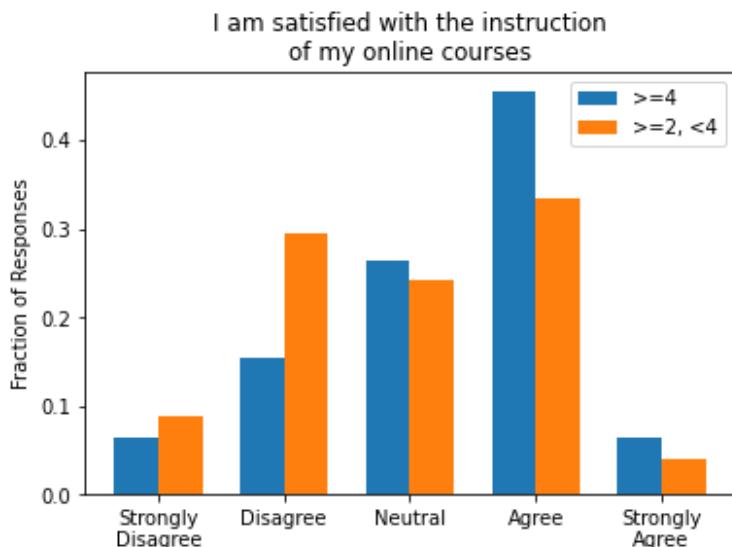
```



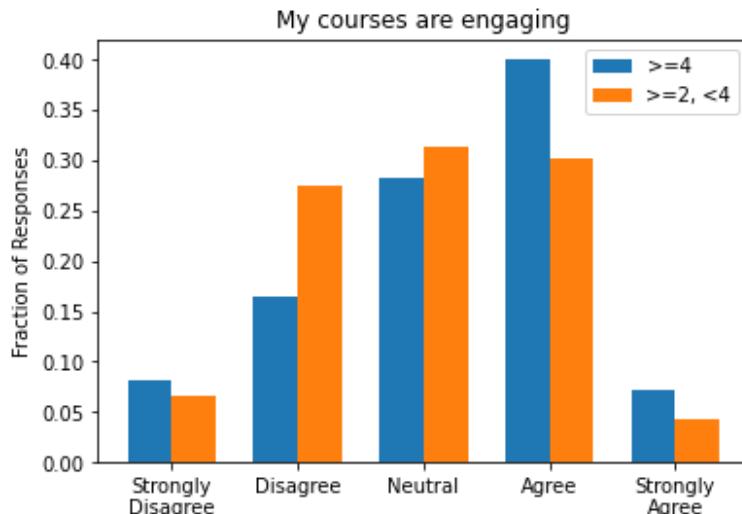
```
>=4 shape: (110, 43), >=2, <4 shape: (708, 43)
MWU results: MannwhitneyuResult(statistic=45538.0, pvalue=0.0030865004
580597284)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: 0.3
f: 0.585
```



```
>=4 shape: (110, 43), >=2, <4 shape: (708, 43)
MWU results: MannwhitneyuResult(statistic=43084.5, pvalue=0.0609001297
1729592)
>=4 median: 3.0
>=2, <4 median: 2.0
cohens d: 0.2
f: 0.553
```



```
>=4 shape: (110, 43), >=2, <4 shape: (708, 43)
MWU results: MannwhitneyuResult(statistic=46368.5, pvalue=0.0007842420
314459071)
>=4 median: 4.0
>=2, <4 median: 3.0
cohens d: 0.338
f: 0.595
```



≥ 4 shape: (110, 43), $\geq 2, < 4$ shape: (708, 43)

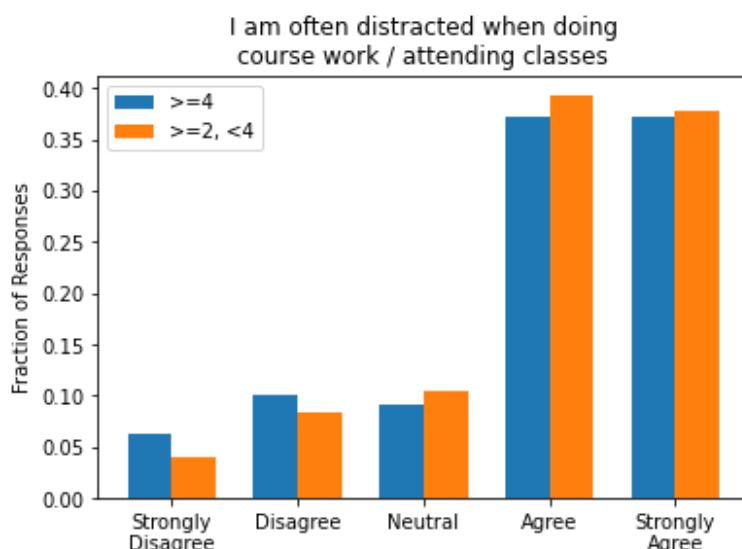
MWU results: MannwhitneyuResult(statistic=44423.5, pvalue=0.0132053819
25255045)

≥ 4 median: 3.0

$\geq 2, < 4$ median: 3.0

cohens d: 0.236

f: 0.57



≥ 4 shape: (110, 43), $\geq 2, < 4$ shape: (708, 43)

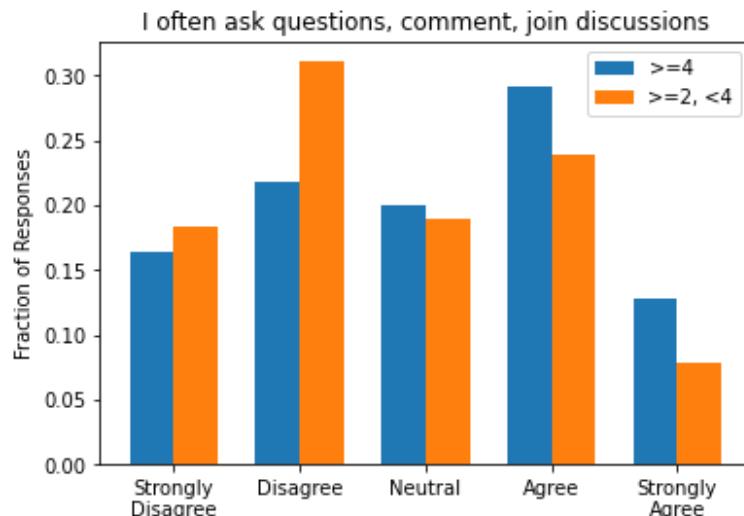
MWU results: MannwhitneyuResult(statistic=37870.0, pvalue=0.6219331179
252032)

≥ 4 median: 4.0

$\geq 2, < 4$ median: 4.0

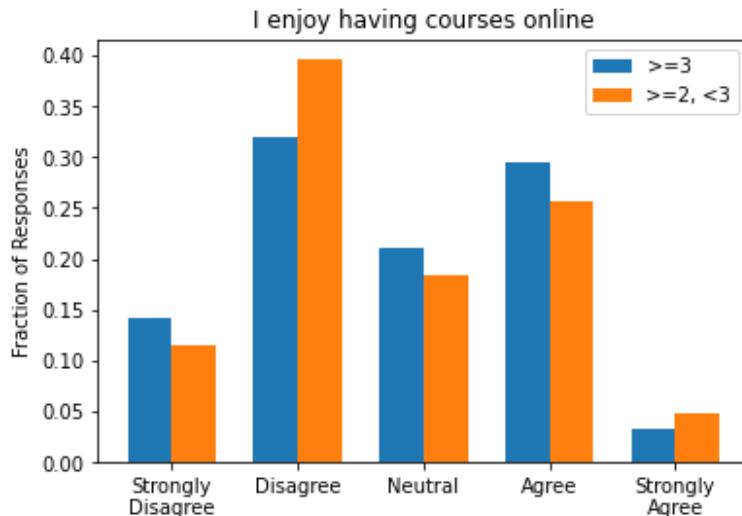
cohens d: -0.0847

f: 0.486



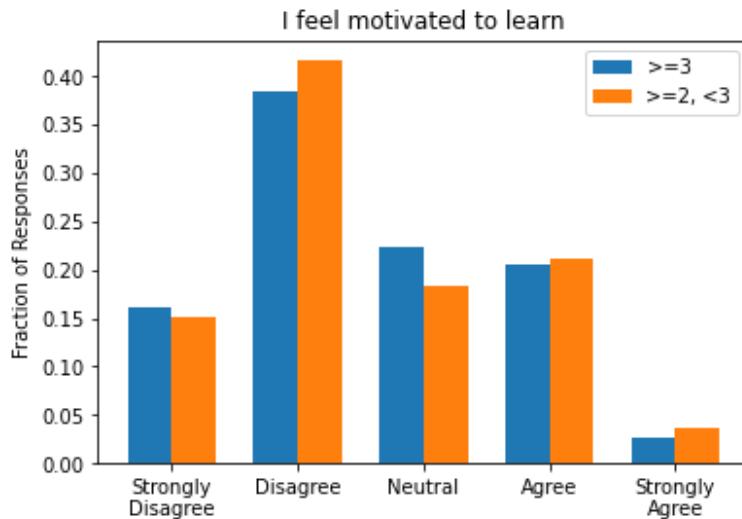
```
>=4 shape: (110, 43), >=2, <4 shape: (708, 43)
MWU results:  MannwhitneyuResult(statistic=43823.0, pvalue=0.0293813427
72063317)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: 0.229
f: 0.563
```

```
PF
2    0.615764
3    0.342365
4    0.041872
Name: num_methods, dtype: float64
```



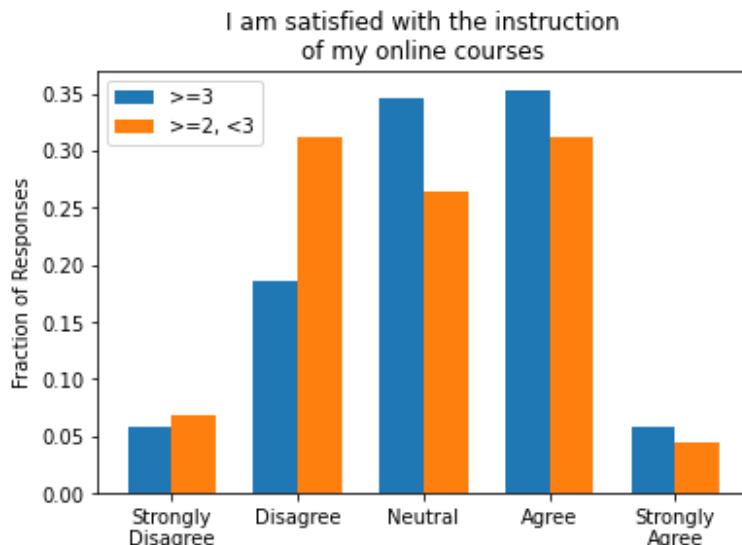
≥ 3 shape: (156, 43), $\geq 2, < 3$ shape: (250, 43)

MWU results: MannwhitneyuResult(statistic=19923.0, pvalue=0.7019180693
 828652)
 ≥ 3 median: 3.0
 $\geq 2, < 3$ median: 2.0
 cohens d: 0.0291
 f: 0.511

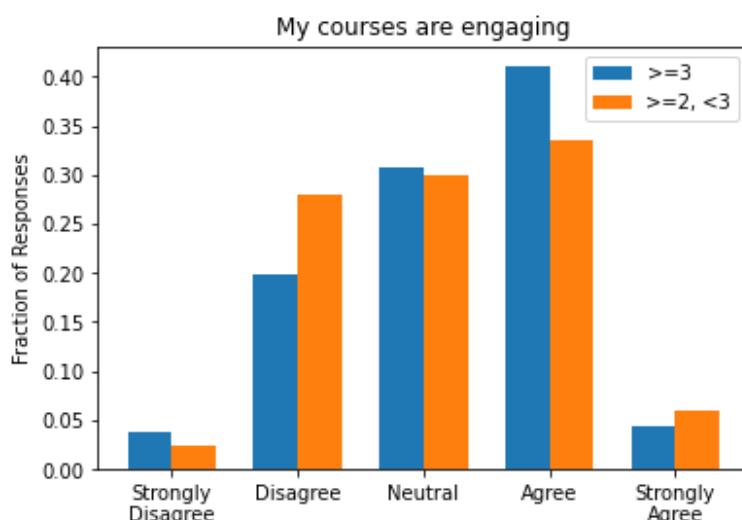


≥ 3 shape: (156, 43), $\geq 2, < 3$ shape: (250, 43)

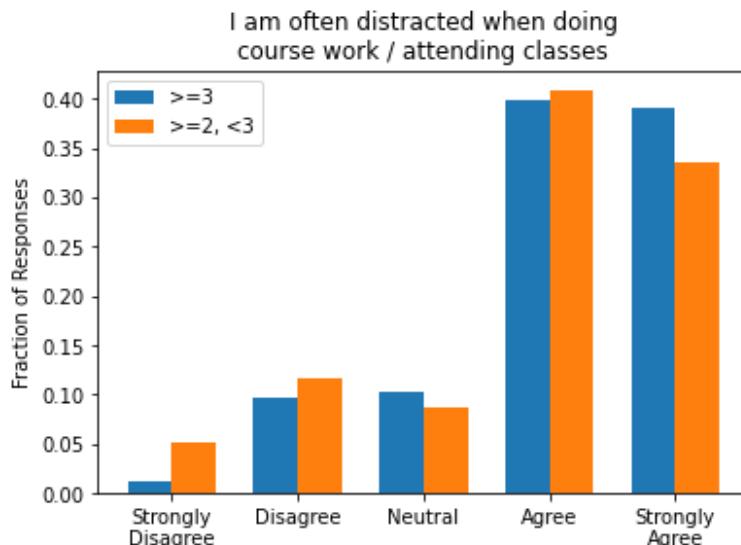
MWU results: MannwhitneyuResult(statistic=19496.0, pvalue=0.9974591237
 572007)
 ≥ 3 median: 2.0
 $\geq 2, < 3$ median: 2.0
 cohens d: -0.0117
 f: 0.5



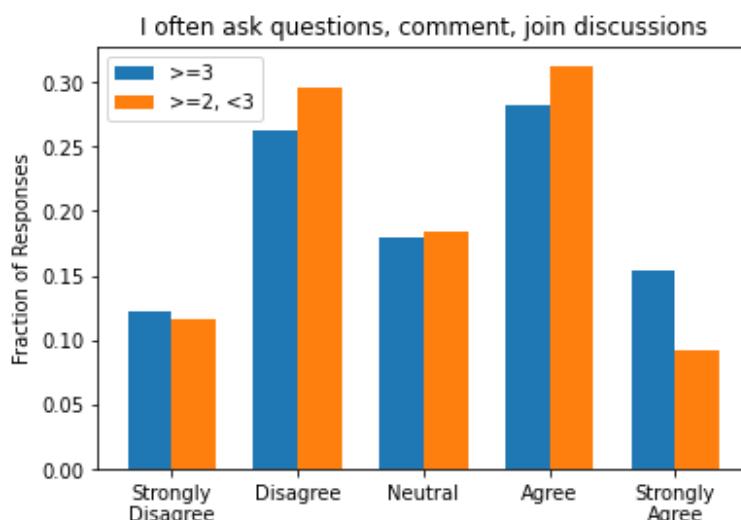
```
>=3 shape: (156, 43), >=2, <3 shape: (250, 43)
MWU results: MannwhitneyuResult(statistic=21813.0, pvalue=0.0360922127
63668606)
>=3 median: 3.0
>=2, <3 median: 3.0
cohens d: 0.211
f: 0.559
```



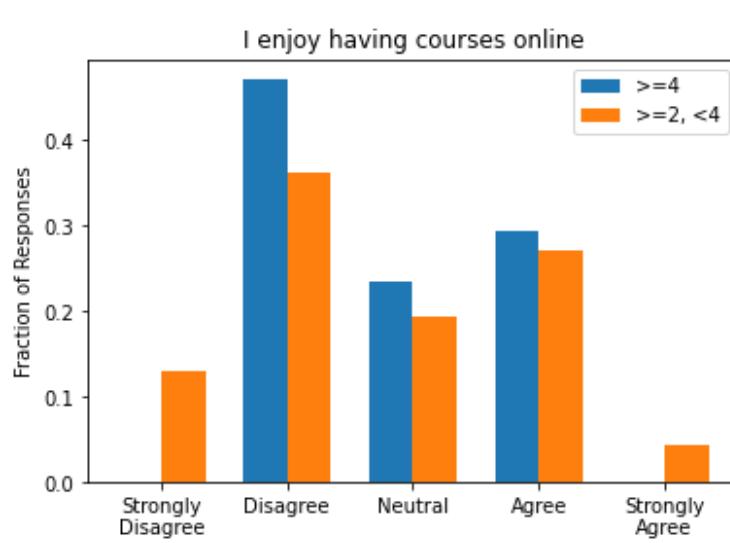
```
>=3 shape: (156, 43), >=2, <3 shape: (250, 43)
MWU results: MannwhitneyuResult(statistic=20786.5, pvalue=0.2406676622
579359)
>=3 median: 3.0
>=2, <3 median: 3.0
cohens d: 0.1
f: 0.533
```



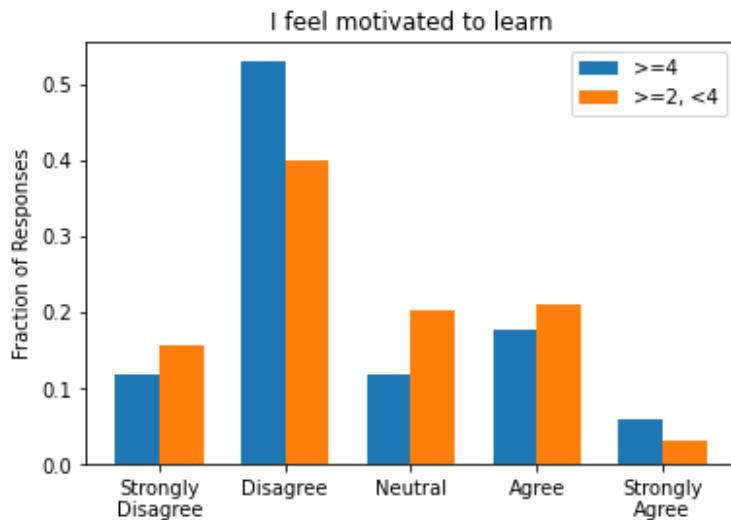
```
>=3 shape: (156, 43), >=2, <3 shape: (250, 43)
MWU results: MannwhitneyuResult(statistic=21091.5, pvalue=0.1417455161
697102)
>=3 median: 4.0
>=2, <3 median: 4.0
cohens d: 0.18
f: 0.541
```



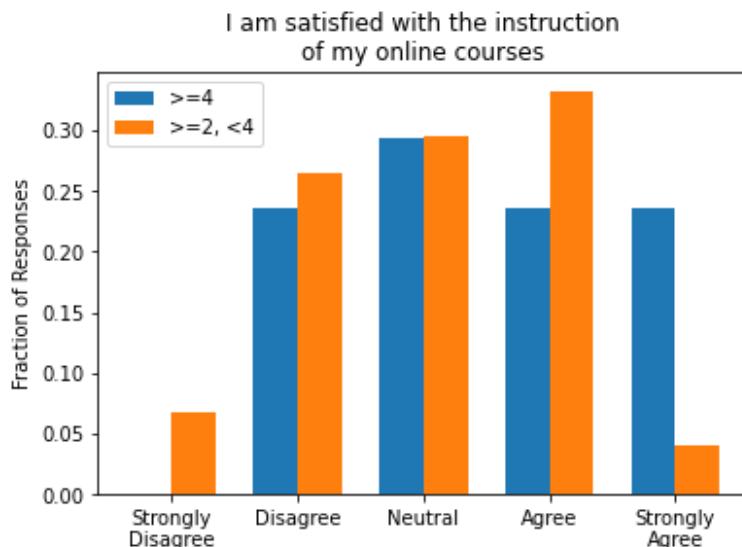
```
>=3 shape: (156, 43), >=2, <3 shape: (250, 43)
MWU results: MannwhitneyuResult(statistic=20505.5, pvalue=0.3676617480
4716556)
>=3 median: 3.0
>=2, <3 median: 3.0
cohens d: 0.0934
f: 0.526
```



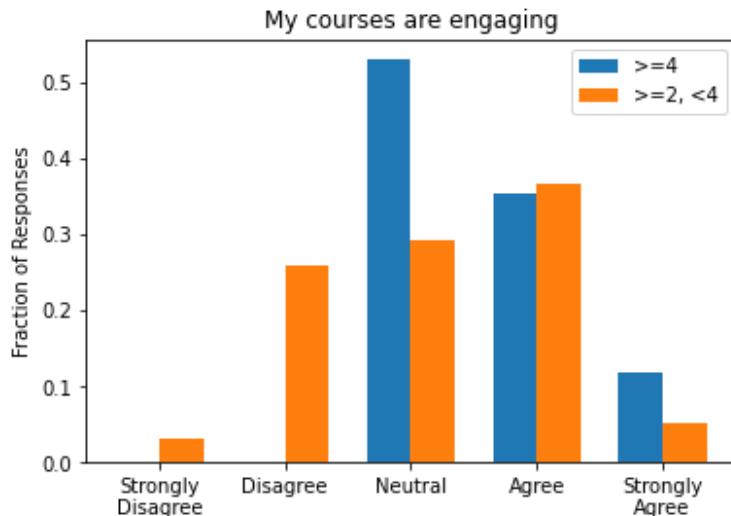
```
>=4 shape: (17, 43), >=2, <4 shape: (389, 43)
MWU results: MannwhitneyuResult(statistic=3487.5, pvalue=0.69130783875
98297)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: 0.0815
f: 0.527
```



```
>=4 shape: (17, 43), >=2, <4 shape: (389, 43)
MWU results: MannwhitneyuResult(statistic=3209.5, pvalue=0.83115209237
37268)
>=4 median: 2.0
>=2, <4 median: 2.0
cohens d: -0.0286
f: 0.485
```



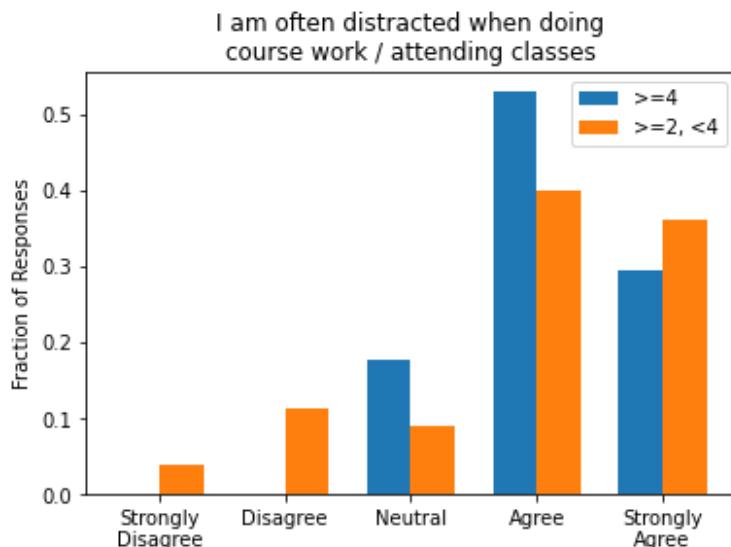
```
>=4 shape: (17, 43), >=2, <4 shape: (389, 43)
MWU results: MannwhitneyuResult(statistic=4000.5, pvalue=0.12691265641
53099)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: 0.446
f: 0.605
```



```

>=4 shape: (17, 43), >=2, <4 shape: (389, 43)
MWU results: MannwhitneyuResult(statistic=4076.0, pvalue=0.08840663389
157259)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: 0.461
f: 0.616

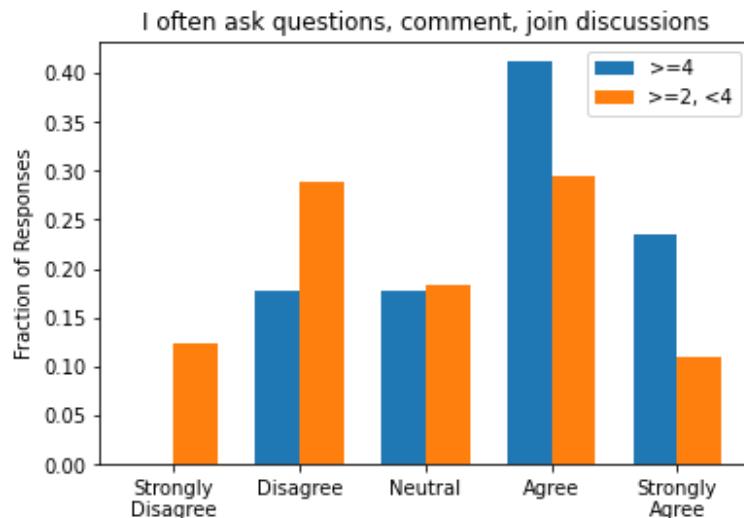
```



```

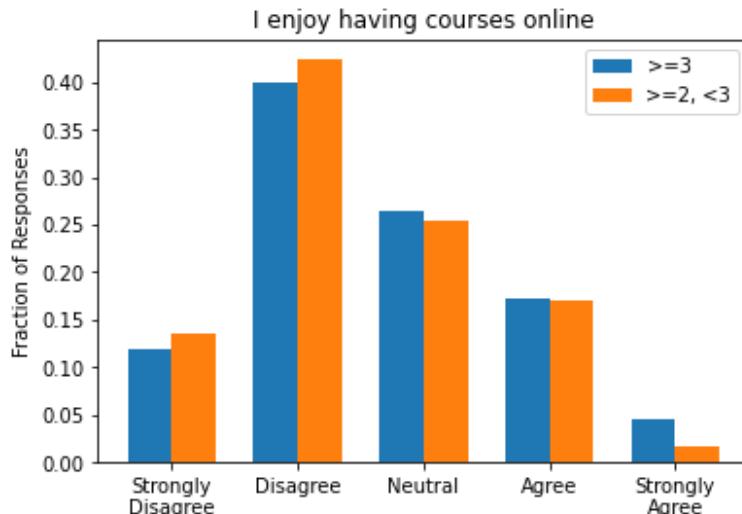
>=4 shape: (17, 43), >=2, <4 shape: (389, 43)
MWU results: MannwhitneyuResult(statistic=3368.0, pvalue=0.89118302388
11831)
>=4 median: 4.0
>=2, <4 median: 4.0
cohens d: 0.172
f: 0.509

```

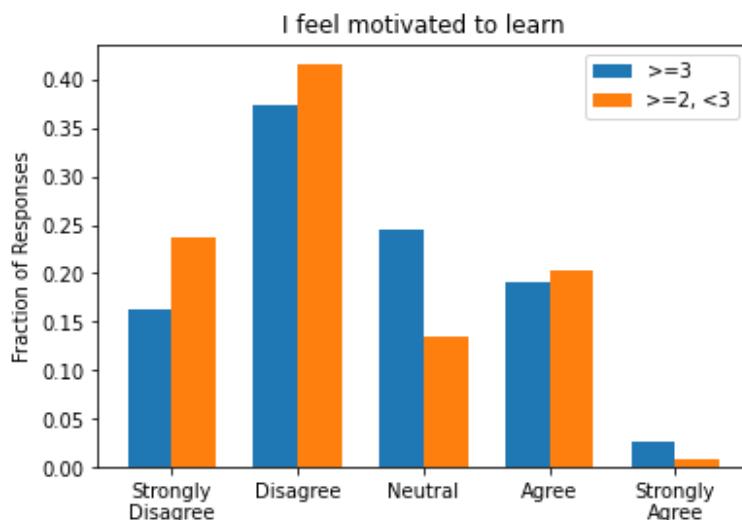


```
>=4 shape: (17, 43), >=2, <4 shape: (389, 43)
MWU results: MannwhitneyuResult(statistic=4388.0, pvalue=0.01861477461
733397)
>=4 median: 4.0
>=2, <4 median: 3.0
cohens d: 0.59
f: 0.664
```

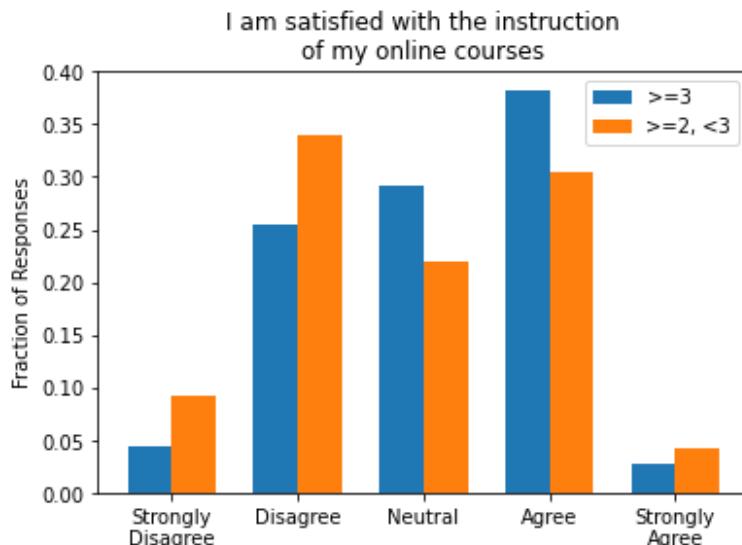
```
-----  
AF  
2    0.517544  
3    0.328947  
4    0.149123  
5    0.004386  
Name: num_methods, dtype: float64
```



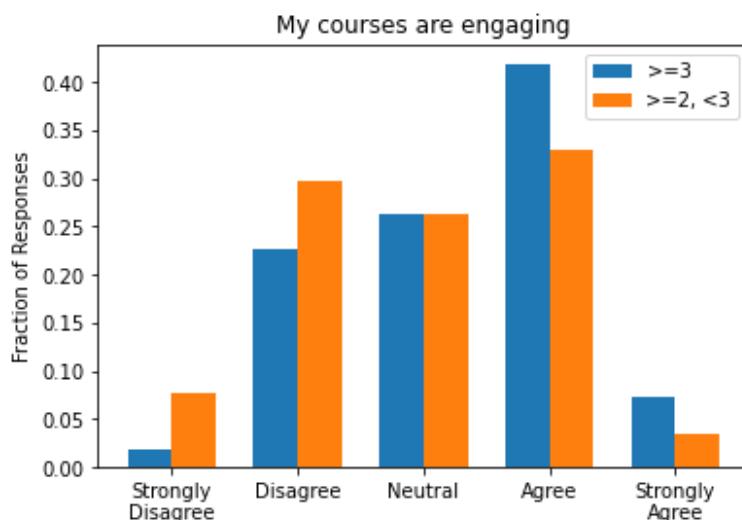
```
>=3 shape: (110, 43), >=2, <3 shape: (118, 43)
MWU results: MannwhitneyuResult(statistic=6856.0, pvalue=0.44026545695
66994)
>=3 median: 2.0
>=2, <3 median: 2.0
cohens d: 0.117
f: 0.528
```



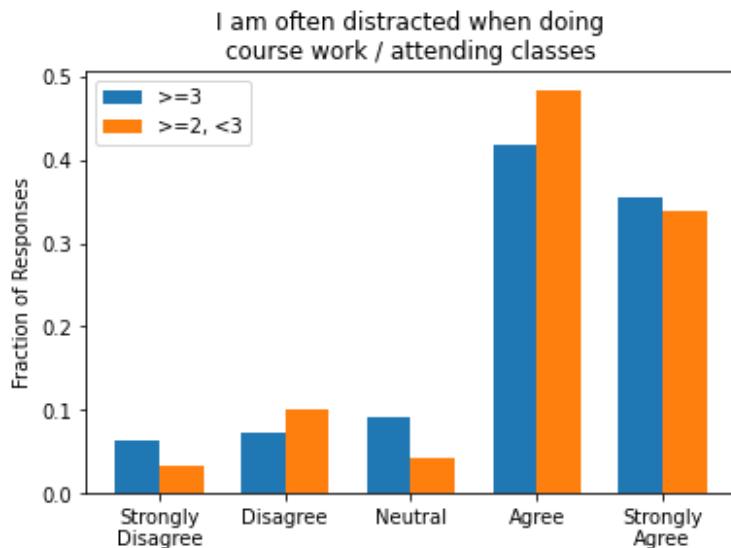
```
>=3 shape: (110, 43), >=2, <3 shape: (118, 43)
MWU results: MannwhitneyuResult(statistic=7257.0, pvalue=0.10756091379
28392)
>=3 median: 2.0
>=2, <3 median: 2.0
cohens d: 0.201
f: 0.559
```



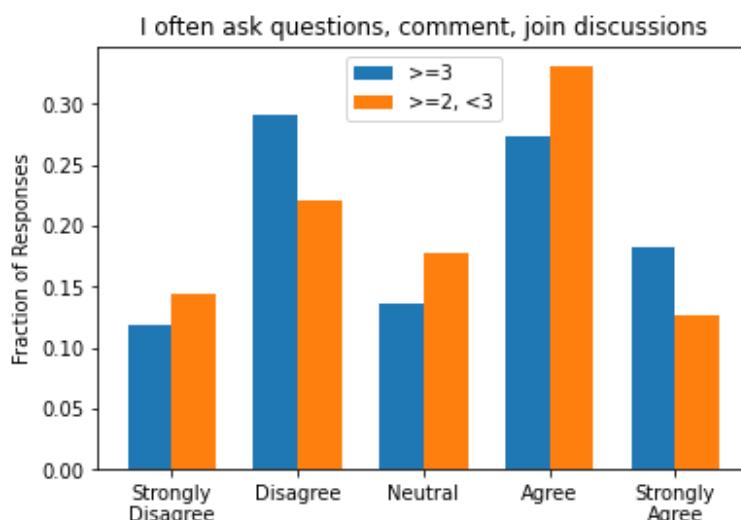
```
>=3 shape: (110, 43), >=2, <3 shape: (118, 43)
MWU results: MannwhitneyuResult(statistic=7280.0, pvalue=0.09753844259
074843)
>=3 median: 3.0
>=2, <3 median: 3.0
cohens d: 0.22
f: 0.561
```



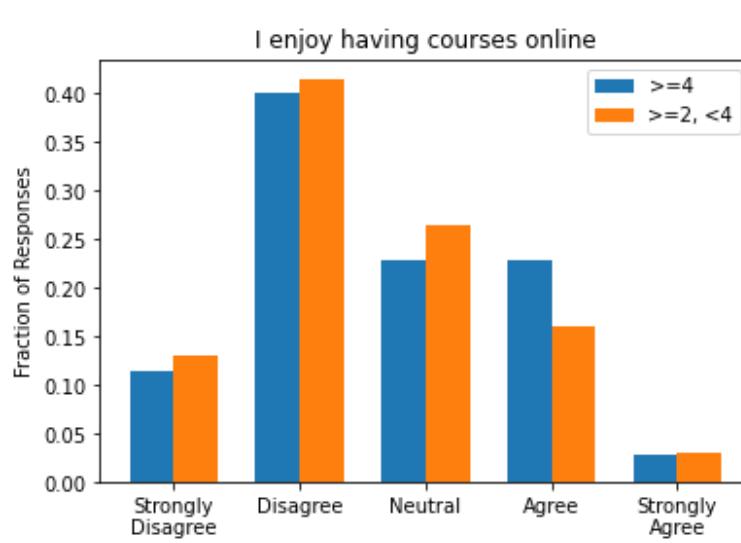
```
>=3 shape: (110, 43), >=2, <3 shape: (118, 43)
MWU results: MannwhitneyuResult(statistic=7672.0, pvalue=0.01289996647
9983463)
>=3 median: 3.0
>=2, <3 median: 3.0
cohens d: 0.35
f: 0.591
```



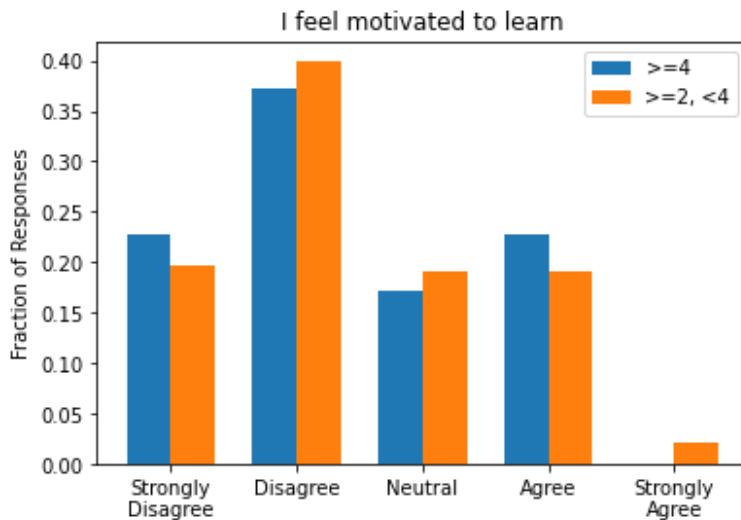
```
>=3 shape: (110, 43), >=2, <3 shape: (118, 43)
MWU results: MannwhitneyuResult(statistic=6378.0, pvalue=0.80966375432
05529)
>=3 median: 4.0
>=2, <3 median: 4.0
cohens d: -0.0585
f: 0.491
```



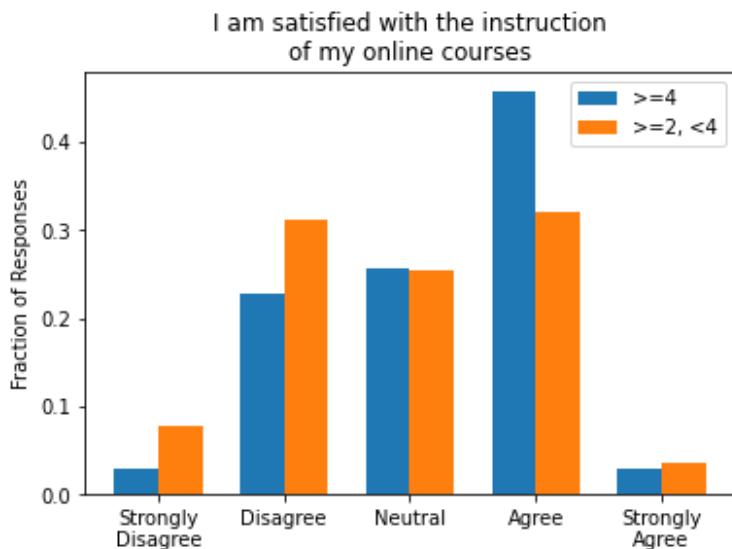
```
>=3 shape: (110, 43), >=2, <3 shape: (118, 43)
MWU results: MannwhitneyuResult(statistic=6588.0, pvalue=0.84037371886
19371)
>=3 median: 3.0
>=2, <3 median: 3.0
cohens d: 0.0251
f: 0.508
```



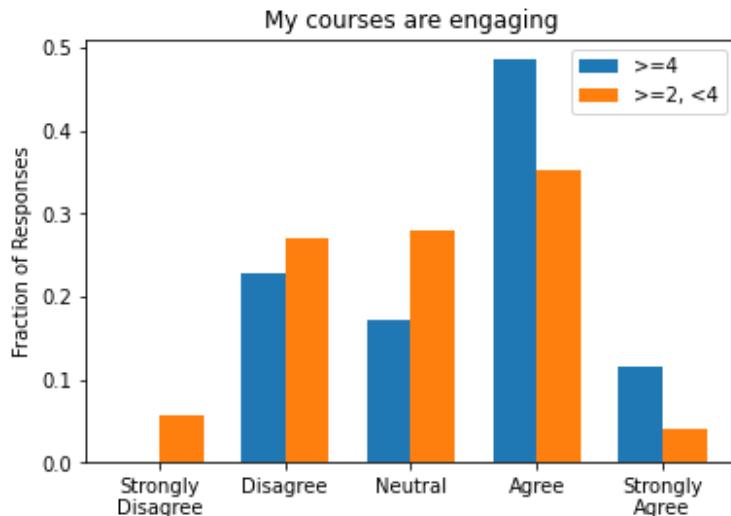
```
>=4 shape: (35, 43), >=2, <4 shape: (193, 43)
MWU results: MannwhitneyuResult(statistic=3566.0, pvalue=0.58214015792
33363)
>=4 median: 2.0
>=2, <4 median: 2.0
cohens d: 0.106
f: 0.528
```



```
>=4 shape: (35, 43), >=2, <4 shape: (193, 43)
MWU results: MannwhitneyuResult(statistic=3311.5, pvalue=0.84881994330
12659)
>=4 median: 2.0
>=2, <4 median: 2.0
cohens d: -0.0375
f: 0.49
```



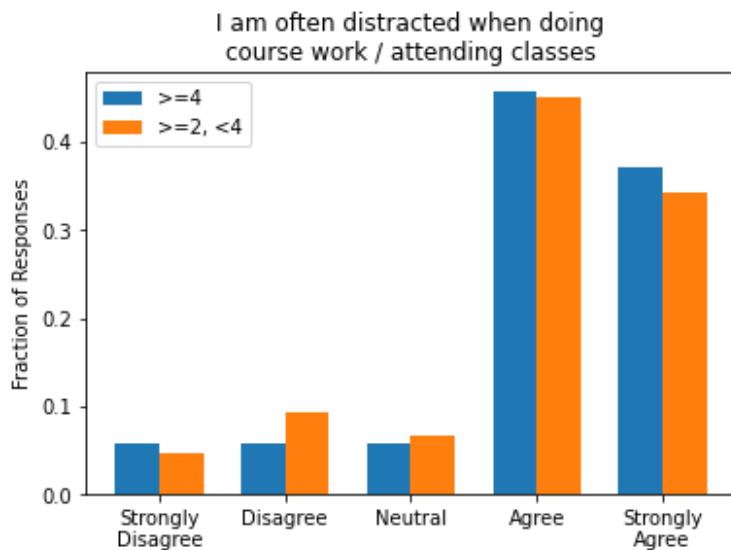
```
>=4 shape: (35, 43), >=2, <4 shape: (193, 43)
MWU results: MannwhitneyuResult(statistic=3932.5, pvalue=0.10671413884
234889)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: 0.293
f: 0.582
```



```

>=4 shape: (35, 43), >=2, <4 shape: (193, 43)
MWU results: MannwhitneyuResult(statistic=4159.0, pvalue=0.02270157117
0509083)
>=4 median: 4.0
>=2, <4 median: 3.0
cohens d: 0.432
f: 0.616

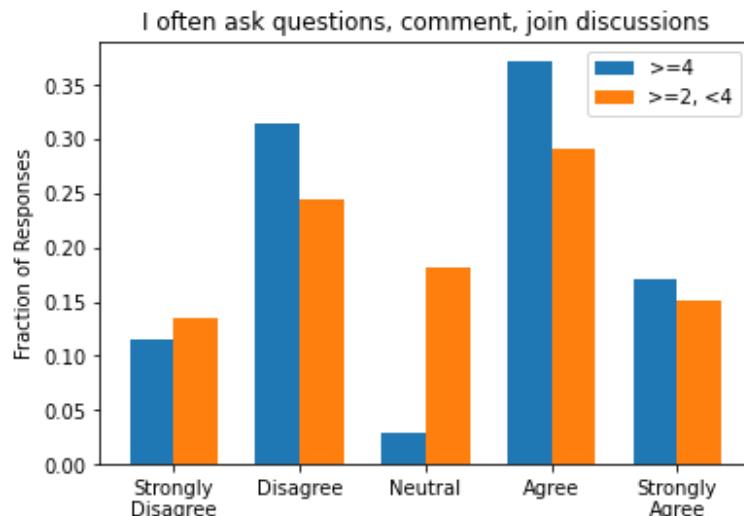
```



```

>=4 shape: (35, 43), >=2, <4 shape: (193, 43)
MWU results: MannwhitneyuResult(statistic=3528.0, pvalue=0.65331298091
73904)
>=4 median: 4.0
>=2, <4 median: 4.0
cohens d: 0.0732
f: 0.522

```

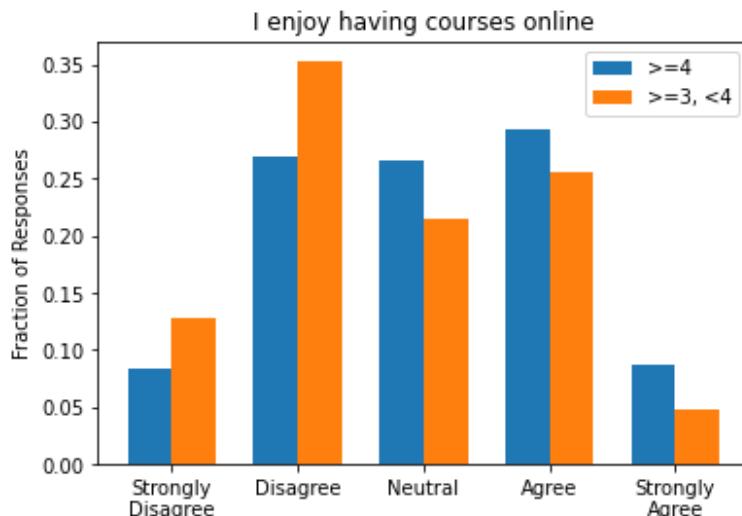


```
>=4 shape: (35, 43), >=2, <4 shape: (193, 43)
MWU results:  MannwhitneyuResult(statistic=3526.0, pvalue=0.67170196752
16163)
>=4 median: 4.0
>=2, <4 median: 3.0
cohens d: 0.0718
f: 0.522
```

PAF

4	0.338262
3	0.288355
5	0.218115
6	0.099815
7	0.053604
9	0.000924
8	0.000924

Name: num_methods, dtype: float64



≥ 4 shape: (770, 43), $\geq 3, < 4$ shape: (312, 43)

MWU results: MannwhitneyuResult(statistic=137066.0, pvalue=0.000167488

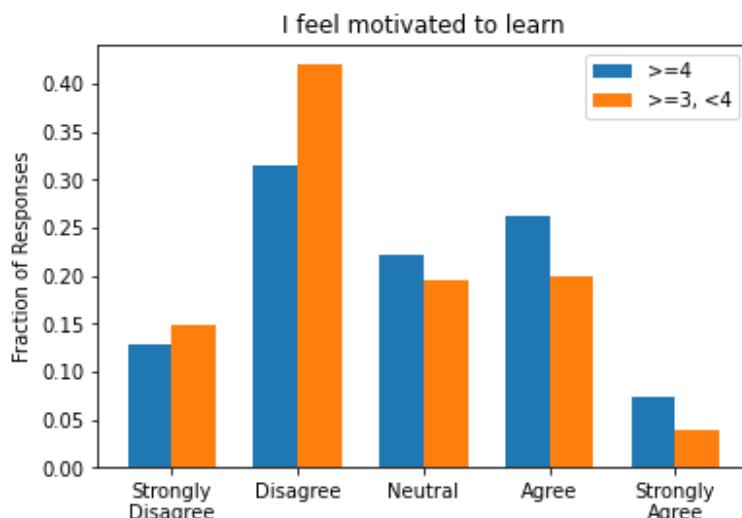
95712881702)

≥ 4 median: 3.0

$\geq 3, < 4$ median: 3.0

cohens d: 0.256

f: 0.571



≥ 4 shape: (770, 43), $\geq 3, < 4$ shape: (312, 43)

MWU results: MannwhitneyuResult(statistic=136216.5, pvalue=0.000342706
5800067912)

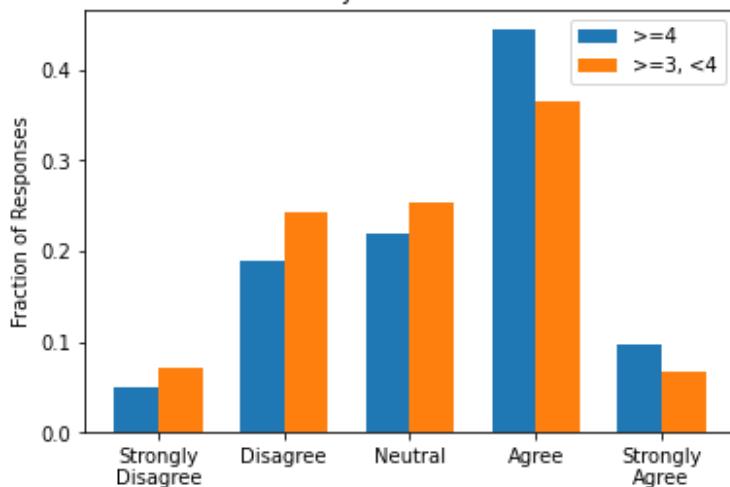
≥ 4 median: 3.0

$\geq 3, < 4$ median: 2.0

cohens d: 0.241

f: 0.567

**I am satisfied with the instruction
of my online courses**



`>=4 shape: (770, 43), >=3, <4 shape: (312, 43)`

`MWU results: MannwhitneyuResult(statistic=135056.0, pvalue=0.000739999
3115557)`

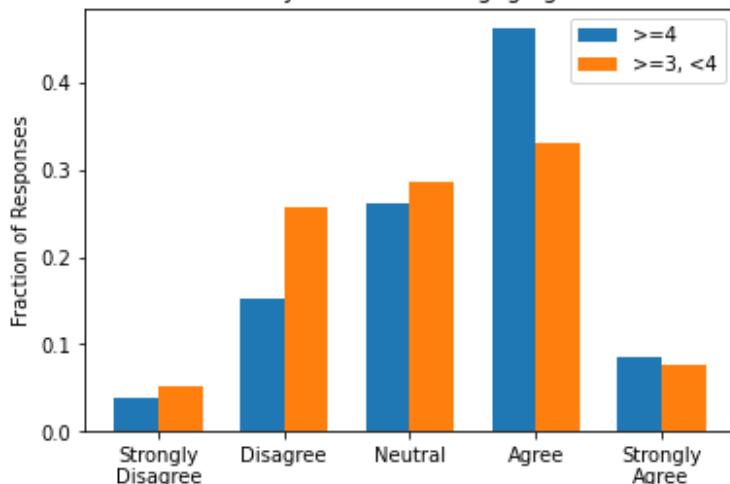
`>=4 median: 4.0`

`>=3, <4 median: 3.0`

`cohens d: 0.223`

`f: 0.562`

My courses are engaging



`>=4 shape: (770, 43), >=3, <4 shape: (312, 43)`

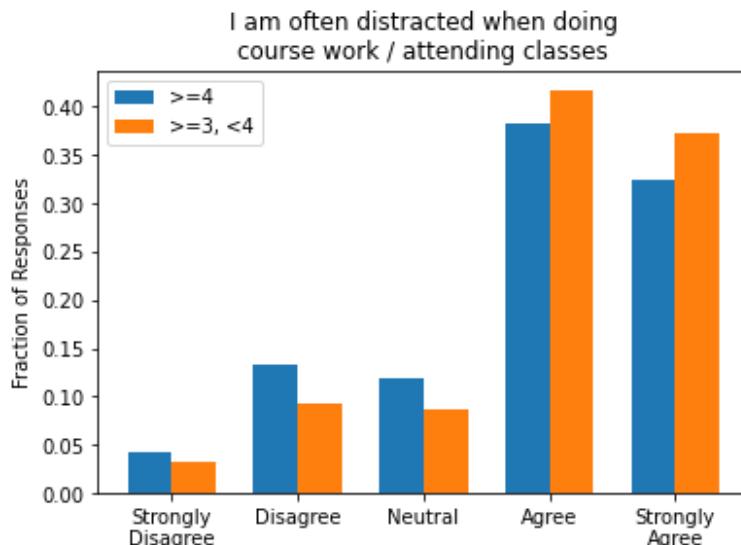
`MWU results: MannwhitneyuResult(statistic=138915.0, pvalue=2.038020919
701117e-05)`

`>=4 median: 4.0`

`>=3, <4 median: 3.0`

`cohens d: 0.28`

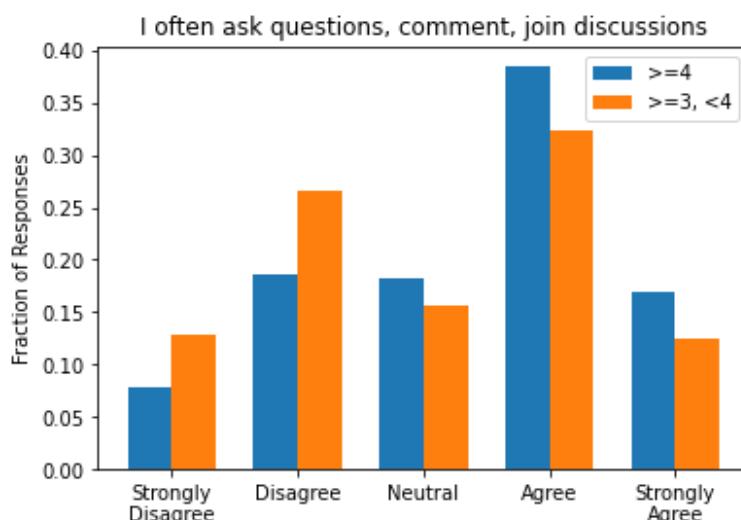
`f: 0.578`



```

>=4 shape: (770, 43), >=3, <4 shape: (312, 43)
MWU results: MannwhitneyuResult(statistic=109226.0, pvalue=0.013570977
445077495)
>=4 median: 4.0
>=3, <4 median: 4.0
cohens d: -0.172
f: 0.455

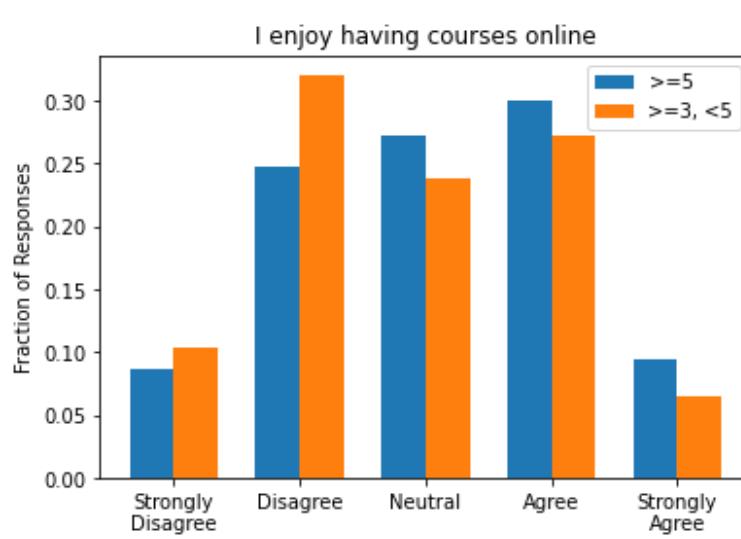
```



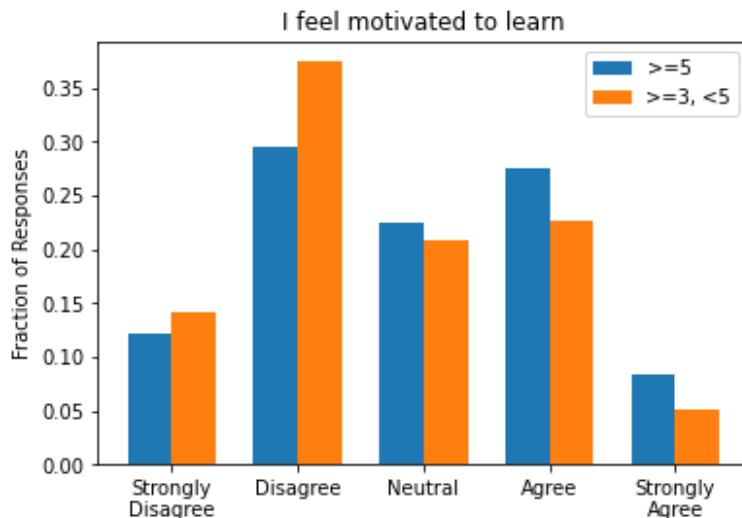
```

>=4 shape: (770, 43), >=3, <4 shape: (312, 43)
MWU results: MannwhitneyuResult(statistic=137537.0, pvalue=0.000106403
49176608183)
>=4 median: 4.0
>=3, <4 median: 3.0
cohens d: 0.272
f: 0.572

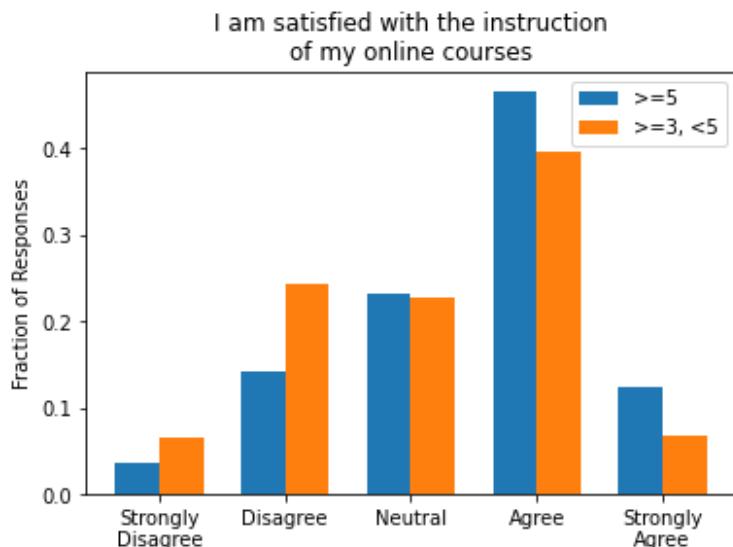
```



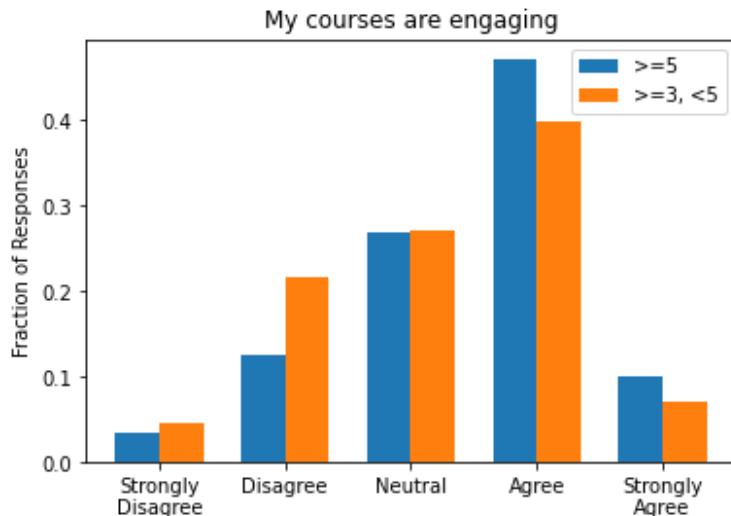
```
>=5 shape: (404, 43), >=3, <5 shape: (678, 43)
MWU results: MannwhitneyuResult(statistic=150004.5, pvalue=0.006647669
907779302)
>=5 median: 3.0
>=3, <5 median: 3.0
cohens d: 0.17
f: 0.548
```



```
>=5 shape: (404, 43), >=3, <5 shape: (678, 43)
MWU results: MannwhitneyuResult(statistic=152621.0, pvalue=0.001100536
5890503485)
>=5 median: 3.0
>=3, <5 median: 2.0
cohens d: 0.208
f: 0.557
```



```
>=5 shape: (404, 43), >=3, <5 shape: (678, 43)
MWU results: MannwhitneyuResult(statistic=160957.0, pvalue=3.811838040
6060125e-07)
>=5 median: 4.0
>=3, <5 median: 3.0
cohens d: 0.327
f: 0.588
```



≥ 5 shape: (404, 43), $\geq 3, < 5$ shape: (678, 43)

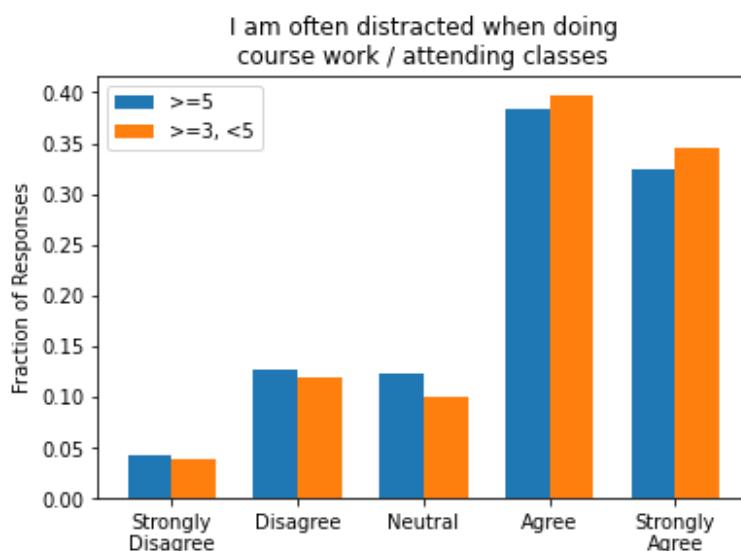
MWU results: MannwhitneyuResult(statistic=155611.5, pvalue=7.476178132
123826e-05)

≥ 5 median: 4.0

$\geq 3, < 5$ median: 3.0

cohens d: 0.249

f: 0.568



≥ 5 shape: (404, 43), $\geq 3, < 5$ shape: (678, 43)

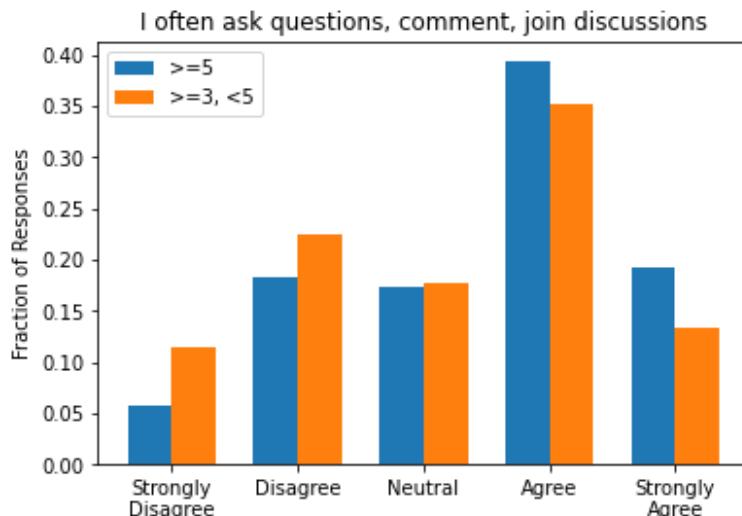
MWU results: MannwhitneyuResult(statistic=132126.0, pvalue=0.305421525
3699323)

≥ 5 median: 4.0

$\geq 3, < 5$ median: 4.0

cohens d: -0.0612

f: 0.482



```
>=5 shape: (404, 43), >=3, <5 shape: (678, 43)
MWU results:  MannwhitneyuResult(statistic=156184.5, pvalue=6.149631291
26371e-05)
>=5 median: 4.0
>=3, <5 median: 3.0
cohens d: 0.26
f: 0.57
```

```
In [ ]: num_diversity_controlled_undergrad[0][0]
```

```
Out[ ]:
```

	question	>=2 median (n = 132)	>=1, <2 median (n = 591)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.147	0.543	0.11
1	remote_motivated	2.0	2.0	0.0683	0.519	0.485
2	remote_satisfied	3.0	3.0	0.0984	0.524	0.363
3	remote_engaging	3.0	3.0	0.0949	0.525	0.358
4	remote_distracted	4.0	4.0	0.00266	0.516	0.548
5	remote_questions	3.0	2.0	0.296	0.578	0.00367

In []: num_diversity_controlled_undergrad[0][2]

Out[]:

	question	>=3 median (n = 5)	>=1, <3 median (n = 718)	cohens d	f	p-value
0	remote_enjoy	3.0		2.0	0.884	0.752
1	remote_motivated	3.0		2.0	0.553	0.684
2	remote_satisfied	3.0		3.0	0.505	0.621
3	remote_engaging	3.0		3.0	0.472	0.641
4	remote_distracted	4.0		4.0	-0.465	0.444
5	remote_questions	4.0		2.0	1.08	0.792
						0.0204

In []: num_diversity_controlled_undergrad[1][0]

Out[]:

	question	>=2 median (n = 60)	>=1, <2 median (n = 227)	cohens d	f	p-value
0	remote_enjoy	3.0		2.0	0.0371	0.517
1	remote_motivated	2.0		2.0	0.254	0.56
2	remote_satisfied	3.0		3.0	0.14	0.539
3	remote_engaging	3.0		3.0	0.0488	0.515
4	remote_distracted	4.0		4.0	0.0332	0.525
5	remote_questions	3.0		2.0	-0.0211	0.496
						0.913

In []: num_diversity_controlled_undergrad[1][2]

Out[]:

	question	>=3 median (n = 1)	>=1, <3 median (n = 286)	cohens d	f	p-value
0	remote_enjoy	4.0		2.0	nan	0.851
1	remote_motivated	3.0		2.0	nan	0.708
2	remote_satisfied	3.0		3.0	nan	0.559
3	remote_engaging	4.0		3.0	nan	0.808
4	remote_distracted	4.0		4.0	nan	0.47
5	remote_questions	5.0		2.5	nan	0.969
						0.0966

In []: num_diversity_controlled_undergrad[2][0]

Out[]:

	question	>=2 median (n = 35)	>=1, <2 median (n = 131)	cohens d	f	p-value
0	remote_enjoy	2.0		2.0	-0.077	0.48
1	remote_motivated	2.0		2.0	0.17	0.542
2	remote_satisfied	3.0		3.0	0.26	0.583
3	remote_engaging	3.0		3.0	-0.103	0.468
4	remote_distracted	4.0		4.0	0.237	0.55
5	remote_questions	4.0		3.0	0.452	0.623
						0.0219

In []: num_diversity_controlled_undergrad[2][2]

Out[]:

	question	>=3 median (n = 4)	>=1, <3 median (n = 162)	cohens d	f	p-value
0	remote_enjoy	2.0		2.0	-0.319	0.403
1	remote_motivated	3.0		2.0	0.325	0.575
2	remote_satisfied	3.0		3.0	0.158	0.545
3	remote_engaging	2.0		3.0	-0.762	0.302
4	remote_distracted	5.0		4.0	0.727	0.726
5	remote_questions	4.5		3.0	0.688	0.699

In []: num_diversity_controlled_undergrad[3][0]

Out[]:

	question	>=3 median (n = 386)	>=2, <3 median (n = 432)	cohens d	f	p-value
0	remote_enjoy	3.0		2.0	0.256	0.57
1	remote_motivated	3.0		2.0	0.285	0.579
2	remote_satisfied	3.0		3.0	0.303	0.582
3	remote_engaging	3.0		3.0	0.241	0.567
4	remote_distracted	4.0		4.0	-0.0406	0.494
5	remote_questions	3.0		2.0	0.177	0.55

In []: num_diversity_controlled_undergrad[3][2]

Out[]:

	question	>=4 median (n = 110)	>=2, <4 median (n = 708)	cohens d	f	p-value
0	remote_enjoy	3.0		3.0	0.3	0.585
1	remote_motivated	3.0		2.0	0.2	0.553
2	remote_satisfied	4.0		3.0	0.338	0.595
3	remote_engaging	3.0		3.0	0.236	0.57
4	remote_distracted	4.0		4.0	-0.0847	0.486
5	remote_questions	3.0		3.0	0.229	0.563

In []: num_diversity_controlled_undergrad[4][0]

Out[]:

	question	>=3 median (n = 156)	>=2, <3 median (n = 250)	cohens d	f	p-value
0	remote_enjoy	3.0		2.0	0.0291	0.511
1	remote_motivated	2.0		2.0	-0.0117	0.5
2	remote_satisfied	3.0		3.0	0.211	0.559
3	remote_engaging	3.0		3.0	0.1	0.533
4	remote_distracted	4.0		4.0	0.18	0.541
5	remote_questions	3.0		3.0	0.0934	0.526

In []: num_diversity_controlled_undergrad[4][2]

Out[]:

	question	>=4 median (n = 17)	>=2, <4 median (n = 389)	cohens d	f	p-value
0	remote_enjoy	3.0		3.0	0.0815	0.527
1	remote_motivated	2.0		2.0	-0.0286	0.485
2	remote_satisfied	3.0		3.0	0.446	0.605
3	remote_engaging	3.0		3.0	0.461	0.616
4	remote_distracted	4.0		4.0	0.172	0.509
5	remote_questions	4.0		3.0	0.59	0.664

In []: num_diversity_controlled_undergrad[5][0]

Out[]:

	question	>=3 median (n = 110)	>=2, <3 median (n = 118)	cohens d	f	p-value
0	remote_enjoy	2.0		2.0	0.117	0.528
1	remote_motivated	2.0		2.0	0.201	0.559
2	remote_satisfied	3.0		3.0	0.22	0.561
3	remote_engaging	3.0		3.0	0.35	0.591
4	remote_distracted	4.0		4.0	-0.0585	0.491
5	remote_questions	3.0		3.0	0.0251	0.508

In []: num_diversity_controlled_undergrad[5][2]

Out[]:

	question	>=4 median (n = 35)	>=2, <4 median (n = 193)	cohens d	f	p-value
0	remote_enjoy	2.0		2.0	0.106	0.528
1	remote_motivated	2.0		2.0	-0.0375	0.49
2	remote_satisfied	3.0		3.0	0.293	0.582
3	remote_engaging	4.0		3.0	0.432	0.616
4	remote_distracted	4.0		4.0	0.0732	0.522
5	remote_questions	4.0		3.0	0.0718	0.522

In []: num_diversity_controlled_undergrad[6][0]

Out[]:

	question	>=4 median (n = 770)	>=3, <4 median (n = 312)	cohens d	f	p-value
0	remote_enjoy	3.0		3.0	0.256	0.571
1	remote_motivated	3.0		2.0	0.241	0.567
2	remote_satisfied	4.0		3.0	0.223	0.562
3	remote_engaging	4.0		3.0	0.28	0.578
4	remote_distracted	4.0		4.0	-0.172	0.455
5	remote_questions	4.0		3.0	0.272	0.572

In []: num_diversity_controlled_undergrad[6][2]

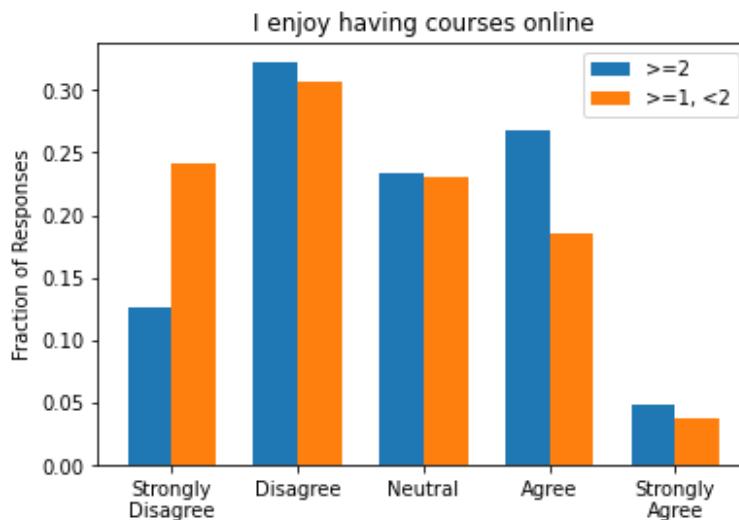
Out[]:

	question	>=5 median (n = 404)	>=3, <5 median (n = 678)	cohens d	f	p-value
0	remote_enjoy	3.0	3.0	0.17	0.548	0.00665
1	remote_motivated	3.0	2.0	0.208	0.557	0.0011
2	remote_satisfied	4.0	3.0	0.327	0.588	3.81e-07
3	remote_engaging	4.0	3.0	0.249	0.568	7.48e-05
4	remote_distracted	4.0	4.0	-0.0612	0.482	0.305
5	remote_questions	4.0	3.0	0.26	0.57	6.15e-05

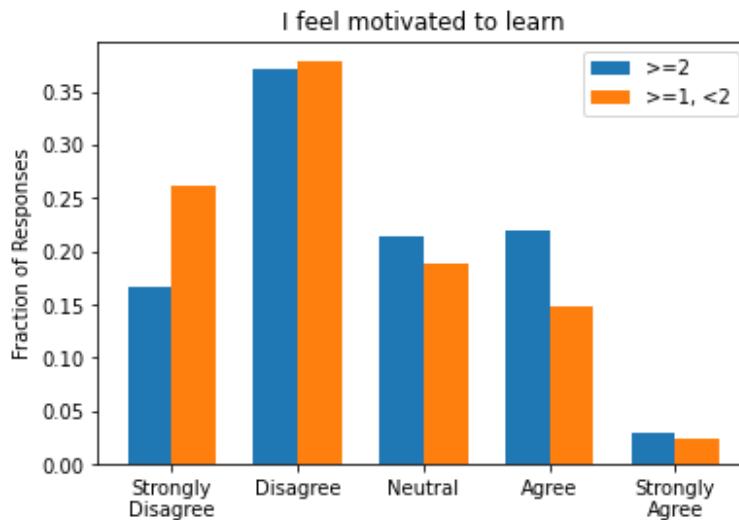
```
In [ ]: num_tech_diversity_controlled_undergrad = []

for cat in ugcats_o:
    num_tech_diversity_controlled_undergrad.append(num_diversity_control
led(cat, 'num_techniques'))
    print('-----')
```

```
L
1    0.648370
2    0.288165
3    0.063465
Name: num_techniques, dtype: float64
```

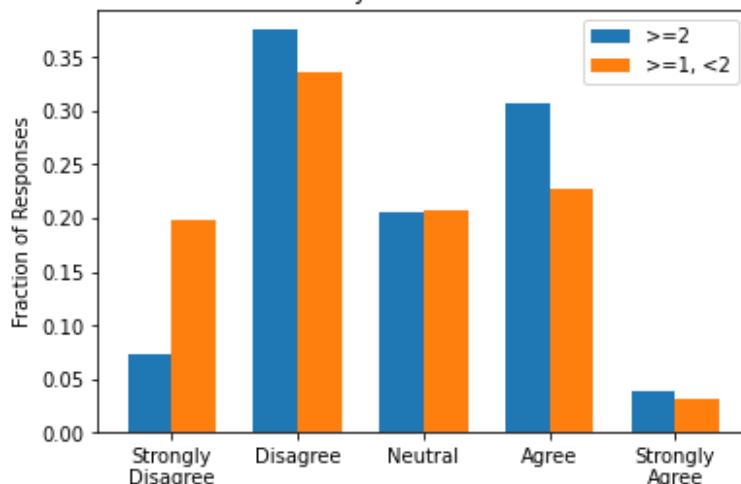


```
>=2 shape: (205, 43), >=1, <2 shape: (378, 43)
MWU results: MannwhitneyuResult(statistic=44846.0, pvalue=0.0011886392
60798232)
>=2 median: 3.0
>=1, <2 median: 2.0
cohens d: 0.28
f: 0.579
```



```
>=2 shape: (205, 43), >=1, <2 shape: (378, 43)
MWU results: MannwhitneyuResult(statistic=44437.0, pvalue=0.0022741019
814109943)
>=2 median: 2.0
>=1, <2 median: 2.0
cohens d: 0.259
f: 0.573
```

**I am satisfied with the instruction
of my online courses**

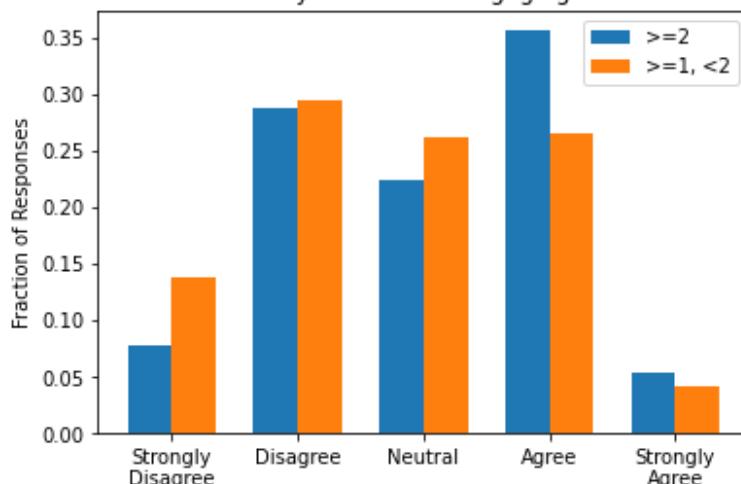


```

>=2 shape: (205, 43), >=1, <2 shape: (378, 43)
MWU results: MannwhitneyuResult(statistic=44674.0, pvalue=0.0015294929
071107256)
>=2 median: 3.0
>=1, <2 median: 2.0
cohens d: 0.275
f: 0.577

```

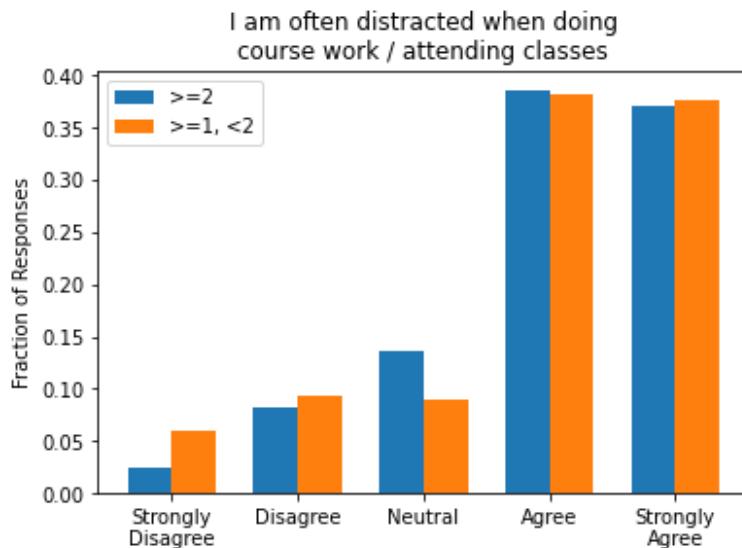
My courses are engaging



```

>=2 shape: (205, 43), >=1, <2 shape: (378, 43)
MWU results: MannwhitneyuResult(statistic=43379.5, pvalue=0.0134447160
2525725)
>=2 median: 3.0
>=1, <2 median: 3.0
cohens d: 0.217
f: 0.56

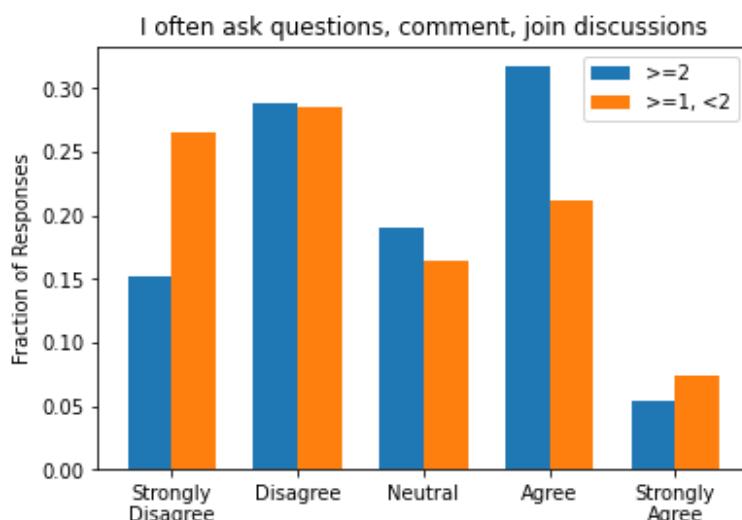
```



```

>=2 shape: (205, 43), >=1, <2 shape: (378, 43)
MWU results: MannwhitneyuResult(statistic=39134.0, pvalue=0.8320358414
006256)
>=2 median: 4.0
>=1, <2 median: 4.0
cohens d: 0.0685
f: 0.505

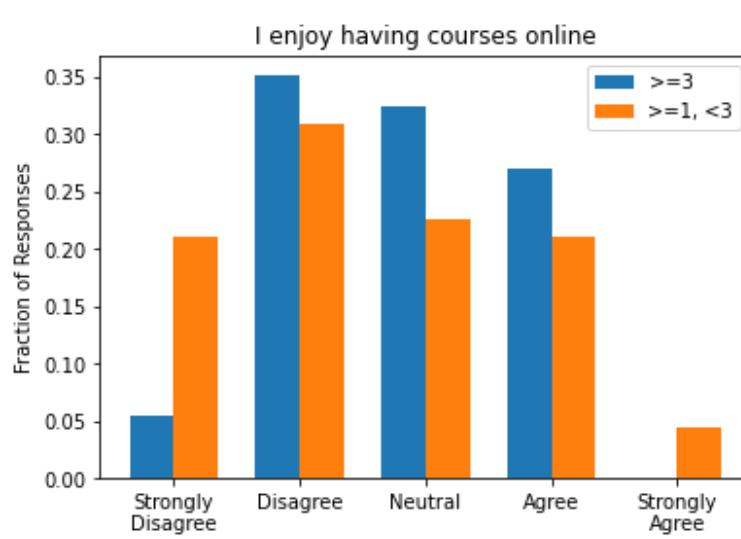
```



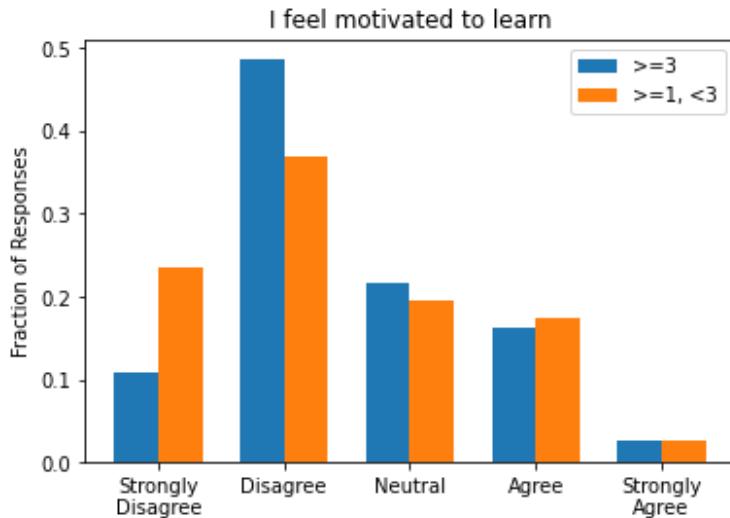
```

>=2 shape: (205, 43), >=1, <2 shape: (378, 43)
MWU results: MannwhitneyuResult(statistic=44111.0, pvalue=0.0044648242
02915385)
>=2 median: 3.0
>=1, <2 median: 2.0
cohens d: 0.231
f: 0.569

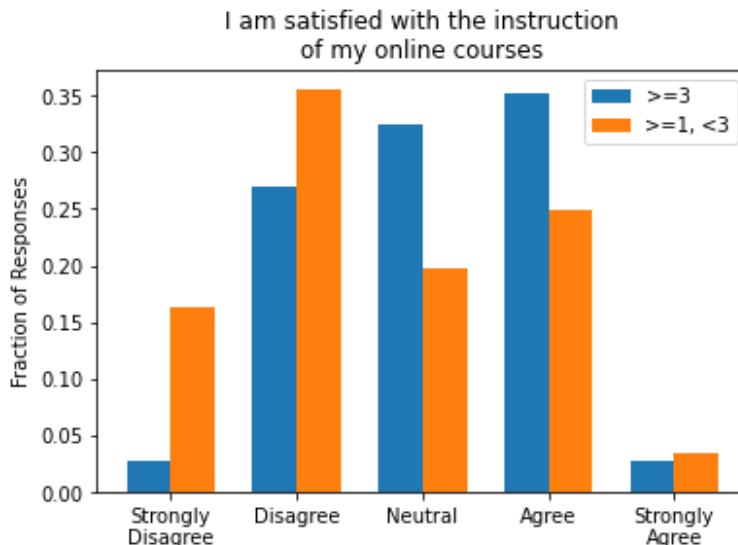
```



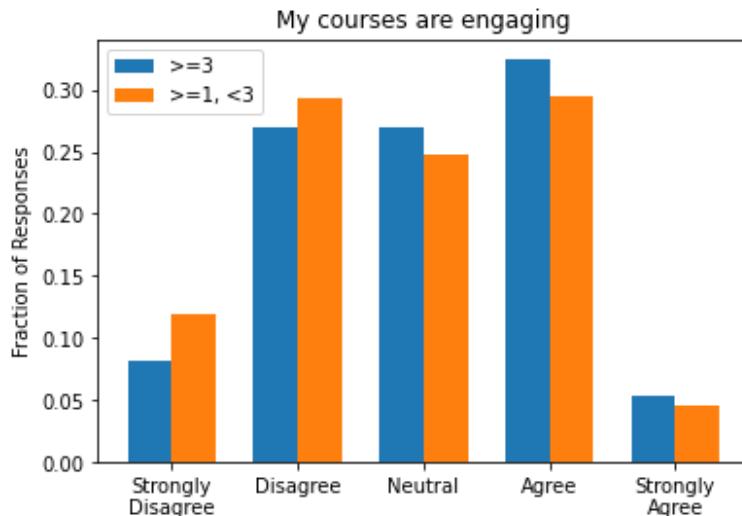
```
>=3 shape: (37, 43), >=1, <3 shape: (546, 43)
MWU results: MannwhitneyuResult(statistic=11499.5, pvalue=0.1457037763
303721)
>=3 median: 3.0
>=1, <3 median: 2.0
cohens d: 0.211
f: 0.569
```



```
>=3 shape: (37, 43), >=1, <3 shape: (546, 43)
MWU results: MannwhitneyuResult(statistic=10903.0, pvalue=0.3999416995
5880376)
>=3 median: 2.0
>=1, <3 median: 2.0
cohens d: 0.118
f: 0.54
```



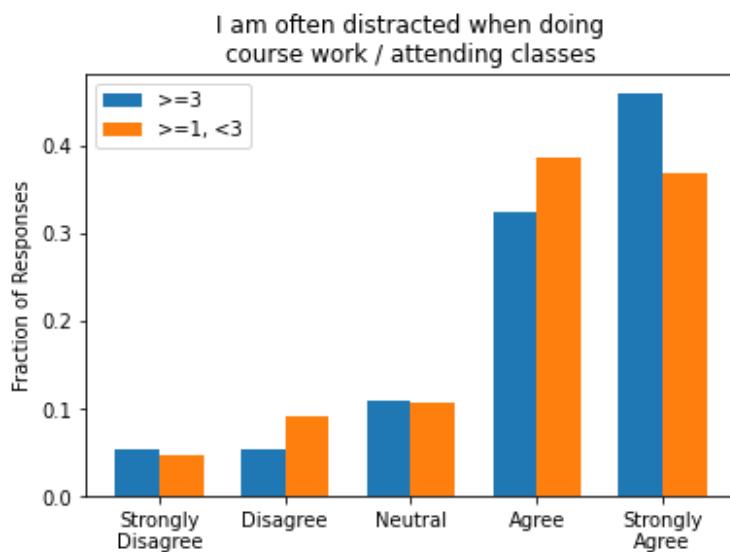
```
>=3 shape: (37, 43), >=1, <3 shape: (546, 43)
MWU results: MannwhitneyuResult(statistic=12452.0, pvalue=0.0138647471
1251223)
>=3 median: 3.0
>=1, <3 median: 2.0
cohens d: 0.398
f: 0.616
```



```

>=3 shape: (37, 43), >=1, <3 shape: (546, 43)
MWU results: MannwhitneyuResult(statistic=10825.5, pvalue=0.4494468103
4770895)
>=3 median: 3.0
>=1, <3 median: 3.0
cohens d: 0.131
f: 0.536

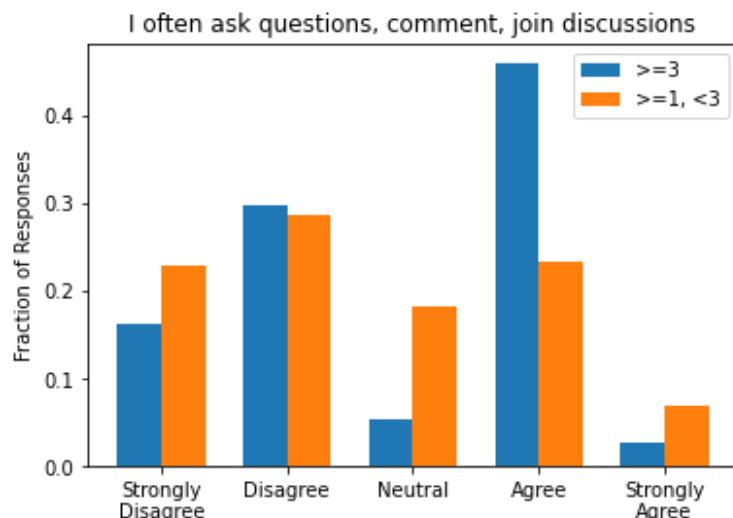
```



```

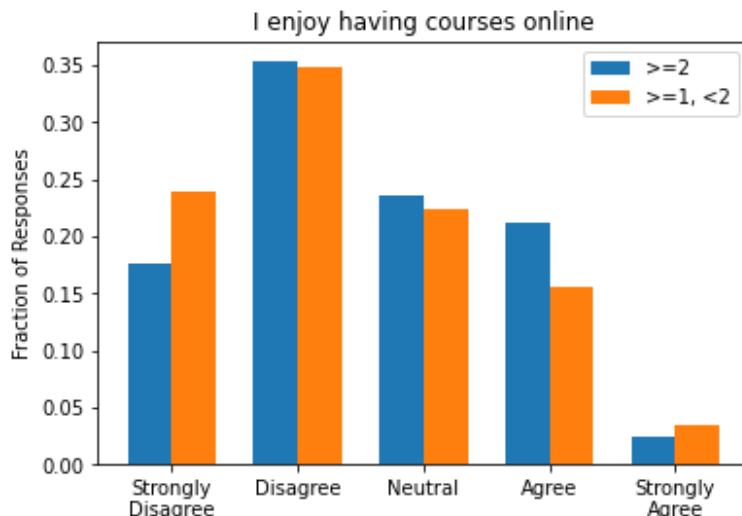
>=3 shape: (37, 43), >=1, <3 shape: (546, 43)
MWU results: MannwhitneyuResult(statistic=10995.5, pvalue=0.3391422825
692819)
>=3 median: 4.0
>=1, <3 median: 4.0
cohens d: 0.129
f: 0.544

```



```
>=3 shape: (37, 43), >=1, <3 shape: (546, 43)
MWU results:  MannwhitneyuResult(statistic=11344.0, pvalue=0.1972098392
9159108)
>=3 median: 3.0
>=1, <3 median: 2.0
cohens d: 0.208
f: 0.562
```

```
-----
I
1    0.701230
2    0.261863
3    0.036907
Name: num_techniques, dtype: float64
```



≥ 2 shape: (170, 43), $\geq 1, < 2$ shape: (399, 43)

MWU results: MannwhitneyuResult(statistic=36747.0, pvalue=0.1018600734

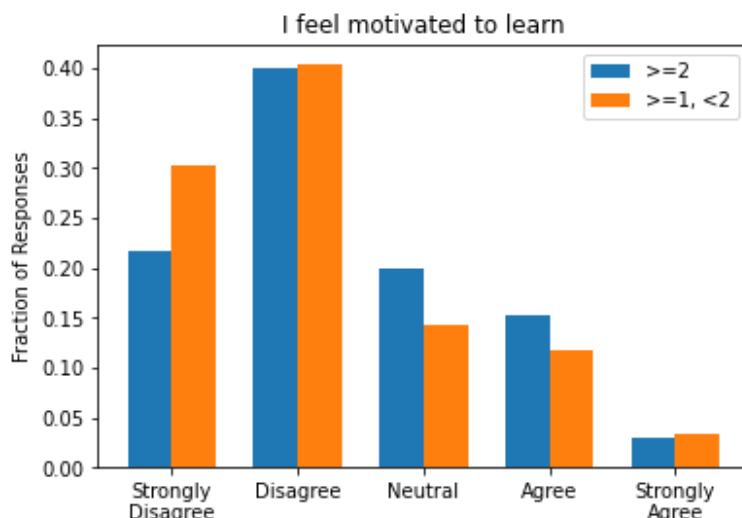
0323233)

≥ 2 median: 2.0

$\geq 1, < 2$ median: 2.0

cohens d: 0.138

f: 0.542



≥ 2 shape: (170, 43), $\geq 1, < 2$ shape: (399, 43)

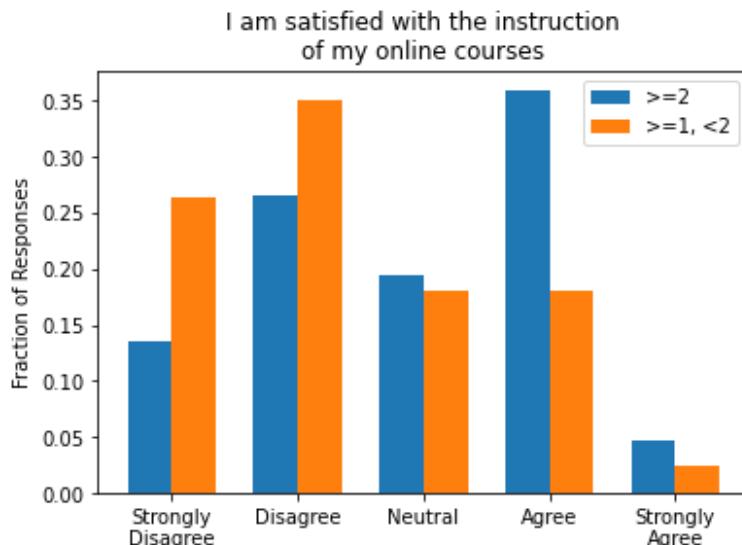
MWU results: MannwhitneyuResult(statistic=37885.0, pvalue=0.0202411078
9864435)

≥ 2 median: 2.0

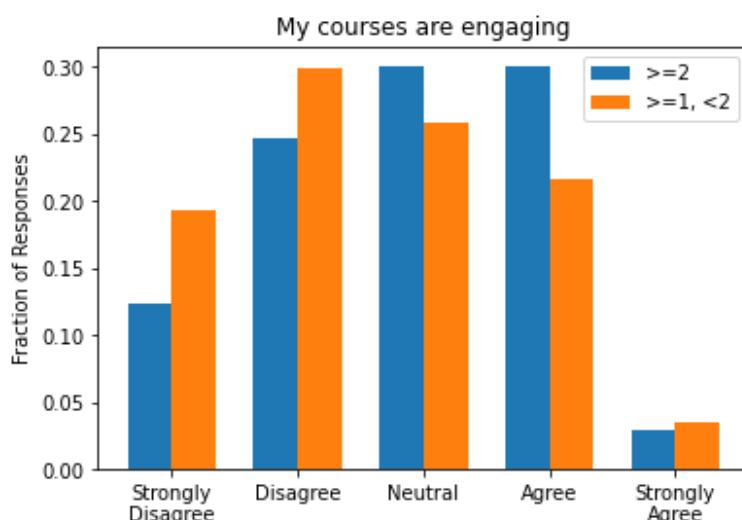
$\geq 1, < 2$ median: 2.0

cohens d: 0.188

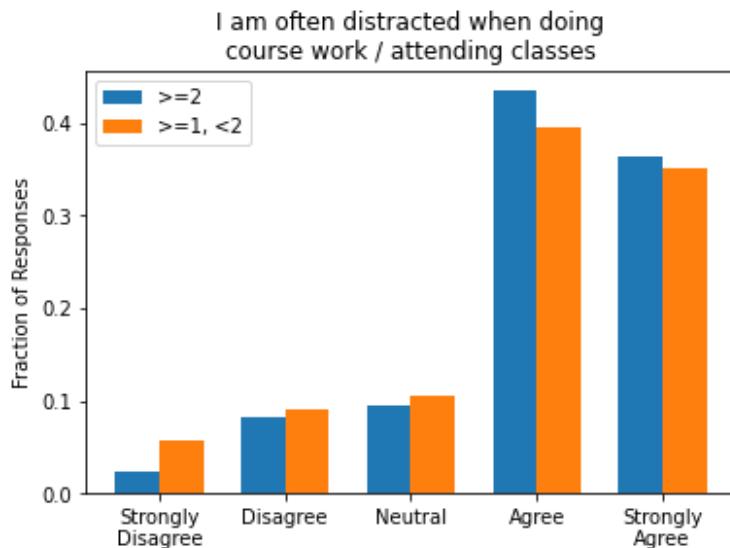
f: 0.559



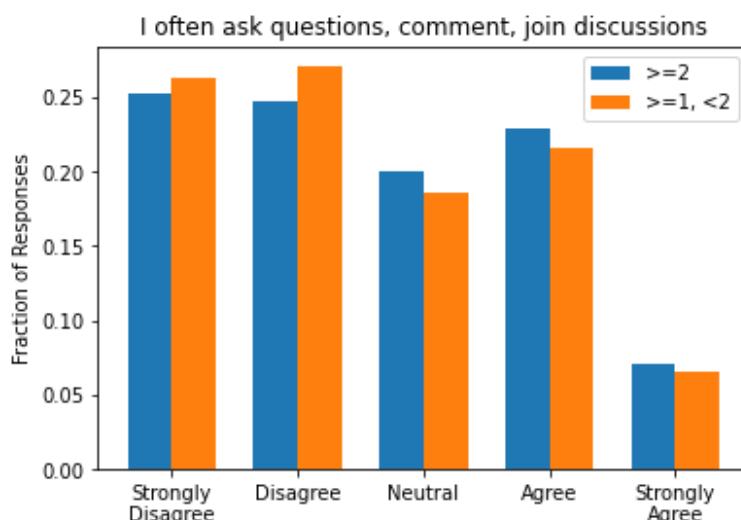
```
>=2 shape: (170, 43), >=1, <2 shape: (399, 43)
MWU results: MannwhitneyuResult(statistic=43040.5, pvalue=1.4648590055
62421e-07)
>=2 median: 3.0
>=1, <2 median: 2.0
cohens d: 0.496
f: 0.635
```



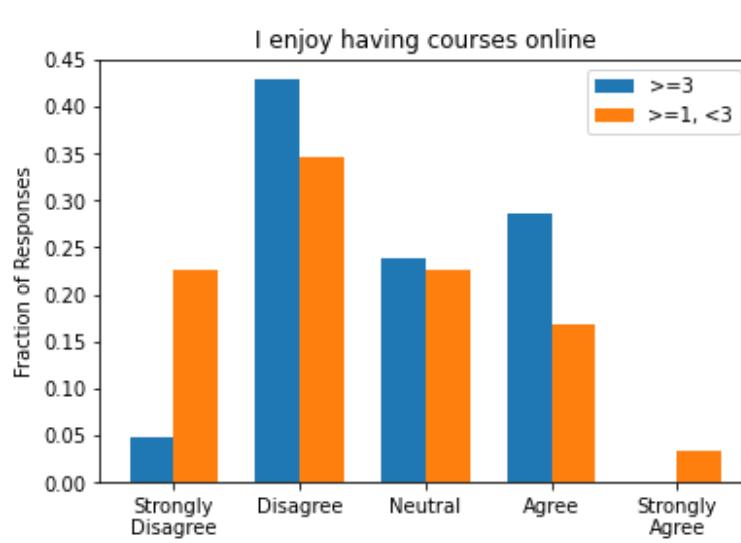
```
>=2 shape: (170, 43), >=1, <2 shape: (399, 43)
MWU results: MannwhitneyuResult(statistic=38566.0, pvalue=0.0074839552
76480172)
>=2 median: 3.0
>=1, <2 median: 3.0
cohens d: 0.237
f: 0.569
```



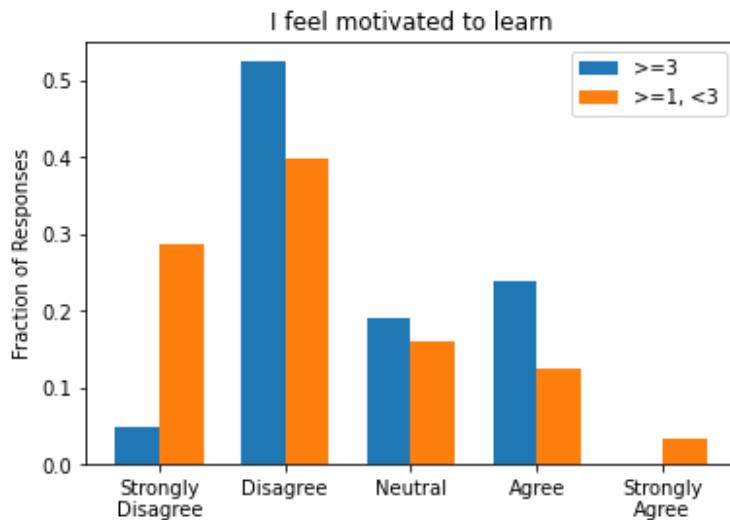
```
>=2 shape: (170, 43), >=1, <2 shape: (399, 43)
MWU results: MannwhitneyuResult(statistic=35618.0, pvalue=0.3135188480
6754593)
>=2 median: 4.0
>=1, <2 median: 4.0
cohens d: 0.129
f: 0.525
```



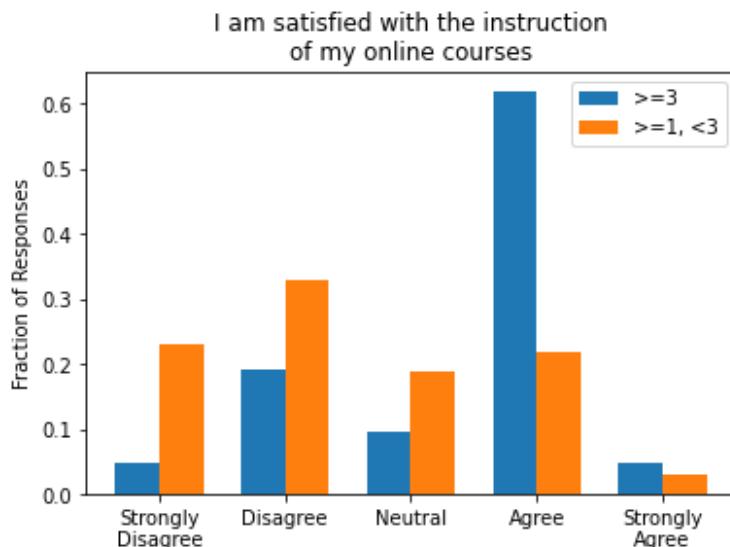
```
>=2 shape: (170, 43), >=1, <2 shape: (399, 43)
MWU results: MannwhitneyuResult(statistic=34937.5, pvalue=0.5583555630
930692)
>=2 median: 2.5
>=1, <2 median: 2.0
cohens d: 0.0542
f: 0.515
```



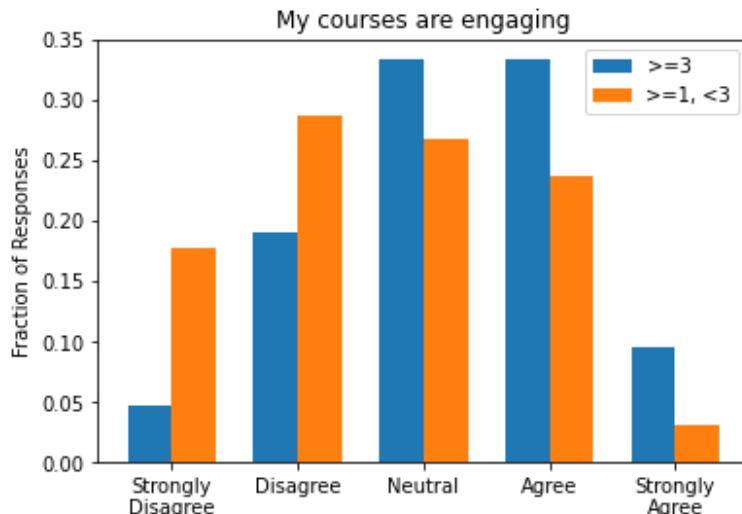
```
>=3 shape: (21, 43), >=1, <3 shape: (548, 43)
MWU results: MannwhitneyuResult(statistic=6817.0, pvalue=0.13613908693
268845)
>=3 median: 3.0
>=1, <3 median: 2.0
cohens d: 0.296
f: 0.592
```



```
>=3 shape: (21, 43), >=1, <3 shape: (548, 43)
MWU results: MannwhitneyuResult(statistic=7158.5, pvalue=0.04617666378
826063)
>=3 median: 2.0
>=1, <3 median: 2.0
cohens d: 0.368
f: 0.622
```



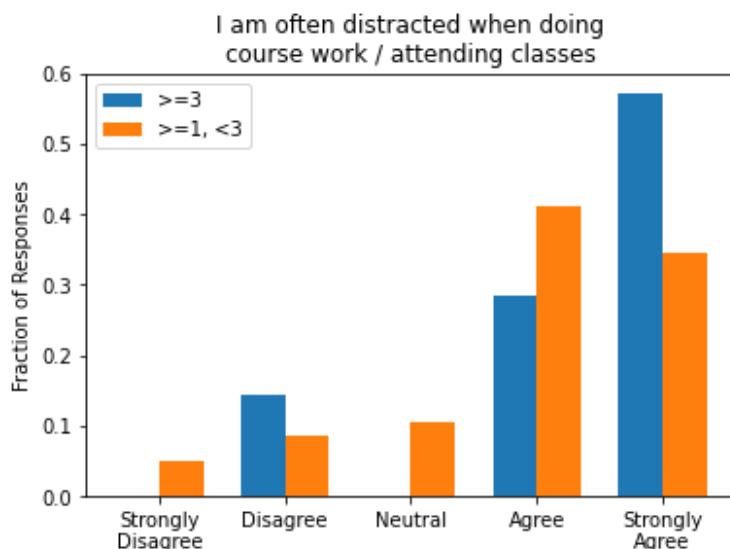
```
>=3 shape: (21, 43), >=1, <3 shape: (548, 43)
MWU results: MannwhitneyuResult(statistic=8315.0, pvalue=0.00034195602
97543066)
>=3 median: 4.0
>=1, <3 median: 2.0
cohens d: 0.816
f: 0.723
```



```

>=3 shape: (21, 43), >=1, <3 shape: (548, 43)
MWU results: MannwhitneyuResult(statistic=7384.0, pvalue=0.02289719841
276552)
>=3 median: 3.0
>=1, <3 median: 3.0
cohens d: 0.521
f: 0.642

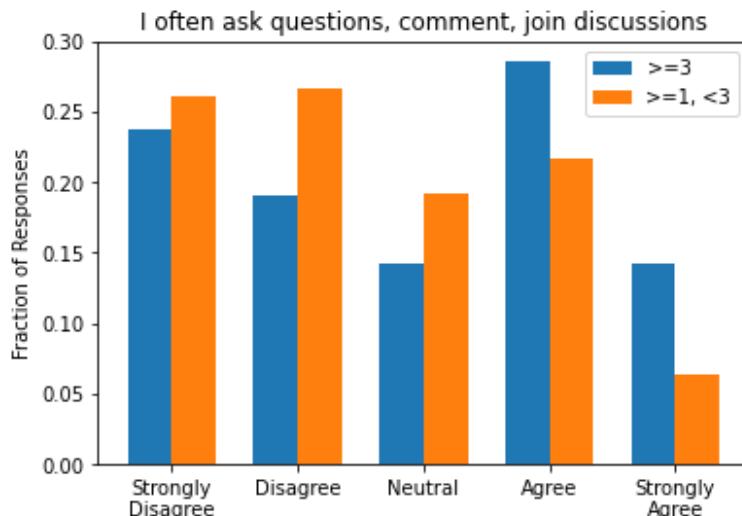
```



```

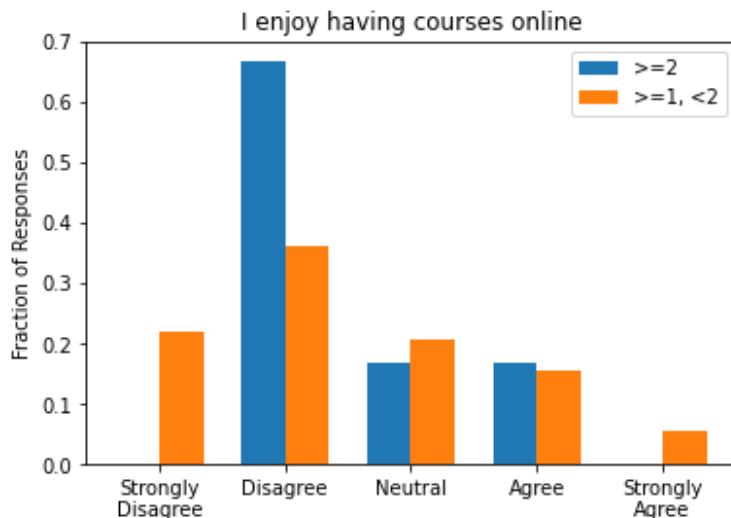
>=3 shape: (21, 43), >=1, <3 shape: (548, 43)
MWU results: MannwhitneyuResult(statistic=7057.5, pvalue=0.06110814657
486847)
>=3 median: 5.0
>=1, <3 median: 4.0
cohens d: 0.328
f: 0.613

```

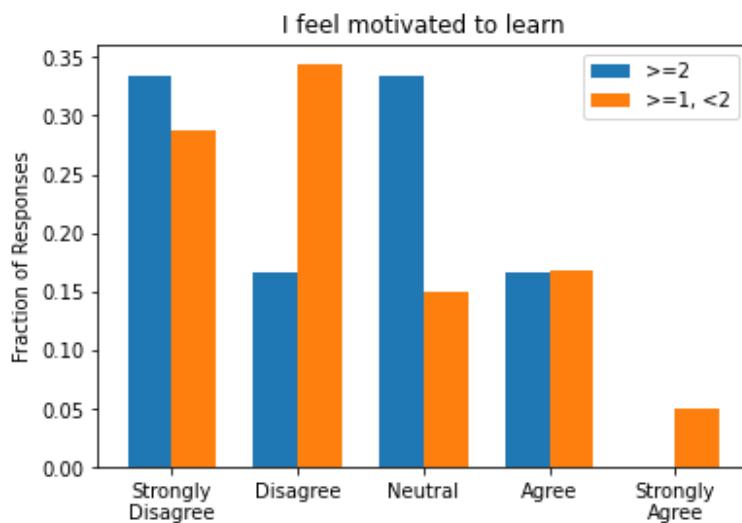


```
>=3 shape: (21, 43), >=1, <3 shape: (548, 43)
MWU results:  MannwhitneyuResult(statistic=6558.5, pvalue=0.26363041479
231974)
>=3 median: 3.0
>=1, <3 median: 2.0
cohens d: 0.275
f: 0.57
```

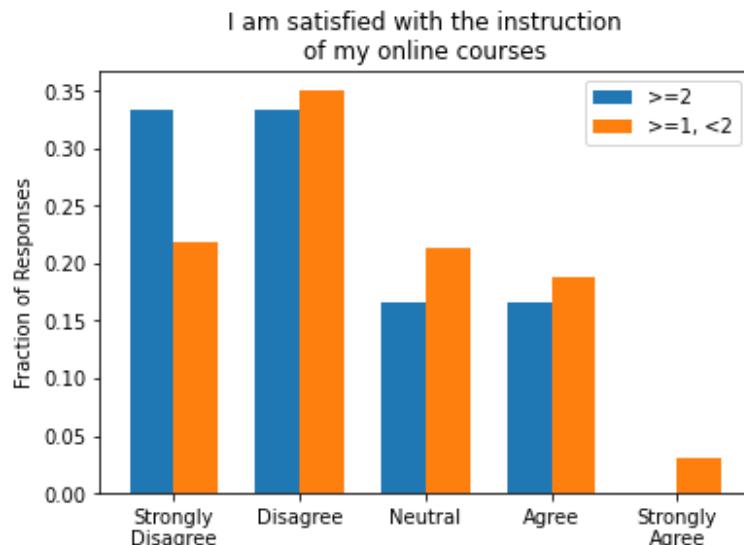
```
-----  
A  
1    0.963855  
2    0.030120  
3    0.006024  
Name: num_techniques, dtype: float64
```



```
>=2 shape: (6, 43), >=1, <2 shape: (160, 43)
MWU results: MannwhitneyuResult(statistic=504.0, pvalue=0.832665381850
2084)
>=2 median: 2.0
>=1, <2 median: 2.0
cohens d: 0.0271
f: 0.525
```



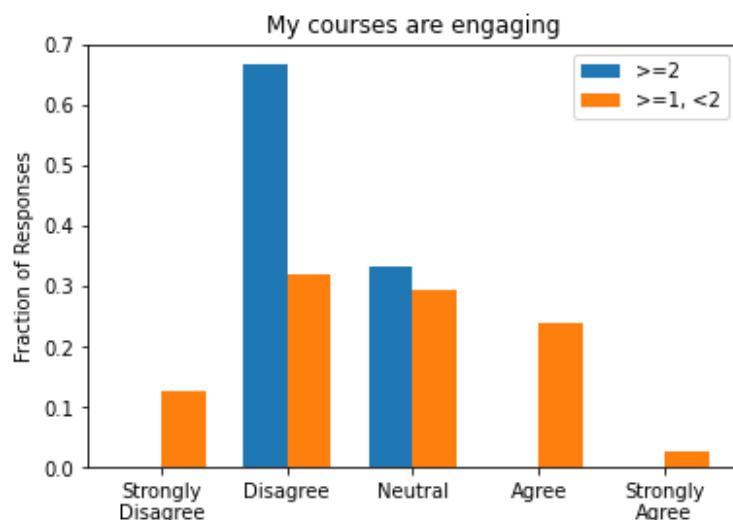
```
>=2 shape: (6, 43), >=1, <2 shape: (160, 43)
MWU results: MannwhitneyuResult(statistic=484.0, pvalue=0.974933542471
4816)
>=2 median: 2.5
>=1, <2 median: 2.0
cohens d: -0.0138
f: 0.504
```



```

>=2 shape: (6, 43), >=1, <2 shape: (160, 43)
MWU results: MannwhitneyuResult(statistic=409.0, pvalue=0.527162884854
4994)
>=2 median: 2.0
>=1, <2 median: 2.0
cohens d: -0.264
f: 0.426

```

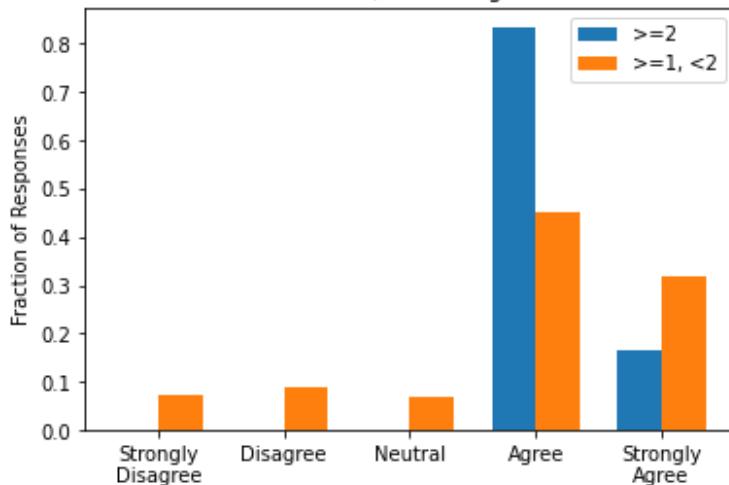


```

>=2 shape: (6, 43), >=1, <2 shape: (160, 43)
MWU results: MannwhitneyuResult(statistic=371.0, pvalue=0.328844446431
10866)
>=2 median: 2.0
>=1, <2 median: 3.0
cohens d: -0.375
f: 0.386

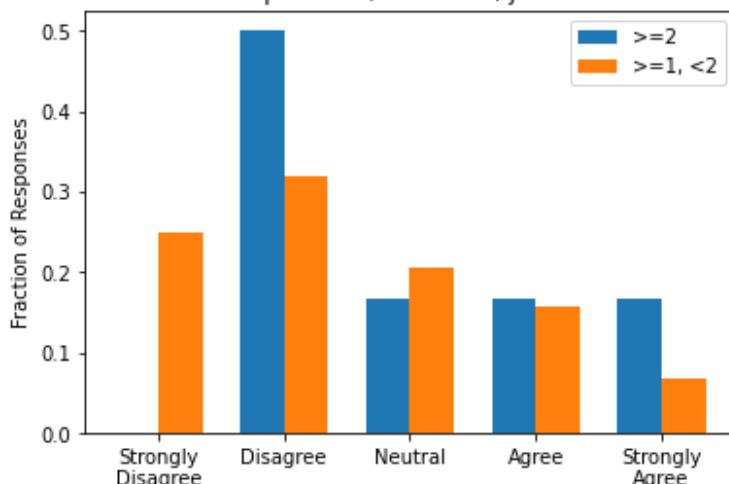
```

I am often distracted when doing
course work / attending classes

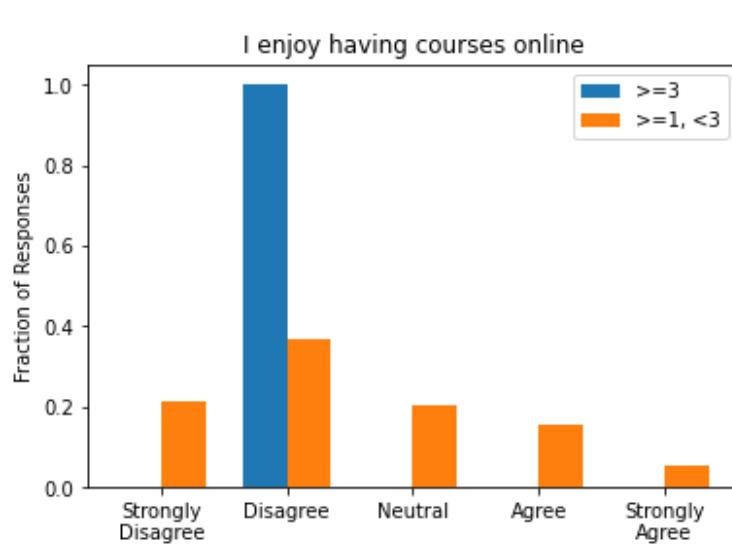


```
>=2 shape: (6, 43), >=1, <2 shape: (160, 43)
MWU results: MannwhitneyuResult(statistic=499.5, pvalue=0.859967945632
2993)
>=2 median: 4.0
>=1, <2 median: 4.0
cohens d: 0.271
f: 0.52
```

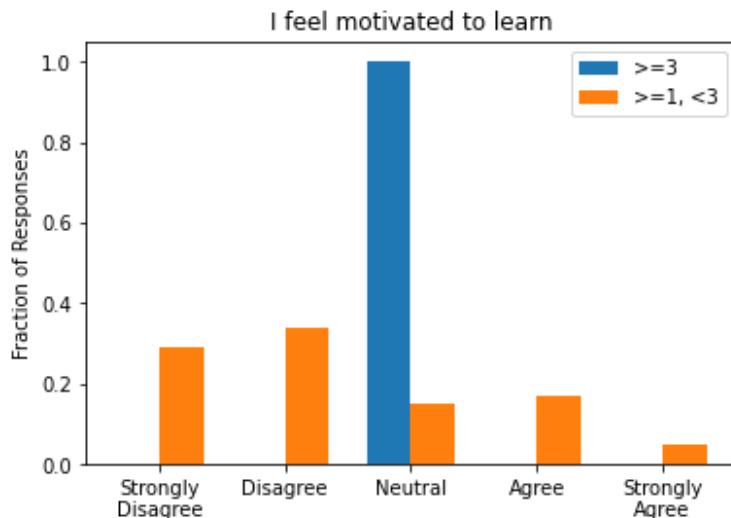
I often ask questions, comment, join discussions



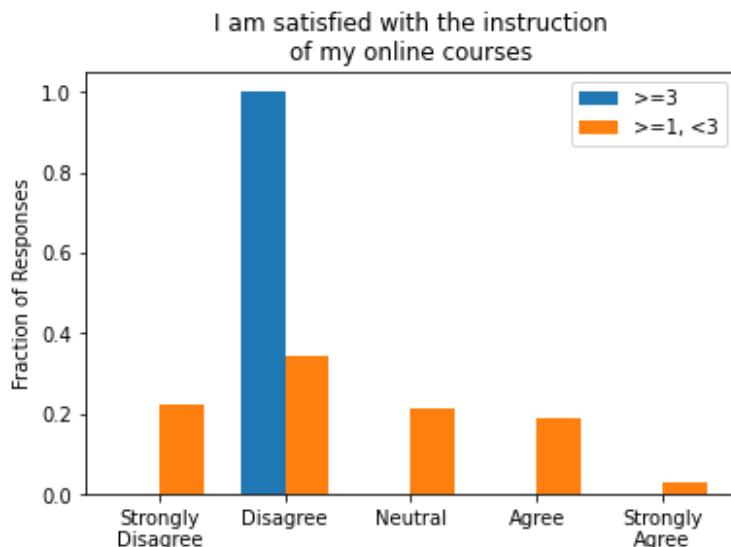
```
>=2 shape: (6, 43), >=1, <2 shape: (160, 43)
MWU results: MannwhitneyuResult(statistic=595.0, pvalue=0.306599059259
3437)
>=2 median: 2.5
>=1, <2 median: 2.0
cohens d: 0.431
f: 0.62
```



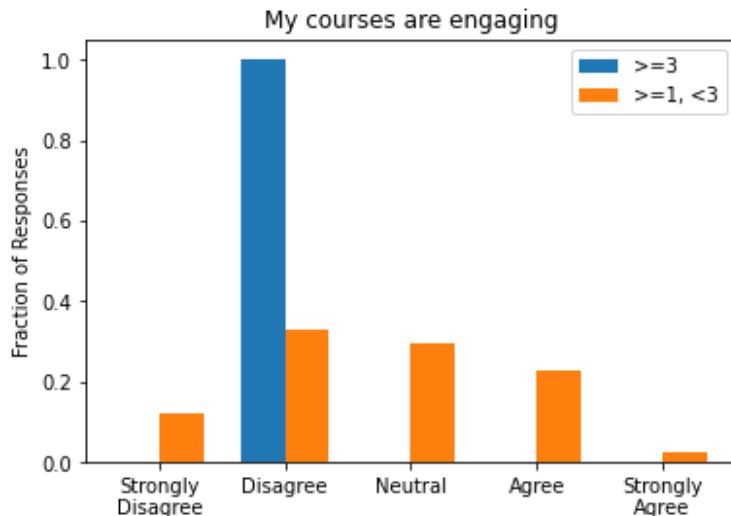
```
>=3 shape: (1, 43), >=1, <3 shape: (165, 43)
MWU results: MannwhitneyuResult(statistic=65.5, pvalue=0.7204703286346
397)
>=3 median: 2.0
>=1, <3 median: 2.0
cohens d: nan
f: 0.397
```



```
>=3 shape: (1, 43), >=1, <3 shape: (165, 43)
MWU results: MannwhitneyuResult(statistic=116.5, pvalue=0.468189037709
9197)
>=3 median: 3.0
>=1, <3 median: 2.0
cohens d: nan
f: 0.706
```



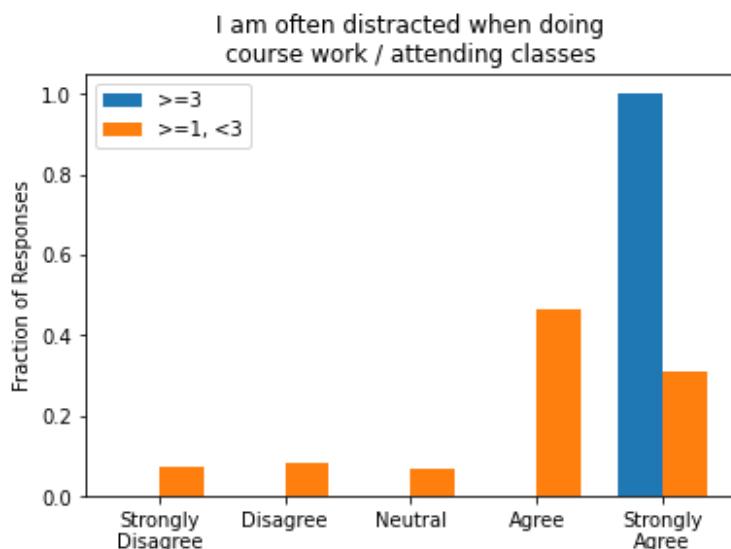
```
>=3 shape: (1, 43), >=1, <3 shape: (165, 43)
MWU results: MannwhitneyuResult(statistic=65.5, pvalue=0.7211085121421
656)
>=3 median: 2.0
>=1, <3 median: 2.0
cohens d: nan
f: 0.397
```



```

>=3 shape: (1, 43), >=1, <3 shape: (165, 43)
MWU results: MannwhitneyuResult(statistic=47.0, pvalue=0.4473950211588
1347)
>=3 median: 2.0
>=1, <3 median: 3.0
cohens d: nan
f: 0.285

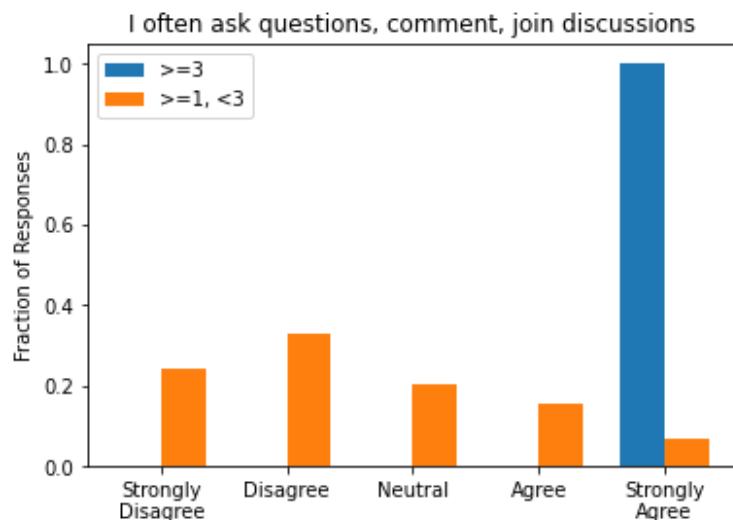
```



```

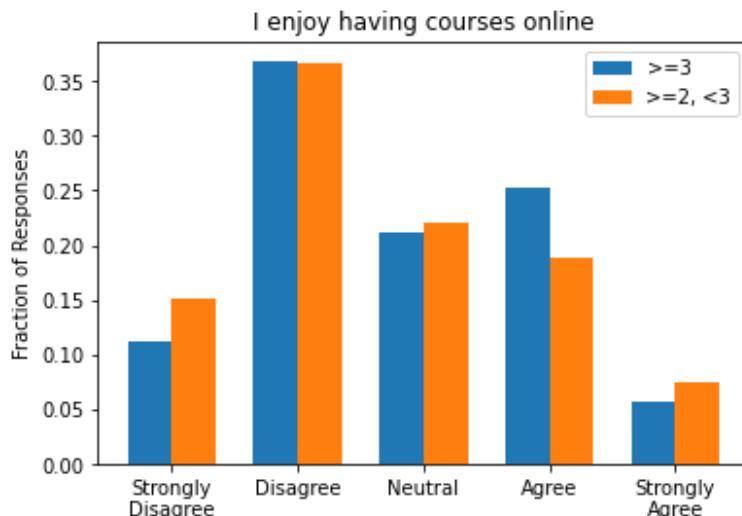
>=3 shape: (1, 43), >=1, <3 shape: (165, 43)
MWU results: MannwhitneyuResult(statistic=139.5, pvalue=0.205732053362
92444)
>=3 median: 5.0
>=1, <3 median: 4.0
cohens d: nan
f: 0.845

```



```
>=3 shape: (1, 43), >=1, <3 shape: (165, 43)
MWU results: MannwhitneyuResult(statistic=159.5, pvalue=0.099425454754
43465)
>=3 median: 5.0
>=1, <3 median: 2.0
cohens d: nan
f: 0.967
```

```
-----  
LI  
3    0.384961  
2    0.346801  
4    0.185185  
5    0.074074  
6    0.008979  
Name: num_techniques, dtype: float64
```



≥ 3 shape: (582, 43), $\geq 2, < 3$ shape: (309, 43)

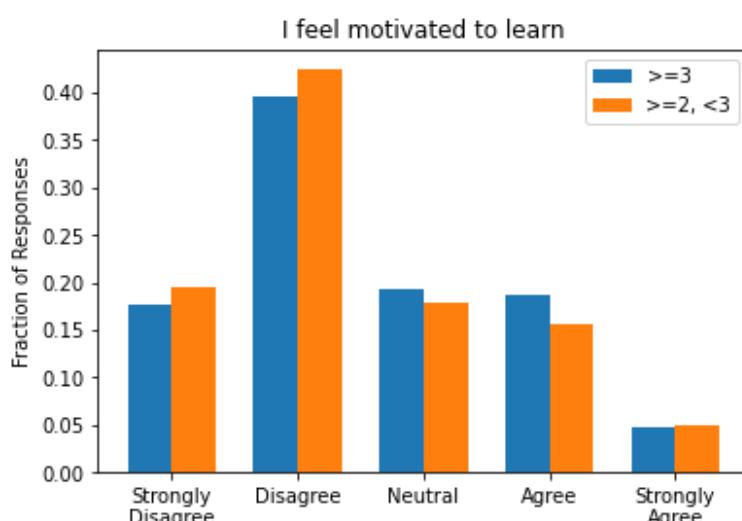
MWU results: MannwhitneyuResult(statistic=95135.0, pvalue=0.1383054594
6064327)

≥ 3 median: 3.0

$\geq 2, < 3$ median: 2.0

cohens d: 0.0956

f: 0.529



≥ 3 shape: (582, 43), $\geq 2, < 3$ shape: (309, 43)

MWU results: MannwhitneyuResult(statistic=94299.0, pvalue=0.2105388603
0071223)

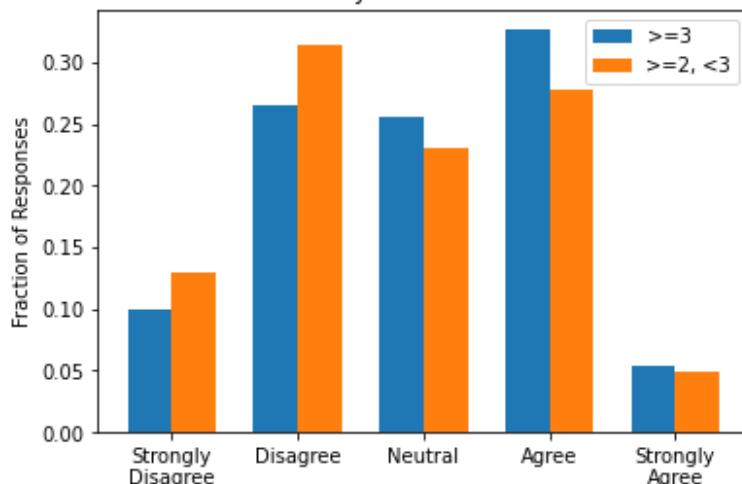
≥ 3 median: 2.0

$\geq 2, < 3$ median: 2.0

cohens d: 0.084

f: 0.524

**I am satisfied with the instruction
of my online courses**



`>=3 shape: (582, 43), >=2, <3 shape: (309, 43)`

`MWU results: MannwhitneyuResult(statistic=97528.0, pvalue=0.031064498062874753)`

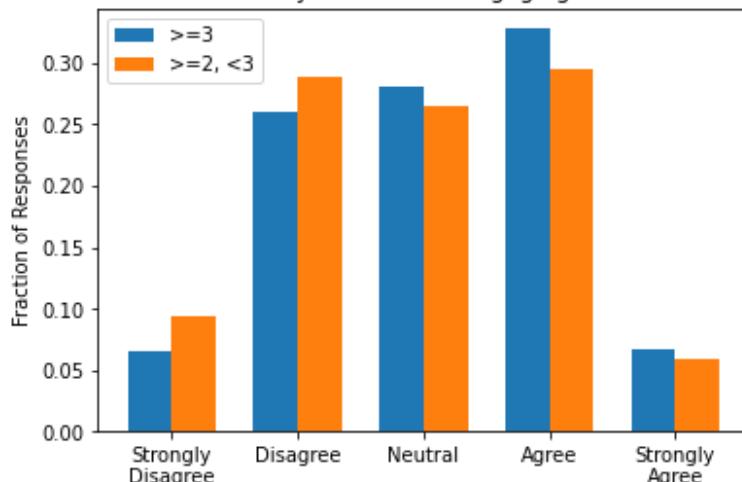
`>=3 median: 3.0`

`>=2, <3 median: 3.0`

`cohens d: 0.15`

`f: 0.542`

My courses are engaging



`>=3 shape: (582, 43), >=2, <3 shape: (309, 43)`

`MWU results: MannwhitneyuResult(statistic=96157.0, pvalue=0.07645570034584338)`

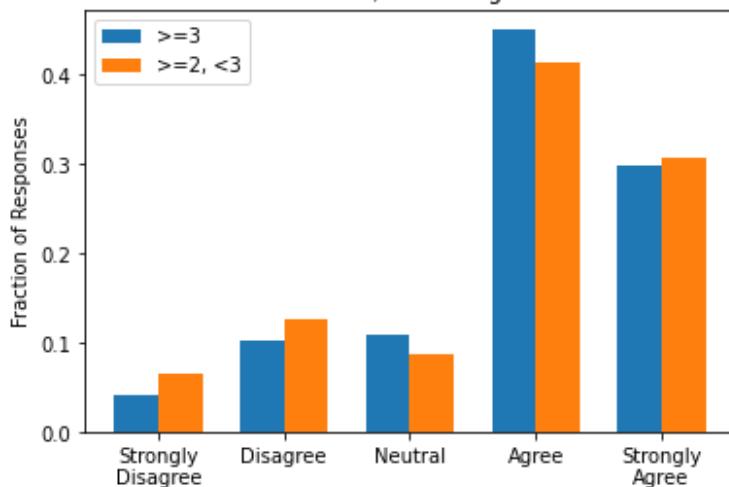
`>=3 median: 3.0`

`>=2, <3 median: 3.0`

`cohens d: 0.128`

`f: 0.535`

I am often distracted when doing
course work / attending classes



≥ 3 shape: (582, 43), $\geq 2, < 3$ shape: (309, 43)

MWU results: MannwhitneyuResult(statistic=91717.0, pvalue=0.6015448880
21839)

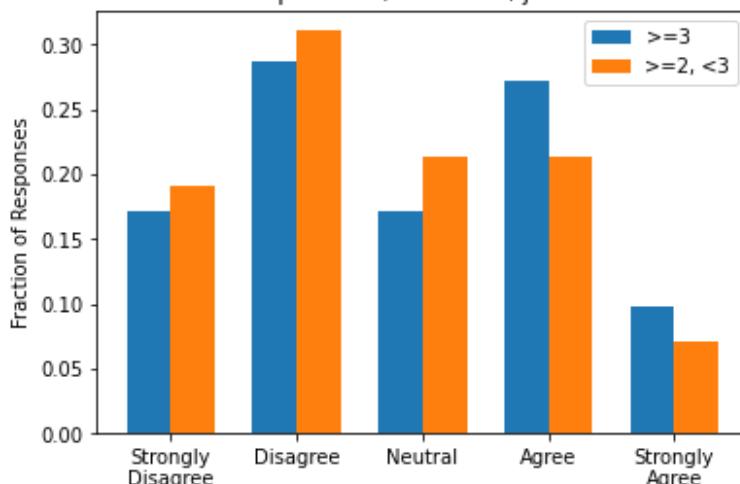
≥ 3 median: 4.0

$\geq 2, < 3$ median: 4.0

cohens d: 0.0762

f: 0.51

I often ask questions, comment, join discussions



≥ 3 shape: (582, 43), $\geq 2, < 3$ shape: (309, 43)

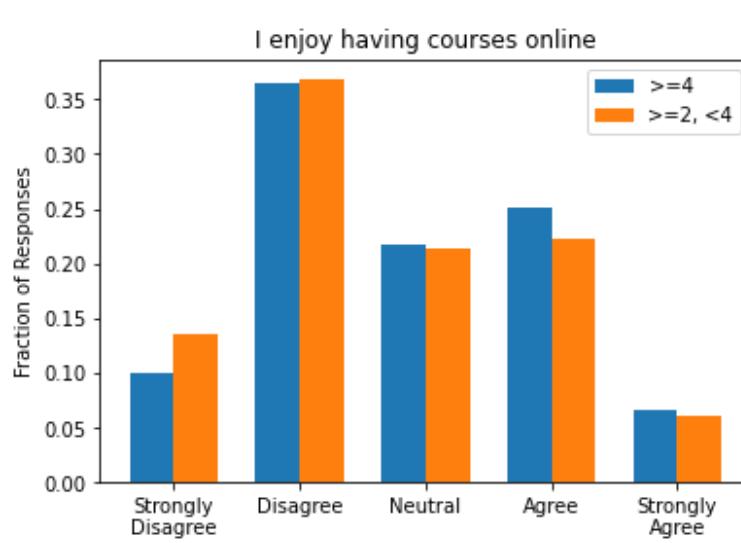
MWU results: MannwhitneyuResult(statistic=96737.0, pvalue=0.0551656882
9069461)

≥ 3 median: 3.0

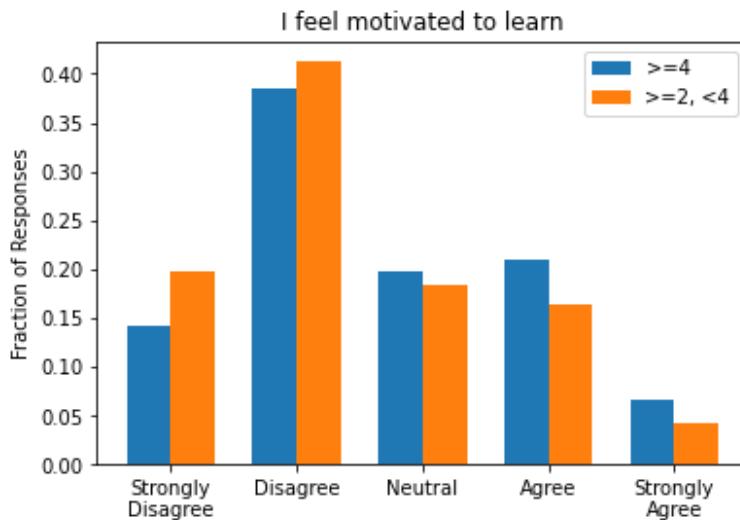
$\geq 2, < 3$ median: 2.0

cohens d: 0.139

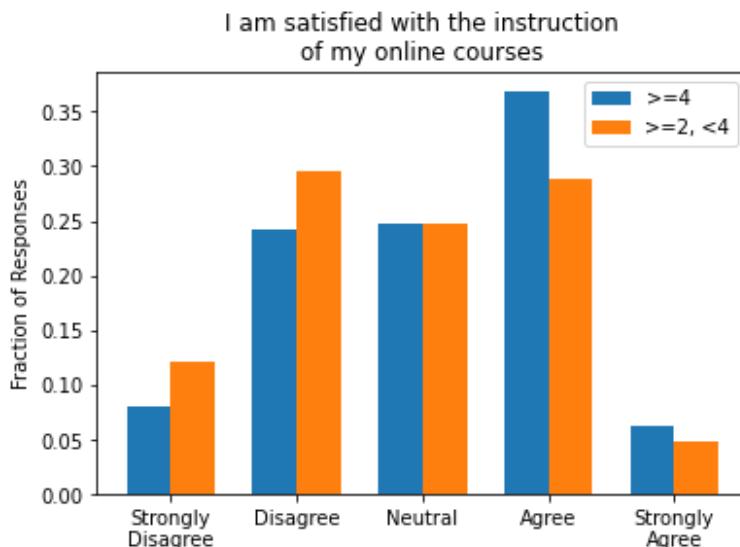
f: 0.538



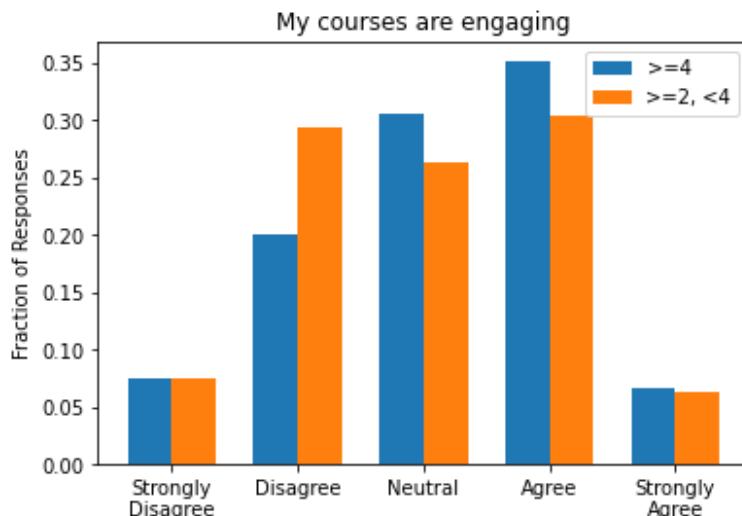
```
>=4 shape: (239, 43), >=2, <4 shape: (652, 43)
MWU results: MannwhitneyuResult(statistic=82304.0, pvalue=0.1802264261
0714457)
>=4 median: 3.0
>=2, <4 median: 2.0
cohens d: 0.0998
f: 0.528
```



```
>=4 shape: (239, 43), >=2, <4 shape: (652, 43)
MWU results: MannwhitneyuResult(statistic=86752.0, pvalue=0.0066417397
83136039)
>=4 median: 2.0
>=2, <4 median: 2.0
cohens d: 0.21
f: 0.557
```



```
>=4 shape: (239, 43), >=2, <4 shape: (652, 43)
MWU results: MannwhitneyuResult(statistic=87650.5, pvalue=0.0030353686
64574037)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: 0.224
f: 0.562
```



≥ 4 shape: (239, 43), $\geq 2, < 4$ shape: (652, 43)

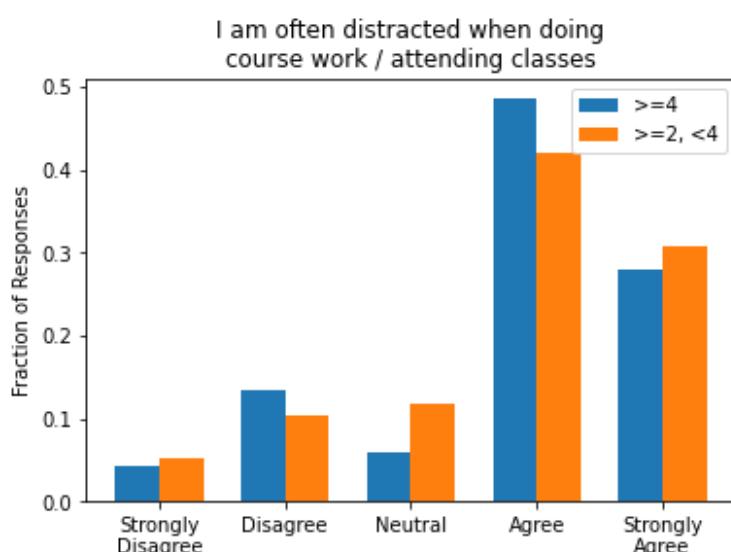
MWU results: MannwhitneyuResult(statistic=84384.0, pvalue=0.0483794396
3135337)

≥ 4 median: 3.0

$\geq 2, < 4$ median: 3.0

cohens d: 0.14

f: 0.542



≥ 4 shape: (239, 43), $\geq 2, < 4$ shape: (652, 43)

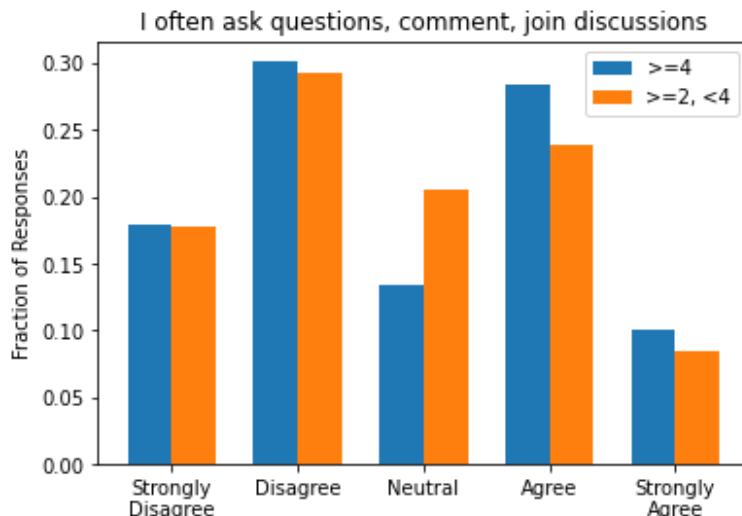
MWU results: MannwhitneyuResult(statistic=77650.5, pvalue=0.9345849209
165392)

≥ 4 median: 4.0

$\geq 2, < 4$ median: 4.0

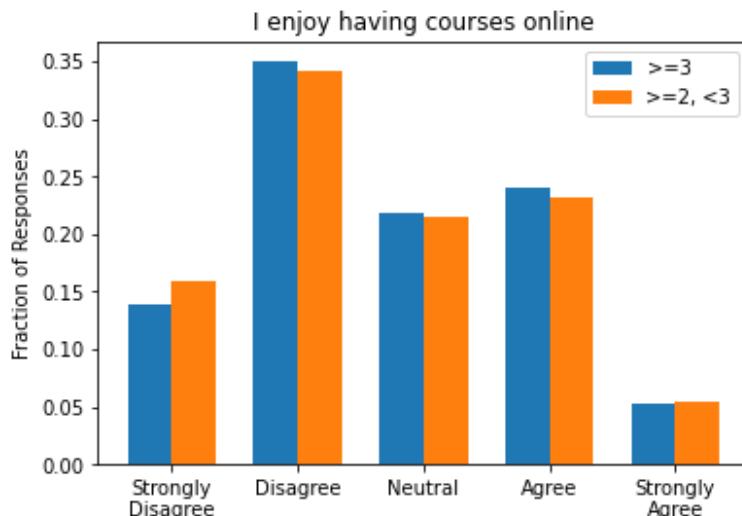
cohens d: -0.00116

f: 0.498



```
>=4 shape: (239, 43), >=2, <4 shape: (652, 43)
MWU results:  MannwhitneyuResult(statistic=79970.0, pvalue=0.5345340348
378824)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: 0.052
f: 0.513
```

```
-----  
LA  
2      0.583072  
3      0.329154  
4      0.087774  
Name: num_techniques, dtype: float64
```



≥ 3 shape: (266, 43), $\geq 2, < 3$ shape: (372, 43)

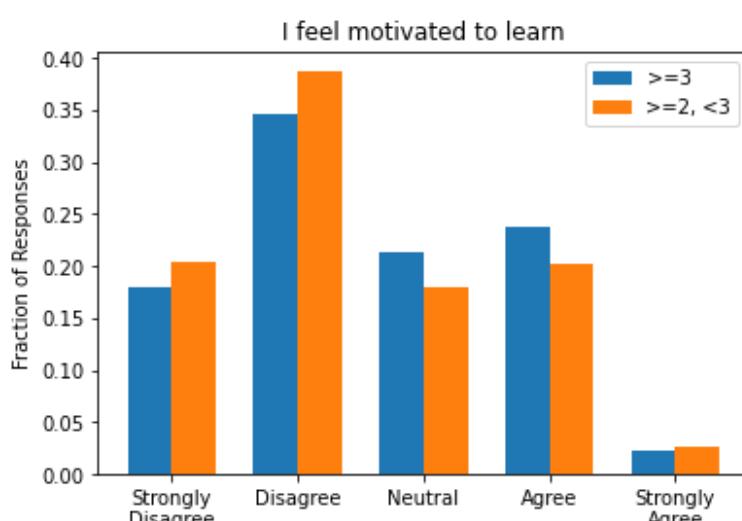
MWU results: MannwhitneyuResult(statistic=50436.0, pvalue=0.6650864179811897)

≥ 3 median: 3.0

$\geq 2, < 3$ median: 2.5

cohens d: 0.0332

f: 0.51



≥ 3 shape: (266, 43), $\geq 2, < 3$ shape: (372, 43)

MWU results: MannwhitneyuResult(statistic=52535.0, pvalue=0.16584086863706515)

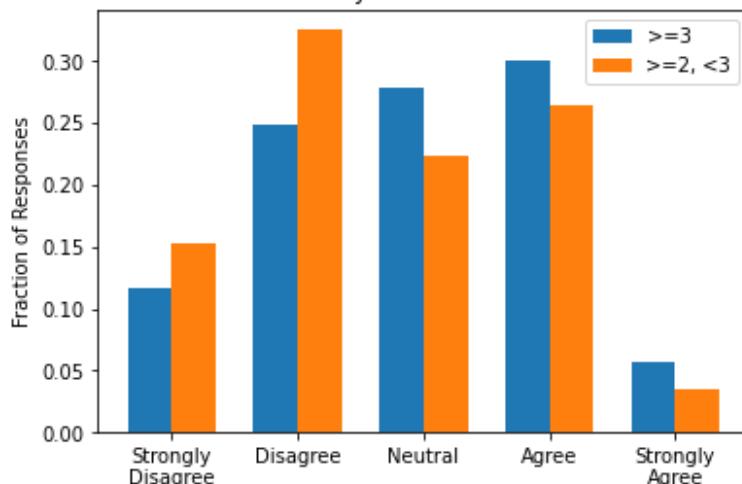
≥ 3 median: 2.0

$\geq 2, < 3$ median: 2.0

cohens d: 0.104

f: 0.531

**I am satisfied with the instruction
of my online courses**



`>=3 shape: (266, 43), >=2, <3 shape: (372, 43)`

`MWU results: MannwhitneyuResult(statistic=55164.0, pvalue=0.0104160525
26230367)`

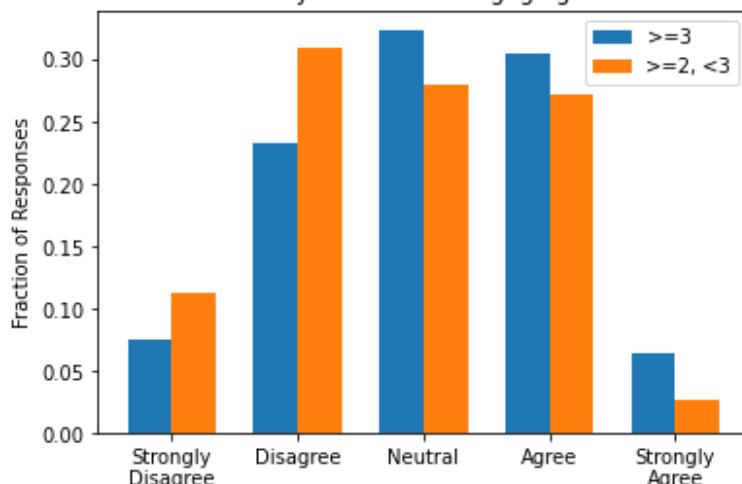
`>=3 median: 3.0`

`>=2, <3 median: 3.0`

`cohens d: 0.206`

`f: 0.557`

My courses are engaging



`>=3 shape: (266, 43), >=2, <3 shape: (372, 43)`

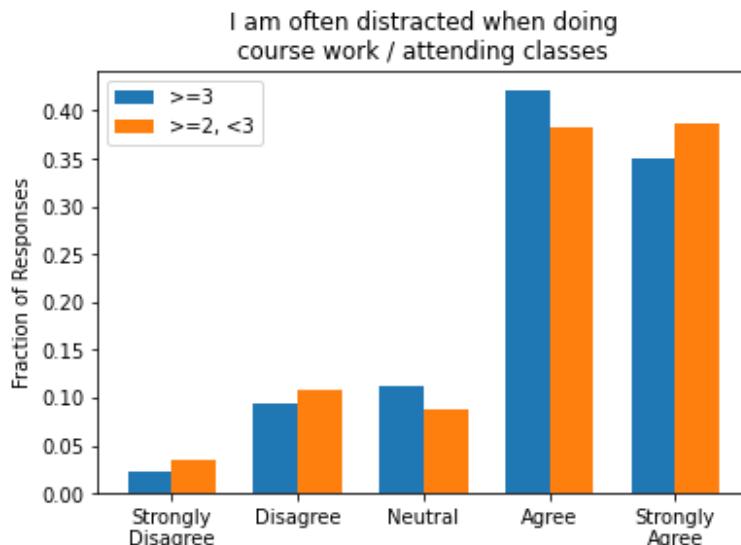
`MWU results: MannwhitneyuResult(statistic=56033.5, pvalue=0.0030249880
419983667)`

`>=3 median: 3.0`

`>=2, <3 median: 3.0`

`cohens d: 0.247`

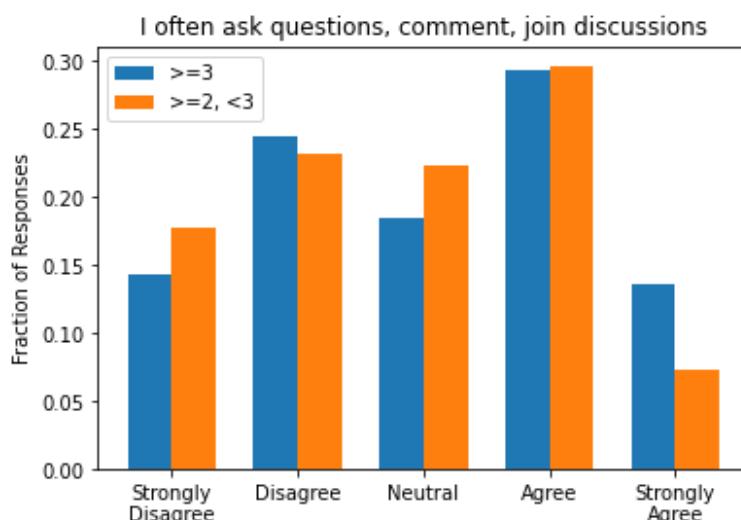
`f: 0.566`



```

>=3 shape: (266, 43), >=2, <3 shape: (372, 43)
MWU results: MannwhitneyuResult(statistic=48433.0, pvalue=0.6289926028
500012)
>=3 median: 4.0
>=2, <3 median: 4.0
cohens d: 0.00253
f: 0.489

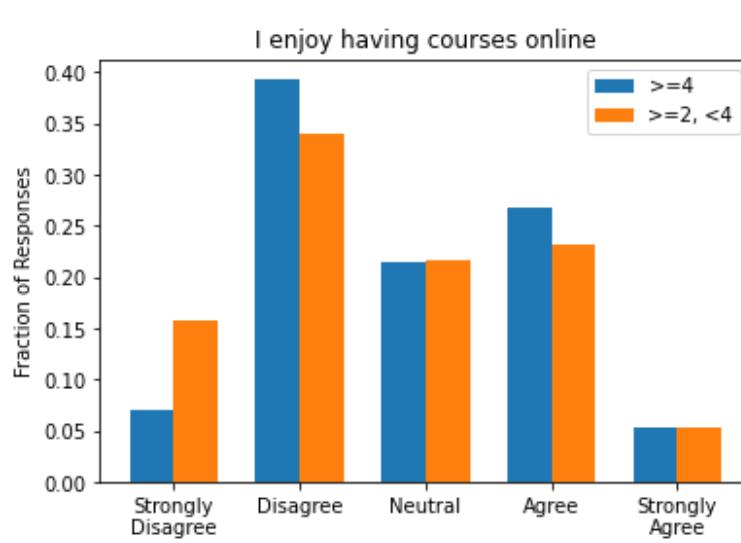
```



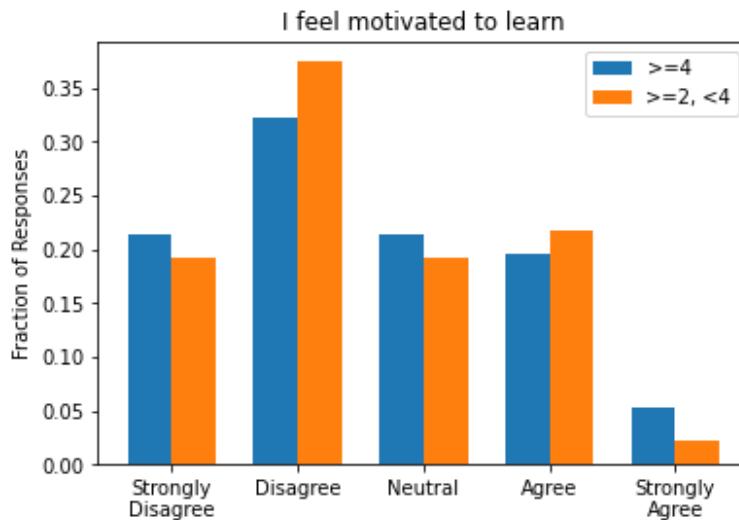
```

>=3 shape: (266, 43), >=2, <3 shape: (372, 43)
MWU results: MannwhitneyuResult(statistic=53346.5, pvalue=0.0831924041
9164141)
>=3 median: 3.0
>=2, <3 median: 3.0
cohens d: 0.143
f: 0.539

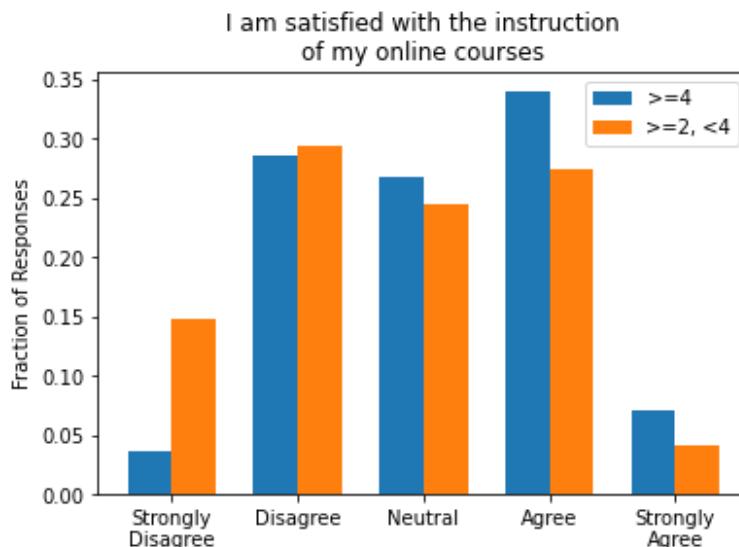
```



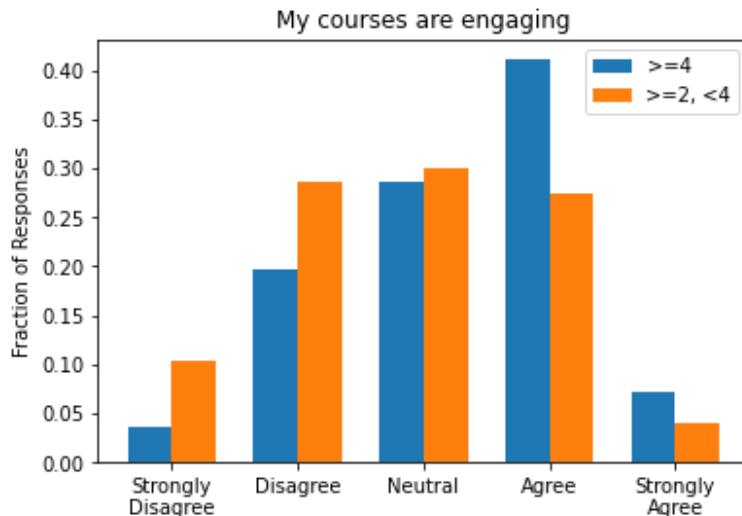
```
>=4 shape: (56, 43), >=2, <4 shape: (582, 43)
MWU results: MannwhitneyuResult(statistic=17574.0, pvalue=0.3152360182
71031)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: 0.138
f: 0.539
```



```
>=4 shape: (56, 43), >=2, <4 shape: (582, 43)
MWU results: MannwhitneyuResult(statistic=16569.0, pvalue=0.8296734403
553317)
>=4 median: 2.0
>=2, <4 median: 2.0
cohens d: 0.0453
f: 0.508
```



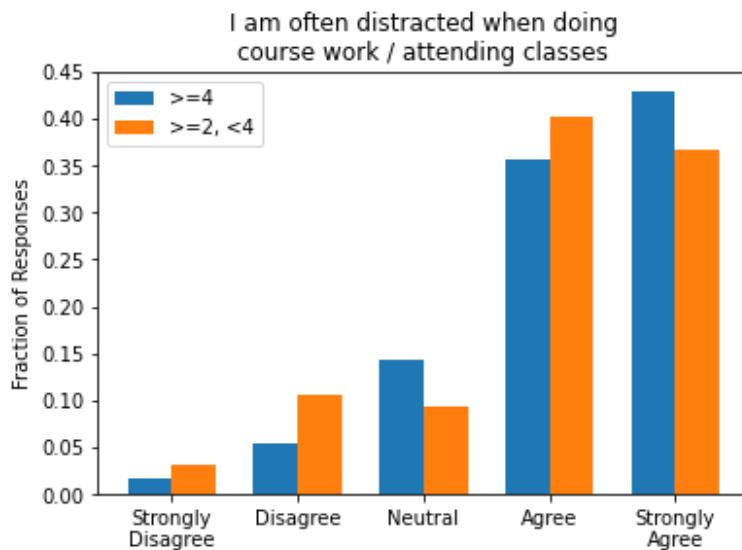
```
>=4 shape: (56, 43), >=2, <4 shape: (582, 43)
MWU results: MannwhitneyuResult(statistic=19121.5, pvalue=0.0266172282
5770823)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: 0.321
f: 0.587
```



```

>=4 shape: (56, 43), >=2, <4 shape: (582, 43)
MWU results: MannwhitneyuResult(statistic=19951.5, pvalue=0.0039768681
75127422)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: 0.405
f: 0.612

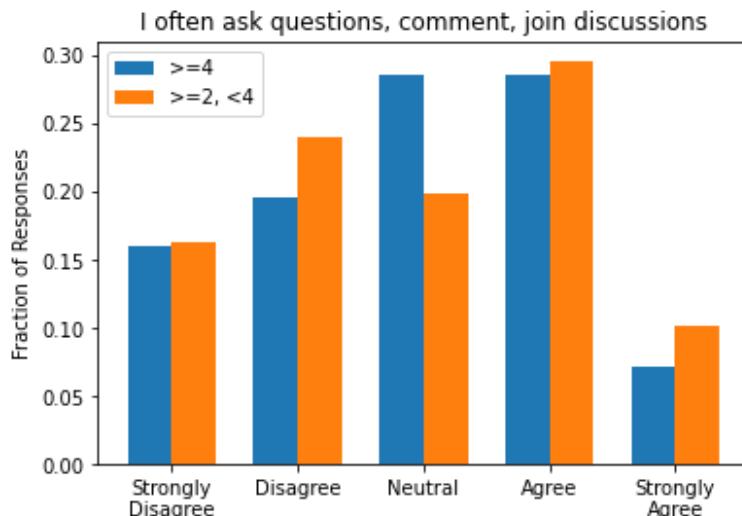
```



```

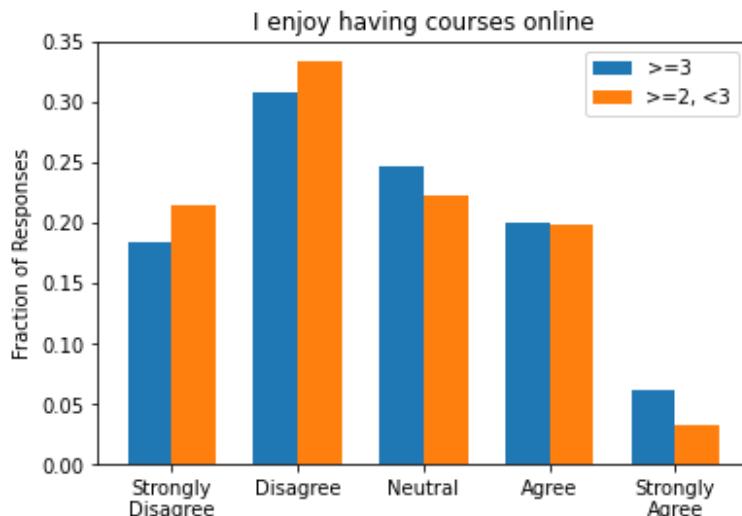
>=4 shape: (56, 43), >=2, <4 shape: (582, 43)
MWU results: MannwhitneyuResult(statistic=17468.0, pvalue=0.3441379267
467931)
>=4 median: 4.0
>=2, <4 median: 4.0
cohens d: 0.149
f: 0.536

```

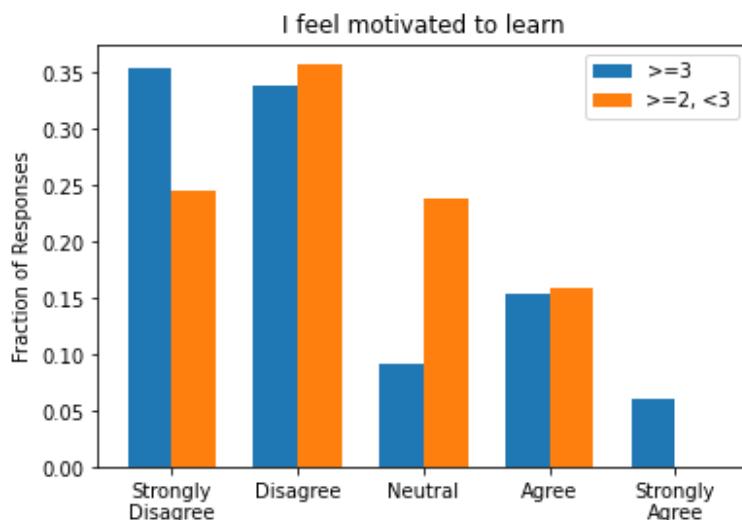


```
>=4 shape: (56, 43), >=2, <4 shape: (582, 43)
MWU results:  MannwhitneyuResult(statistic=16132.5, pvalue=0.8988264813
749587)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: -0.0164
f: 0.495
```

```
-----  
IA  
2      0.659686  
3      0.261780  
4      0.078534  
Name: num_techniques, dtype: float64
```

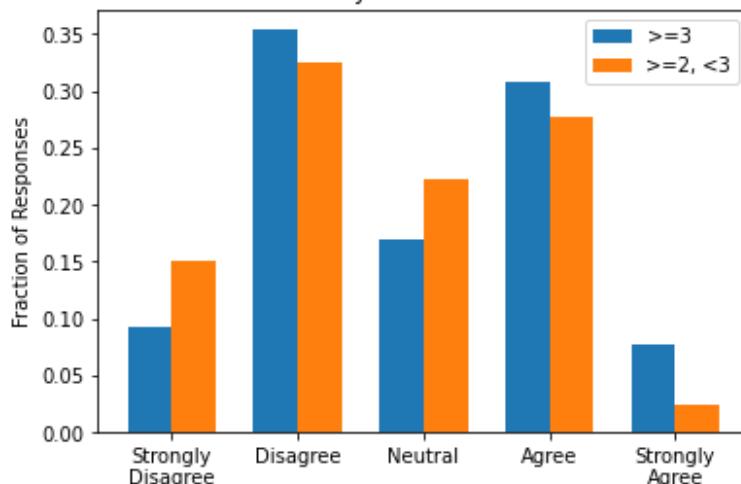


```
>=3 shape: (65, 43), >=2, <3 shape: (126, 43)
MWU results: MannwhitneyuResult(statistic=4369.5, pvalue=0.43427720210
600884)
>=3 median: 3.0
>=2, <3 median: 2.0
cohens d: 0.127
f: 0.534
```



```
>=3 shape: (65, 43), >=2, <3 shape: (126, 43)
MWU results: MannwhitneyuResult(statistic=3743.5, pvalue=0.31302738954
29423)
>=3 median: 2.0
>=2, <3 median: 2.0
cohens d: -0.0713
f: 0.457
```

**I am satisfied with the instruction
of my online courses**



≥ 3 shape: (65, 43), $\geq 2, < 3$ shape: (126, 43)

MWU results: MannwhitneyuResult(statistic=4512.0, pvalue=0.23225682021136718)

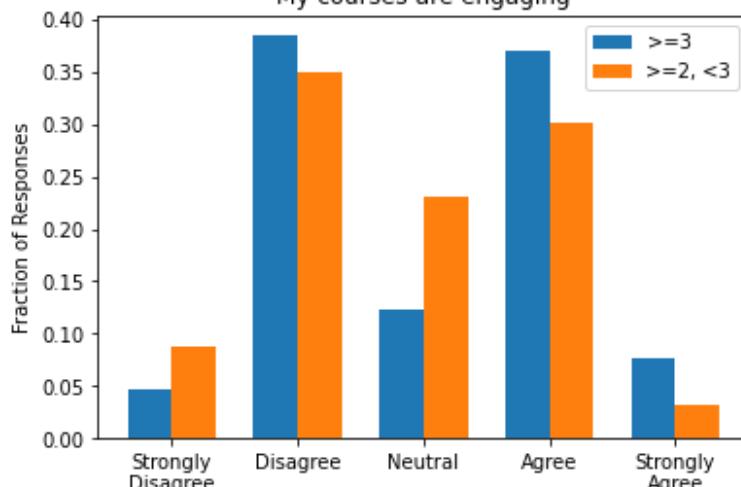
≥ 3 median: 3.0

$\geq 2, < 3$ median: 3.0

cohens d: 0.2

f: 0.551

My courses are engaging



≥ 3 shape: (65, 43), $\geq 2, < 3$ shape: (126, 43)

MWU results: MannwhitneyuResult(statistic=4489.5, pvalue=0.2541196186893915)

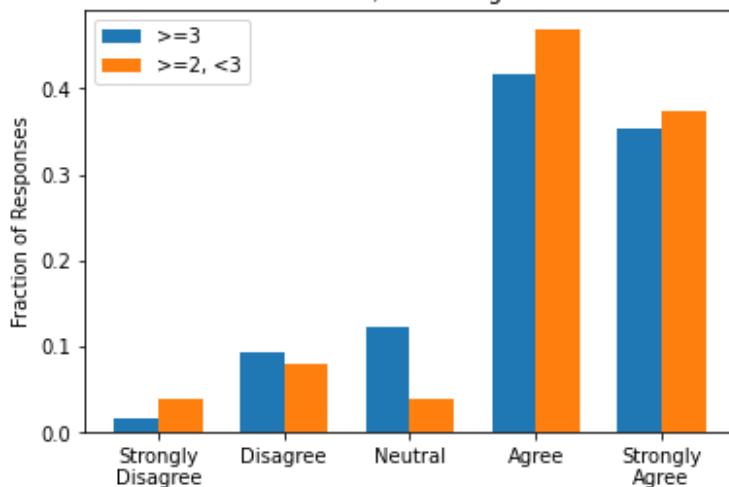
≥ 3 median: 3.0

$\geq 2, < 3$ median: 3.0

cohens d: 0.19

f: 0.548

I am often distracted when doing
course work / attending classes



>=3 shape: (65, 43), >=2, <3 shape: (126, 43)

MWU results: MannwhitneyuResult(statistic=3896.5, pvalue=0.55498931035
12606)

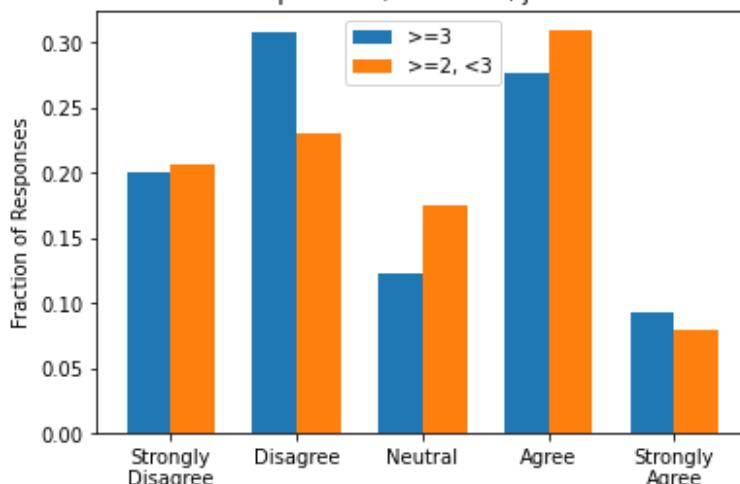
>=3 median: 4.0

>=2, <3 median: 4.0

cohens d: -0.0539

f: 0.476

I often ask questions, comment, join discussions



>=3 shape: (65, 43), >=2, <3 shape: (126, 43)

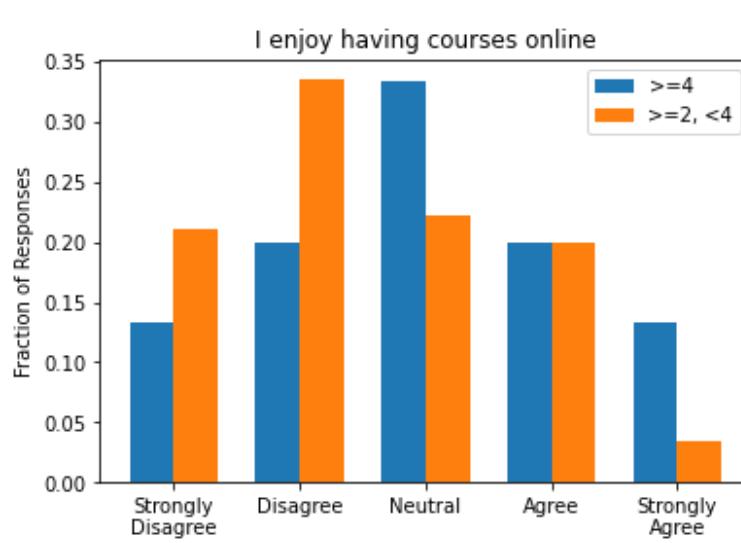
MWU results: MannwhitneyuResult(statistic=3970.0, pvalue=0.72329421603
41027)

>=3 median: 2.0

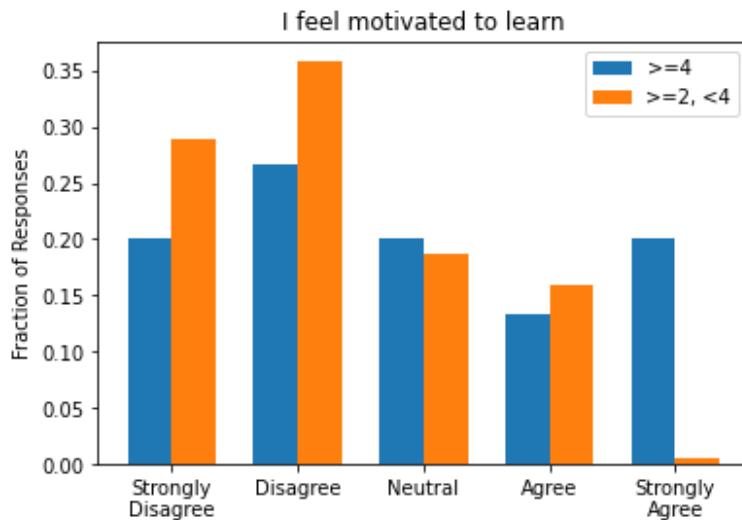
>=2, <3 median: 3.0

cohens d: -0.0551

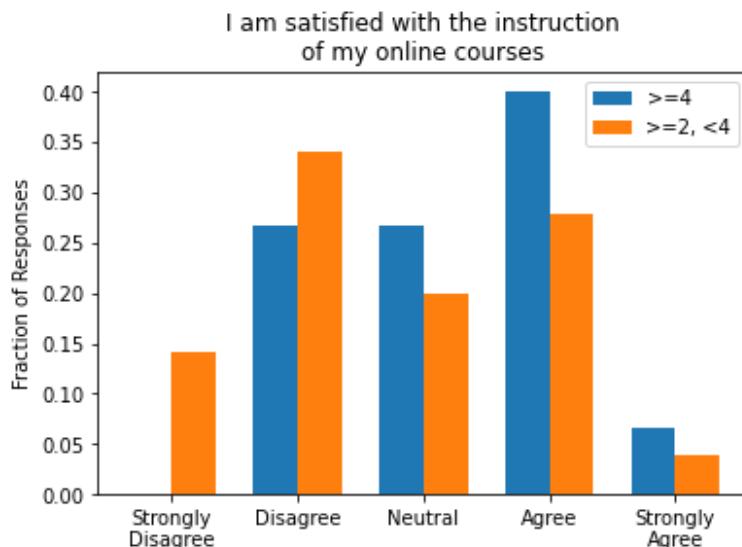
f: 0.485



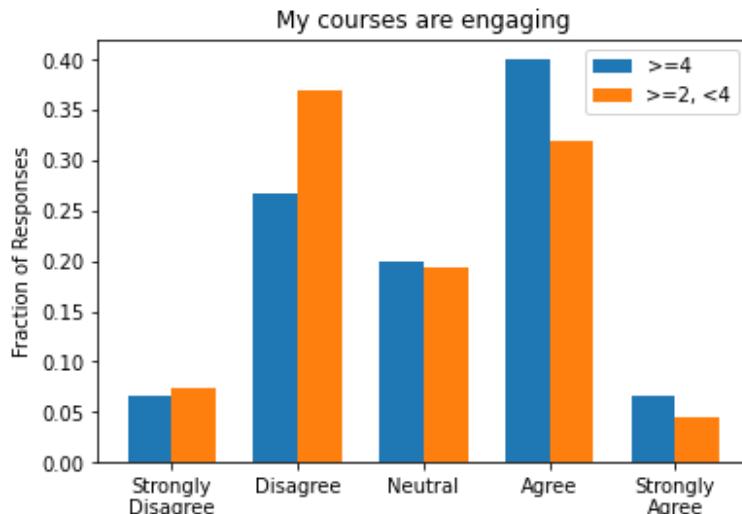
```
>=4 shape: (15, 43), >=2, <4 shape: (176, 43)
MWU results: MannwhitneyuResult(statistic=1617.5, pvalue=0.13549691359
991756)
>=4 median: 3.0
>=2, <4 median: 2.0
cohens d: 0.428
f: 0.613
```



```
>=4 shape: (15, 43), >=2, <4 shape: (176, 43)
MWU results: MannwhitneyuResult(statistic=1646.5, pvalue=0.09885720898
474279)
>=4 median: 3.0
>=2, <4 median: 2.0
cohens d: 0.581
f: 0.624
```



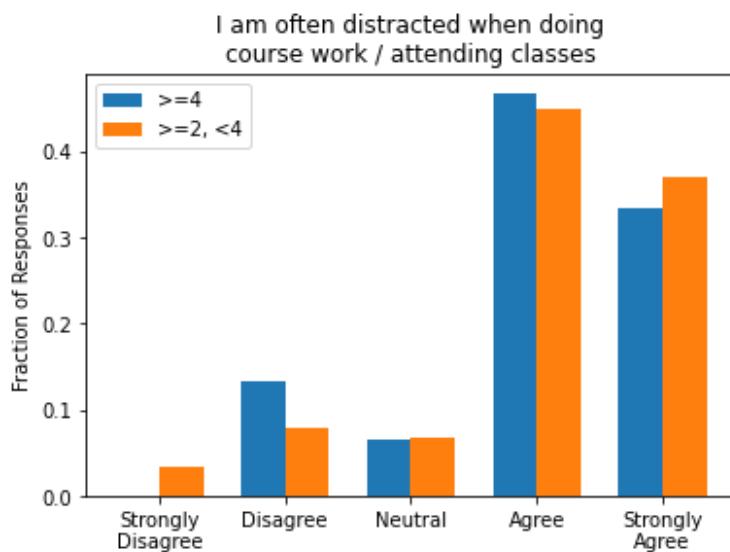
```
>=4 shape: (15, 43), >=2, <4 shape: (176, 43)
MWU results: MannwhitneyuResult(statistic=1669.5, pvalue=0.07789495891
72687)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: 0.476
f: 0.632
```



```

>=4 shape: (15, 43), >=2, <4 shape: (176, 43)
MWU results: MannwhitneyuResult(statistic=1485.5, pvalue=0.40025139060
55223)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: 0.223
f: 0.563

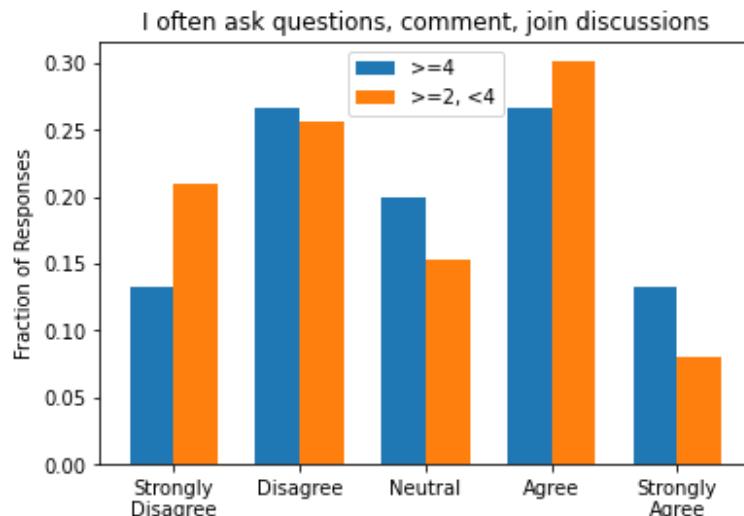
```



```

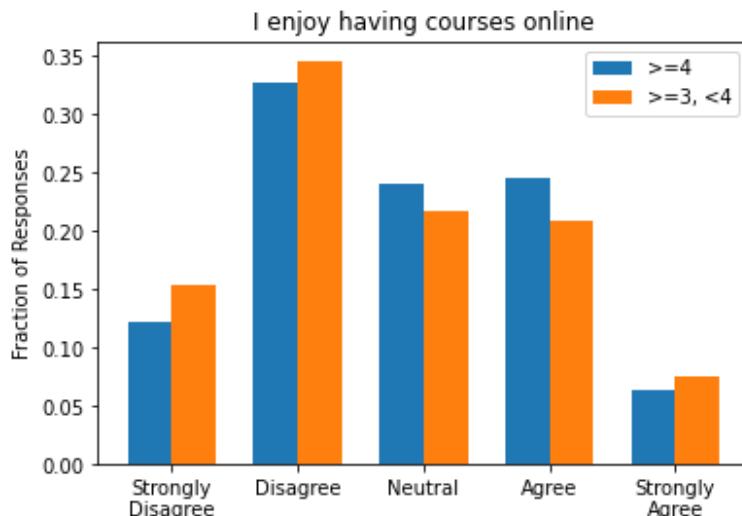
>=4 shape: (15, 43), >=2, <4 shape: (176, 43)
MWU results: MannwhitneyuResult(statistic=1270.0, pvalue=0.79491932841
45983)
>=4 median: 4.0
>=2, <4 median: 4.0
cohens d: -0.0386
f: 0.481

```

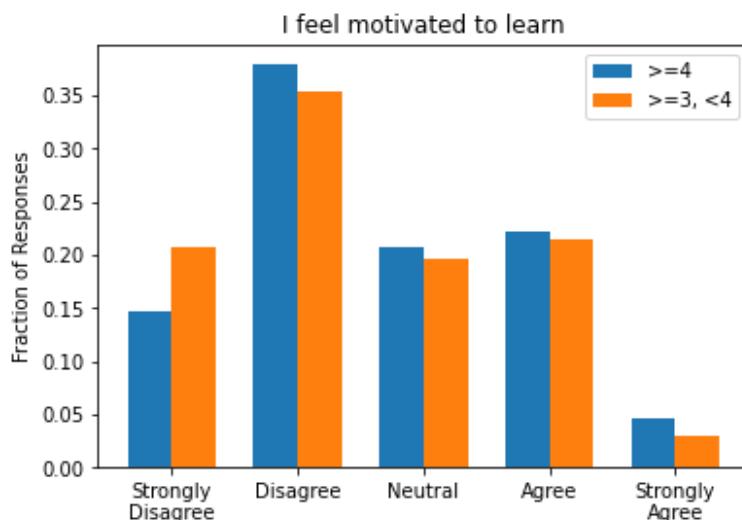


```
>=4 shape: (15, 43), >=2, <4 shape: (176, 43)
MWU results:  MannwhitneyuResult(statistic=1441.5, pvalue=0.54445937847
12749)
>=4 median: 3.0
>=2, <4 median: 3.0
cohens d: 0.167
f: 0.546
```

```
-----  
LIA  
4    0.296736  
3    0.243917  
5    0.239169  
6    0.138872  
7    0.080119  
8    0.001187  
Name: num_techniques, dtype: float64
```

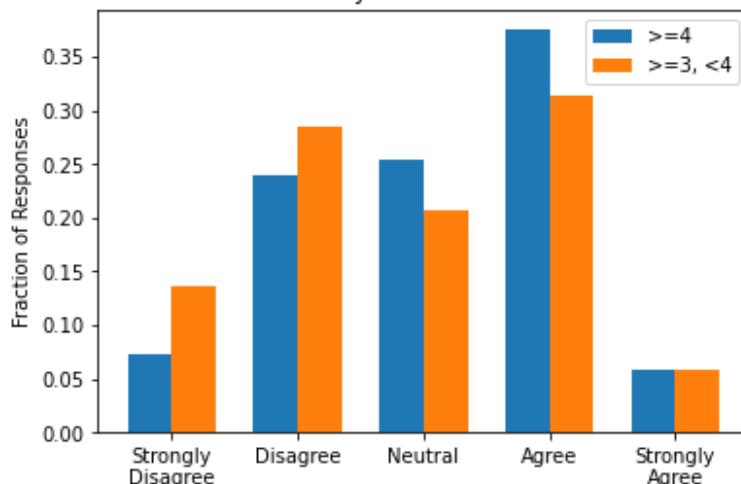


```
>=4 shape: (1274, 43), >=3, <4 shape: (411, 43)
MWU results: MannwhitneyuResult(statistic=275007.5, pvalue=0.111401154
95055648)
>=4 median: 3.0
>=3, <4 median: 3.0
cohens d: 0.0818
f: 0.525
```



```
>=4 shape: (1274, 43), >=3, <4 shape: (411, 43)
MWU results: MannwhitneyuResult(statistic=279116.5, pvalue=0.035859929
72648333)
>=4 median: 2.0
>=3, <4 median: 2.0
cohens d: 0.12
f: 0.533
```

**I am satisfied with the instruction
of my online courses**



`>=4 shape: (1274, 43), >=3, <4 shape: (411, 43)`

`MWU results: MannwhitneyuResult(statistic=290928.5, pvalue=0.0004074491130933304)`

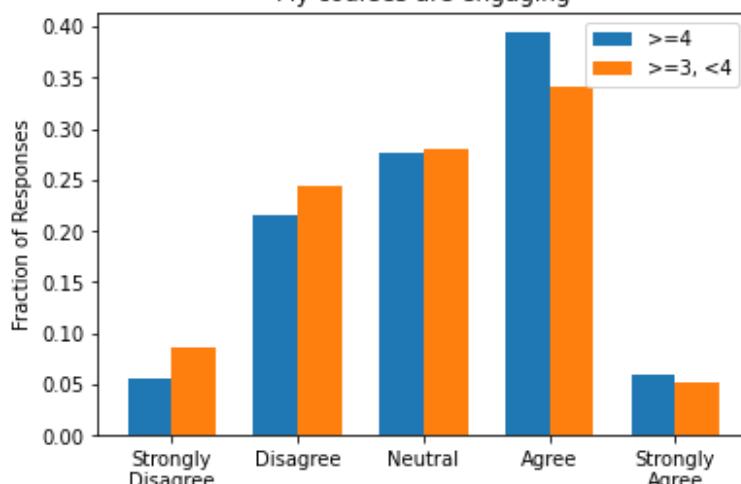
`>=4 median: 3.0`

`>=3, <4 median: 3.0`

`cohens d: 0.213`

`f: 0.556`

My courses are engaging



`>=4 shape: (1274, 43), >=3, <4 shape: (411, 43)`

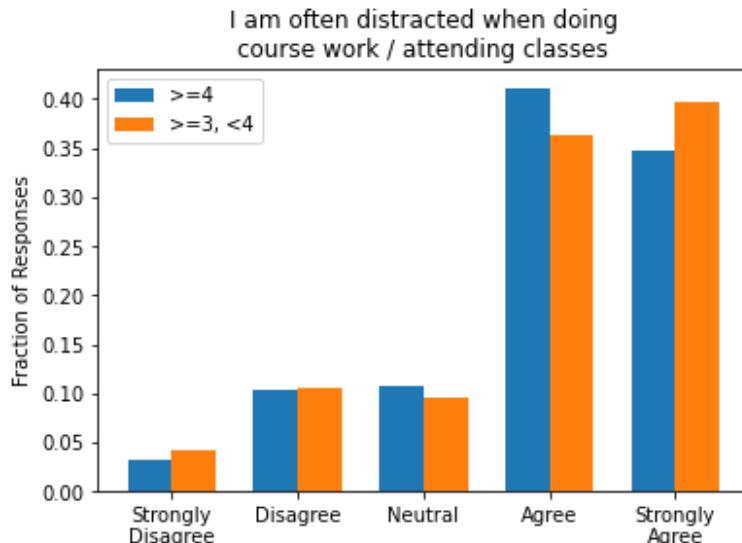
`MWU results: MannwhitneyuResult(statistic=282970.0, pvalue=0.009778735158108424)`

`>=4 median: 3.0`

`>=3, <4 median: 3.0`

`cohens d: 0.152`

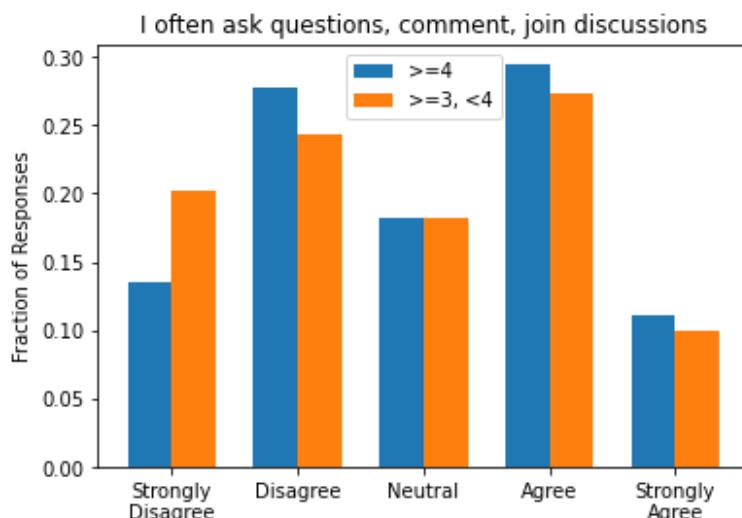
`f: 0.54`



```

>=4 shape: (1274, 43), >=3, <4 shape: (411, 43)
MWU results: MannwhitneyuResult(statistic=252663.0, pvalue=0.257945679
96217577)
>=4 median: 4.0
>=3, <4 median: 4.0
cohens d: -0.0286
f: 0.483

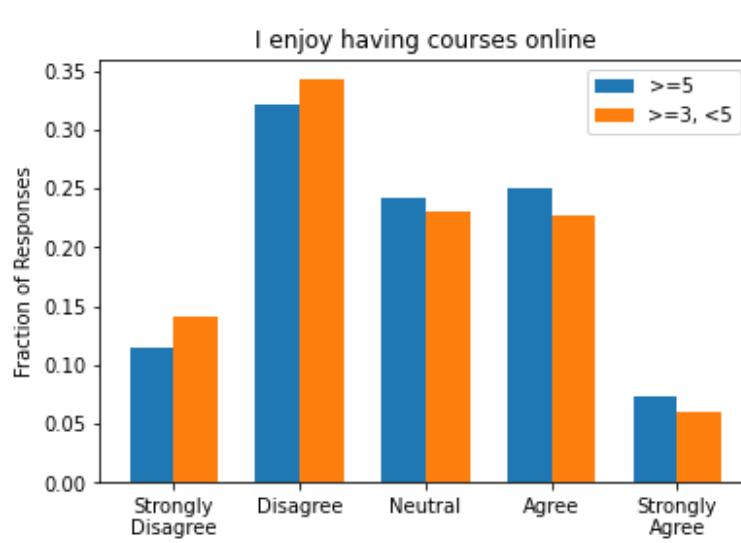
```



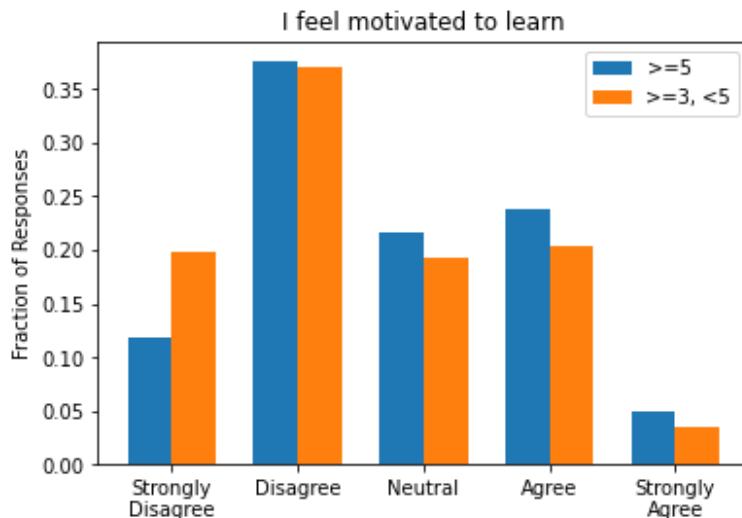
```

>=4 shape: (1274, 43), >=3, <4 shape: (411, 43)
MWU results: MannwhitneyuResult(statistic=278186.5, pvalue=0.049547950
32853753)
>=4 median: 3.0
>=3, <4 median: 3.0
cohens d: 0.113
f: 0.531

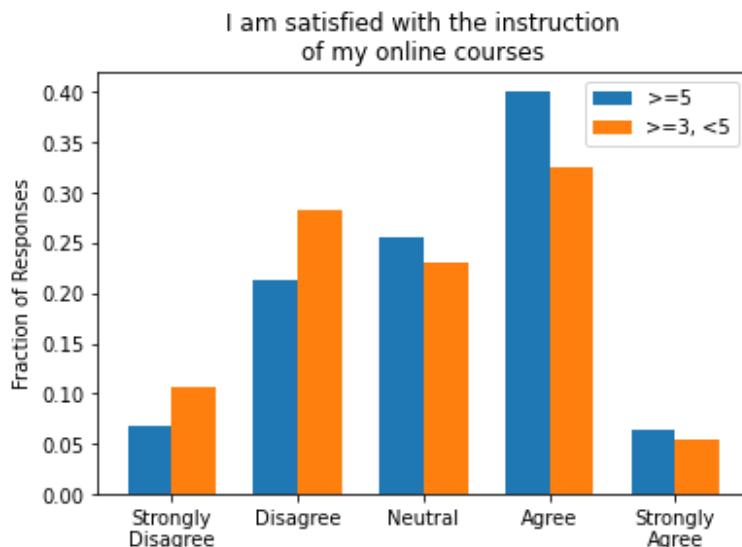
```



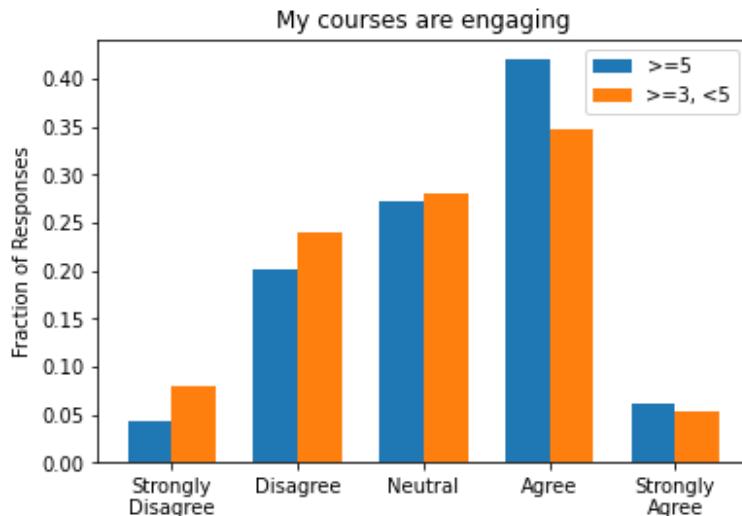
```
>=5 shape: (774, 43), >=3, <5 shape: (911, 43)
MWU results: MannwhitneyuResult(statistic=374117.5, pvalue=0.025048805
351551465)
>=5 median: 3.0
>=3, <5 median: 3.0
cohens d: 0.11
f: 0.531
```



```
>=5 shape: (774, 43), >=3, <5 shape: (911, 43)
MWU results: MannwhitneyuResult(statistic=390753.5, pvalue=6.591874409
990302e-05)
>=5 median: 3.0
>=3, <5 median: 2.0
cohens d: 0.192
f: 0.554
```



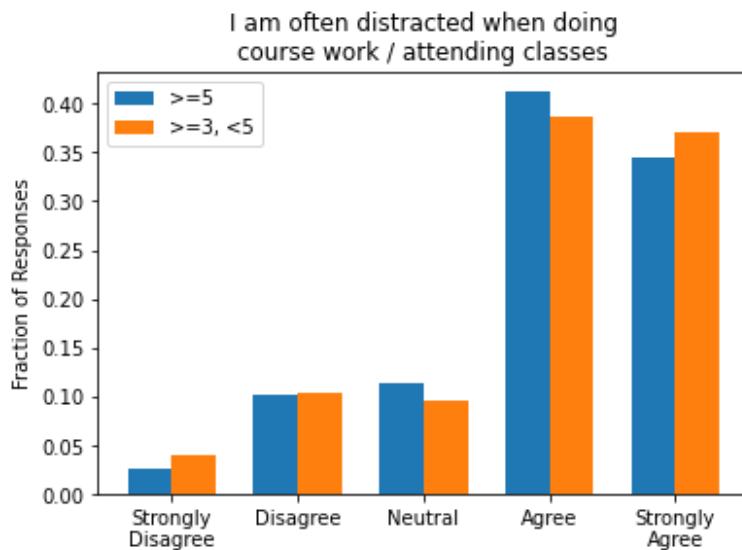
```
>=5 shape: (774, 43), >=3, <5 shape: (911, 43)
MWU results: MannwhitneyuResult(statistic=395515.5, pvalue=6.991108222
822298e-06)
>=5 median: 3.0
>=3, <5 median: 3.0
cohens d: 0.223
f: 0.561
```



```

>=5 shape: (774, 43), >=3, <5 shape: (911, 43)
MWU results: MannwhitneyuResult(statistic=389196.5, pvalue=0.000115955
58097308035)
>=5 median: 3.0
>=3, <5 median: 3.0
cohens d: 0.194
f: 0.552

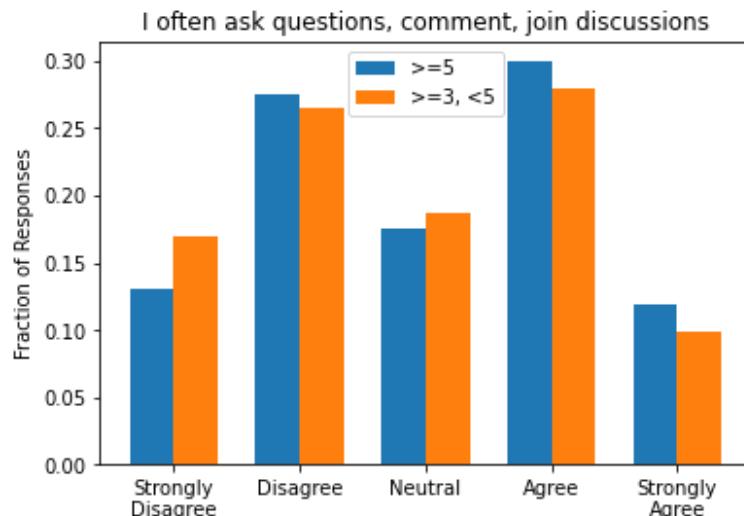
```



```

>=5 shape: (774, 43), >=3, <5 shape: (911, 43)
MWU results: MannwhitneyuResult(statistic=347149.5, pvalue=0.564292544
0816569)
>=5 median: 4.0
>=3, <5 median: 4.0
cohens d: 0.00158
f: 0.492

```



```
>=5 shape: (774, 43), >=3, <5 shape: (911, 43)
MWU results:  MannwhitneyuResult(statistic=372157.5, pvalue=0.042854413
39621971)
>=5 median: 3.0
>=3, <5 median: 3.0
cohens d: 0.1
f: 0.528
```

```
In [ ]: num_tech_diversity_controlled_undergrad[0][0]
```

```
Out[ ]:
```

	question	>=2 median (n = 205)	>=1, <2 median (n = 378)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.28	0.579	0.00119
1	remote_motivated	2.0	2.0	0.259	0.573	0.00227
2	remote_satisfied	3.0	2.0	0.275	0.577	0.00153
3	remote_engaging	3.0	3.0	0.217	0.56	0.0134
4	remote_distracted	4.0	4.0	0.0685	0.505	0.832
5	remote_questions	3.0	2.0	0.231	0.569	0.00446

In []: num_tech_diversity_controlled_undergrad[0][2]

Out[]:

	question	>=3 median (n = 37)	>=1, <3 median (n = 546)	cohens d	f	p-value
0	remote_enjoy	3.0		2.0	0.211	0.569
1	remote_motivated	2.0		2.0	0.118	0.54
2	remote_satisfied	3.0		2.0	0.398	0.616
3	remote_engaging	3.0		3.0	0.131	0.536
4	remote_distracted	4.0		4.0	0.129	0.544
5	remote_questions	3.0		2.0	0.208	0.562

In []: num_tech_diversity_controlled_undergrad[1][0]

Out[]:

	question	>=2 median (n = 170)	>=1, <2 median (n = 399)	cohens d	f	p-value
0	remote_enjoy	2.0		2.0	0.138	0.542
1	remote_motivated	2.0		2.0	0.188	0.559
2	remote_satisfied	3.0		2.0	0.496	0.635
3	remote_engaging	3.0		3.0	0.237	0.569
4	remote_distracted	4.0		4.0	0.129	0.525
5	remote_questions	2.5		2.0	0.0542	0.515

In []: num_tech_diversity_controlled_undergrad[1][2]

Out[]:

	question	>=3 median (n = 21)	>=1, <3 median (n = 548)	cohens d	f	p-value
0	remote_enjoy	3.0		2.0	0.296	0.592
1	remote_motivated	2.0		2.0	0.368	0.622
2	remote_satisfied	4.0		2.0	0.816	0.723
3	remote_engaging	3.0		3.0	0.521	0.642
4	remote_distracted	5.0		4.0	0.328	0.613
5	remote_questions	3.0		2.0	0.275	0.57

In []: num_tech_diversity_controlled_undergrad[2][0]

Out[]:

	question	>=2 median (n = 6)	>=1, <2 median (n = 160)	cohens d	f	p-value
0	remote_enjoy	2.0		2.0	0.0271	0.525
1	remote_motivated	2.5		2.0	-0.0138	0.504
2	remote_satisfied	2.0		2.0	-0.264	0.426
3	remote_engaging	2.0		3.0	-0.375	0.386
4	remote_distracted	4.0		4.0	0.271	0.52
5	remote_questions	2.5		2.0	0.431	0.62

In []: num_tech_diversity_controlled_undergrad[2][2]

Out[]:

	question	>=3 median (n = 1)	>=1, <3 median (n = 165)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	nan	0.397	0.72
1	remote_motivated	3.0	2.0	nan	0.706	0.468
2	remote_satisfied	2.0	2.0	nan	0.397	0.721
3	remote_engaging	2.0	3.0	nan	0.285	0.447
4	remote_distracted	5.0	4.0	nan	0.845	0.206
5	remote_questions	5.0	2.0	nan	0.967	0.0994

In []: num_tech_diversity_controlled_undergrad[3][0]

Out[]:

	question	>=3 median (n = 582)	>=2, <3 median (n = 309)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.0956	0.529	0.138
1	remote_motivated	2.0	2.0	0.084	0.524	0.211
2	remote_satisfied	3.0	3.0	0.15	0.542	0.0311
3	remote_engaging	3.0	3.0	0.128	0.535	0.0765
4	remote_distracted	4.0	4.0	0.0762	0.51	0.602
5	remote_questions	3.0	2.0	0.139	0.538	0.0552

In []: num_tech_diversity_controlled_undergrad[3][2]

Out[]:

	question	>=4 median (n = 239)	>=2, <4 median (n = 652)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.0998	0.528	0.18
1	remote_motivated	2.0	2.0	0.21	0.557	0.00664
2	remote_satisfied	3.0	3.0	0.224	0.562	0.00304
3	remote_engaging	3.0	3.0	0.14	0.542	0.0484
4	remote_distracted	4.0	4.0	-0.00116	0.498	0.935
5	remote_questions	3.0	3.0	0.052	0.513	0.535

In []: num_tech_diversity_controlled_undergrad[4][0]

Out[]:

	question	>=3 median (n = 266)	>=2, <3 median (n = 372)	cohens d	f	p-value
0	remote_enjoy	3.0	2.5	0.0332	0.51	0.665
1	remote_motivated	2.0	2.0	0.104	0.531	0.166
2	remote_satisfied	3.0	3.0	0.206	0.557	0.0104
3	remote_engaging	3.0	3.0	0.247	0.566	0.00302
4	remote_distracted	4.0	4.0	0.00253	0.489	0.629
5	remote_questions	3.0	3.0	0.143	0.539	0.0832

In []: num_tech_diversity_controlled_undergrad[4][2]

Out[]:

	question	>=4 median (n = 56)	>=2, <4 median (n = 582)	cohens d	f	p-value
0	remote_enjoy	3.0		3.0	0.138	0.539
1	remote_motivated	2.0		2.0	0.0453	0.508
2	remote_satisfied	3.0		3.0	0.321	0.587
3	remote_engaging	3.0		3.0	0.405	0.612
4	remote_distracted	4.0		4.0	0.149	0.536
5	remote_questions	3.0		3.0	-0.0164	0.495

In []: num_tech_diversity_controlled_undergrad[5][0]

Out[]:

	question	>=3 median (n = 65)	>=2, <3 median (n = 126)	cohens d	f	p-value
0	remote_enjoy	3.0		2.0	0.127	0.534
1	remote_motivated	2.0		2.0	-0.0713	0.457
2	remote_satisfied	3.0		3.0	0.2	0.551
3	remote_engaging	3.0		3.0	0.19	0.548
4	remote_distracted	4.0		4.0	-0.0539	0.476
5	remote_questions	2.0		3.0	-0.0551	0.485

In []: num_tech_diversity_controlled_undergrad[5][2]

Out[]:

	question	>=4 median (n = 15)	>=2, <4 median (n = 176)	cohens d	f	p-value
0	remote_enjoy	3.0		2.0	0.428	0.613
1	remote_motivated	3.0		2.0	0.581	0.624
2	remote_satisfied	3.0		3.0	0.476	0.632
3	remote_engaging	3.0		3.0	0.223	0.563
4	remote_distracted	4.0		4.0	-0.0386	0.481
5	remote_questions	3.0		3.0	0.167	0.546

In []: num_tech_diversity_controlled_undergrad[6][0]

Out[]:

	question	>=4 median (n = 1274)	>=3, <4 median (n = 411)	cohens d	f	p-value
0	remote_enjoy	3.0		3.0	0.0818	0.525
1	remote_motivated	2.0		2.0	0.12	0.533
2	remote_satisfied	3.0		3.0	0.213	0.556
3	remote_engaging	3.0		3.0	0.152	0.54
4	remote_distracted	4.0		4.0	-0.0286	0.483
5	remote_questions	3.0		3.0	0.113	0.531

```
In [ ]: num_tech_diversity_controlled_undergrad[6][2]
```

Out[]:

	question	>=5 median (n = 774)	>=3, <5 median (n = 911)	cohens d	f	p-value
0	remote_enjoy	3.0	3.0	0.11	0.531	0.025
1	remote_motivated	3.0	2.0	0.192	0.554	6.59e-05
2	remote_satisfied	3.0	3.0	0.223	0.561	6.99e-06
3	remote_engaging	3.0	3.0	0.194	0.552	0.000116
4	remote_distracted	4.0	4.0	0.00158	0.492	0.564
5	remote_questions	3.0	3.0	0.1	0.528	0.0429

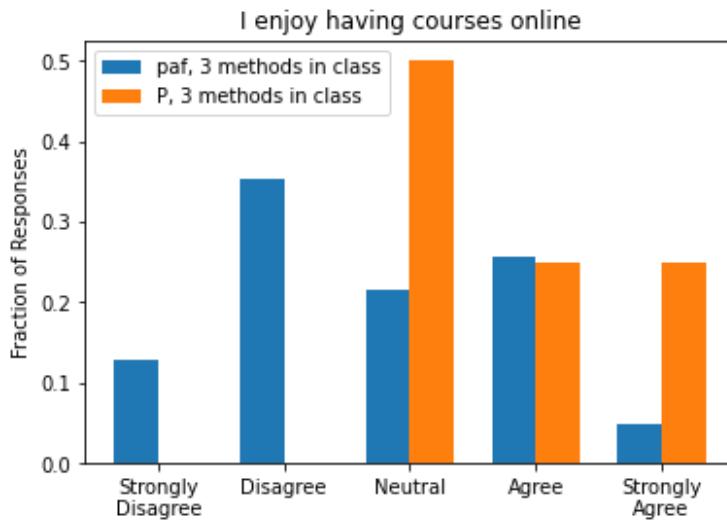
Effects of diversity of methods and techniques, controlling for number

```
In [ ]: for cat in ugcats:
    print(cat.name)
    print(cat['num_methods'].value_counts(normalize=True))

P
1    0.778656
2    0.167325
0    0.047431
3    0.005270
4    0.001318
Name: num_methods, dtype: float64
A
1    0.729904
2    0.189711
0    0.077170
3    0.003215
Name: num_methods, dtype: float64
F
1    0.752874
2    0.178161
0    0.045977
3    0.017241
4    0.005747
Name: num_methods, dtype: float64
PA
2    0.517365
3    0.330539
4    0.117365
0    0.020359
5    0.014371
Name: num_methods, dtype: float64
PF
2    0.609756
3    0.339024
4    0.041463
0    0.009756
Name: num_methods, dtype: float64
AF
2    0.502128
3    0.319149
4    0.144681
0    0.029787
5    0.004255
Name: num_methods, dtype: float64
PAF
4    0.331822
3    0.282865
5    0.213962
6    0.097915
7    0.052584
0    0.019039
9    0.000907
8    0.000907
Name: num_methods, dtype: float64
```

```
In [ ]: # 3 types vs. 1 and 2 types, controlled for number of methods
three_vs_2_and_1_type = []
for num in [3, 4, 5]:
    a = ugcats[ugcats['num_methods']==num]
    a.name = f'paf, {num} methods in class'
    subset_ls.append(a)
    subset_name.append(a.name)
    for i in range(len(ugcats)-1):
        b = ugcats[i][ugcats[i]['num_methods']==num]
        b.name = f'{ugcats[i].name}, {num} methods in class'
        subset_ls.append(b)
        subset_name.append(b.name)
        print(a.name, a.shape[0], b.name, b.shape[0])
    three_vs_2_and_1_type.append(mwu_comparison(a, b))
```

paf, 3 methods in class 312 P, 3 methods in class 4



paf, 3 methods in class shape: (312, 43), P, 3 methods in class shape: (4, 43)

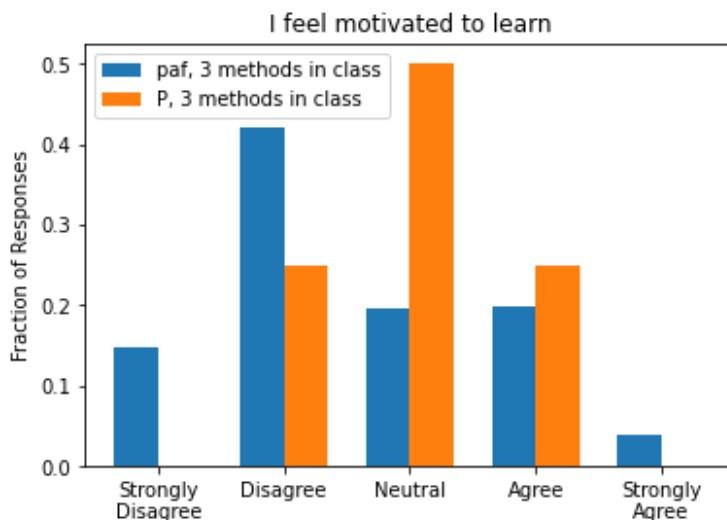
MWU results: MannwhitneyuResult(statistic=319.5, pvalue=0.08227720166795185)

paf, 3 methods in class median: 3.0

P, 3 methods in class median: 3.5

cohens d: -0.9

f: 0.256



paf, 3 methods in class shape: (312, 43), P, 3 methods in class shape: (4, 43)

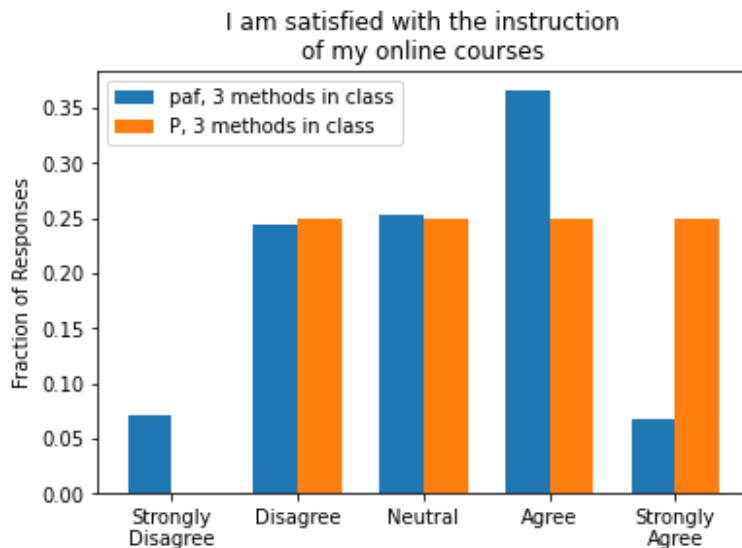
MWU results: MannwhitneyuResult(statistic=452.5, pvalue=0.32302083860831776)

paf, 3 methods in class median: 2.0

P, 3 methods in class median: 3.0

cohens d: -0.406

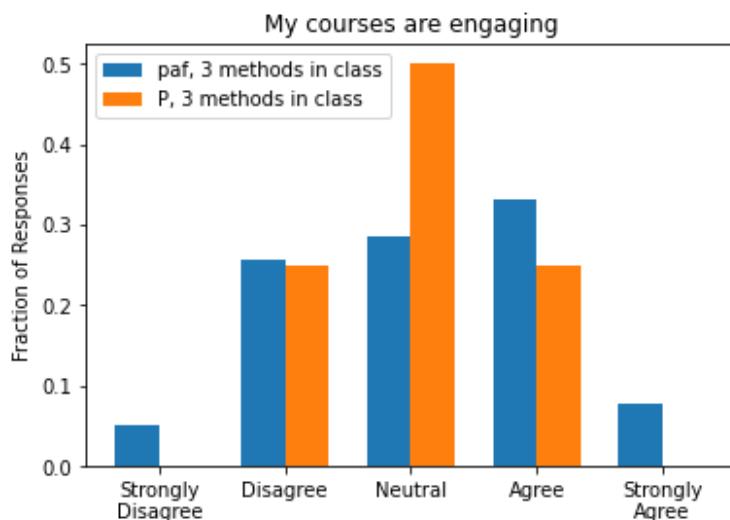
f: 0.363



```

paf, 3 methods in class shape: (312, 43), P, 3 methods in class shape: (4, 43)
MWU results: MannwhitneyuResult(statistic=515.0, pvalue=0.533381439724
2431)
paf, 3 methods in class median: 3.0
P, 3 methods in class median: 3.5
cohens d: -0.358
f: 0.413

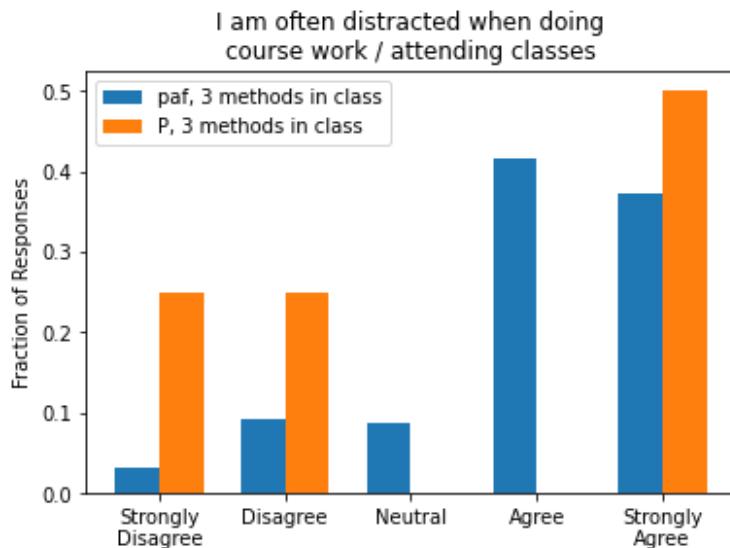
```



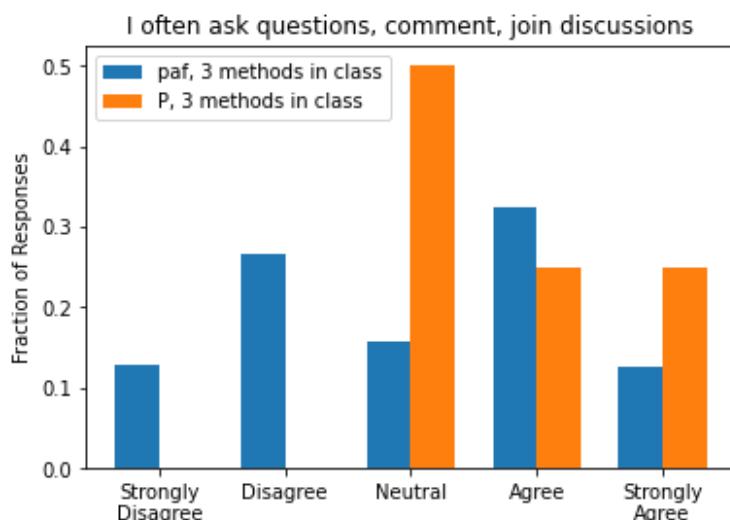
```

paf, 3 methods in class shape: (312, 43), P, 3 methods in class shape: (4, 43)
MWU results: MannwhitneyuResult(statistic=674.5, pvalue=0.774403288835
8043)
paf, 3 methods in class median: 3.0
P, 3 methods in class median: 3.0
cohens d: 0.12
f: 0.54

```

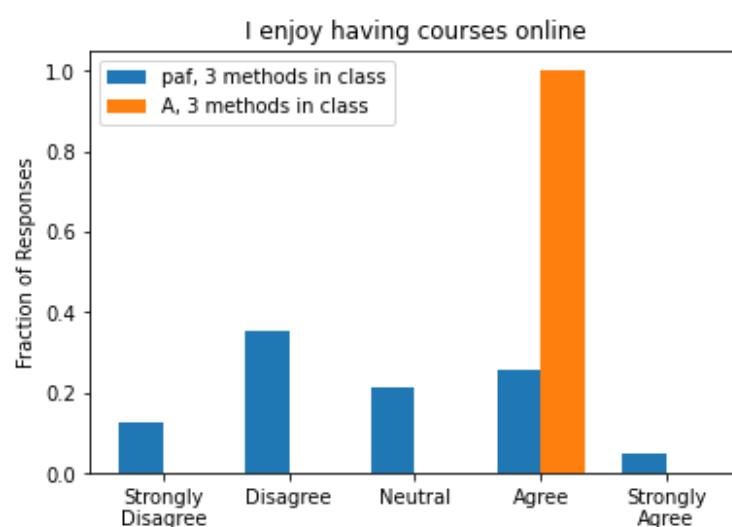


```
paf, 3 methods in class shape: (312, 43), P, 3 methods in class shape: (4, 43)
MWU results: MannwhitneyuResult(statistic=710.5, pvalue=0.612976569985
1799)
paf, 3 methods in class median: 4.0
P, 3 methods in class median: 3.5
cohens d: 0.702
f: 0.569
```

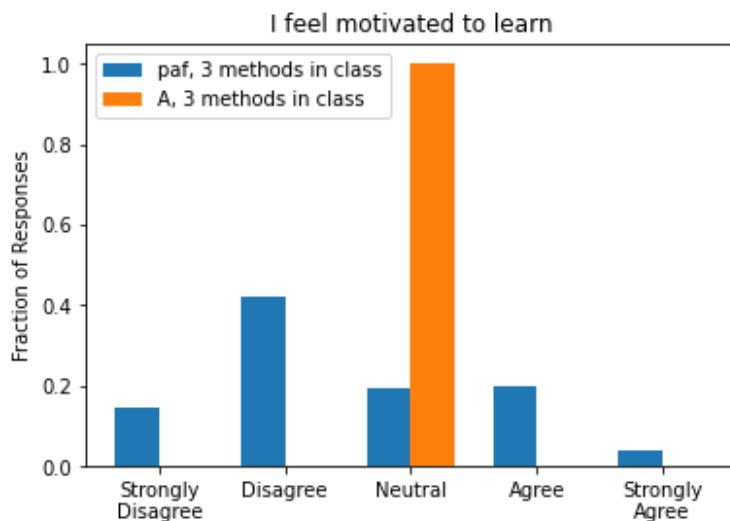


```
paf, 3 methods in class shape: (312, 43), P, 3 methods in class shape: (4, 43)
MWU results: MannwhitneyuResult(statistic=438.0, pvalue=0.292001081245
63406)
paf, 3 methods in class median: 3.0
P, 3 methods in class median: 3.5
cohens d: -0.553
f: 0.351
```

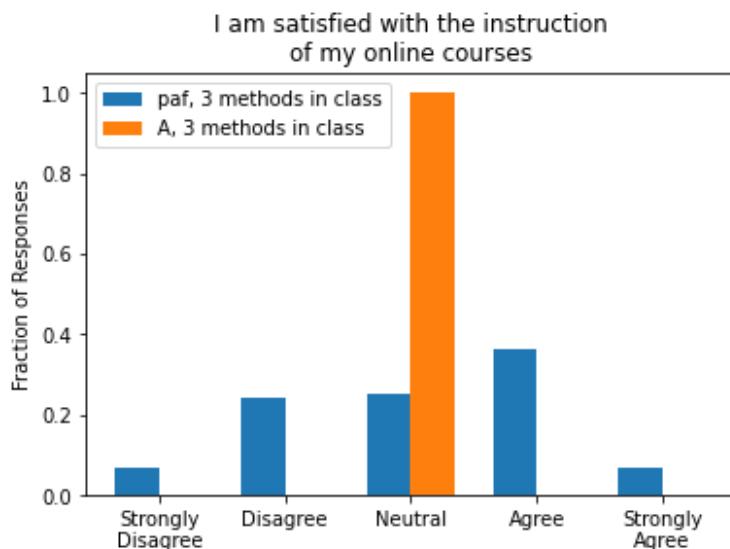
paf, 3 methods in class 312 A, 3 methods in class 1



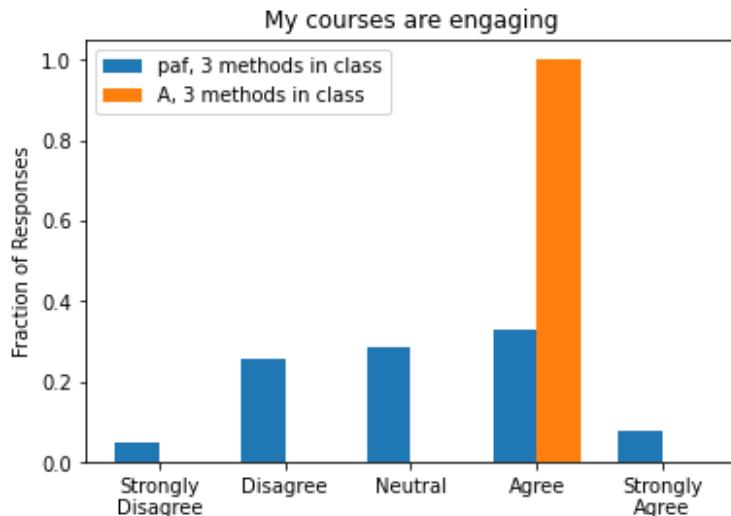
```
paf, 3 methods in class shape: (312, 43), A, 3 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=55.0, pvalue=0.2480577073254
6006)
paf, 3 methods in class median: 3.0
A, 3 methods in class median: 4.0
cohens d: nan
f: 0.176
```



```
paf, 3 methods in class shape: (312, 43), A, 3 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=104.5, pvalue=0.553601475784
985)
paf, 3 methods in class median: 2.0
A, 3 methods in class median: 3.0
cohens d: nan
f: 0.335
```



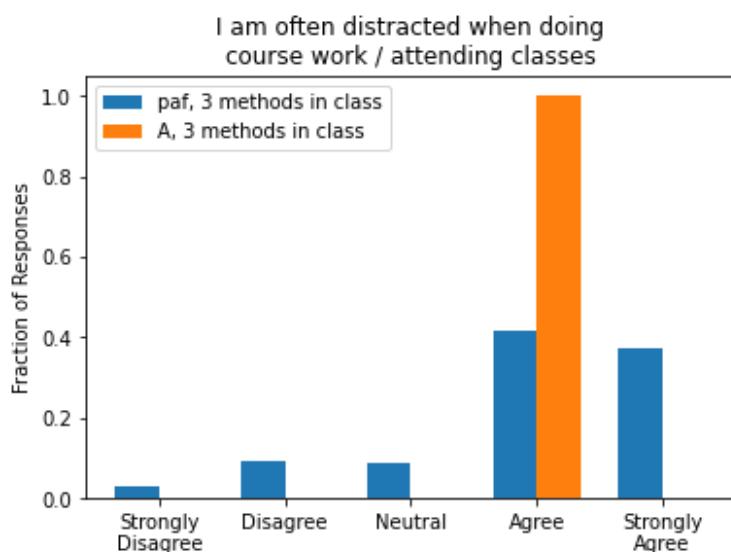
```
paf, 3 methods in class shape: (312, 43), A, 3 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=174.5, pvalue=0.835469611361
3583)
paf, 3 methods in class median: 3.0
A, 3 methods in class median: 3.0
cohens d: nan
f: 0.559
```



```

paf, 3 methods in class shape: (312, 43), A, 3 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=75.5, pvalue=0.3567569335739
078)
paf, 3 methods in class median: 3.0
A, 3 methods in class median: 4.0
cohens d: nan
f: 0.242

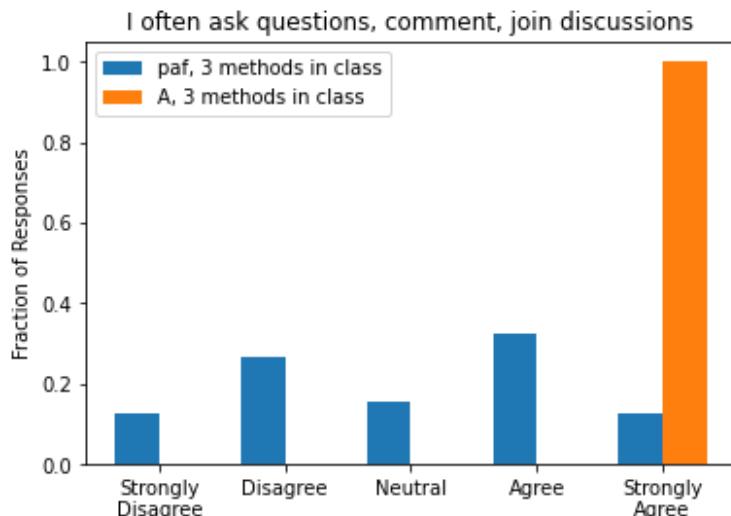
```



```

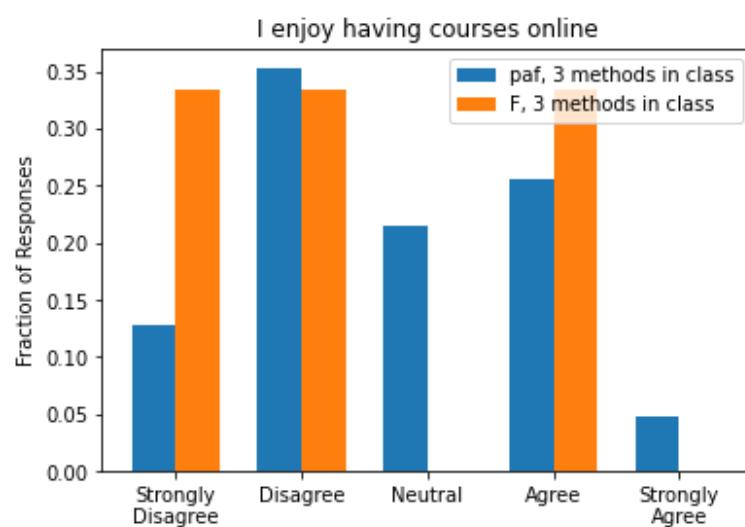
paf, 3 methods in class shape: (312, 43), A, 3 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=181.0, pvalue=0.771826176659
6631)
paf, 3 methods in class median: 4.0
A, 3 methods in class median: 4.0
cohens d: nan
f: 0.58

```

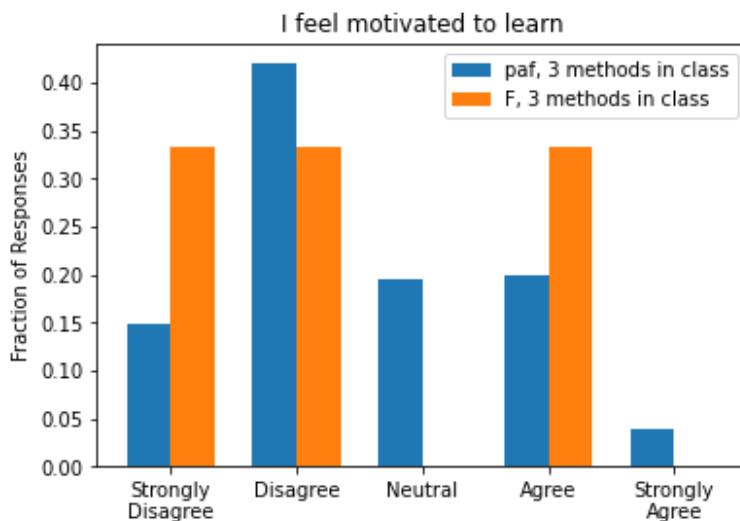


```
paf, 3 methods in class shape: (312, 43), A, 3 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=19.5, pvalue=0.1205007361847
7583)
paf, 3 methods in class median: 3.0
A, 3 methods in class median: 5.0
cohens d: nan
f: 0.0625
```

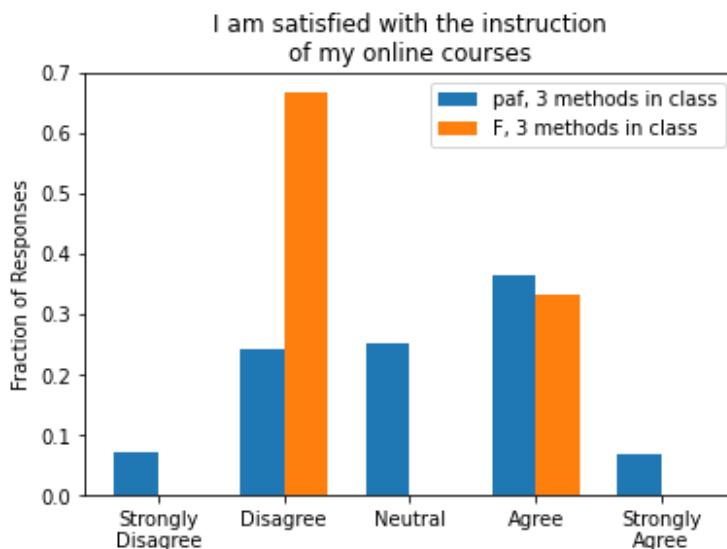
paf, 3 methods in class 312 F, 3 methods in class 3



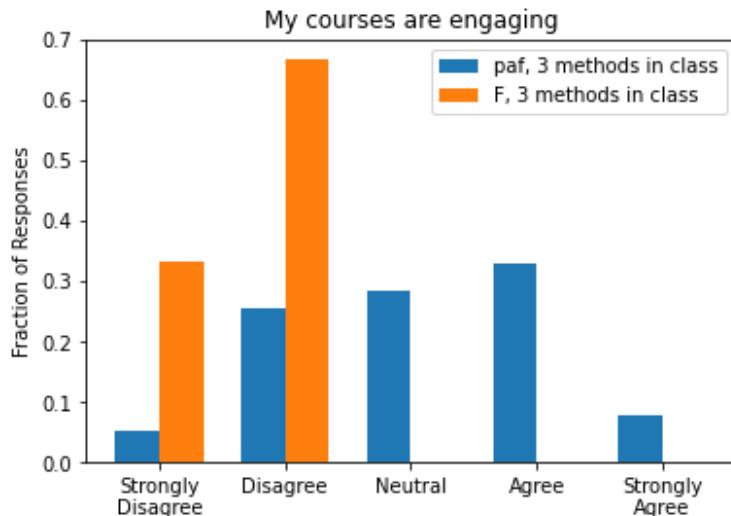
```
paf, 3 methods in class shape: (312, 43), F, 3 methods in class shape: (3, 43)
MWU results: MannwhitneyuResult(statistic=564.0, pvalue=0.527594286442
0999)
paf, 3 methods in class median: 3.0
F, 3 methods in class median: 2.0
cohens d: 0.366
f: 0.603
```



```
paf, 3 methods in class shape: (312, 43), F, 3 methods in class shape: (3, 43)
MWU results: MannwhitneyuResult(statistic=532.5, pvalue=0.668755957588
056)
paf, 3 methods in class median: 2.0
F, 3 methods in class median: 2.0
cohens d: 0.209
f: 0.569
```



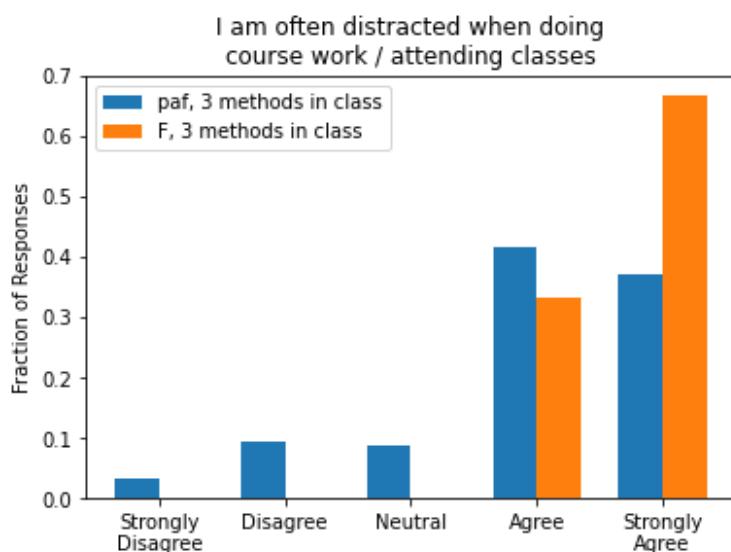
```
paf, 3 methods in class shape: (312, 43), F, 3 methods in class shape: (3, 43)
MWU results: MannwhitneyuResult(statistic=582.0, pvalue=0.450956308054
53324)
paf, 3 methods in class median: 3.0
F, 3 methods in class median: 2.0
cohens d: 0.418
f: 0.622
```



```

paf, 3 methods in class shape: (312, 43), F, 3 methods in class shape: (3, 43)
MWU results: MannwhitneyuResult(statistic=816.0, pvalue=0.021316347566
619376)
paf, 3 methods in class median: 3.0
F, 3 methods in class median: 2.0
cohens d: 1.4
f: 0.872

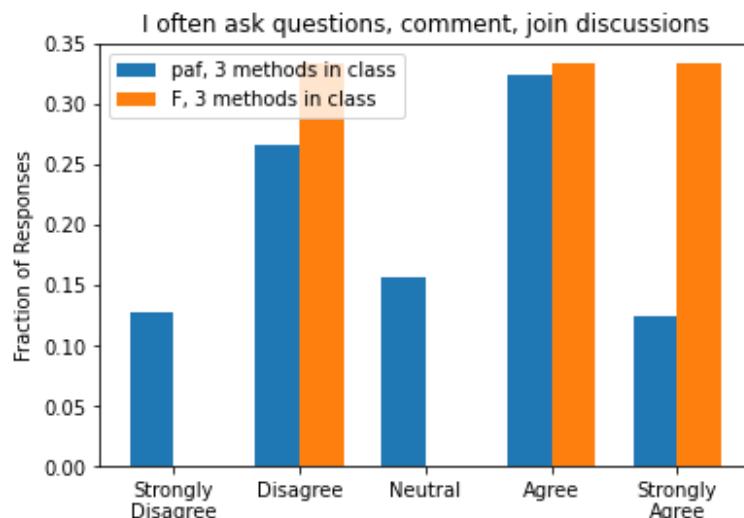
```



```

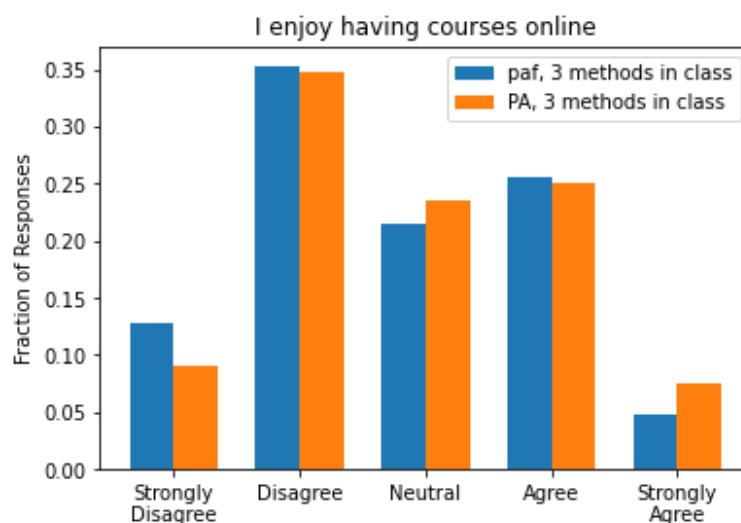
paf, 3 methods in class shape: (312, 43), F, 3 methods in class shape: (3, 43)
MWU results: MannwhitneyuResult(statistic=297.0, pvalue=0.245394965220
34554)
paf, 3 methods in class median: 4.0
F, 3 methods in class median: 5.0
cohens d: -0.628
f: 0.317

```

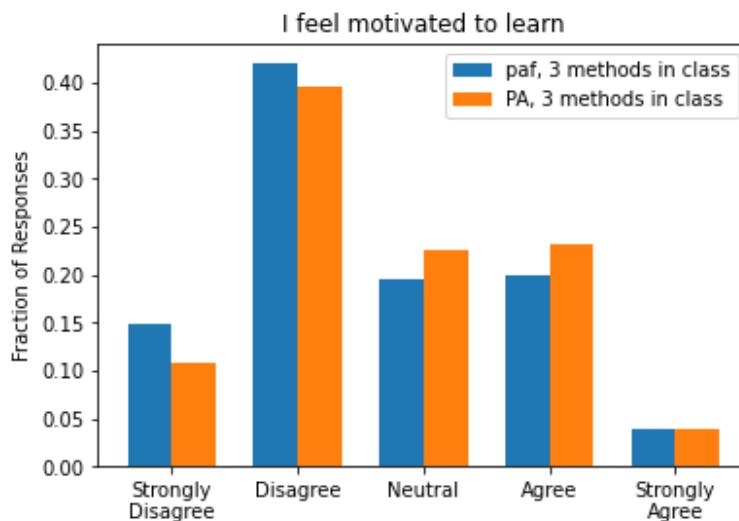


```
paf, 3 methods in class shape: (312, 43), F, 3 methods in class shape: (3, 43)
MWU results: MannwhitneyuResult(statistic=339.5, pvalue=0.400200376534
03673)
paf, 3 methods in class median: 3.0
F, 3 methods in class median: 4.0
cohens d: -0.485
f: 0.363
```

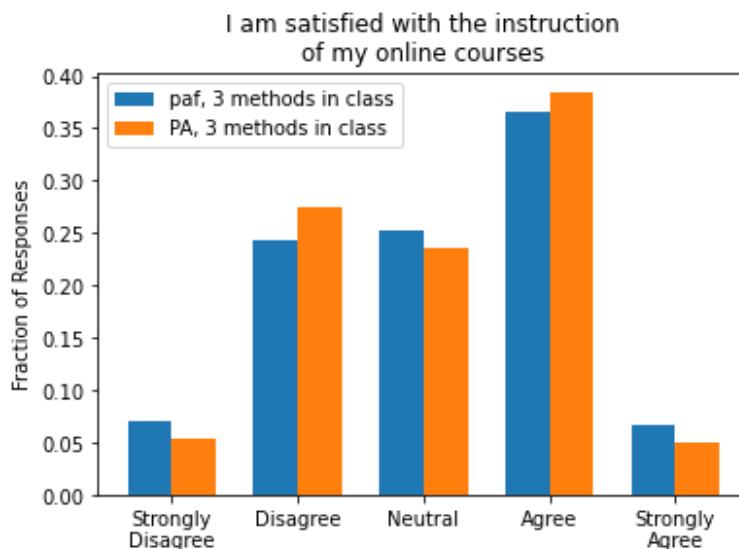
paf, 3 methods in class 312 PA, 3 methods in class 276



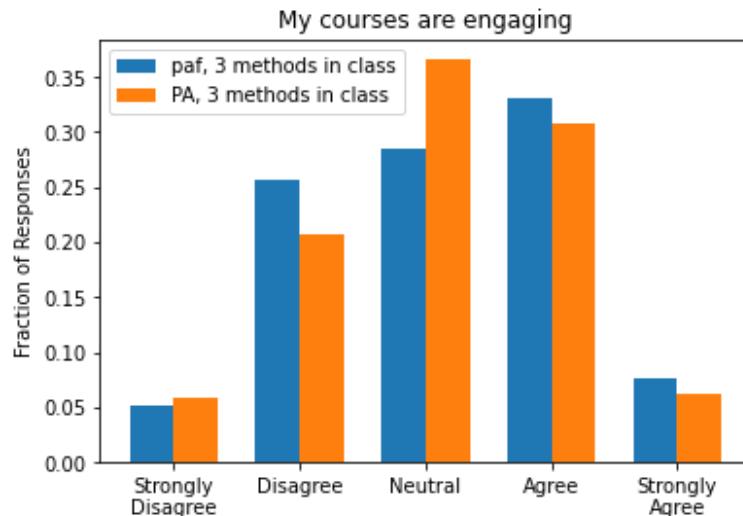
paf, 3 methods in class shape: (312, 43), PA, 3 methods in class shape: (276, 43)
 MWU results: MannwhitneyuResult(statistic=40437.0, pvalue=0.1860806634
 3745033)
 paf, 3 methods in class median: 3.0
 PA, 3 methods in class median: 3.0
 cohens d: -0.116
 f: 0.47



paf, 3 methods in class shape: (312, 43), PA, 3 methods in class shape: (276, 43)
 MWU results: MannwhitneyuResult(statistic=39821.5, pvalue=0.0992947087
 8832858)
 paf, 3 methods in class median: 2.0
 PA, 3 methods in class median: 2.0
 cohens d: -0.129
 f: 0.462



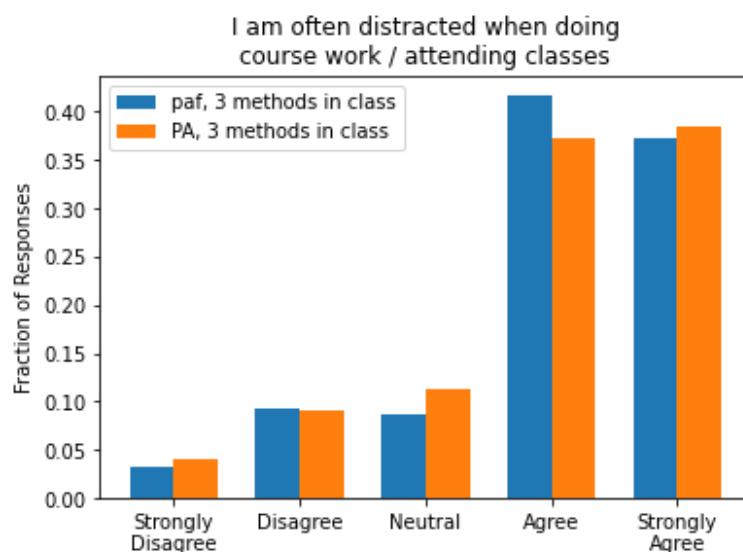
paf, 3 methods in class shape: (312, 43), PA, 3 methods in class shape: (276, 43)
 MWU results: MannwhitneyuResult(statistic=43424.5, pvalue=0.8515767634
 339437)
 paf, 3 methods in class median: 3.0
 PA, 3 methods in class median: 3.0
 cohens d: 0.0132
 f: 0.504



```

paf, 3 methods in class shape: (312, 43), PA, 3 methods in class shape: (276, 43)
MWU results: MannwhitneyuResult(statistic=43399.0, pvalue=0.8621432677
196835)
paf, 3 methods in class median: 3.0
PA, 3 methods in class median: 3.0
cohens d: 0.016
f: 0.504

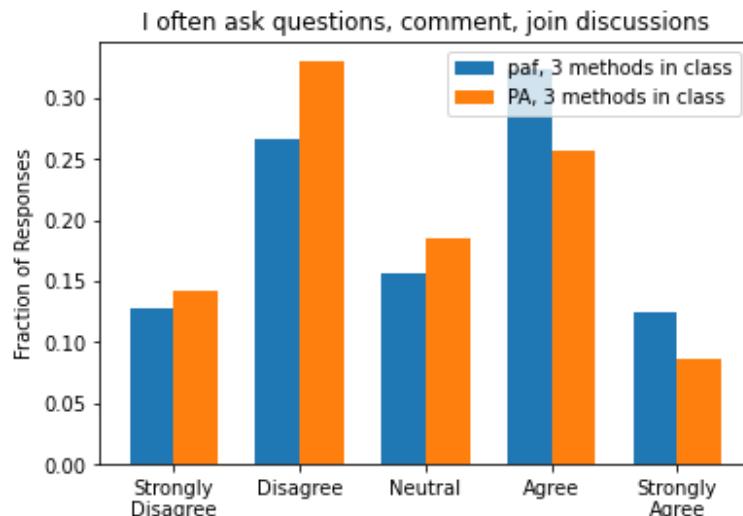
```



```

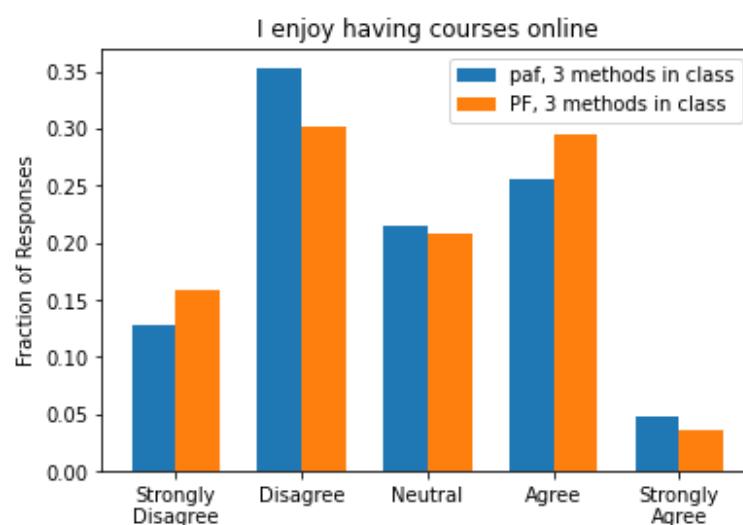
paf, 3 methods in class shape: (312, 43), PA, 3 methods in class shape: (276, 43)
MWU results: MannwhitneyuResult(statistic=43400.0, pvalue=0.8588104049
202061)
paf, 3 methods in class median: 4.0
PA, 3 methods in class median: 4.0
cohens d: 0.0298
f: 0.504

```

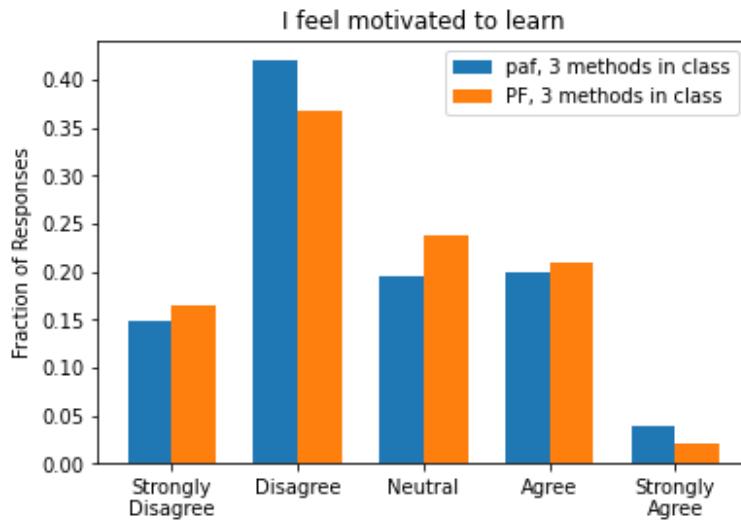


```
paf, 3 methods in class shape: (312, 43), PA, 3 methods in class shape:  
(276, 43)  
MWU results: MannwhitneyuResult(statistic=47575.5, pvalue=0.0234171035  
97923993)  
paf, 3 methods in class median: 3.0  
PA, 3 methods in class median: 3.0  
cohens d: 0.187  
f: 0.552
```

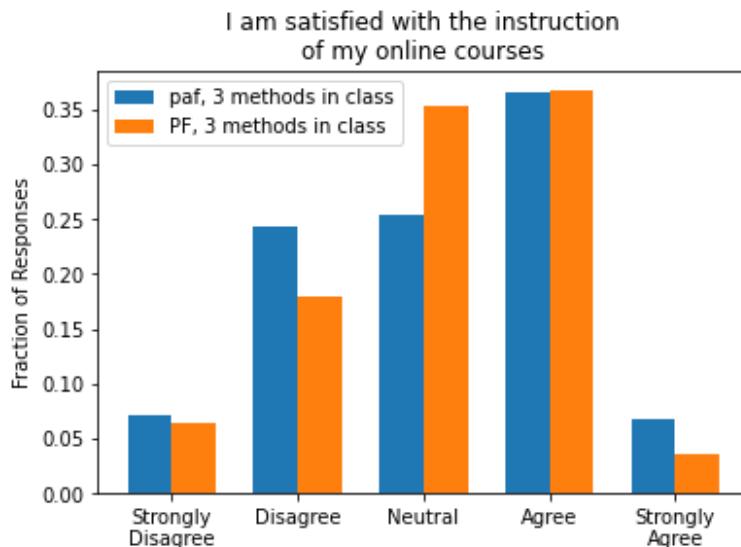
paf, 3 methods in class 312 PF, 3 methods in class 139



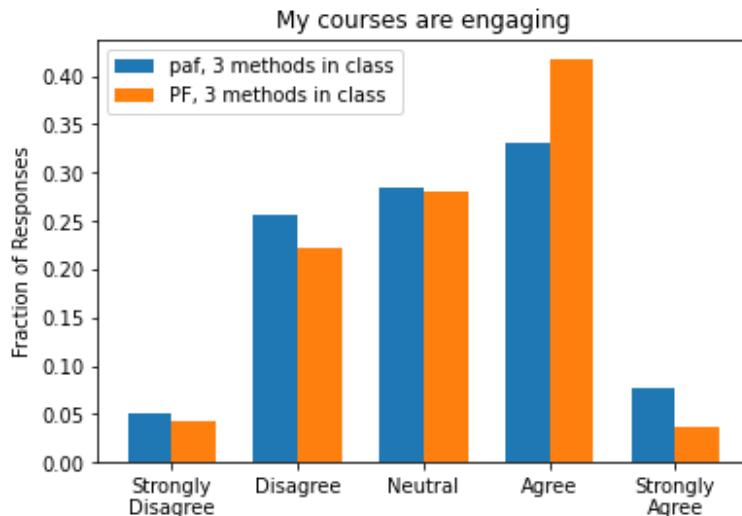
paf, 3 methods in class shape: (312, 43), PF, 3 methods in class shape: (139, 43)
 MWU results: MannwhitneyuResult(statistic=21557.0, pvalue=0.9182579996
 473849)
 paf, 3 methods in class median: 3.0
 PF, 3 methods in class median: 3.0
 cohens d: -0.00409
 f: 0.497



paf, 3 methods in class shape: (312, 43), PF, 3 methods in class shape: (139, 43)
 MWU results: MannwhitneyuResult(statistic=21586.0, pvalue=0.9363805328
 590128)
 paf, 3 methods in class median: 2.0
 PF, 3 methods in class median: 2.0
 cohens d: 0.00644
 f: 0.498



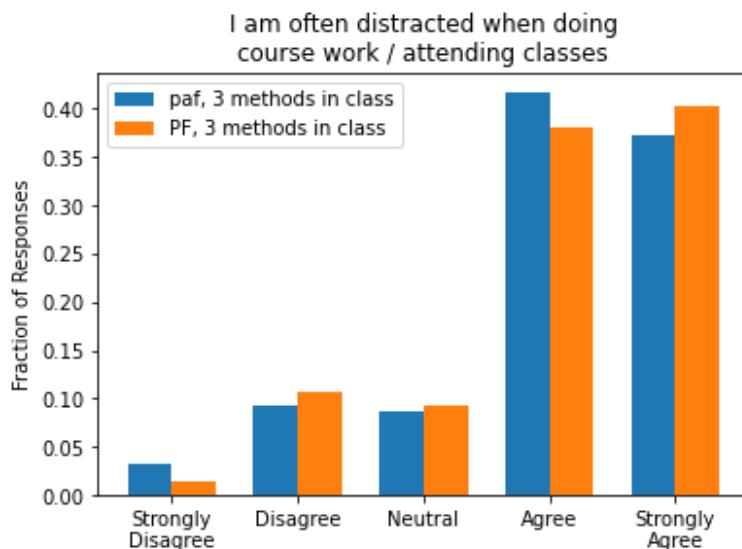
paf, 3 methods in class shape: (312, 43), PF, 3 methods in class shape: (139, 43)
 MWU results: MannwhitneyuResult(statistic=21590.0, pvalue=0.9390860084
 450288)
 paf, 3 methods in class median: 3.0
 PF, 3 methods in class median: 3.0
 cohens d: -0.0135
 f: 0.498



```

paf, 3 methods in class shape: (312, 43), PF, 3 methods in class shape: (139, 43)
MWU results: MannwhitneyuResult(statistic=20887.5, pvalue=0.5153019907
642421)
paf, 3 methods in class median: 3.0
PF, 3 methods in class median: 3.0
cohens d: -0.0538
f: 0.482

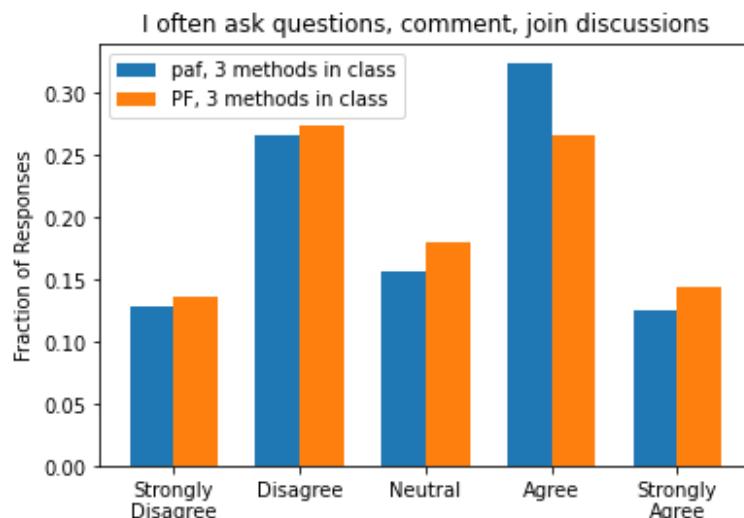
```



```

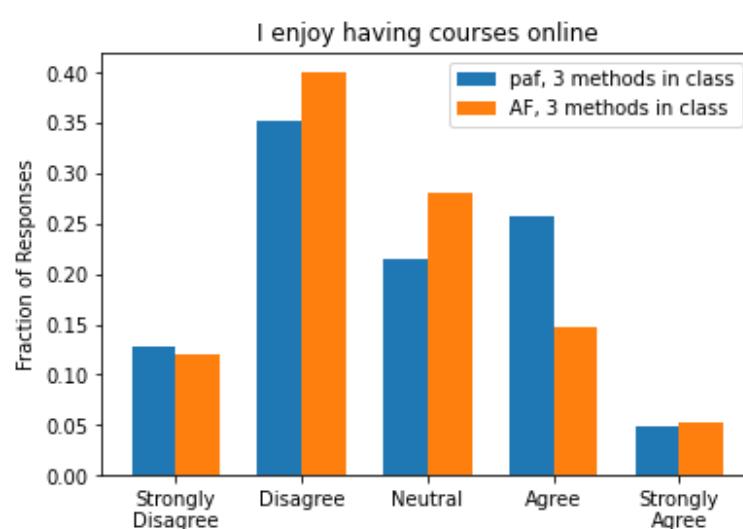
paf, 3 methods in class shape: (312, 43), PF, 3 methods in class shape: (139, 43)
MWU results: MannwhitneyuResult(statistic=21141.0, pvalue=0.6501987283
488913)
paf, 3 methods in class median: 4.0
PF, 3 methods in class median: 4.0
cohens d: -0.0449
f: 0.487

```

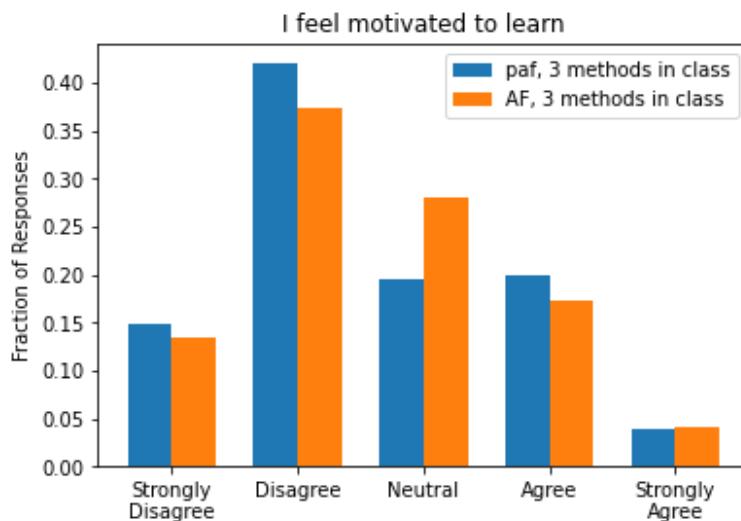


```
paf, 3 methods in class shape: (312, 43), PF, 3 methods in class shape:  
(139, 43)  
MWU results: MannwhitneyuResult(statistic=22121.0, pvalue=0.7250884629  
823414)  
paf, 3 methods in class median: 3.0  
PF, 3 methods in class median: 3.0  
cohens d: 0.0346  
f: 0.51
```

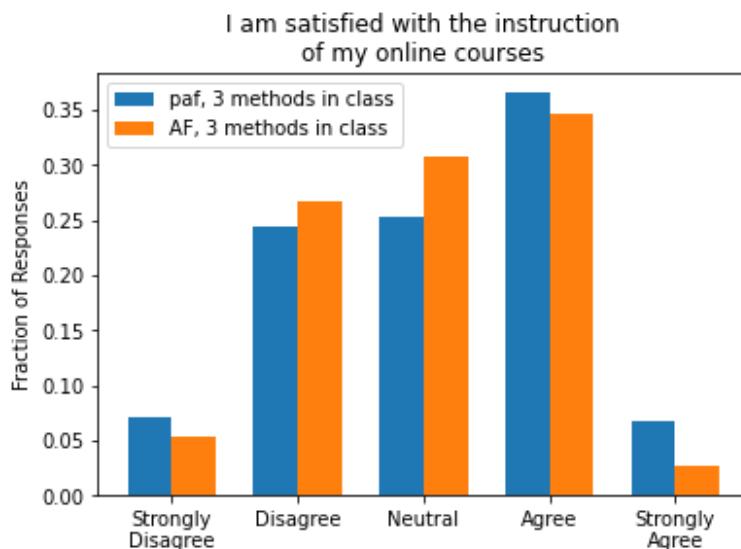
paf, 3 methods in class 312 AF, 3 methods in class 75



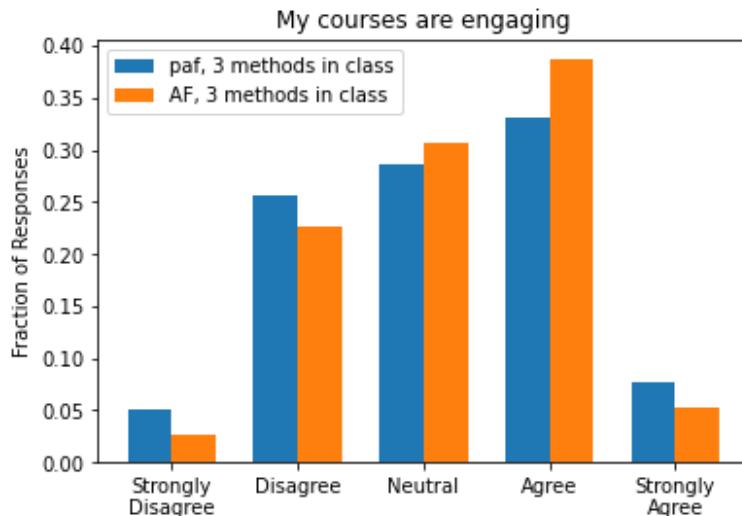
paf, 3 methods in class shape: (312, 43), AF, 3 methods in class shape: (75, 43)
 MWU results: MannwhitneyuResult(statistic=12471.5, pvalue=0.3569251206
 1065074)
 paf, 3 methods in class median: 3.0
 AF, 3 methods in class median: 2.0
 cohens d: 0.118
 f: 0.533



paf, 3 methods in class shape: (312, 43), AF, 3 methods in class shape: (75, 43)
 MWU results: MannwhitneyuResult(statistic=11275.5, pvalue=0.6095105844
 364369)
 paf, 3 methods in class median: 2.0
 AF, 3 methods in class median: 2.0
 cohens d: -0.0487
 f: 0.482



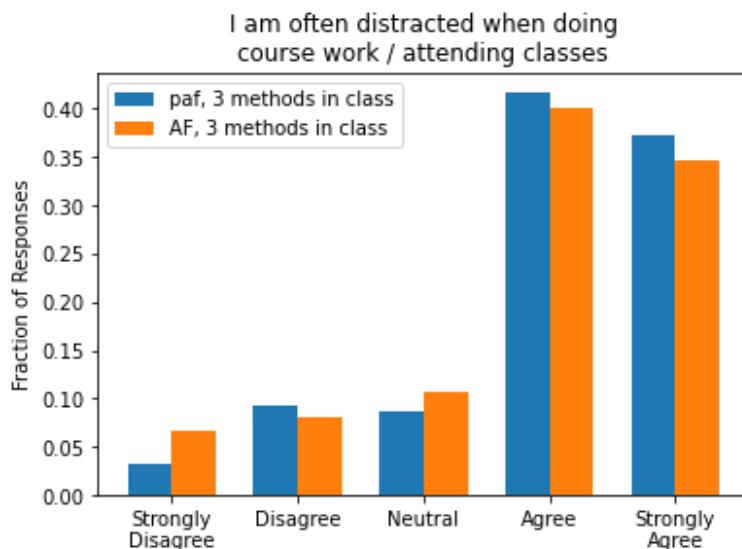
paf, 3 methods in class shape: (312, 43), AF, 3 methods in class shape: (75, 43)
 MWU results: MannwhitneyuResult(statistic=12306.5, pvalue=0.4672800136
 629043)
 paf, 3 methods in class median: 3.0
 AF, 3 methods in class median: 3.0
 cohens d: 0.0842
 f: 0.526



```

paf, 3 methods in class shape: (312, 43), AF, 3 methods in class shape: (75, 43)
MWU results: MannwhitneyuResult(statistic=11142.0, pvalue=0.5039622310
826589)
paf, 3 methods in class median: 3.0
AF, 3 methods in class median: 3.0
cohens d: -0.0862
f: 0.476

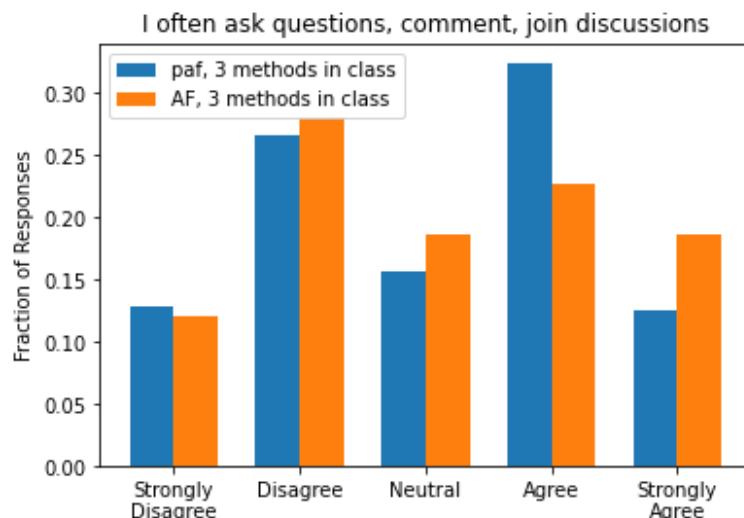
```



```

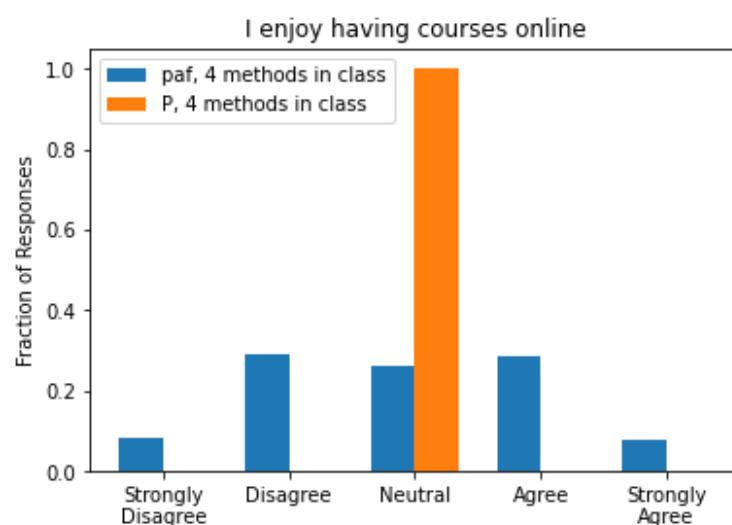
paf, 3 methods in class shape: (312, 43), AF, 3 methods in class shape: (75, 43)
MWU results: MannwhitneyuResult(statistic=12274.0, pvalue=0.4817540354
449268)
paf, 3 methods in class median: 4.0
AF, 3 methods in class median: 4.0
cohens d: 0.114
f: 0.525

```

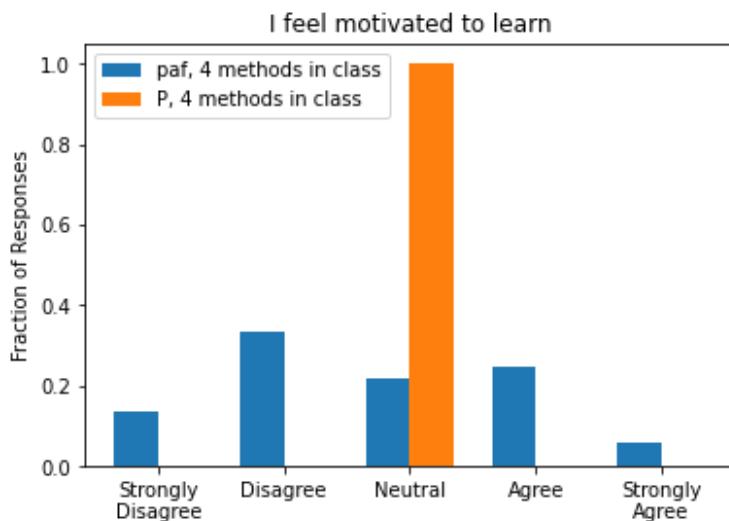


```
paf, 3 methods in class shape: (312, 43), AF, 3 methods in class shape: (75, 43)
MWU results: MannwhitneyuResult(statistic=11566.0, pvalue=0.8744404260
607243)
paf, 3 methods in class median: 3.0
AF, 3 methods in class median: 3.0
cohens d: -0.0225
f: 0.494
```

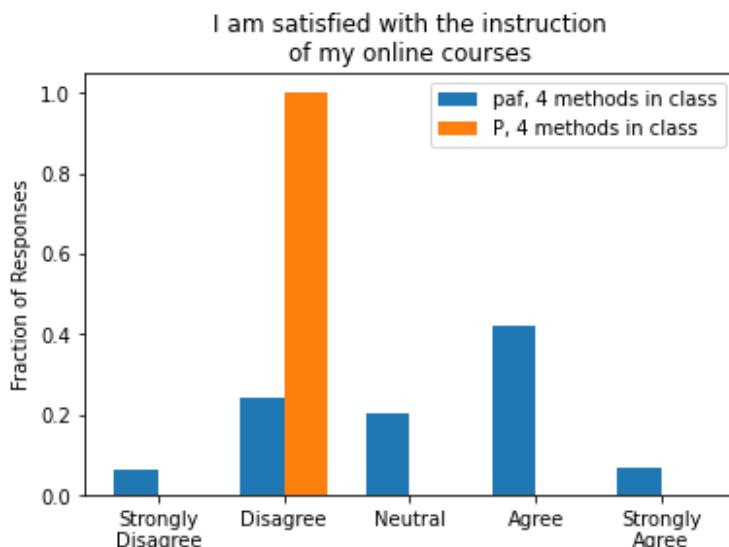
paf, 4 methods in class 366 P, 4 methods in class 1



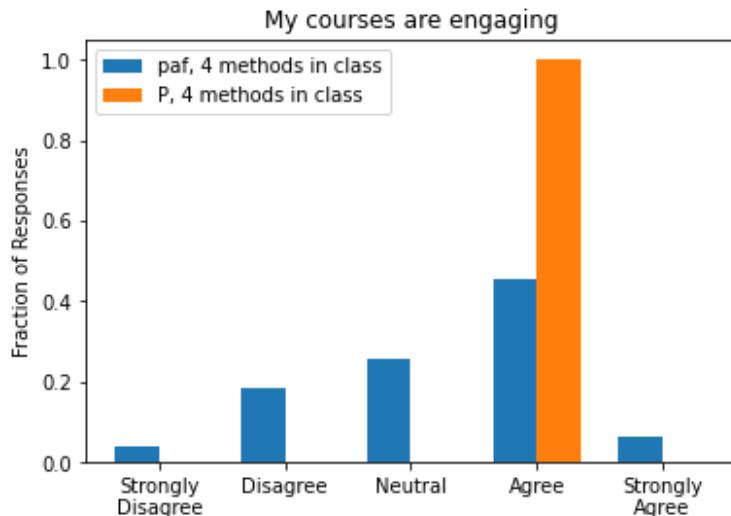
```
paf, 4 methods in class shape: (366, 43), P, 4 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=181.5, pvalue=0.992202605731
7666)
paf, 4 methods in class median: 3.0
P, 4 methods in class median: 3.0
cohens d: nan
f: 0.496
```



```
paf, 4 methods in class shape: (366, 43), P, 4 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=153.0, pvalue=0.773209411583
4118)
paf, 4 methods in class median: 3.0
P, 4 methods in class median: 3.0
cohens d: nan
f: 0.418
```



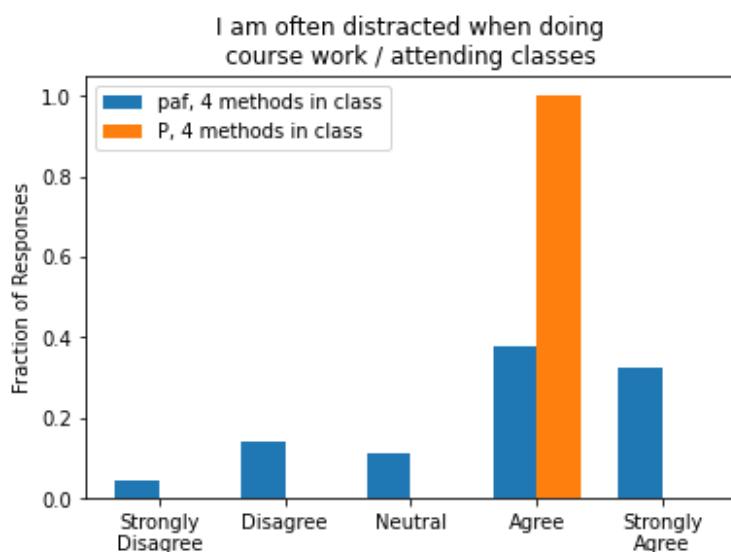
```
paf, 4 methods in class shape: (366, 43), P, 4 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=298.5, pvalue=0.253138942549
67706)
paf, 4 methods in class median: 3.0
P, 4 methods in class median: 2.0
cohens d: nan
f: 0.816
```



```

paf, 4 methods in class shape: (366, 43), P, 4 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=107.0, pvalue=0.448101514604
49876)
paf, 4 methods in class median: 4.0
P, 4 methods in class median: 4.0
cohens d: nan
f: 0.292

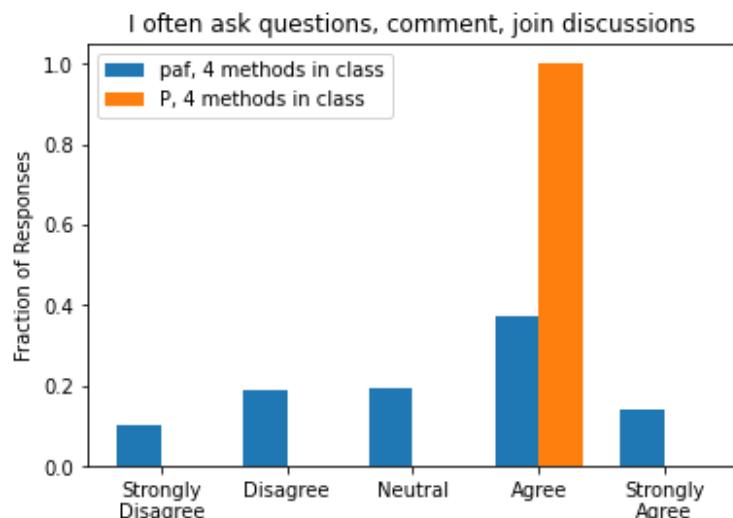
```



```

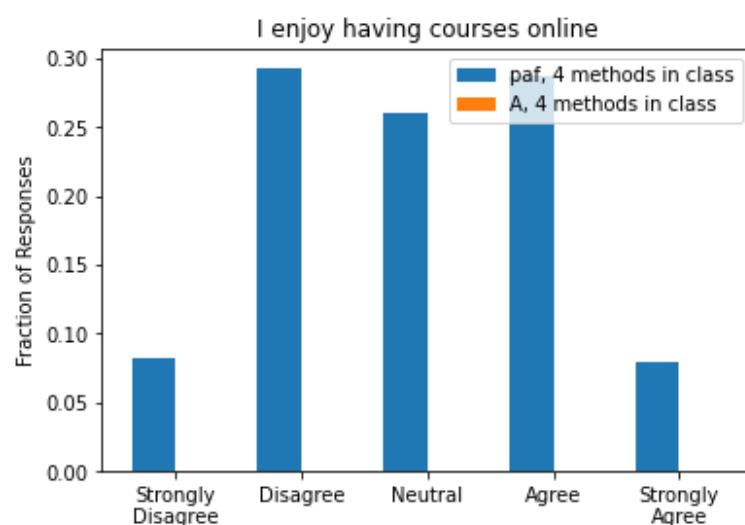
paf, 4 methods in class shape: (366, 43), P, 4 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=187.5, pvalue=0.968375433420
1161)
paf, 4 methods in class median: 4.0
P, 4 methods in class median: 4.0
cohens d: nan
f: 0.512

```



```
paf, 4 methods in class shape: (366, 43), P, 4 methods in class shape:  
(1, 43)  
MWU results: MannwhitneyuResult(statistic=120.5, pvalue=0.543756711706  
3)  
paf, 4 methods in class median: 4.0  
P, 4 methods in class median: 4.0  
cohens d: nan  
f: 0.329
```

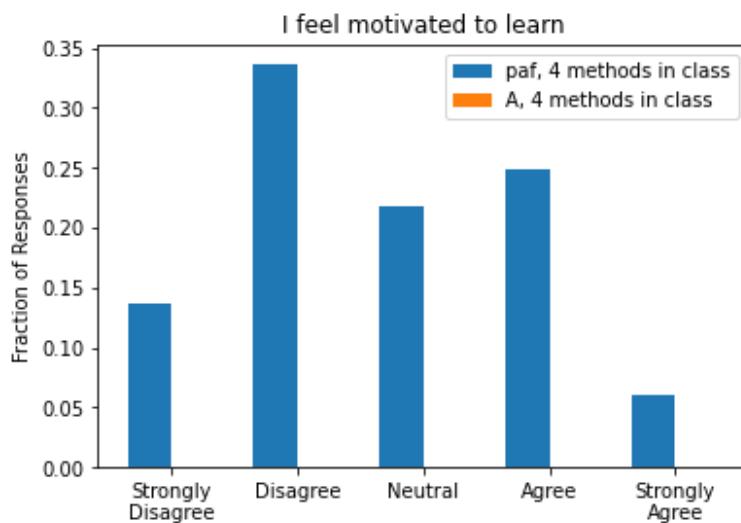
paf, 4 methods in class 366 A, 4 methods in class 0



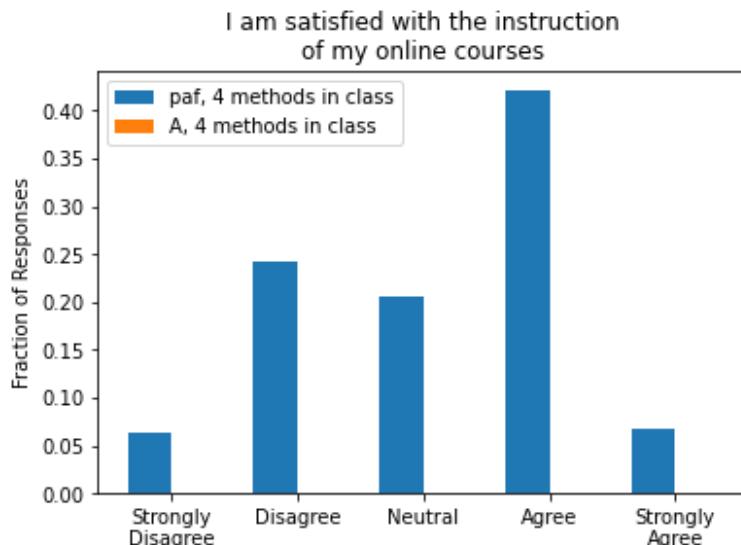
```
paf, 4 methods in class shape: (366, 43), A, 4 methods in class shape:
(0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 4 methods in class median: 3.0
A, 4 methods in class median: nan
cohens d: nan
f: nan

/usr/local/lib/python3.6/dist-packages/scipy/stats/stats.py:6415: RuntimeWarning:
divide by zero encountered in double_scalars

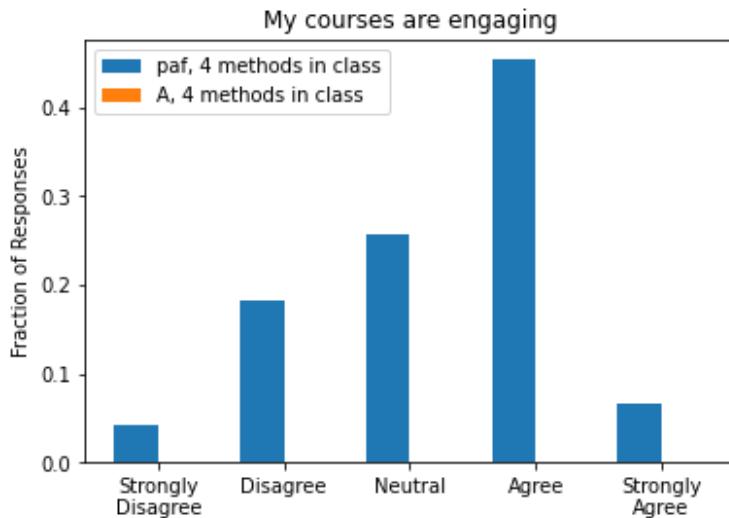
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:10: RuntimeWarning:
invalid value encountered in double_scalars
```



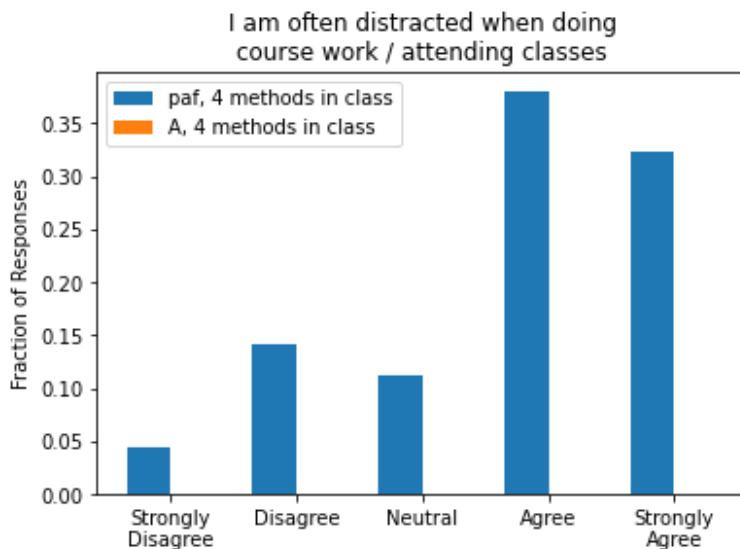
```
paf, 4 methods in class shape: (366, 43), A, 4 methods in class shape:
(0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 4 methods in class median: 3.0
A, 4 methods in class median: nan
cohens d: nan
f: nan
```



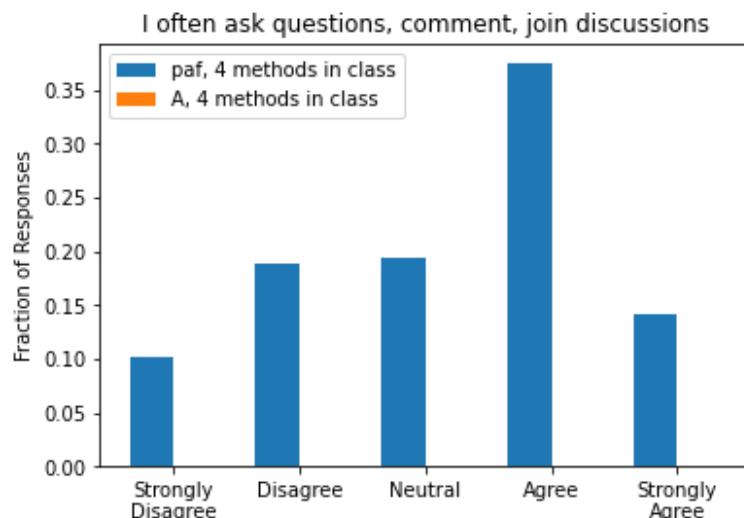
```
paf, 4 methods in class shape: (366, 43), A, 4 methods in class shape: (0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 4 methods in class median: 3.0
A, 4 methods in class median: nan
cohens d: nan
f: nan
```



```
paf, 4 methods in class shape: (366, 43), A, 4 methods in class shape: (0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 4 methods in class median: 4.0
A, 4 methods in class median: nan
cohens d: nan
f: nan
```

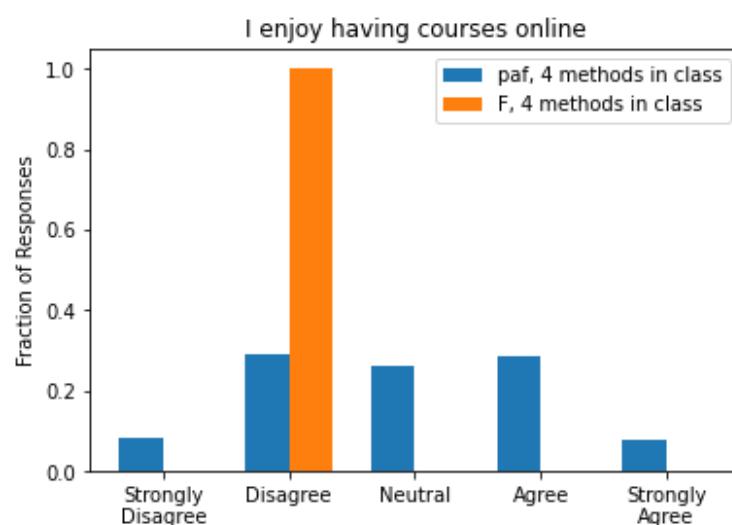


```
paf, 4 methods in class shape: (366, 43), A, 4 methods in class shape: (0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 4 methods in class median: 4.0
A, 4 methods in class median: nan
cohens d: nan
f: nan
```

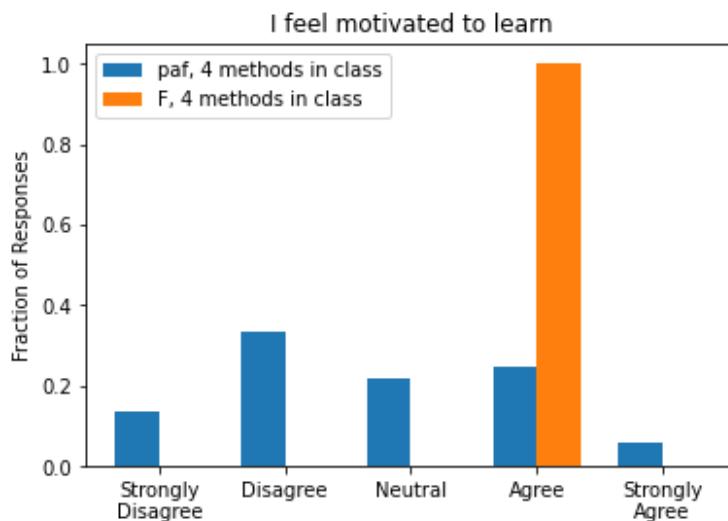


```
paf, 4 methods in class shape: (366, 43), A, 4 methods in class shape:  
(0, 43)  
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)  
paf, 4 methods in class median: 4.0  
A, 4 methods in class median: nan  
cohens d: nan  
f: nan
```

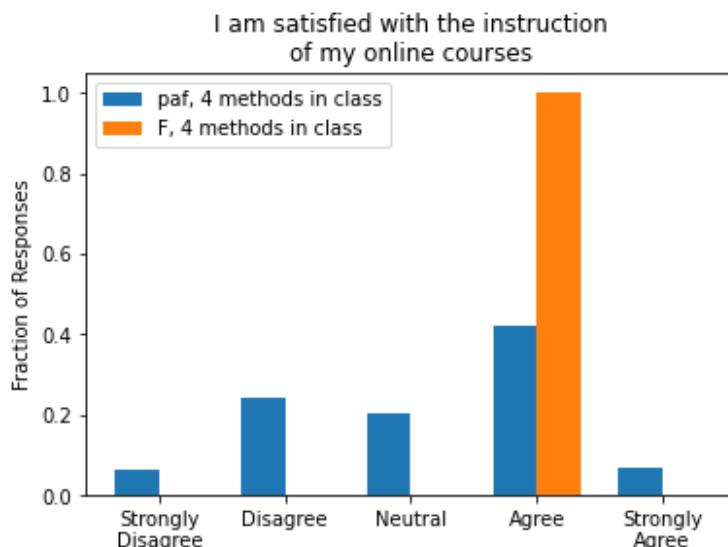
paf, 4 methods in class 366 F, 4 methods in class 1



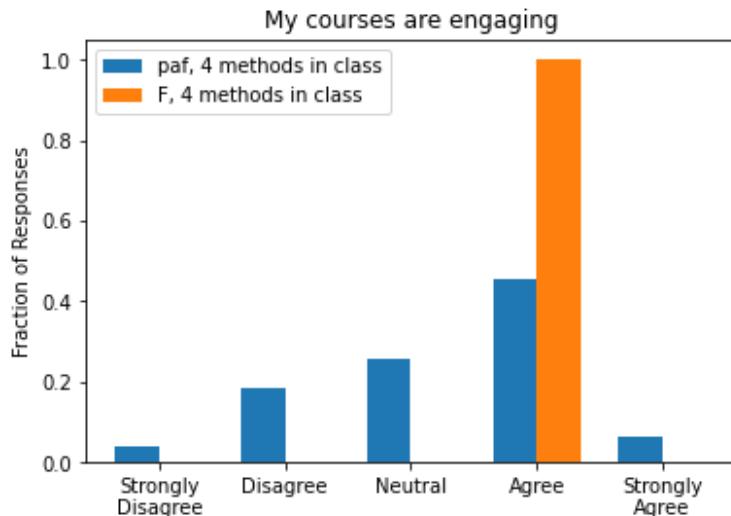
```
paf, 4 methods in class shape: (366, 43), F, 4 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=282.5, pvalue=0.333255199718
53523)
paf, 4 methods in class median: 3.0
F, 4 methods in class median: 2.0
cohens d: nan
f: 0.772
```



```
paf, 4 methods in class shape: (366, 43), F, 4 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=67.5, pvalue=0.2612335466829
2265)
paf, 4 methods in class median: 3.0
F, 4 methods in class median: 4.0
cohens d: nan
f: 0.184
```



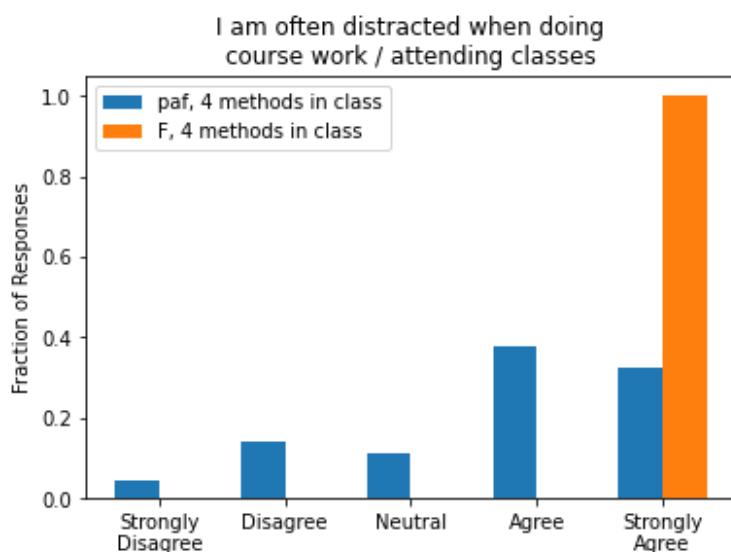
```
paf, 4 methods in class shape: (366, 43), F, 4 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=102.0, pvalue=0.423503485504
1696)
paf, 4 methods in class median: 3.0
F, 4 methods in class median: 4.0
cohens d: nan
f: 0.279
```



```

paf, 4 methods in class shape: (366, 43), F, 4 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=107.0, pvalue=0.448101514604
49876)
paf, 4 methods in class median: 4.0
F, 4 methods in class median: 4.0
cohens d: nan
f: 0.292

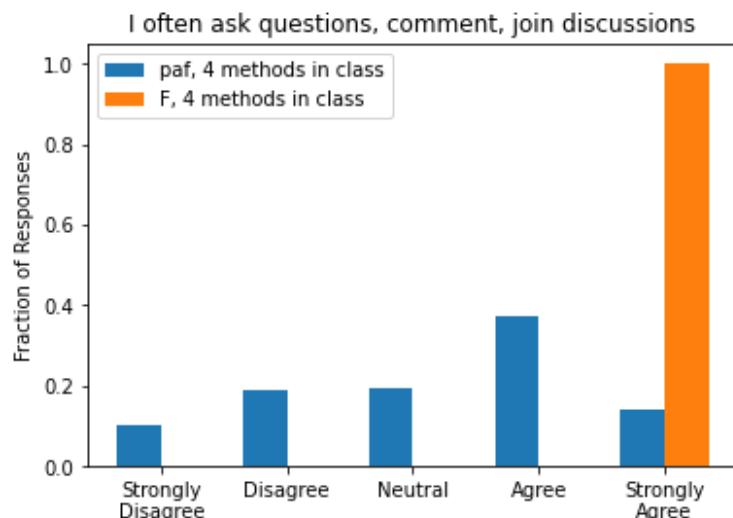
```



```

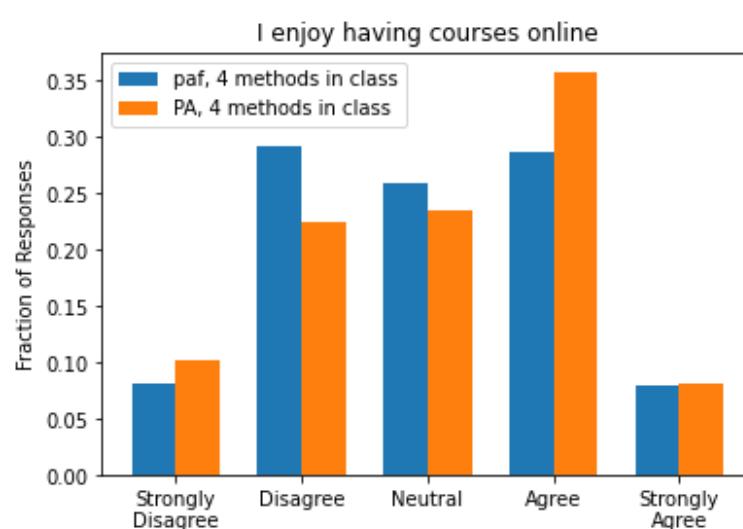
paf, 4 methods in class shape: (366, 43), F, 4 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=59.0, pvalue=0.2210105866828
1215)
paf, 4 methods in class median: 4.0
F, 4 methods in class median: 5.0
cohens d: nan
f: 0.161

```

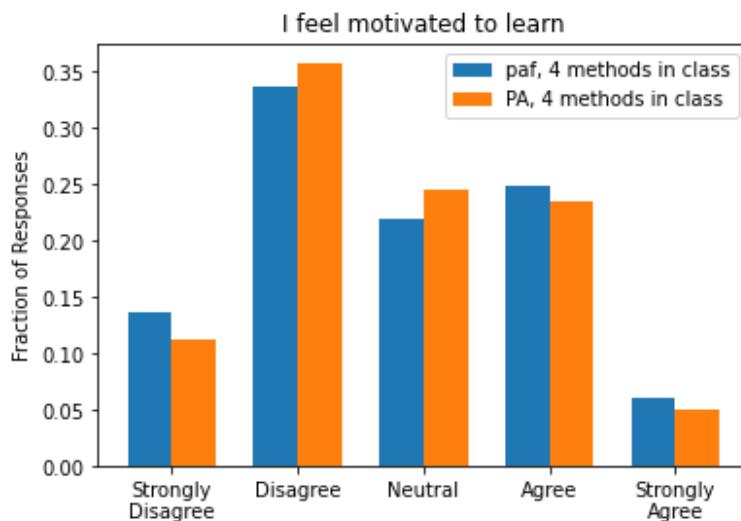


```
paf, 4 methods in class shape: (366, 43), F, 4 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=26.0, pvalue=0.1255875862402
5418)
paf, 4 methods in class median: 4.0
F, 4 methods in class median: 5.0
cohens d: nan
f: 0.071
```

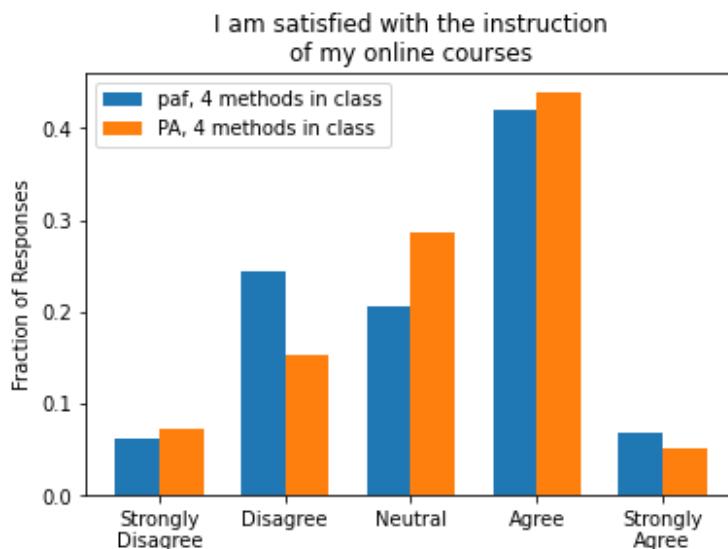
paf, 4 methods in class 366 PA, 4 methods in class 98



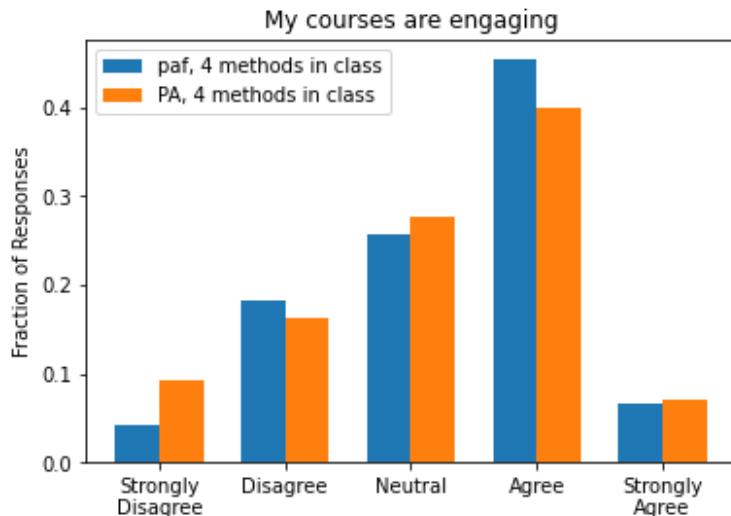
paf, 4 methods in class shape: (366, 43), PA, 4 methods in class shape: (98, 43)
 MWU results: MannwhitneyuResult(statistic=16868.0, pvalue=0.3495593451
 9436405)
 paf, 4 methods in class median: 3.0
 PA, 4 methods in class median: 3.0
 cohens d: -0.092
 f: 0.47



paf, 4 methods in class shape: (366, 43), PA, 4 methods in class shape: (98, 43)
 MWU results: MannwhitneyuResult(statistic=17938.0, pvalue=0.9975463127
 716447)
 paf, 4 methods in class median: 3.0
 PA, 4 methods in class median: 3.0
 cohens d: 0.00392
 f: 0.5



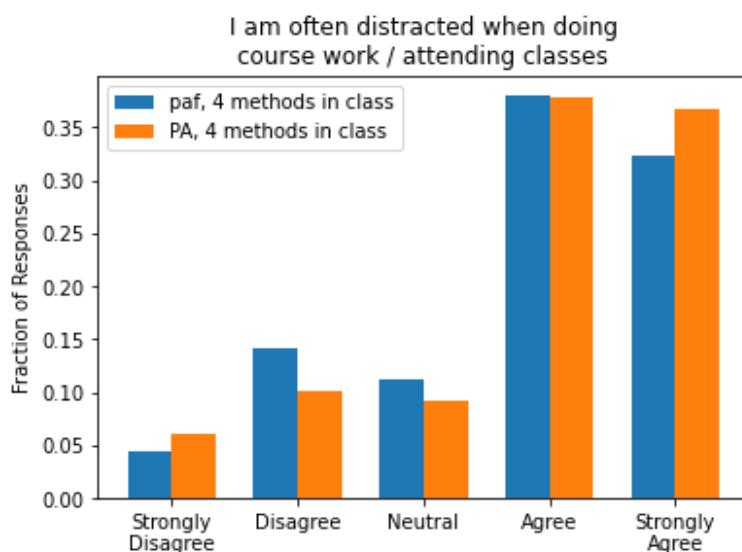
paf, 4 methods in class shape: (366, 43), PA, 4 methods in class shape: (98, 43)
 MWU results: MannwhitneyuResult(statistic=17469.5, pvalue=0.6783639359
 00002)
 paf, 4 methods in class median: 3.0
 PA, 4 methods in class median: 3.0
 cohens d: -0.053
 f: 0.487



```

paf, 4 methods in class shape: (366, 43), PA, 4 methods in class shape: (98, 43)
MWU results: MannwhitneyuResult(statistic=18962.5, pvalue=0.3552997923
52734)
paf, 4 methods in class median: 4.0
PA, 4 methods in class median: 3.0
cohens d: 0.125
f: 0.529

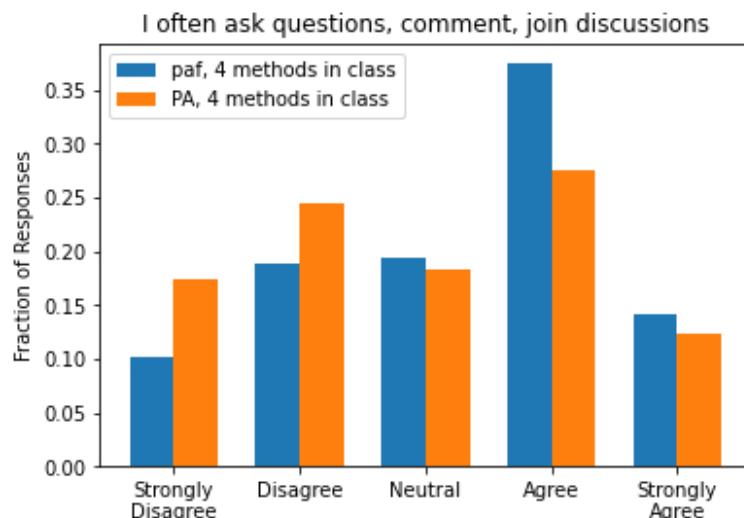
```



```

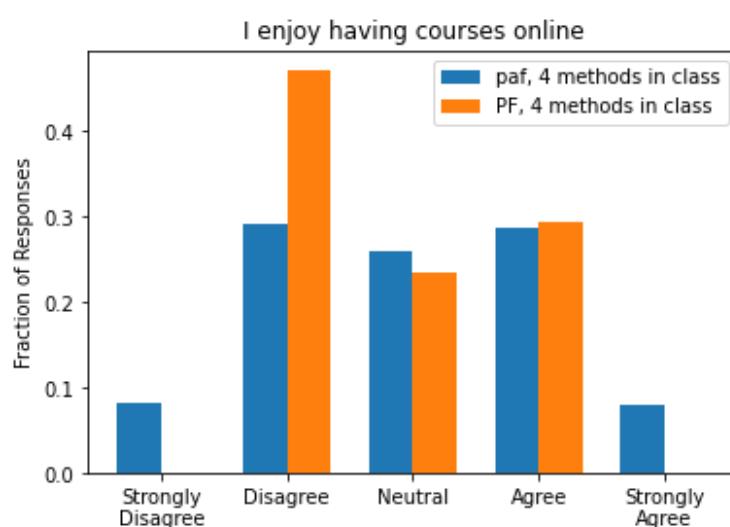
paf, 4 methods in class shape: (366, 43), PA, 4 methods in class shape: (98, 43)
MWU results: MannwhitneyuResult(statistic=16947.0, pvalue=0.3791114248
267572)
paf, 4 methods in class median: 4.0
PA, 4 methods in class median: 4.0
cohens d: -0.0791
f: 0.472

```

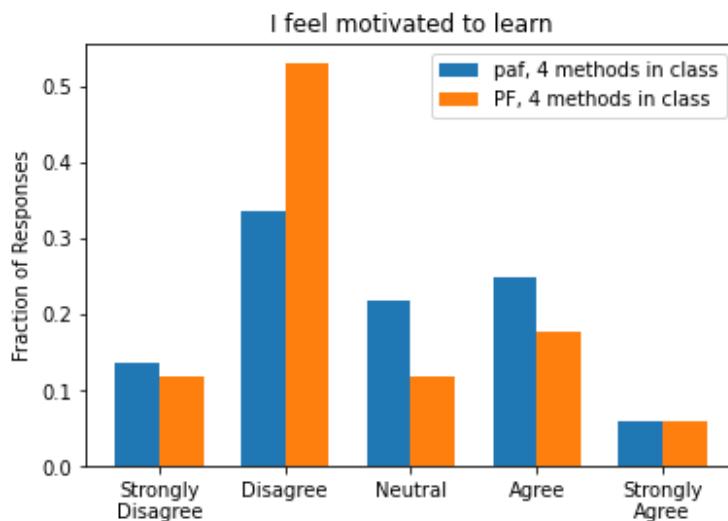


```
paf, 4 methods in class shape: (366, 43), PA, 4 methods in class shape:  
(98, 43)  
MWU results: MannwhitneyuResult(statistic=20582.0, pvalue=0.0203133543  
8932919)  
paf, 4 methods in class median: 4.0  
PA, 4 methods in class median: 3.0  
cohens d: 0.275  
f: 0.574
```

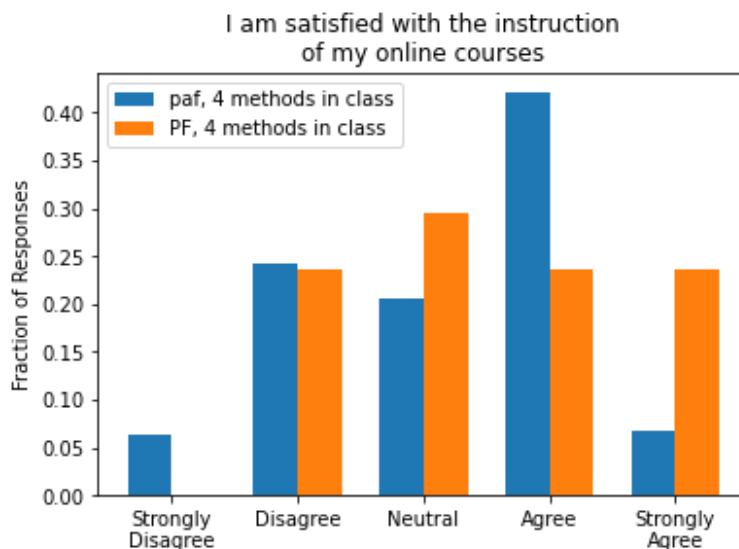
paf, 4 methods in class 366 PF, 4 methods in class 17



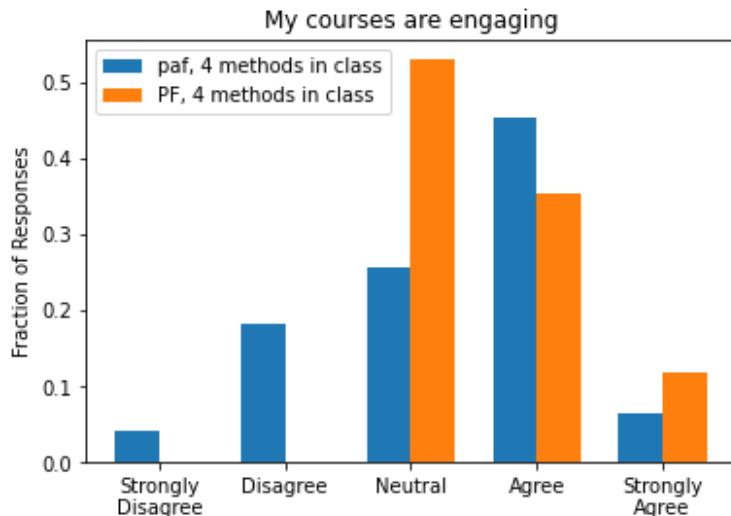
paf, 4 methods in class shape: (366, 43), PF, 4 methods in class shape: (17, 43)
 MWU results: MannwhitneyuResult(statistic=3393.5, pvalue=0.51248805441
 11914)
 paf, 4 methods in class median: 3.0
 PF, 4 methods in class median: 3.0
 cohens d: 0.151
 f: 0.545



paf, 4 methods in class shape: (366, 43), PF, 4 methods in class shape: (17, 43)
 MWU results: MannwhitneyuResult(statistic=3492.0, pvalue=0.37701221566
 49146)
 paf, 4 methods in class median: 3.0
 PF, 4 methods in class median: 2.0
 cohens d: 0.201
 f: 0.561



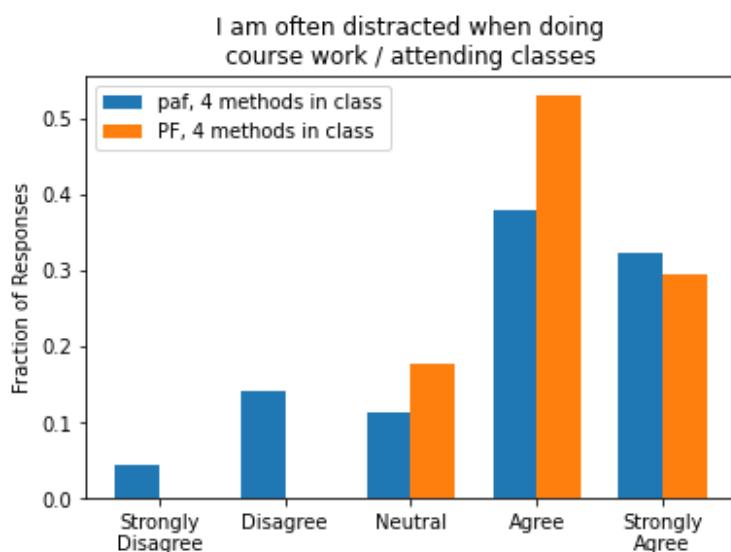
paf, 4 methods in class shape: (366, 43), PF, 4 methods in class shape: (17, 43)
 MWU results: MannwhitneyuResult(statistic=2734.5, pvalue=0.37592821677
 760613)
 paf, 4 methods in class median: 3.0
 PF, 4 methods in class median: 3.0
 cohens d: -0.262
 f: 0.439



```

paf, 4 methods in class shape: (366, 43), PF, 4 methods in class shape: (17, 43)
MWU results: MannwhitneyuResult(statistic=2799.0, pvalue=0.45785499879
13785)
paf, 4 methods in class median: 4.0
PF, 4 methods in class median: 3.0
cohens d: -0.276
f: 0.45

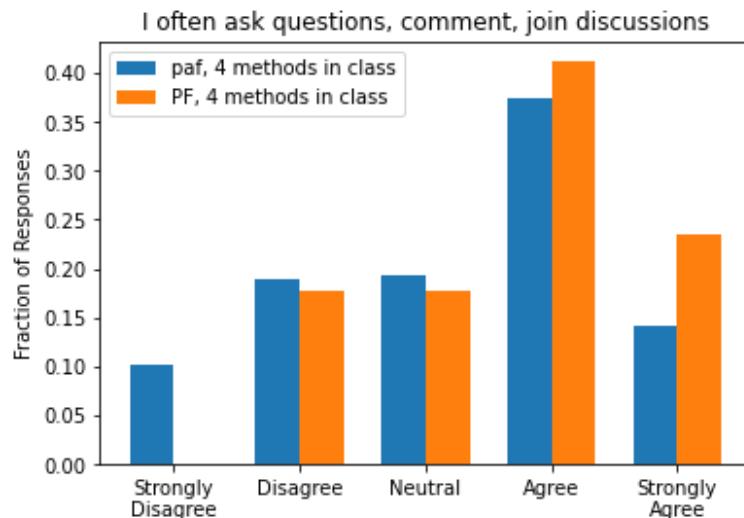
```



```

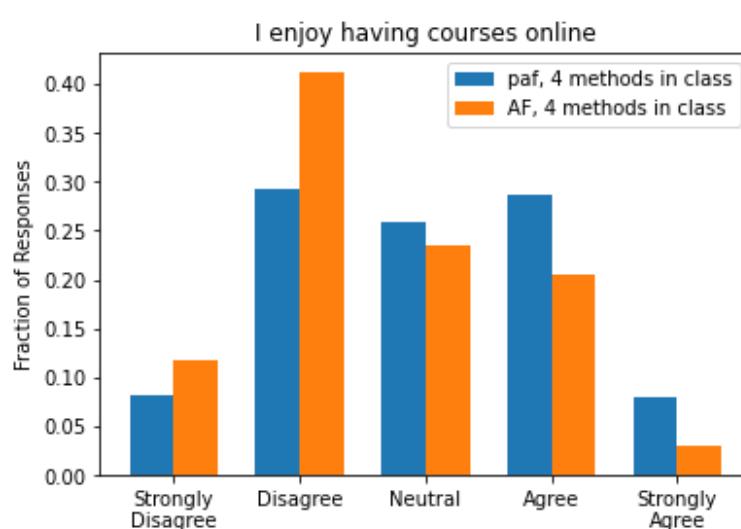
paf, 4 methods in class shape: (366, 43), PF, 4 methods in class shape: (17, 43)
MWU results: MannwhitneyuResult(statistic=2815.0, pvalue=0.48636632762
87198)
paf, 4 methods in class median: 4.0
PF, 4 methods in class median: 4.0
cohens d: -0.281
f: 0.452

```

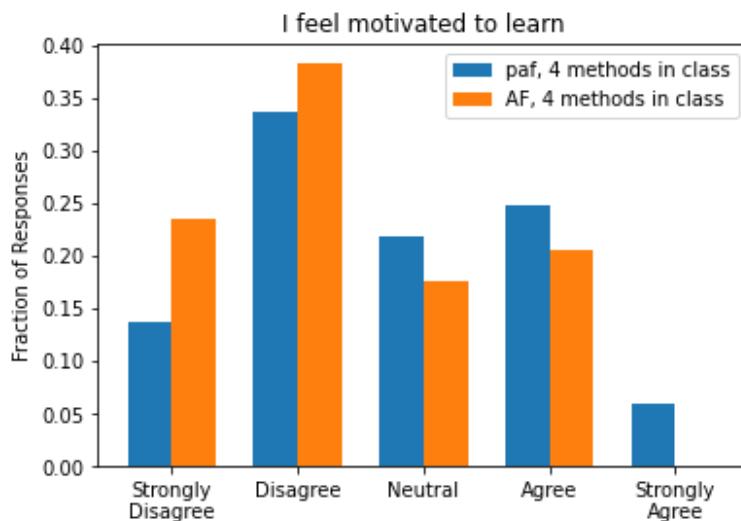


```
paf, 4 methods in class shape: (366, 43), PF, 4 methods in class shape:  
(17, 43)  
MWU results: MannwhitneyuResult(statistic=2504.5, pvalue=0.15881613925  
390048)  
paf, 4 methods in class median: 4.0  
PF, 4 methods in class median: 4.0  
cohens d: -0.364  
f: 0.403
```

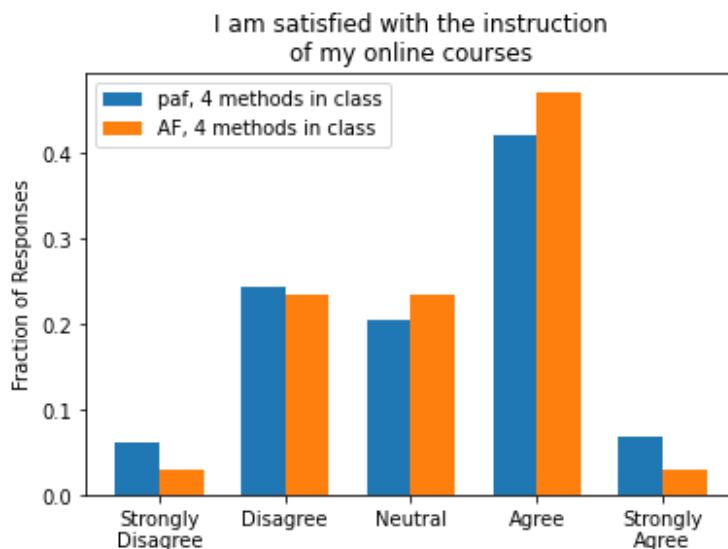
paf, 4 methods in class 366 AF, 4 methods in class 34



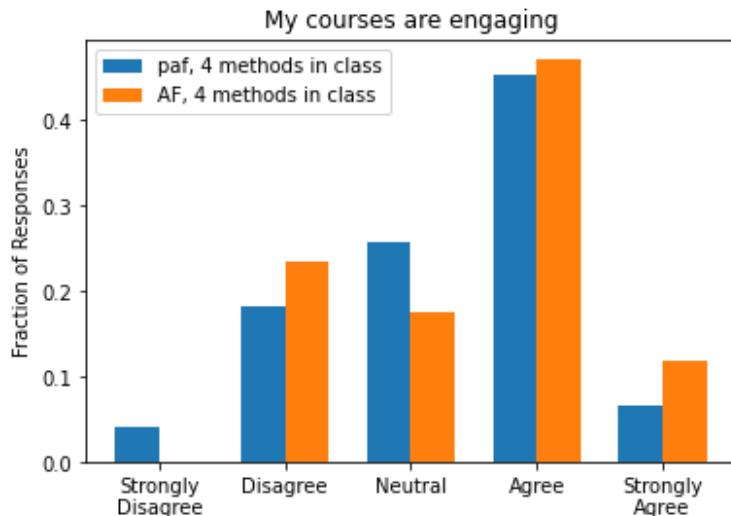
paf, 4 methods in class shape: (366, 43), AF, 4 methods in class shape: (34, 43)
 MWU results: MannwhitneyuResult(statistic=7396.0, pvalue=0.05946449095
 818034)
 paf, 4 methods in class median: 3.0
 AF, 4 methods in class median: 2.0
 cohens d: 0.337
 f: 0.594



paf, 4 methods in class shape: (366, 43), AF, 4 methods in class shape: (34, 43)
 MWU results: MannwhitneyuResult(statistic=7427.0, pvalue=0.05312153413
 666266)
 paf, 4 methods in class median: 3.0
 AF, 4 methods in class median: 2.0
 cohens d: 0.356
 f: 0.597



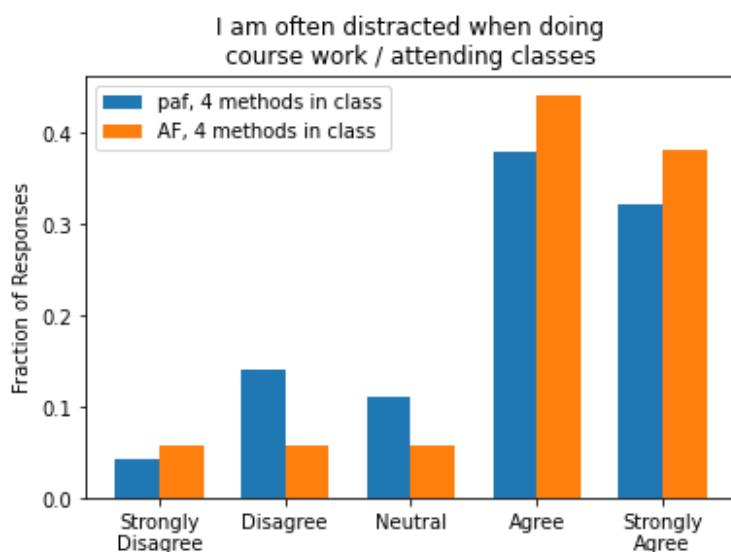
paf, 4 methods in class shape: (366, 43), AF, 4 methods in class shape: (34, 43)
 MWU results: MannwhitneyuResult(statistic=6119.0, pvalue=0.86690571274
 47368)
 paf, 4 methods in class median: 3.0
 AF, 4 methods in class median: 3.5
 cohens d: -0.0439
 f: 0.492



```

paf, 4 methods in class shape: (366, 43), AF, 4 methods in class shape: (34, 43)
MWU results: MannwhitneyuResult(statistic=5722.0, pvalue=0.40981232047
576455)
paf, 4 methods in class median: 4.0
AF, 4 methods in class median: 4.0
cohens d: -0.154
f: 0.46

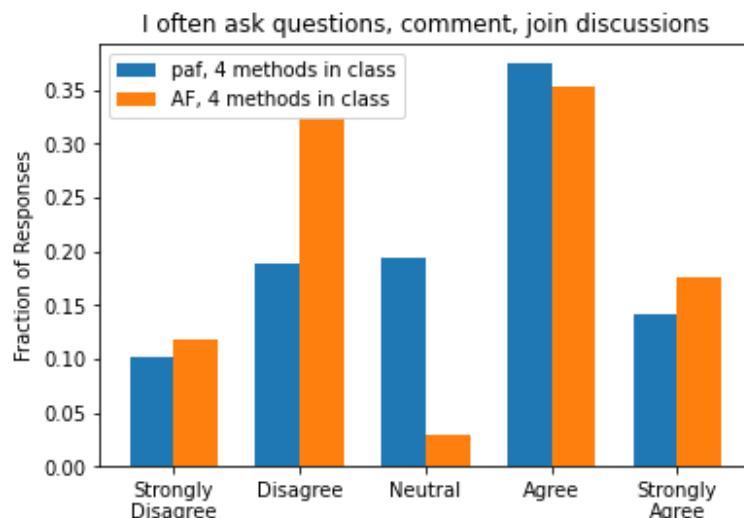
```



```

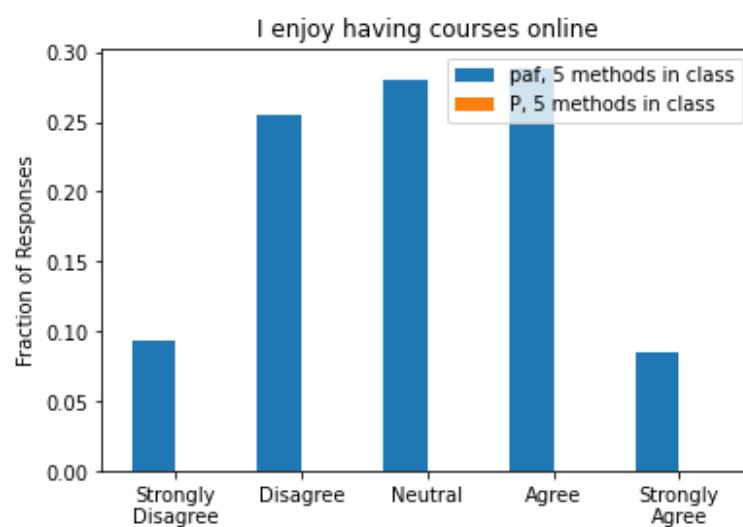
paf, 4 methods in class shape: (366, 43), AF, 4 methods in class shape: (34, 43)
MWU results: MannwhitneyuResult(statistic=5498.5, pvalue=0.23831797357
051032)
paf, 4 methods in class median: 4.0
AF, 4 methods in class median: 4.0
cohens d: -0.202
f: 0.442

```



```
paf, 4 methods in class shape: (366, 43), AF, 4 methods in class shape:  
(34, 43)  
MWU results: MannwhitneyuResult(statistic=6456.0, pvalue=0.70735968528  
92898)  
paf, 4 methods in class median: 4.0  
AF, 4 methods in class median: 4.0  
cohens d: 0.0985  
f: 0.519
```

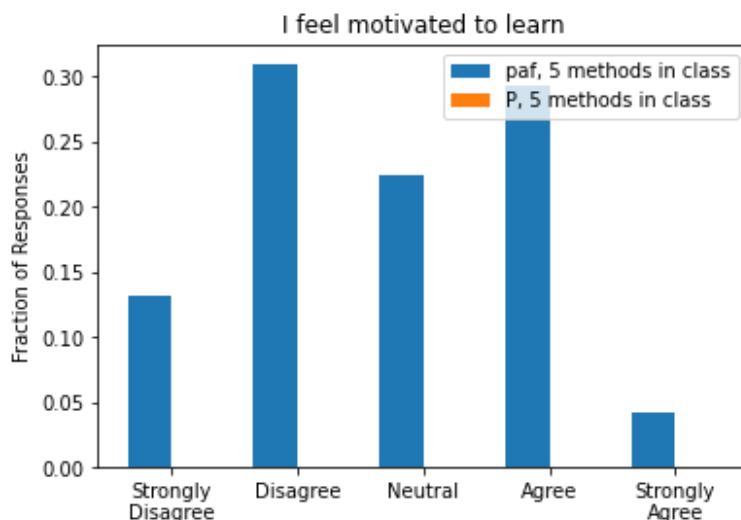
paf, 5 methods in class 236 P, 5 methods in class 0



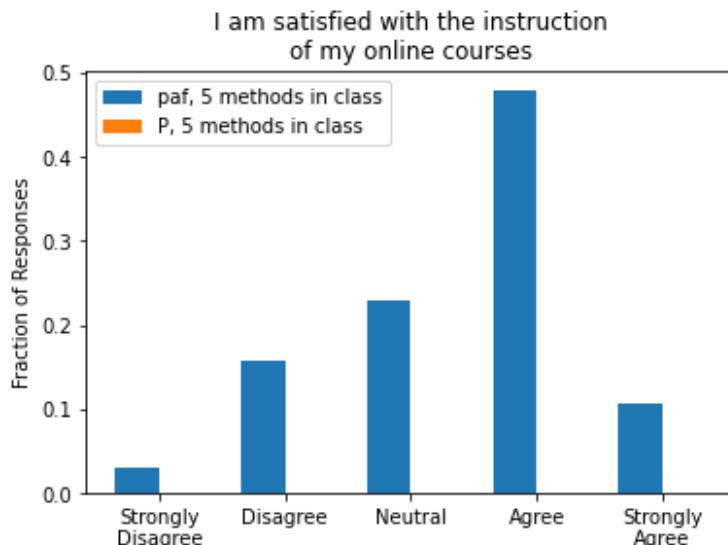
```
paf, 5 methods in class shape: (236, 43), P, 5 methods in class shape:
(0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 5 methods in class median: 3.0
P, 5 methods in class median: nan
cohens d: nan
f: nan

/usr/local/lib/python3.6/dist-packages/scipy/stats/stats.py:6415: RuntimeWarning:
divide by zero encountered in double_scalars

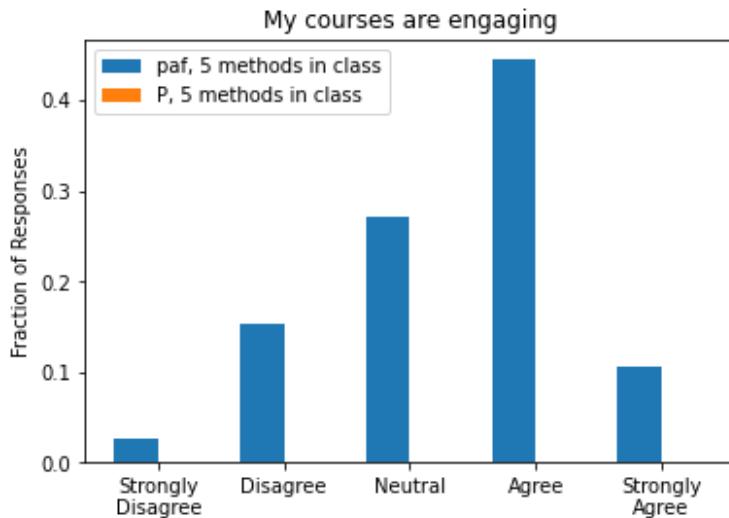
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:10: RuntimeWarning:
invalid value encountered in double_scalars
```



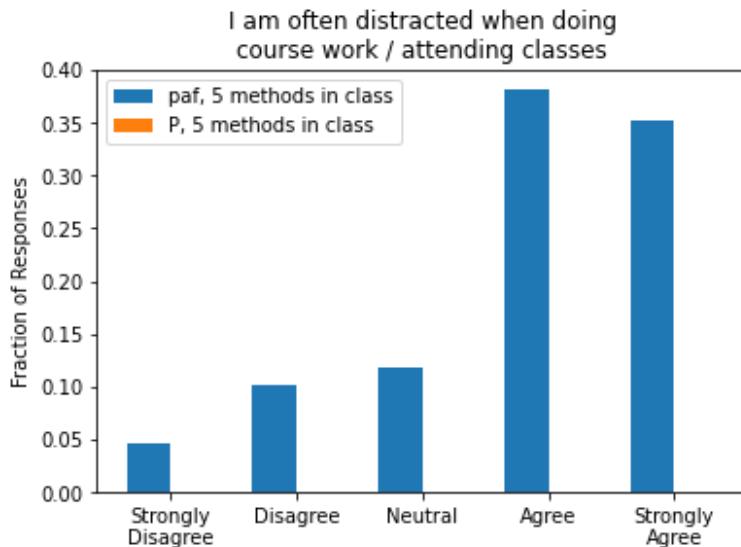
```
paf, 5 methods in class shape: (236, 43), P, 5 methods in class shape:
(0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 5 methods in class median: 3.0
P, 5 methods in class median: nan
cohens d: nan
f: nan
```



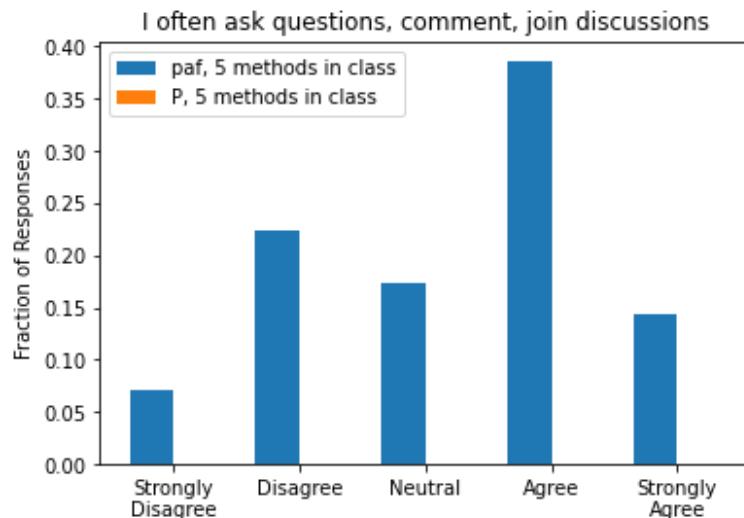
paf, 5 methods in class shape: (236, 43), P, 5 methods in class shape: (0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 5 methods in class median: 4.0
P, 5 methods in class median: nan
cohens d: nan
f: nan



paf, 5 methods in class shape: (236, 43), P, 5 methods in class shape: (0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 5 methods in class median: 4.0
P, 5 methods in class median: nan
cohens d: nan
f: nan

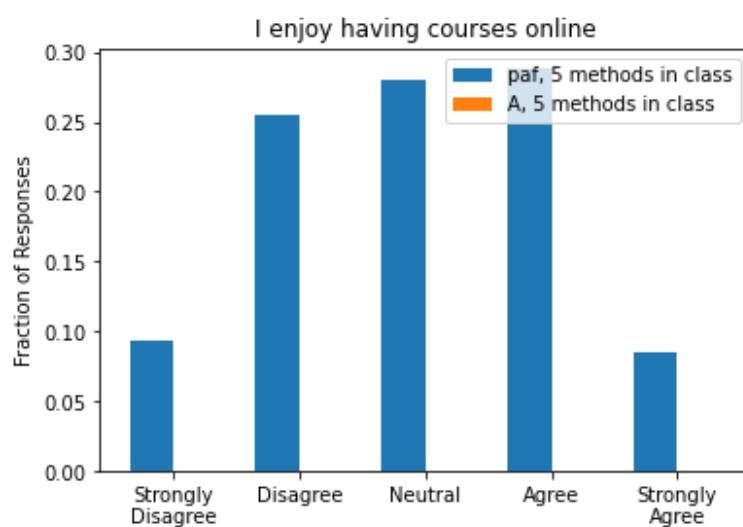


paf, 5 methods in class shape: (236, 43), P, 5 methods in class shape: (0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 5 methods in class median: 4.0
P, 5 methods in class median: nan
cohens d: nan
f: nan



```
paf, 5 methods in class shape: (236, 43), P, 5 methods in class shape:  
(0, 43)  
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)  
paf, 5 methods in class median: 4.0  
P, 5 methods in class median: nan  
cohens d: nan  
f: nan
```

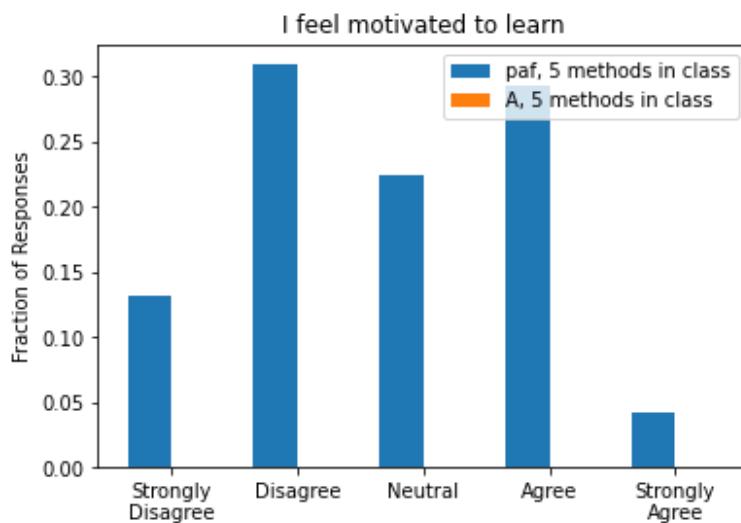
paf, 5 methods in class 236 A, 5 methods in class 0



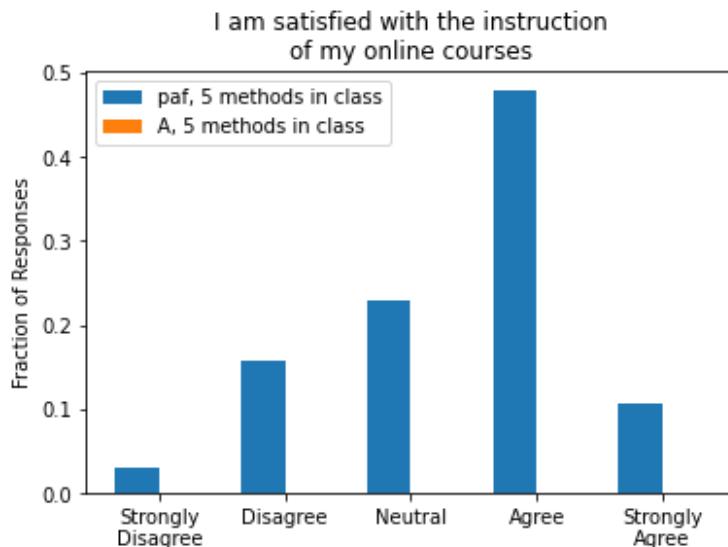
```
paf, 5 methods in class shape: (236, 43), A, 5 methods in class shape: (0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 5 methods in class median: 3.0
A, 5 methods in class median: nan
cohens d: nan
f: nan

/usr/local/lib/python3.6/dist-packages/scipy/stats/stats.py:6415: RuntimeWarning:
divide by zero encountered in double_scalars

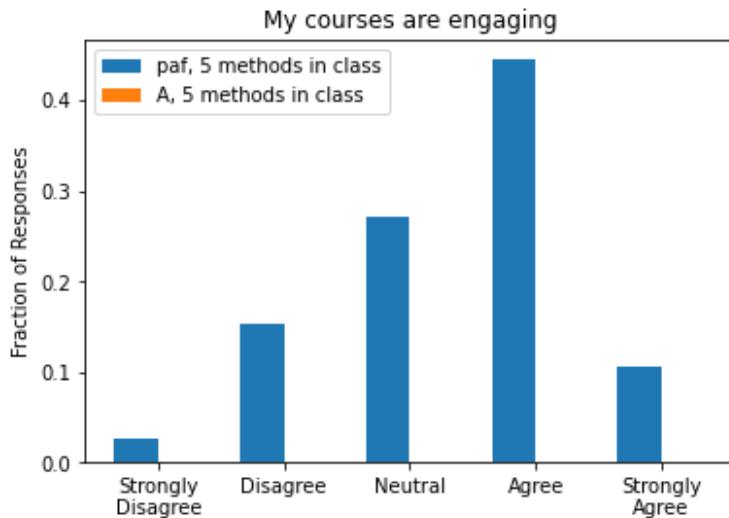
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:10: RuntimeWarning:
invalid value encountered in double_scalars
```



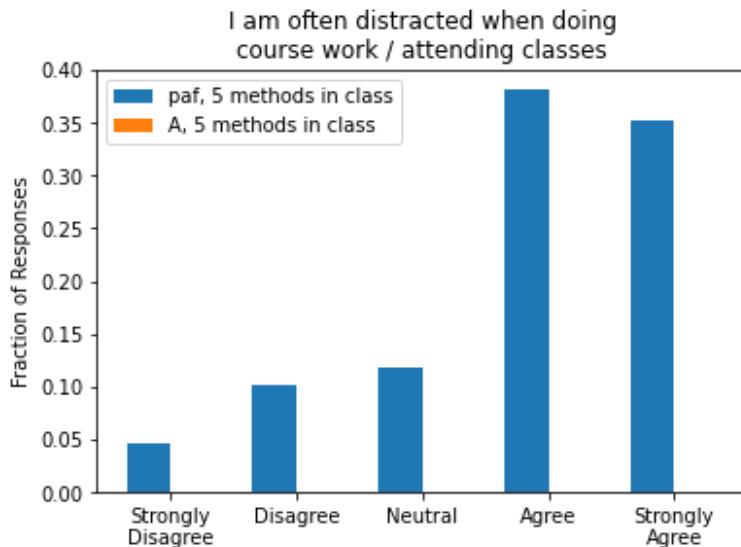
```
paf, 5 methods in class shape: (236, 43), A, 5 methods in class shape: (0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 5 methods in class median: 3.0
A, 5 methods in class median: nan
cohens d: nan
f: nan
```



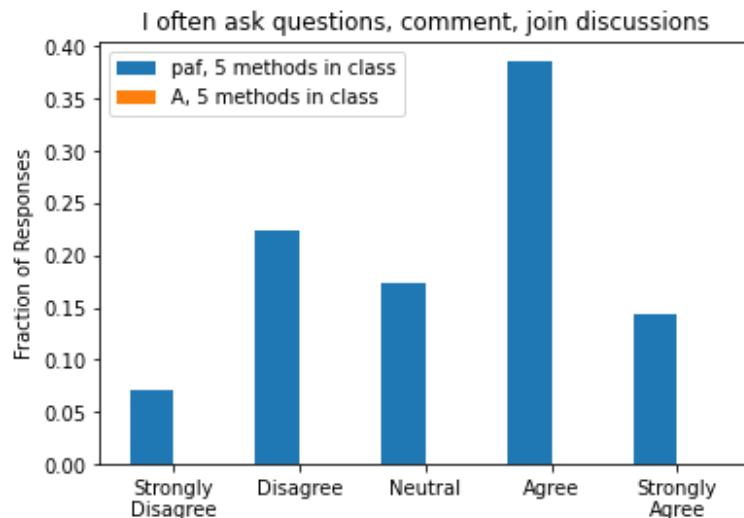
paf, 5 methods in class shape: (236, 43), A, 5 methods in class shape: (0, 43)
 MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
 paf, 5 methods in class median: 4.0
 A, 5 methods in class median: nan
 cohens d: nan
 f: nan



paf, 5 methods in class shape: (236, 43), A, 5 methods in class shape: (0, 43)
 MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
 paf, 5 methods in class median: 4.0
 A, 5 methods in class median: nan
 cohens d: nan
 f: nan

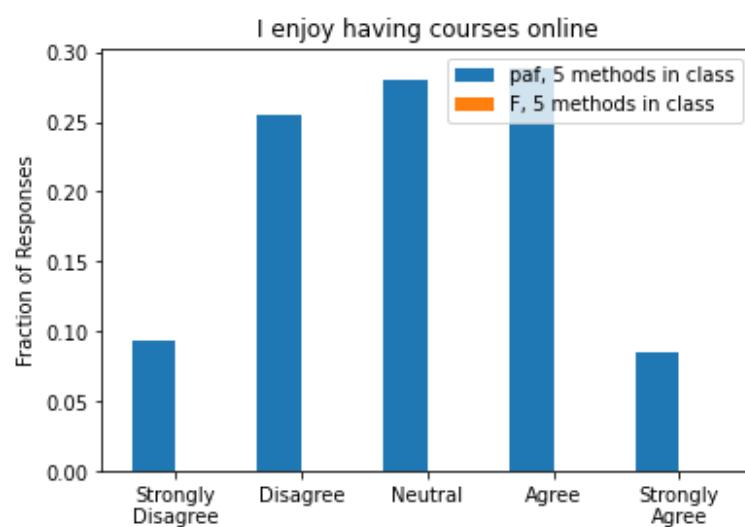


paf, 5 methods in class shape: (236, 43), A, 5 methods in class shape: (0, 43)
 MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
 paf, 5 methods in class median: 4.0
 A, 5 methods in class median: nan
 cohens d: nan
 f: nan



```
paf, 5 methods in class shape: (236, 43), A, 5 methods in class shape:  
(0, 43)  
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)  
paf, 5 methods in class median: 4.0  
A, 5 methods in class median: nan  
cohens d: nan  
f: nan
```

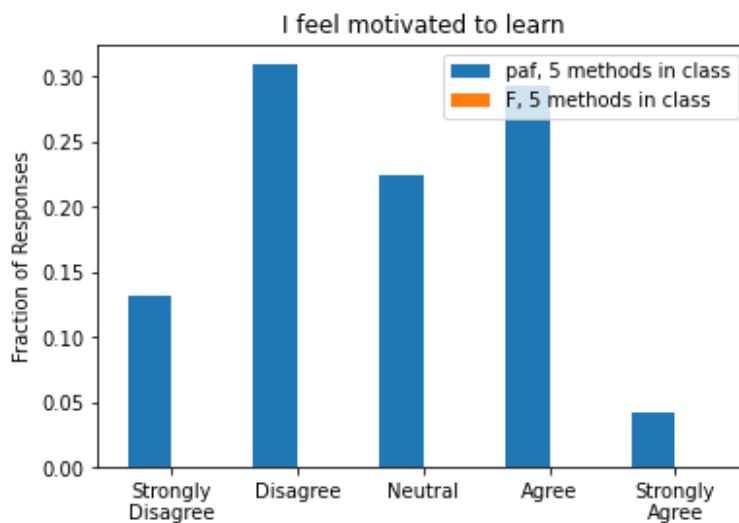
paf, 5 methods in class 236 F, 5 methods in class 0



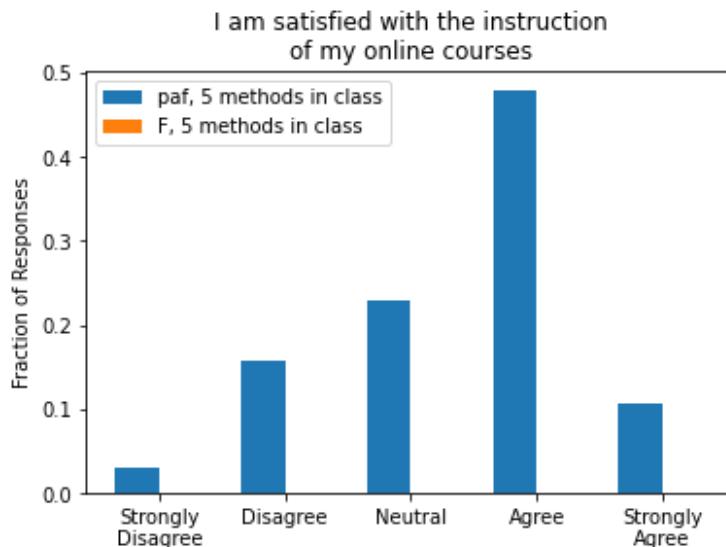
```
paf, 5 methods in class shape: (236, 43), F, 5 methods in class shape:
(0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 5 methods in class median: 3.0
F, 5 methods in class median: nan
cohens d: nan
f: nan

/usr/local/lib/python3.6/dist-packages/scipy/stats/stats.py:6415: RuntimeWarning:
divide by zero encountered in double_scalars

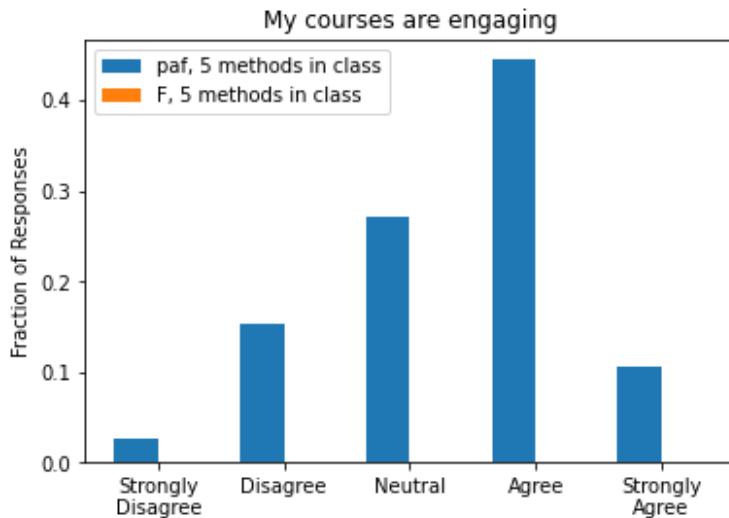
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:10: RuntimeWarning:
invalid value encountered in double_scalars
```



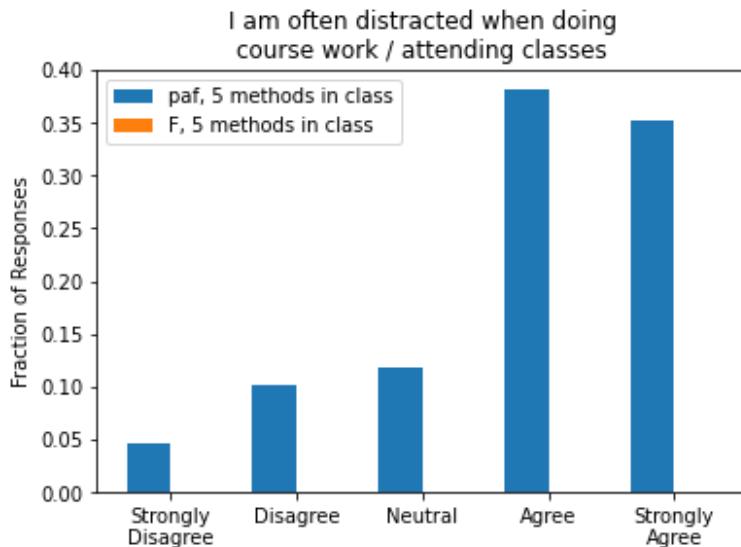
```
paf, 5 methods in class shape: (236, 43), F, 5 methods in class shape:
(0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 5 methods in class median: 3.0
F, 5 methods in class median: nan
cohens d: nan
f: nan
```



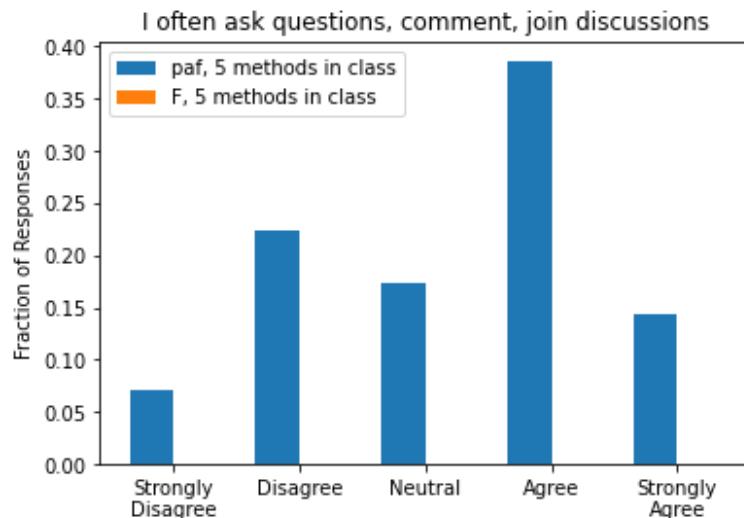
paf, 5 methods in class shape: (236, 43), F, 5 methods in class shape: (0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 5 methods in class median: 4.0
F, 5 methods in class median: nan
cohens d: nan
f: nan



paf, 5 methods in class shape: (236, 43), F, 5 methods in class shape: (0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 5 methods in class median: 4.0
F, 5 methods in class median: nan
cohens d: nan
f: nan

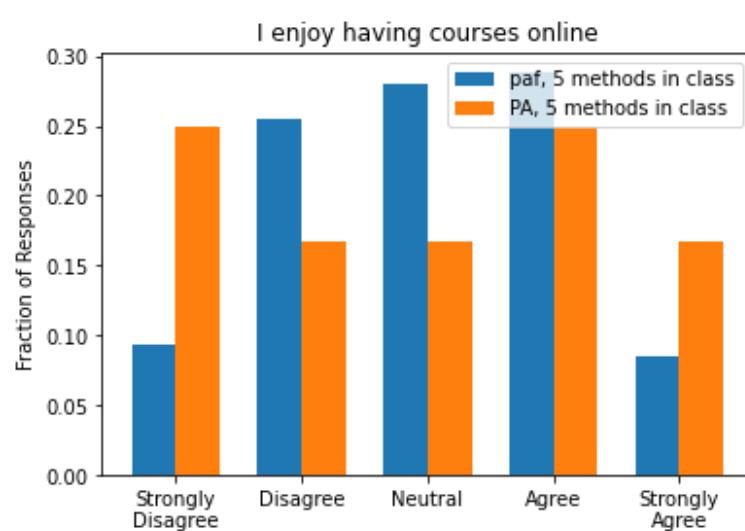


paf, 5 methods in class shape: (236, 43), F, 5 methods in class shape: (0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 5 methods in class median: 4.0
F, 5 methods in class median: nan
cohens d: nan
f: nan

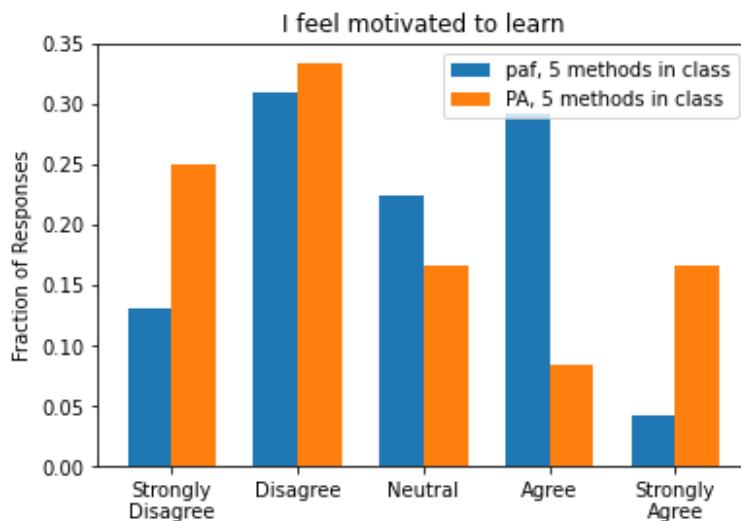


```
paf, 5 methods in class shape: (236, 43), F, 5 methods in class shape:  
(0, 43)  
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)  
paf, 5 methods in class median: 4.0  
F, 5 methods in class median: nan  
cohens d: nan  
f: nan
```

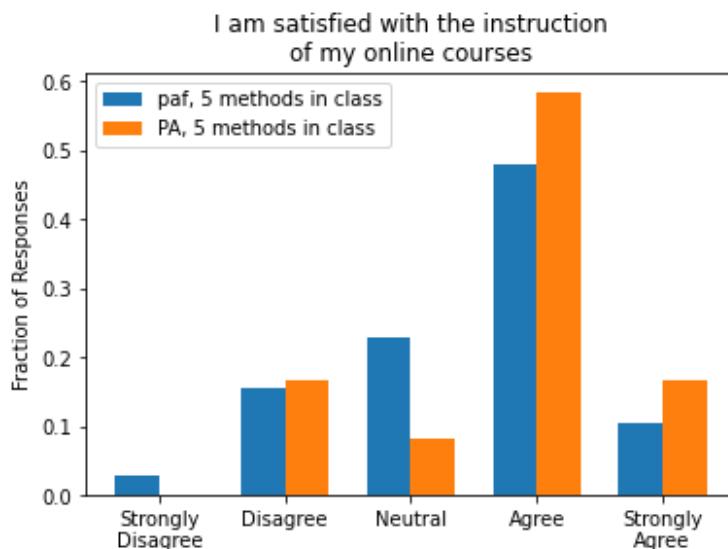
paf, 5 methods in class 236 PA, 5 methods in class 12



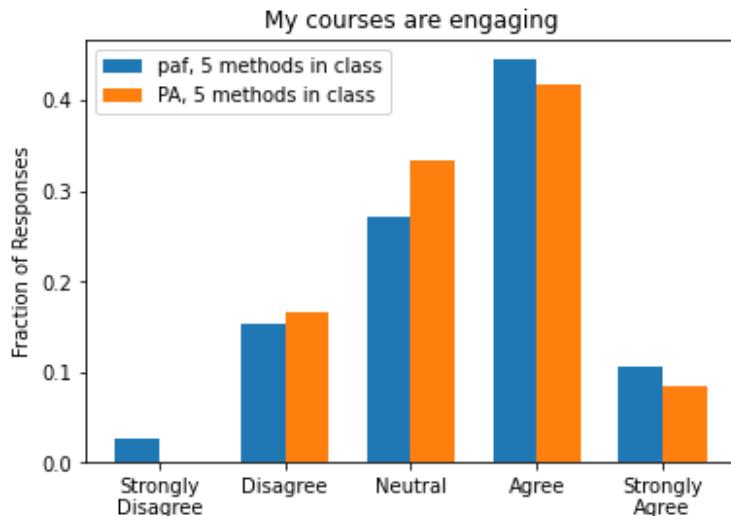
paf, 5 methods in class shape: (236, 43), PA, 5 methods in class shape: (12, 43)
 MWU results: MannwhitneyuResult(statistic=1467.0, pvalue=0.82974428959
 90579)
 paf, 5 methods in class median: 3.0
 PA, 5 methods in class median: 3.0
 cohens d: 0.0878
 f: 0.518



paf, 5 methods in class shape: (236, 43), PA, 5 methods in class shape: (12, 43)
 MWU results: MannwhitneyuResult(statistic=1601.0, pvalue=0.43097133774
 09403)
 paf, 5 methods in class median: 3.0
 PA, 5 methods in class median: 2.0
 cohens d: 0.194
 f: 0.565



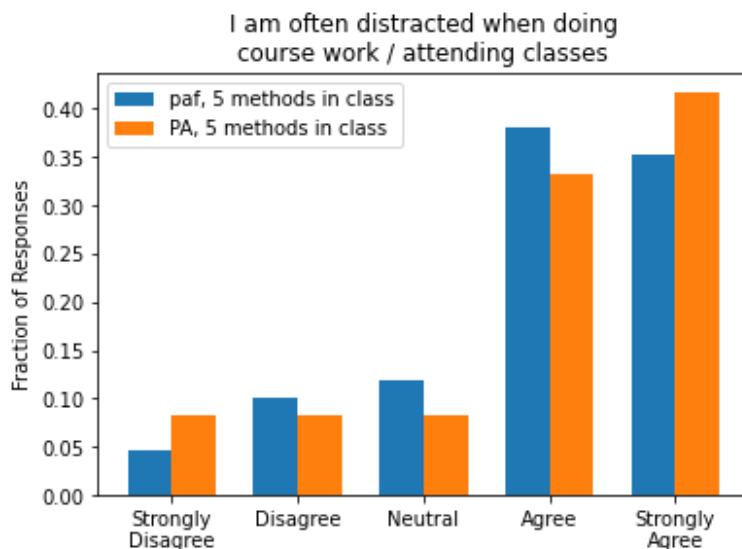
paf, 5 methods in class shape: (236, 43), PA, 5 methods in class shape: (12, 43)
 MWU results: MannwhitneyuResult(statistic=1181.5, pvalue=0.30088406254
 95395)
 paf, 5 methods in class median: 4.0
 PA, 5 methods in class median: 4.0
 cohens d: -0.282
 f: 0.417



```

paf, 5 methods in class shape: (236, 43), PA, 5 methods in class shape: (12, 43)
MWU results: MannwhitneyuResult(statistic=1472.0, pvalue=0.80797177465
31736)
paf, 5 methods in class median: 4.0
PA, 5 methods in class median: 3.5
cohens d: 0.0384
f: 0.52

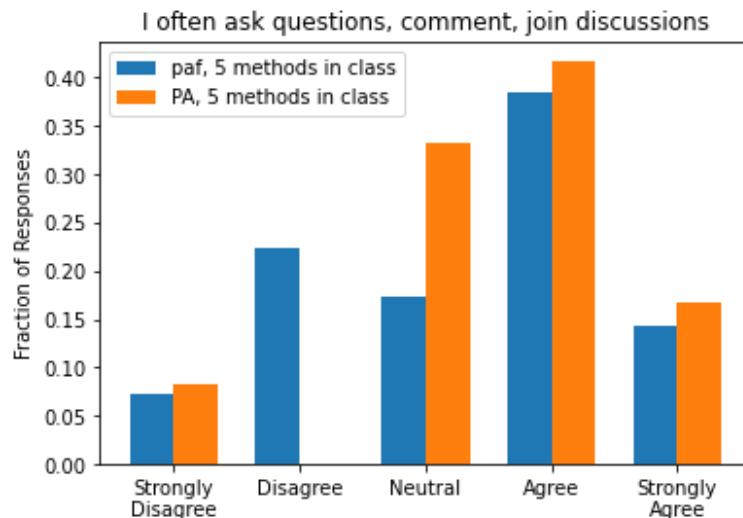
```



```

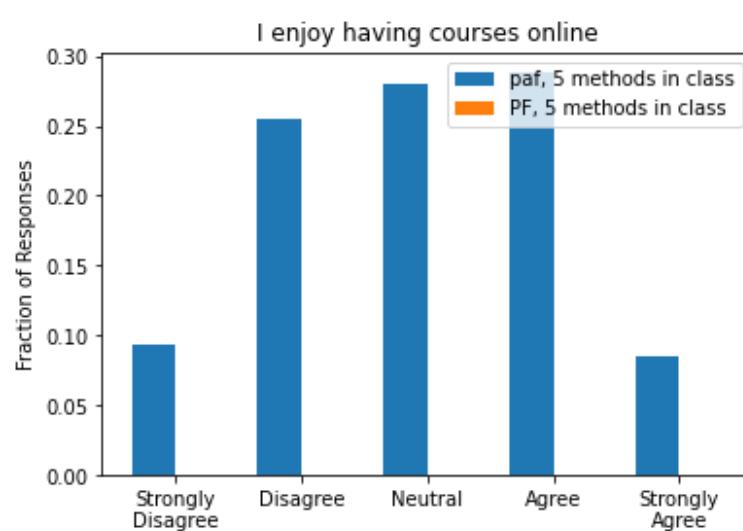
paf, 5 methods in class shape: (236, 43), PA, 5 methods in class shape: (12, 43)
MWU results: MannwhitneyuResult(statistic=1350.0, pvalue=0.77556004125
11536)
paf, 5 methods in class median: 4.0
PA, 5 methods in class median: 4.0
cohens d: -0.0235
f: 0.477

```



```
paf, 5 methods in class shape: (236, 43), PA, 5 methods in class shape: (12, 43)
MWU results: MannwhitneyuResult(statistic=1241.0, pvalue=0.45365354002
19478)
paf, 5 methods in class median: 4.0
PA, 5 methods in class median: 4.0
cohens d: -0.237
f: 0.438
```

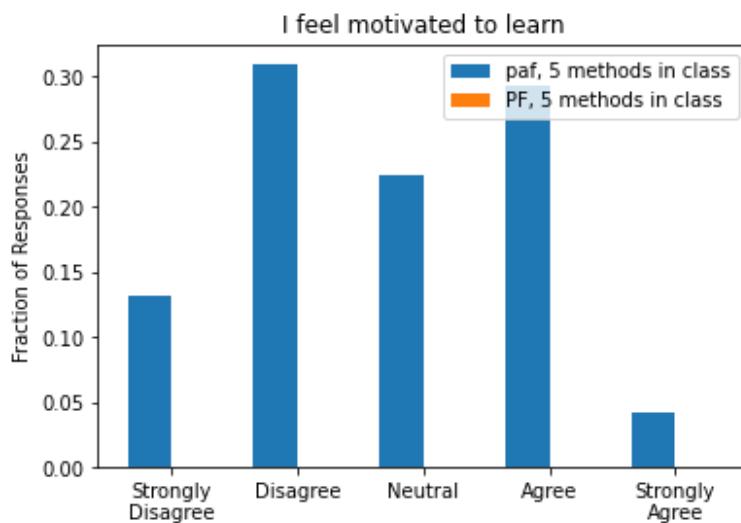
paf, 5 methods in class 236 PF, 5 methods in class 0



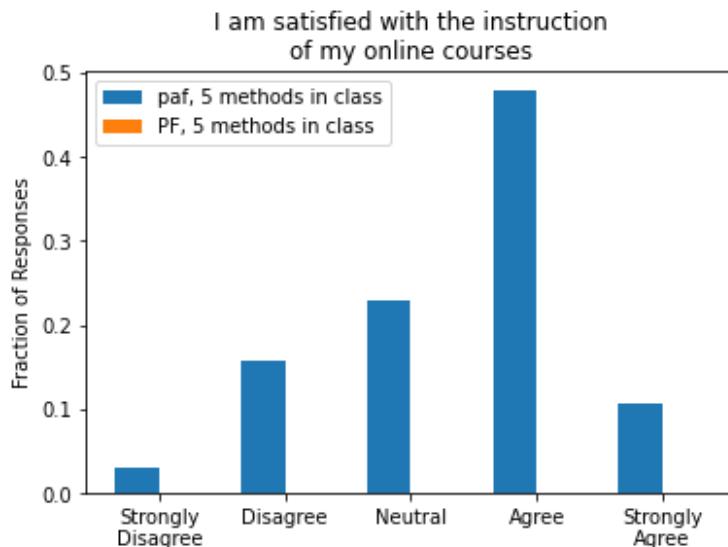
```
paf, 5 methods in class shape: (236, 43), PF, 5 methods in class shape: (0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 5 methods in class median: 3.0
PF, 5 methods in class median: nan
cohens d: nan
f: nan

/usr/local/lib/python3.6/dist-packages/scipy/stats/stats.py:6415: RuntimeWarning:
divide by zero encountered in double_scalars

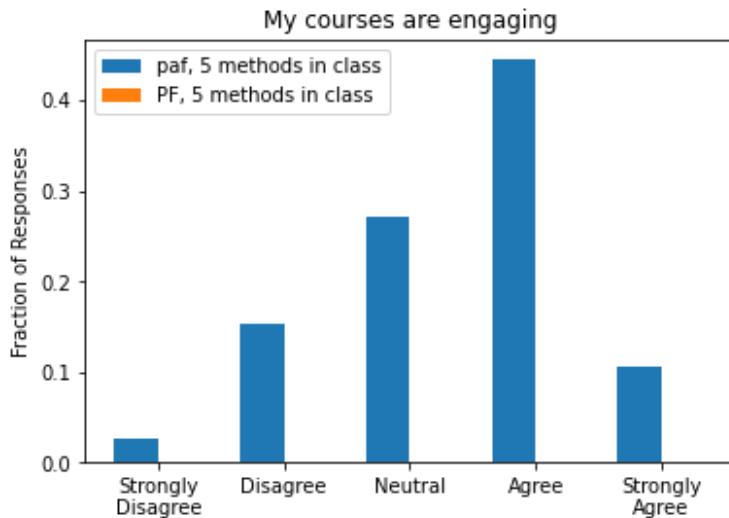
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:10: RuntimeWarning:
invalid value encountered in double_scalars
```



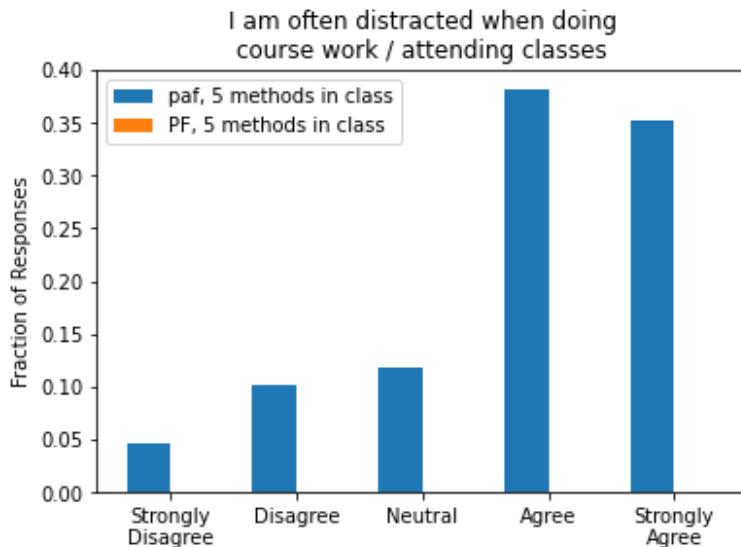
```
paf, 5 methods in class shape: (236, 43), PF, 5 methods in class shape: (0, 43)
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
paf, 5 methods in class median: 3.0
PF, 5 methods in class median: nan
cohens d: nan
f: nan
```



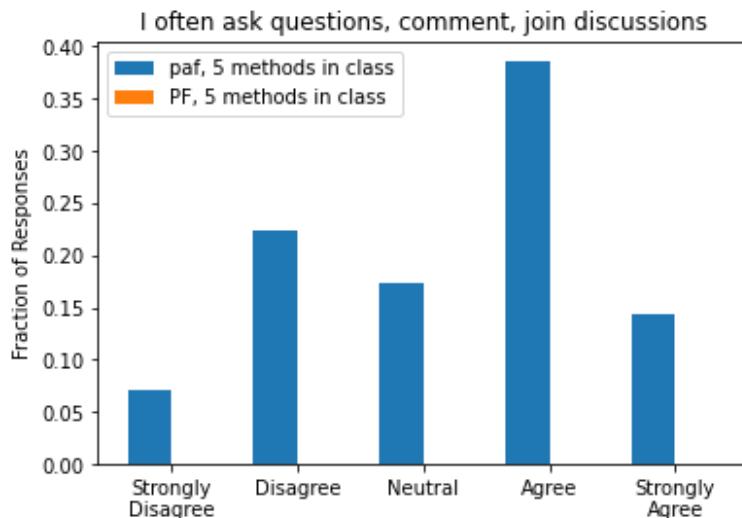
paf, 5 methods in class shape: (236, 43), PF, 5 methods in class shape: (0, 43)
 MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
 paf, 5 methods in class median: 4.0
 PF, 5 methods in class median: nan
 cohens d: nan
 f: nan



paf, 5 methods in class shape: (236, 43), PF, 5 methods in class shape: (0, 43)
 MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
 paf, 5 methods in class median: 4.0
 PF, 5 methods in class median: nan
 cohens d: nan
 f: nan

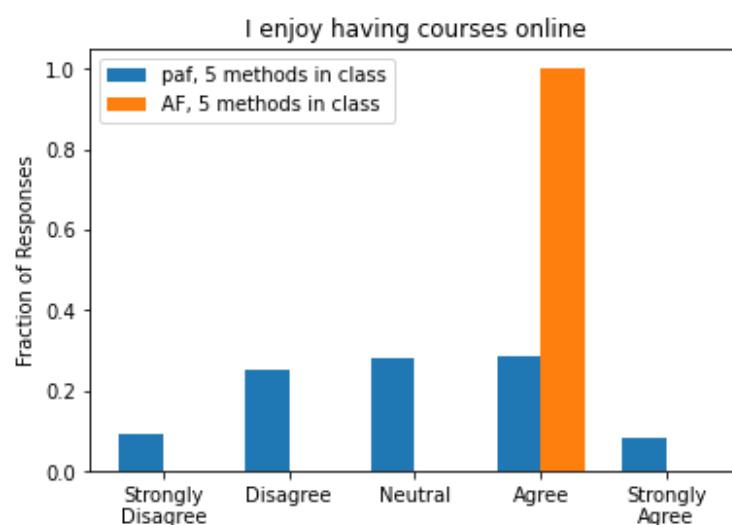


paf, 5 methods in class shape: (236, 43), PF, 5 methods in class shape: (0, 43)
 MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)
 paf, 5 methods in class median: 4.0
 PF, 5 methods in class median: nan
 cohens d: nan
 f: nan

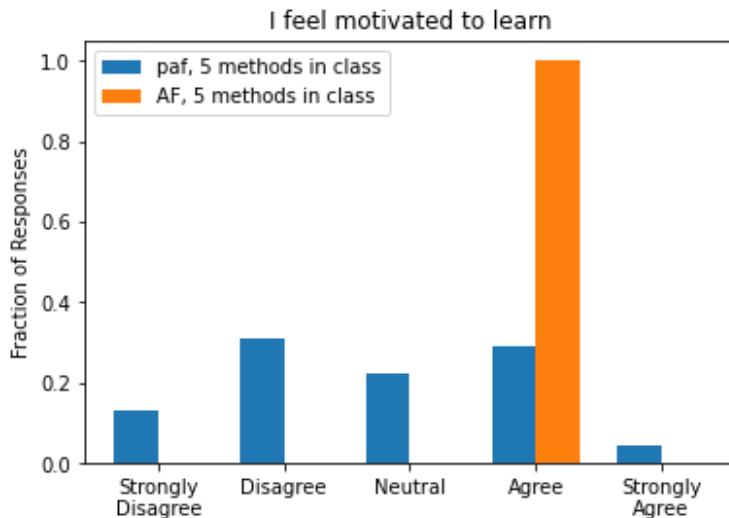


```
paf, 5 methods in class shape: (236, 43), PF, 5 methods in class shape:  
(0, 43)  
MWU results: MannwhitneyuResult(statistic=0.0, pvalue=0.0)  
paf, 5 methods in class median: 4.0  
PF, 5 methods in class median: nan  
cohens d: nan  
f: nan
```

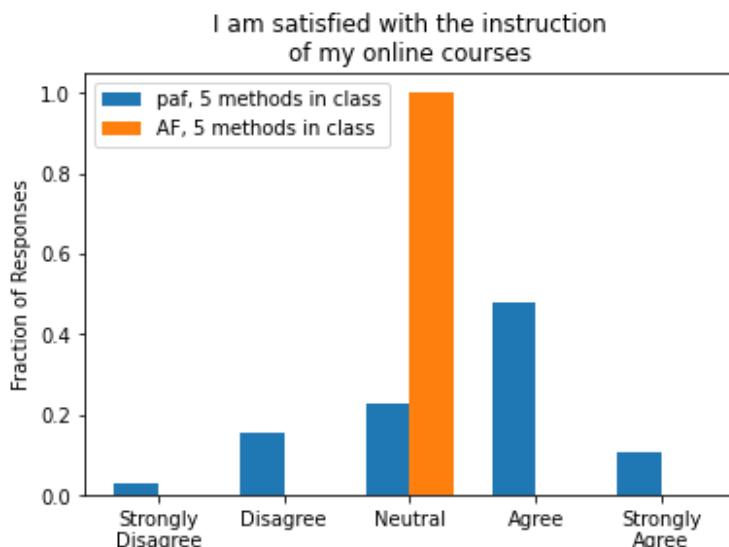
paf, 5 methods in class 236 AF, 5 methods in class 1



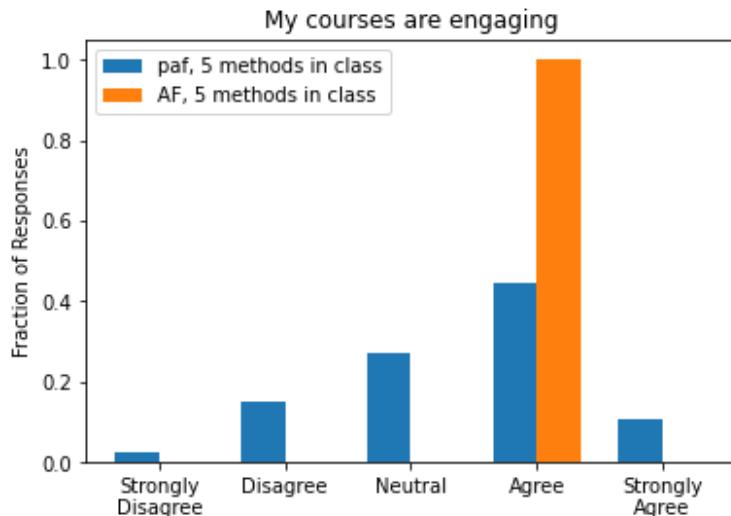
```
paf, 5 methods in class shape: (236, 43), AF, 5 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=54.0, pvalue=0.3374069028437
807)
paf, 5 methods in class median: 3.0
AF, 5 methods in class median: 4.0
cohens d: nan
f: 0.229
```



```
paf, 5 methods in class shape: (236, 43), AF, 5 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=44.5, pvalue=0.2689301821379
8625)
paf, 5 methods in class median: 3.0
AF, 5 methods in class median: 4.0
cohens d: nan
f: 0.189
```



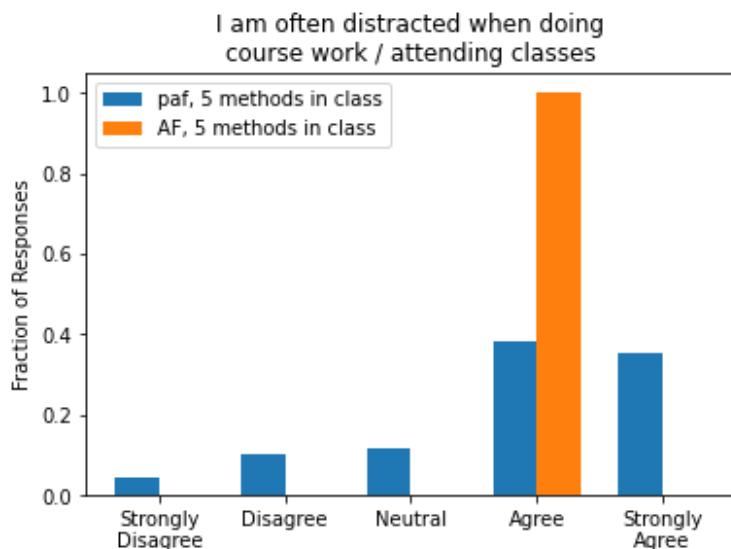
```
paf, 5 methods in class shape: (236, 43), AF, 5 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=165.0, pvalue=0.467248007200
24595)
paf, 5 methods in class median: 4.0
AF, 5 methods in class median: 3.0
cohens d: nan
f: 0.699
```



```

paf, 5 methods in class shape: (236, 43), AF, 5 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=77.5, pvalue=0.5345445682828
116)
paf, 5 methods in class median: 4.0
AF, 5 methods in class median: 4.0
cohens d: nan
f: 0.328

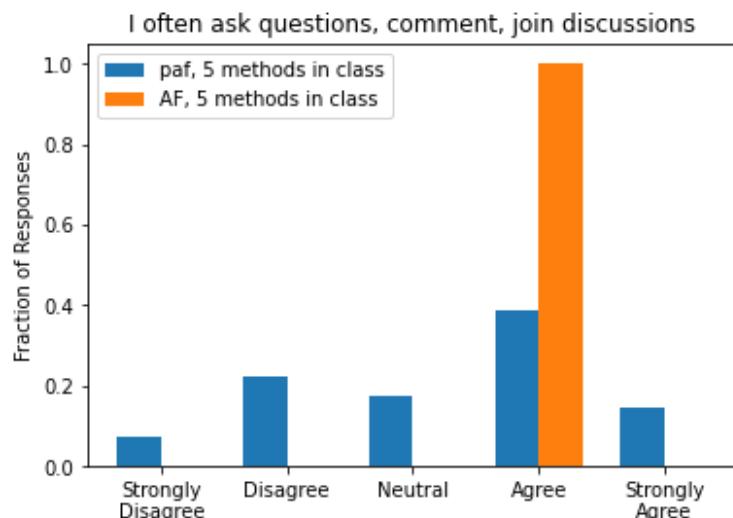
```



```

paf, 5 methods in class shape: (236, 43), AF, 5 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=128.0, pvalue=0.883480265953
1464)
paf, 5 methods in class median: 4.0
AF, 5 methods in class median: 4.0
cohens d: nan
f: 0.542

```



```
paf, 5 methods in class shape: (236, 43), AF, 5 methods in class shape: (1, 43)
MWU results: MannwhitneyuResult(statistic=79.5, pvalue=0.5629276242980
107)
paf, 5 methods in class median: 4.0
AF, 5 methods in class median: 4.0
cohens d: nan
f: 0.337
```

```
In [ ]: three_vs_2_and_1_type[0]
```

Out[]:

	question	paf, 3 methods in class median (n = 312)	P, 3 methods in class median (n = 4)	cohens d	f	p- value
0	remote_enjoy	3.0	3.5	-0.9	0.256	0.0823
1	remote_motivated	2.0	3.0	-0.406	0.363	0.323
2	remote_satisfied	3.0	3.5	-0.358	0.413	0.533
3	remote_engaging	3.0	3.0	0.12	0.54	0.774
4	remote_distracted	4.0	3.5	0.702	0.569	0.613
5	remote_questions	3.0	3.5	-0.553	0.351	0.292

In []: three_vs_2_and_1_type[1]

Out[]:

	question	paf, 3 methods in class median (n = 312)	A, 3 methods in class median (n = 1)	cohens d	f	p- value
0	remote_enjoy	3.0	4.0	nan	0.176	0.248
1	remote_motivated	2.0	3.0	nan	0.335	0.554
2	remote_satisfied	3.0	3.0	nan	0.559	0.835
3	remote_engaging	3.0	4.0	nan	0.242	0.357
4	remote_distracted	4.0	4.0	nan	0.58	0.772
5	remote_questions	3.0	5.0	nan	0.0625	0.121

In []: three_vs_2_and_1_type[2]

Out[]:

	question	paf, 3 methods in class median (n = 312)	F, 3 methods in class median (n = 3)	cohens d	f	p- value
0	remote_enjoy	3.0	2.0	0.366	0.603	0.528
1	remote_motivated	2.0	2.0	0.209	0.569	0.669
2	remote_satisfied	3.0	2.0	0.418	0.622	0.451
3	remote_engaging	3.0	2.0	1.4	0.872	0.0213
4	remote_distracted	4.0	5.0	-0.628	0.317	0.245
5	remote_questions	3.0	4.0	-0.485	0.363	0.4

In []: three_vs_2_and_1_type[3]

Out[]:

	question	paf, 3 methods in class median (n = 312)	PA, 3 methods in class median (n = 276)	cohens d	f	p- value
0	remote_enjoy	3.0	3.0	-0.116	0.47	0.186
1	remote_motivated	2.0	2.0	-0.129	0.462	0.0993
2	remote_satisfied	3.0	3.0	0.0132	0.504	0.852
3	remote_engaging	3.0	3.0	0.016	0.504	0.862
4	remote_distracted	4.0	4.0	0.0298	0.504	0.859
5	remote_questions	3.0	3.0	0.187	0.552	0.0234

In []: three_vs_2_and_1_type[4]

Out[]:

	question	paf, 3 methods in class median (n = 312)	PF, 3 methods in class median (n = 139)	cohens d	f	p- value
0	remote_enjoy	3.0	3.0	-0.00409	0.497	0.918
1	remote_motivated	2.0	2.0	0.00644	0.498	0.936
2	remote_satisfied	3.0	3.0	-0.0135	0.498	0.939
3	remote_engaging	3.0	3.0	-0.0538	0.482	0.515
4	remote_distracted	4.0	4.0	-0.0449	0.487	0.65
5	remote_questions	3.0	3.0	0.0346	0.51	0.725

In []: three_vs_2_and_1_type[5]

Out[]:

	question	paf, 3 methods in class median (n = 312)	AF, 3 methods in class median (n = 75)	cohens d	f	p- value
0	remote_enjoy	3.0	2.0	0.118	0.533	0.357
1	remote_motivated	2.0	2.0	-0.0487	0.482	0.61
2	remote_satisfied	3.0	3.0	0.0842	0.526	0.467
3	remote_engaging	3.0	3.0	-0.0862	0.476	0.504
4	remote_distracted	4.0	4.0	0.114	0.525	0.482
5	remote_questions	3.0	3.0	-0.0225	0.494	0.874

In []: three_vs_2_and_1_type[6]

Out[]:

	question	paf, 4 methods in class median (n = 366)	P, 4 methods in class median (n = 1)	cohens d	f	p- value
0	remote_enjoy	3.0	3.0	nan	0.496	0.992
1	remote_motivated	3.0	3.0	nan	0.418	0.773
2	remote_satisfied	3.0	2.0	nan	0.816	0.253
3	remote_engaging	4.0	4.0	nan	0.292	0.448
4	remote_distracted	4.0	4.0	nan	0.512	0.968
5	remote_questions	4.0	4.0	nan	0.329	0.544

In []: three_vs_2_and_1_type[7]

Out[]:

	question	paf, 4 methods in class median (n = 366)	A, 4 methods in class median (n = 0)	cohens d	f	p- value
0	remote_enjoy	3.0	nan	nan	nan	0.0
1	remote_motivated	3.0	nan	nan	nan	0.0
2	remote_satisfied	3.0	nan	nan	nan	0.0
3	remote_engaging	4.0	nan	nan	nan	0.0
4	remote_distracted	4.0	nan	nan	nan	0.0
5	remote_questions	4.0	nan	nan	nan	0.0

In []: three_vs_2_and_1_type[8]

Out[]:

	question	paf, 4 methods in class median (n = 366)	F, 4 methods in class median (n = 1)	cohens d	f	p- value
0	remote_enjoy	3.0	2.0	nan	0.772	0.333
1	remote_motivated	3.0	4.0	nan	0.184	0.261
2	remote_satisfied	3.0	4.0	nan	0.279	0.424
3	remote_engaging	4.0	4.0	nan	0.292	0.448
4	remote_distracted	4.0	5.0	nan	0.161	0.221
5	remote_questions	4.0	5.0	nan	0.071	0.126

In []: three_vs_2_and_1_type[9]

Out[]:

	question	paf, 4 methods in class median (n = 366)	PA, 4 methods in class median (n = 98)	cohens d	f	p- value
0	remote_enjoy	3.0	3.0	-0.092	0.47	0.35
1	remote_motivated	3.0	3.0	0.00392	0.5	0.998
2	remote_satisfied	3.0	3.0	-0.053	0.487	0.678
3	remote_engaging	4.0	3.0	0.125	0.529	0.355
4	remote_distracted	4.0	4.0	-0.0791	0.472	0.379
5	remote_questions	4.0	3.0	0.275	0.574	0.0203

In []: three_vs_2_and_1_type[10]

Out[]:

	question	paf, 4 methods in class median (n = 366)	PF, 4 methods in class median (n = 17)	cohens d	f	p- value
0	remote_enjoy	3.0		3.0	0.151	0.545
1	remote_motivated	3.0		2.0	0.201	0.561
2	remote_satisfied	3.0		3.0	-0.262	0.439
3	remote_engaging	4.0		3.0	-0.276	0.45
4	remote_distracted	4.0		4.0	-0.281	0.452
5	remote_questions	4.0		4.0	-0.364	0.403
						0.159

In []: three_vs_2_and_1_type[11]

Out[]:

	question	paf, 4 methods in class median (n = 366)	AF, 4 methods in class median (n = 34)	cohens d	f	p- value
0	remote_enjoy	3.0		2.0	0.337	0.594
1	remote_motivated	3.0		2.0	0.356	0.597
2	remote_satisfied	3.0		3.5	-0.0439	0.492
3	remote_engaging	4.0		4.0	-0.154	0.46
4	remote_distracted	4.0		4.0	-0.202	0.442
5	remote_questions	4.0		4.0	0.0985	0.519
						0.707

In []: three_vs_2_and_1_type[12]

Out[]:

	question	paf, 5 methods in class median (n = 236)	P, 5 methods in class median (n = 0)	cohens d	f	p- value
0	remote_enjoy	3.0		nan	nan	0.0
1	remote_motivated	3.0		nan	nan	0.0
2	remote_satisfied	4.0		nan	nan	0.0
3	remote_engaging	4.0		nan	nan	0.0
4	remote_distracted	4.0		nan	nan	0.0
5	remote_questions	4.0		nan	nan	0.0

In []: three_vs_2_and_1_type[13]

Out[]:

	question	paf, 5 methods in class median (n = 236)	A, 5 methods in class median (n = 0)	cohens d	f	p- value
0	remote_enjoy	3.0	nan	nan	nan	0.0
1	remote_motivated	3.0	nan	nan	nan	0.0
2	remote_satisfied	4.0	nan	nan	nan	0.0
3	remote_engaging	4.0	nan	nan	nan	0.0
4	remote_distracted	4.0	nan	nan	nan	0.0
5	remote_questions	4.0	nan	nan	nan	0.0

In []: three_vs_2_and_1_type[14]

Out[]:

	question	paf, 5 methods in class median (n = 236)	F, 5 methods in class median (n = 0)	cohens d	f	p- value
0	remote_enjoy	3.0	nan	nan	nan	0.0
1	remote_motivated	3.0	nan	nan	nan	0.0
2	remote_satisfied	4.0	nan	nan	nan	0.0
3	remote_engaging	4.0	nan	nan	nan	0.0
4	remote_distracted	4.0	nan	nan	nan	0.0
5	remote_questions	4.0	nan	nan	nan	0.0

In []: three_vs_2_and_1_type[15]

Out[]:

	question	paf, 5 methods in class median (n = 236)	PA, 5 methods in class median (n = 12)	cohens d	f	p- value
0	remote_enjoy	3.0	3.0	0.0878	0.518	0.83
1	remote_motivated	3.0	2.0	0.194	0.565	0.431
2	remote_satisfied	4.0	4.0	-0.282	0.417	0.301
3	remote_engaging	4.0	3.5	0.0384	0.52	0.808
4	remote_distracted	4.0	4.0	-0.0235	0.477	0.776
5	remote_questions	4.0	4.0	-0.237	0.438	0.454

In []: three_vs_2_and_1_type[16]

Out[]:

	question	paf, 5 methods in class median (n = 236)	PF, 5 methods in class median (n = 0)	cohens d	f	p- value
0	remote_enjoy	3.0	nan	nan	nan	0.0
1	remote_motivated	3.0	nan	nan	nan	0.0
2	remote_satisfied	4.0	nan	nan	nan	0.0
3	remote_engaging	4.0	nan	nan	nan	0.0
4	remote_distracted	4.0	nan	nan	nan	0.0
5	remote_questions	4.0	nan	nan	nan	0.0

In []: three_vs_2_and_1_type[17]

Out[]:

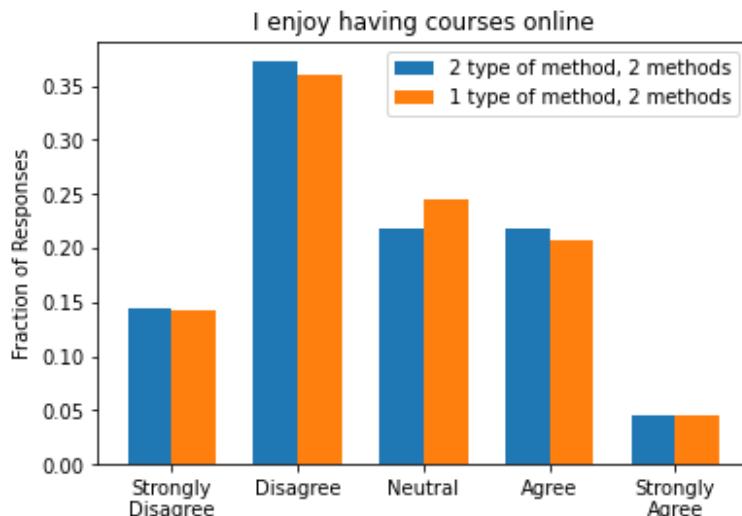
	question	paf, 5 methods in class median (n = 236)	AF, 5 methods in class median (n = 1)	cohens d	f	p- value
0	remote_enjoy	3.0	4.0	nan	0.229	0.337
1	remote_motivated	3.0	4.0	nan	0.189	0.269
2	remote_satisfied	4.0	3.0	nan	0.699	0.467
3	remote_engaging	4.0	4.0	nan	0.328	0.535
4	remote_distracted	4.0	4.0	nan	0.542	0.883
5	remote_questions	4.0	4.0	nan	0.337	0.563

In []: # 2 types vs. 1 type OVERALL, controlled for 2 methods

```
a = pd.concat([ugcat1, ugcatt2, ugcatt3])
a = a[a['num_methods']==2]
b = pd.concat([ugcat4, ugcatt5, ugcatt6])
b = b[b['num_methods']==2]
a.name = '1 type of method, 2 methods'
b.name = '2 type of method, 2 methods'
subset_ls.append(a)
subset_name.append(a.name)
subset_ls.append(b)
subset_name.append(b.name)
print(a.name, a.shape[0], b.name, b.shape[0])
```

1 type of method, 2 methods 217 2 type of method, 2 methods 800

```
In [ ]: mwu_comparison(b, a)
```



2 type of method, 2 methods shape: (800, 43), 1 type of method, 2 methods shape: (217, 43)

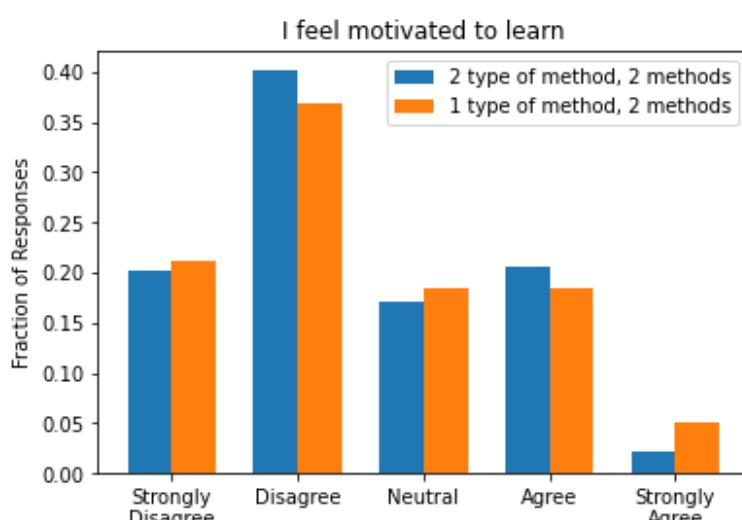
MWU results: MannwhitneyuResult(statistic=86290.0, pvalue=0.8902039743280344)

2 type of method, 2 methods median: 2.0

1 type of method, 2 methods median: 2.0

cohens d: -0.00735

f: 0.497



2 type of method, 2 methods shape: (800, 43), 1 type of method, 2 methods shape: (217, 43)

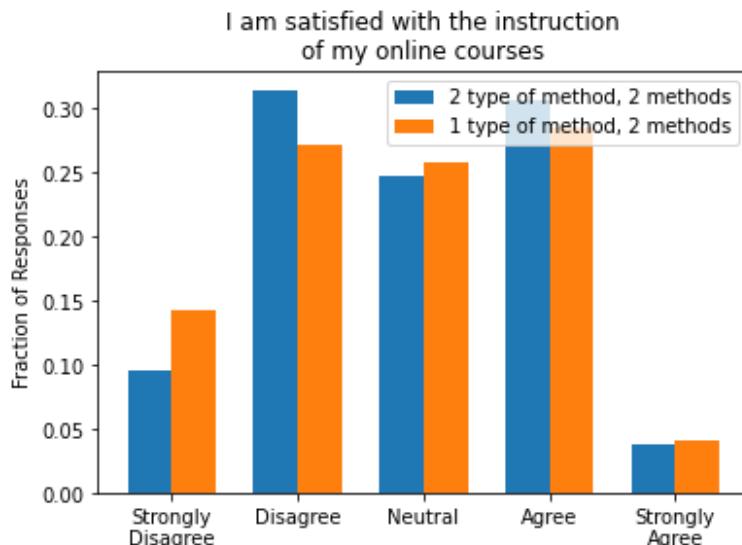
MWU results: MannwhitneyuResult(statistic=85287.5, pvalue=0.6807267466864755)

2 type of method, 2 methods median: 2.0

1 type of method, 2 methods median: 2.0

cohens d: -0.0468

f: 0.491



2 type of method, 2 methods shape: (800, 43), 1 type of method, 2 methods shape: (217, 43)

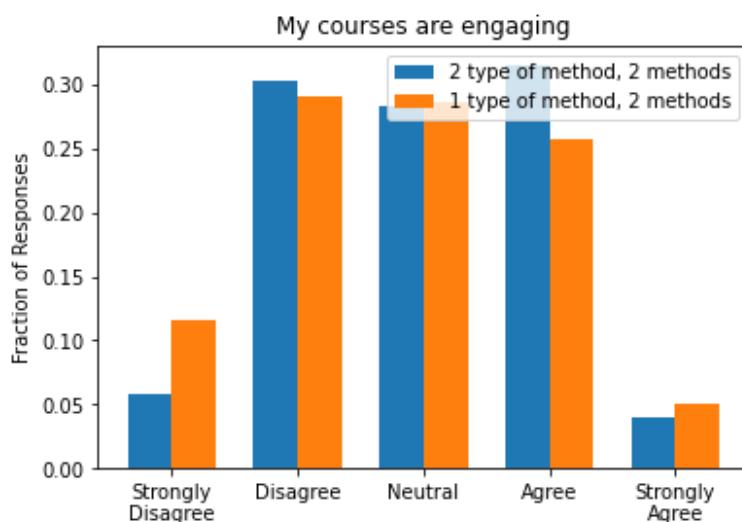
MWU results: MannwhitneyuResult(statistic=89467.5, pvalue=0.4704980291998724)

2 type of method, 2 methods median: 3.0

1 type of method, 2 methods median: 3.0

cohens d: 0.0616

f: 0.515



2 type of method, 2 methods shape: (800, 43), 1 type of method, 2 methods shape: (217, 43)

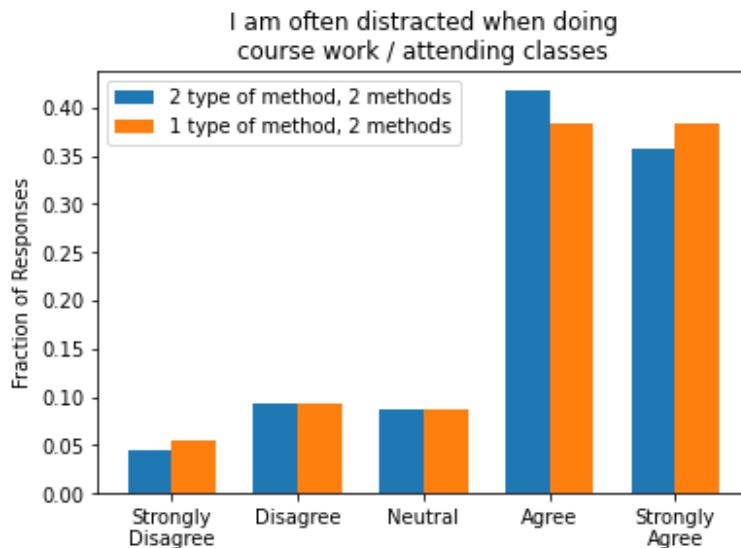
MWU results: MannwhitneyuResult(statistic=92941.5, pvalue=0.09553790313216974)

2 type of method, 2 methods median: 3.0

1 type of method, 2 methods median: 3.0

cohens d: 0.134

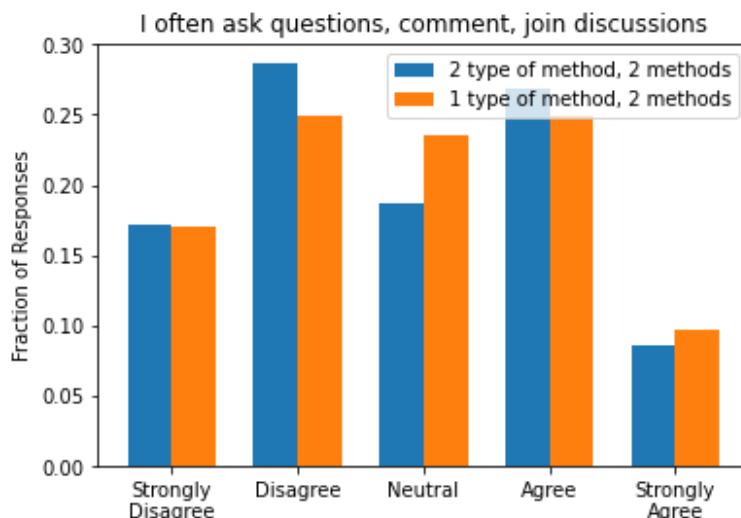
f: 0.535



```

2 type of method, 2 methods shape: (800, 43), 1 type of method, 2 methods shape: (217, 43)
MWU results: MannwhitneyuResult(statistic=85853.0, pvalue=0.7928106113
837718)
2 type of method, 2 methods median: 4.0
1 type of method, 2 methods median: 4.0
cohens d: 0.00588
f: 0.495

```



```

2 type of method, 2 methods shape: (800, 43), 1 type of method, 2 methods shape: (217, 43)
MWU results: MannwhitneyuResult(statistic=85249.0, pvalue=0.6779326212
608414)
2 type of method, 2 methods median: 3.0
1 type of method, 2 methods median: 3.0
cohens d: -0.0321
f: 0.491

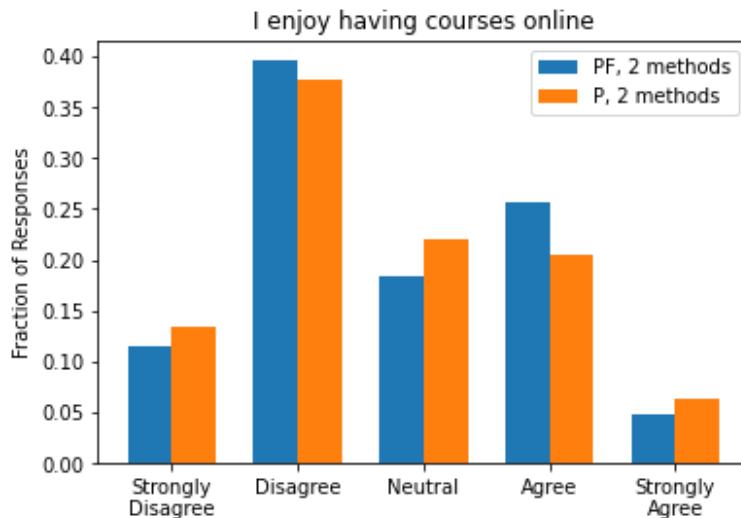
```

Out[]:

	question	2 type of method, 2 methods median (n = 800)	1 type of method, 2 methods median (n = 217)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	-0.00735	0.497	0.89
1	remote_motivated	2.0	2.0	-0.0468	0.491	0.681
2	remote_satisfied	3.0	3.0	0.0616	0.515	0.47
3	remote_engaging	3.0	3.0	0.134	0.535	0.0955
4	remote_distracted	4.0	4.0	0.00588	0.495	0.793
5	remote_questions	3.0	3.0	-0.0321	0.491	0.678

```
In [ ]: # 2 types vs. 1 type SPECIFIC, controlled for 2 methods
specific = []
for each in [[ugcat1, ugcat5], [ugcat2, ugcat5], [ugcat1, ugcat6]]:
    a = each[0][each[0]['num_methods']==2]
    b = each[1][each[1]['num_methods']==2]
    a.name = f'{each[0].name}, 2 methods'
    b.name = f'{each[1].name}, 2 methods'
    subset_ls.append(a)
    subset_name.append(a.name)
    subset_ls.append(b)
    subset_name.append(b.name)
    print(a.name, a.shape[0], b.name, b.shape[0])
    specific.append(mwu_comparison(b, a))
```

P, 2 methods 127 PF, 2 methods 250



PF, 2 methods shape: (250, 43), P, 2 methods shape: (127, 43)

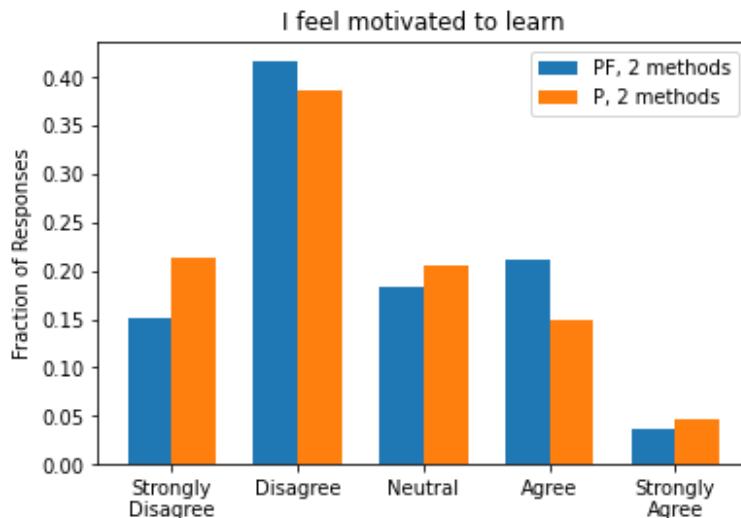
MWU results: MannwhitneyuResult(statistic=16199.5, pvalue=0.7352008010
654396)

PF, 2 methods median: 2.0

P, 2 methods median: 2.0

cohens d: 0.0348

f: 0.51



PF, 2 methods shape: (250, 43), P, 2 methods shape: (127, 43)

MWU results: MannwhitneyuResult(statistic=16988.5, pvalue=0.2443899056
9658148)

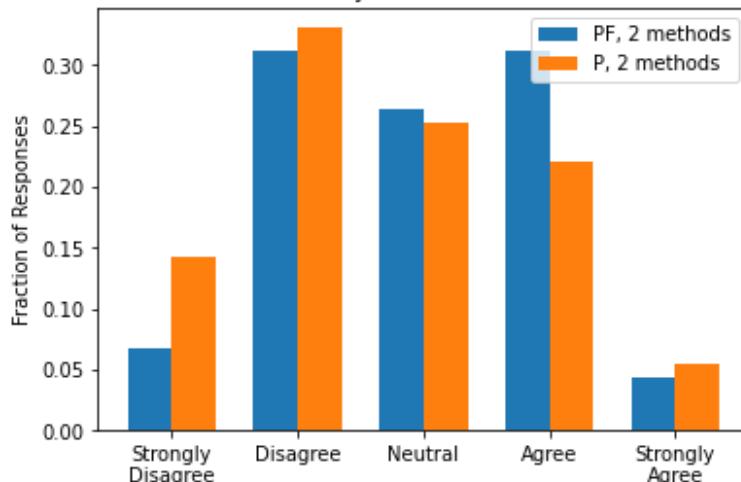
PF, 2 methods median: 2.0

P, 2 methods median: 2.0

cohens d: 0.119

f: 0.535

**I am satisfied with the instruction
of my online courses**

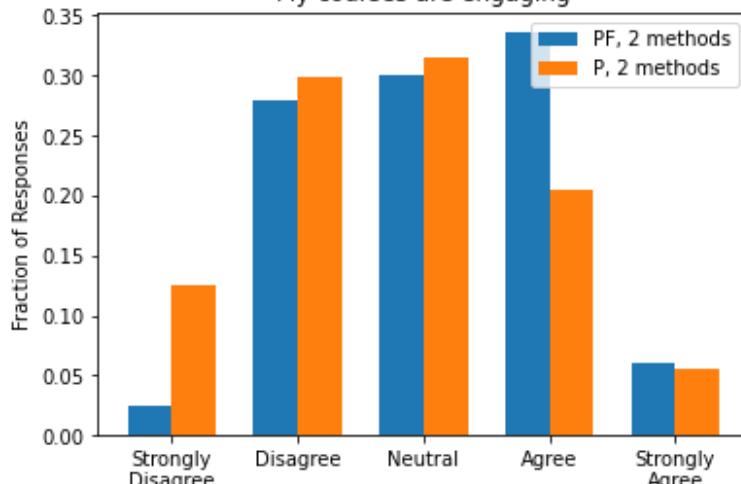


```

PF, 2 methods shape: (250, 43), P, 2 methods shape: (127, 43)
MWU results: MannwhitneyuResult(statistic=17837.5, pvalue=0.0415899083
1796499)
PF, 2 methods median: 3.0
P, 2 methods median: 3.0
cohens d: 0.221
f: 0.562

```

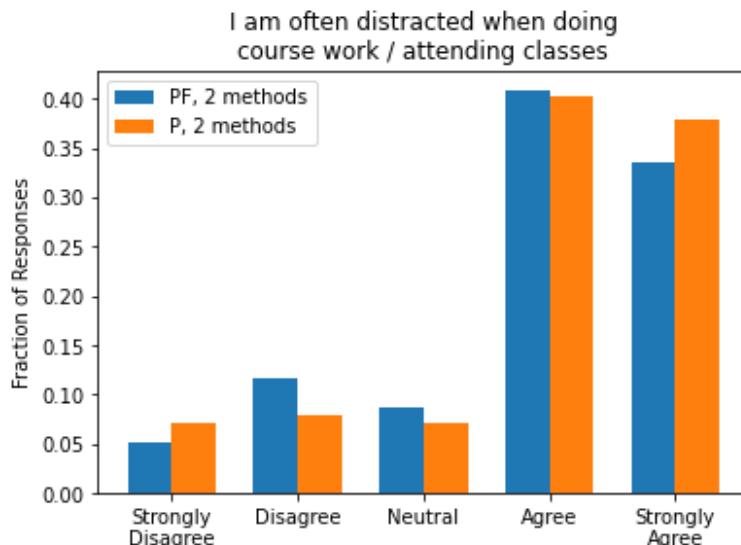
My courses are engaging



```

PF, 2 methods shape: (250, 43), P, 2 methods shape: (127, 43)
MWU results: MannwhitneyuResult(statistic=18888.5, pvalue=0.0017116640
615533816)
PF, 2 methods median: 3.0
P, 2 methods median: 3.0
cohens d: 0.36
f: 0.595

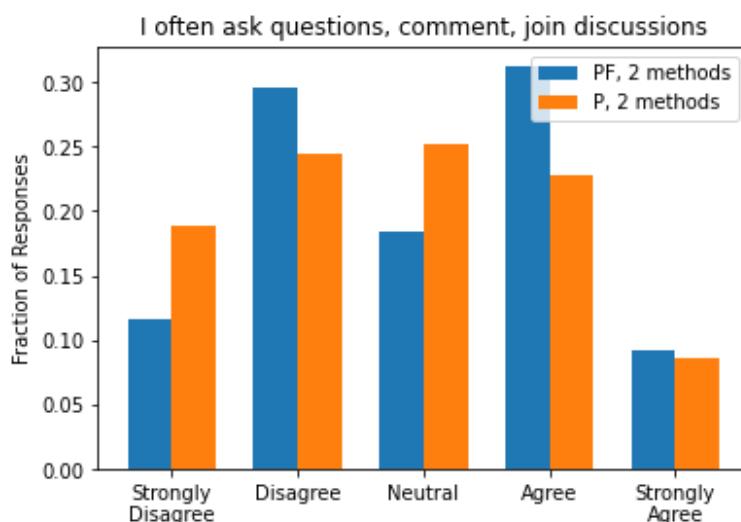
```



```

PF, 2 methods shape: (250, 43), P, 2 methods shape: (127, 43)
MWU results: MannwhitneyuResult(statistic=15090.5, pvalue=0.4055532448
32917)
PF, 2 methods median: 4.0
P, 2 methods median: 4.0
cohens d: -0.0659
f: 0.475

```

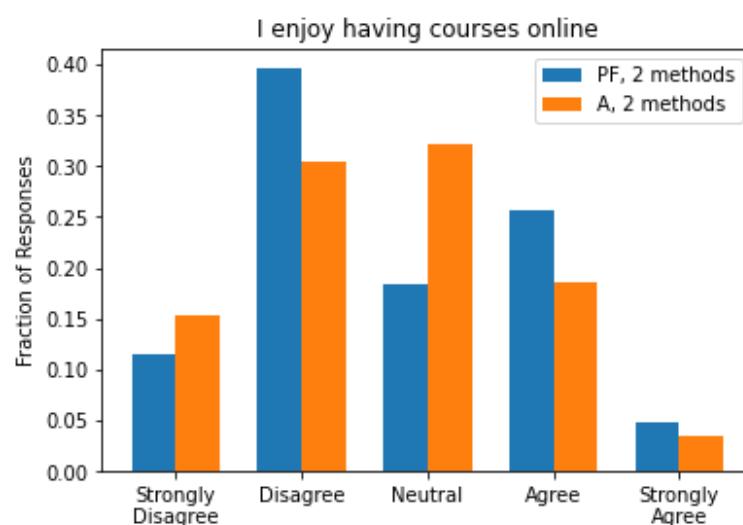


```

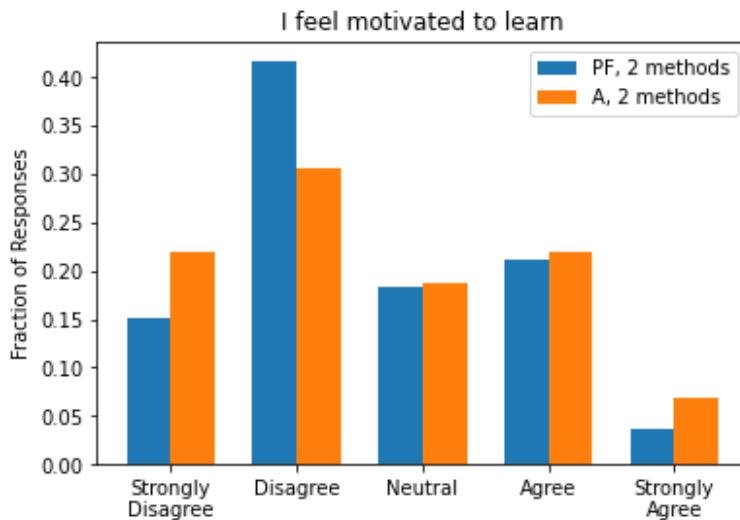
PF, 2 methods shape: (250, 43), P, 2 methods shape: (127, 43)
MWU results: MannwhitneyuResult(statistic=17248.5, pvalue=0.1574586976
0876274)
PF, 2 methods median: 3.0
P, 2 methods median: 3.0
cohens d: 0.155
f: 0.543

```

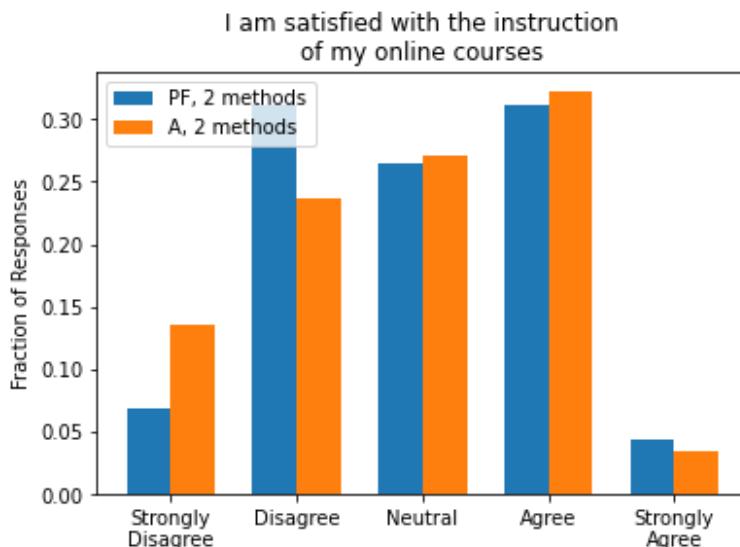
A, 2 methods 59 PF, 2 methods 250



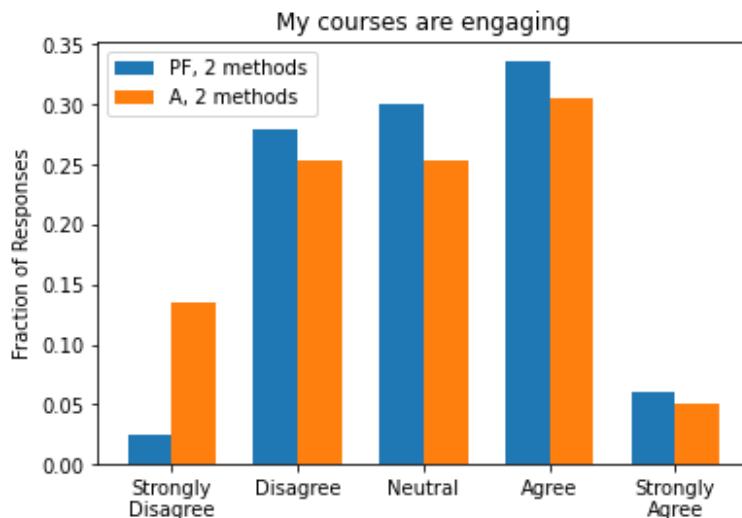
PF, 2 methods shape: (250, 43), A, 2 methods shape: (59, 43)
 MWU results: MannwhitneyuResult(statistic=7583.5, pvalue=0.72538375772
 83497)
 PF, 2 methods median: 2.0
 A, 2 methods median: 3.0
 cohens d: 0.0725
 f: 0.514



PF, 2 methods shape: (250, 43), A, 2 methods shape: (59, 43)
 MWU results: MannwhitneyuResult(statistic=7297.5, pvalue=0.89640756243
 51866)
 PF, 2 methods median: 2.0
 A, 2 methods median: 2.0
 cohens d: -0.0411
 f: 0.495



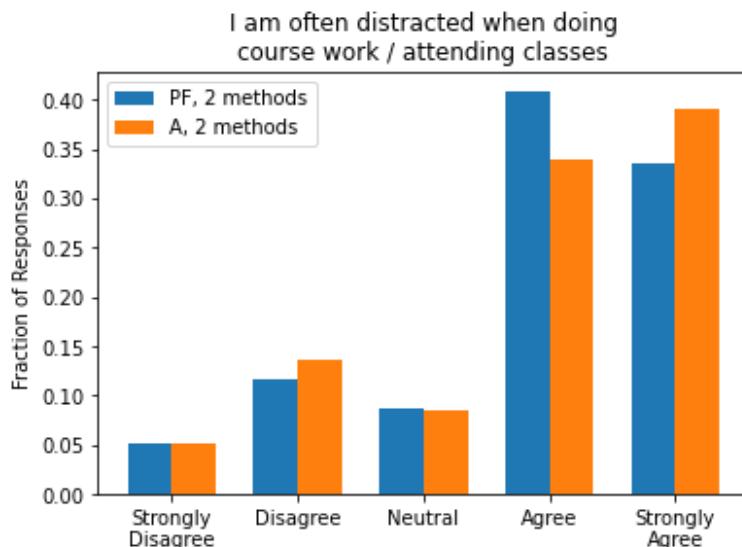
PF, 2 methods shape: (250, 43), A, 2 methods shape: (59, 43)
 MWU results: MannwhitneyuResult(statistic=7561.0, pvalue=0.75448826714
 48626)
 PF, 2 methods median: 3.0
 A, 2 methods median: 3.0
 cohens d: 0.0672
 f: 0.513



```

PF, 2 methods shape: (250, 43), A, 2 methods shape: (59, 43)
MWU results: MannwhitneyuResult(statistic=8207.0, pvalue=0.15980500996
763713)
PF, 2 methods median: 3.0
A, 2 methods median: 3.0
cohens d: 0.245
f: 0.556

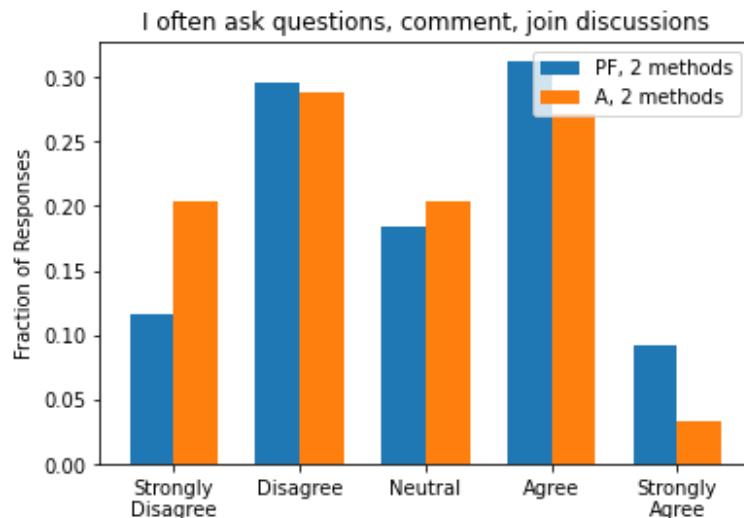
```



```

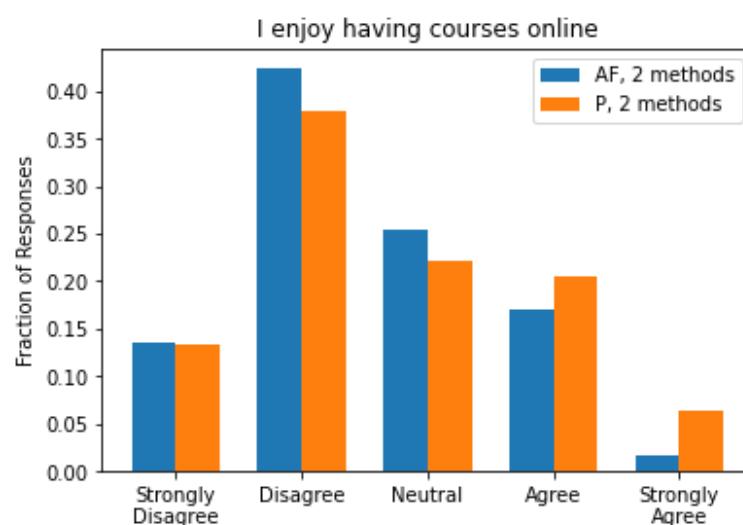
PF, 2 methods shape: (250, 43), A, 2 methods shape: (59, 43)
MWU results: MannwhitneyuResult(statistic=7161.5, pvalue=0.71521791823
6658)
PF, 2 methods median: 4.0
A, 2 methods median: 4.0
cohens d: -0.0183
f: 0.486

```

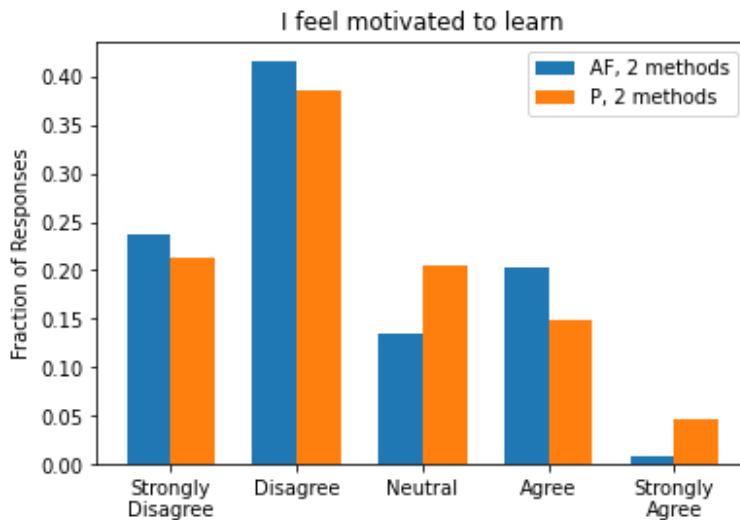


```
PF, 2 methods shape: (250, 43), A, 2 methods shape: (59, 43)
MWU results: MannwhitneyuResult(statistic=8457.0, pvalue=0.07027666707
585668)
PF, 2 methods median: 3.0
A, 2 methods median: 3.0
cohens d: 0.27
f: 0.573
```

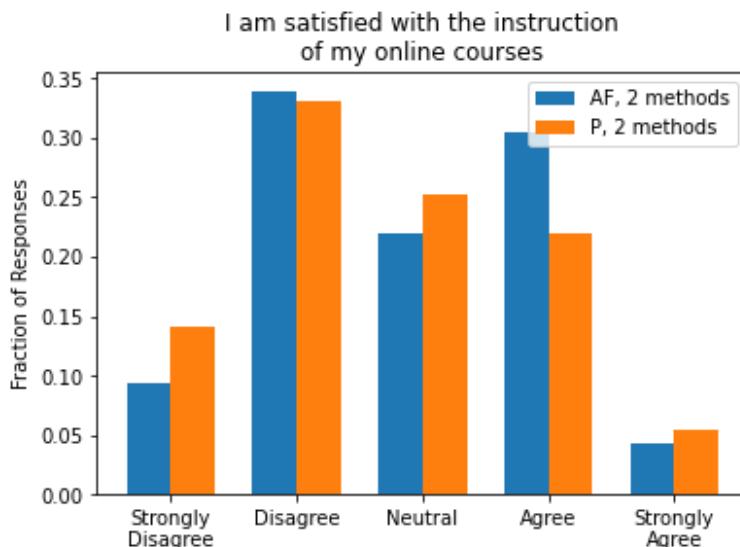
P, 2 methods 127 AF, 2 methods 118



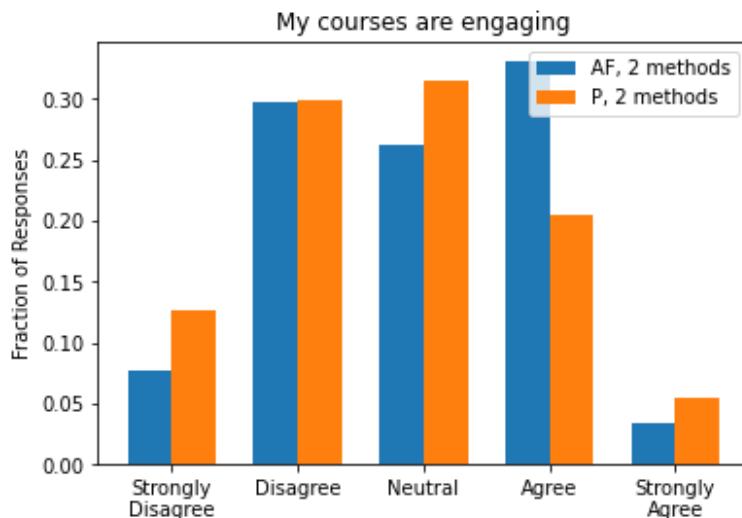
AF, 2 methods shape: (118, 43), P, 2 methods shape: (127, 43)
 MWU results: MannwhitneyuResult(statistic=6922.0, pvalue=0.28154899181
 52607)
 AF, 2 methods median: 2.0
 P, 2 methods median: 2.0
 cohens d: -0.166
 f: 0.462



AF, 2 methods shape: (118, 43), P, 2 methods shape: (127, 43)
 MWU results: MannwhitneyuResult(statistic=7125.5, pvalue=0.48862565334
 191044)
 AF, 2 methods median: 2.0
 P, 2 methods median: 2.0
 cohens d: -0.093
 f: 0.475



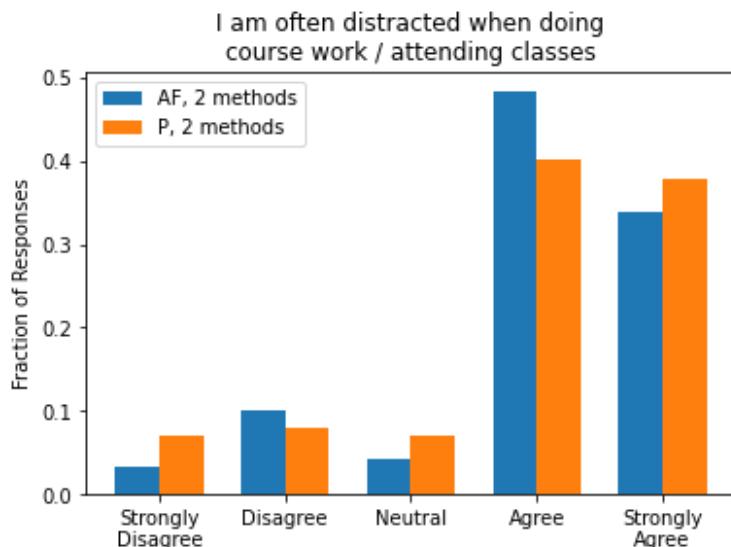
AF, 2 methods shape: (118, 43), P, 2 methods shape: (127, 43)
 MWU results: MannwhitneyuResult(statistic=8068.5, pvalue=0.28195490612
 071394)
 AF, 2 methods median: 3.0
 P, 2 methods median: 3.0
 cohens d: 0.134
 f: 0.538



```

AF, 2 methods shape: (118, 43), P, 2 methods shape: (127, 43)
MWU results: MannwhitneyuResult(statistic=8258.0, pvalue=0.15250842779
046747)
AF, 2 methods median: 3.0
P, 2 methods median: 3.0
cohens d: 0.174
f: 0.551

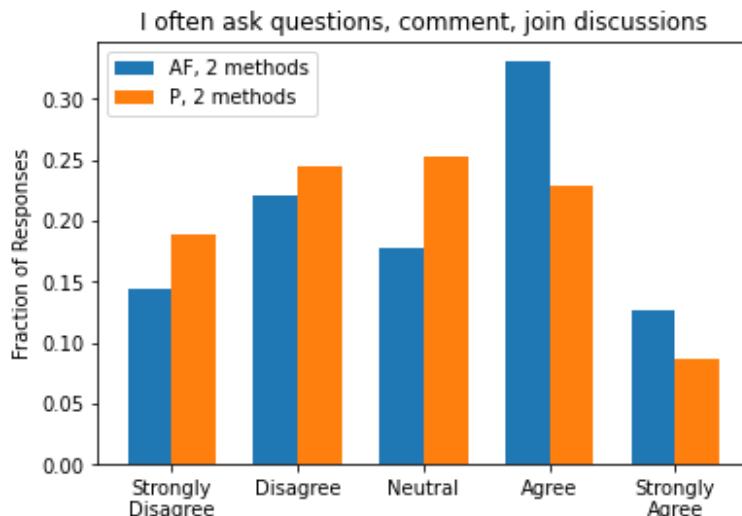
```



```

AF, 2 methods shape: (118, 43), P, 2 methods shape: (127, 43)
MWU results: MannwhitneyuResult(statistic=7473.0, pvalue=0.96985932308
555)
AF, 2 methods median: 4.0
P, 2 methods median: 4.0
cohens d: 0.0485
f: 0.499

```



```
AF, 2 methods shape: (118, 43), P, 2 methods shape: (127, 43)
MWU results: MannwhitneyuResult(statistic=8503.0, pvalue=0.06167849277
782695)
AF, 2 methods median: 3.0
P, 2 methods median: 3.0
cohens d: 0.235
f: 0.567
```

```
In [ ]: specific[0]
```

```
Out[ ]:
```

question	PF, 2 methods median (n = 250)	P, 2 methods median (n = 127)	cohens d	f	p-value
0 remote_enjoy	2.0	2.0	0.0348	0.51	0.735
1 remote_motivated	2.0	2.0	0.119	0.535	0.244
2 remote_satisfied	3.0	3.0	0.221	0.562	0.0416
3 remote_engaging	3.0	3.0	0.36	0.595	0.00171
4 remote_distracted	4.0	4.0	-0.0659	0.475	0.406
5 remote_questions	3.0	3.0	0.155	0.543	0.157

In []: specific[1]

Out[]:

	question	PF, 2 methods median (n = 250)	A, 2 methods median (n = 59)	cohens d	f	p-value
0	remote_enjoy	2.0	3.0	0.0725	0.514	0.725
1	remote_motivated	2.0	2.0	-0.0411	0.495	0.896
2	remote_satisfied	3.0	3.0	0.0672	0.513	0.754
3	remote_engaging	3.0	3.0	0.245	0.556	0.16
4	remote_distracted	4.0	4.0	-0.0183	0.486	0.715
5	remote_questions	3.0	3.0	0.27	0.573	0.0703

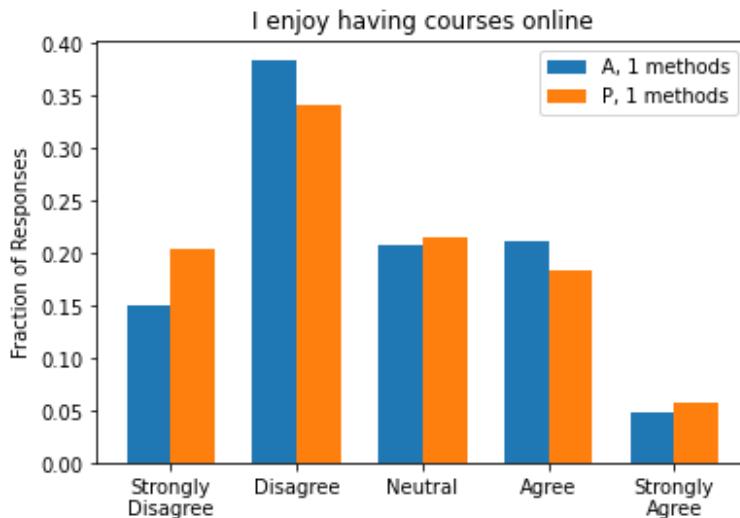
In []: specific[2]

Out[]:

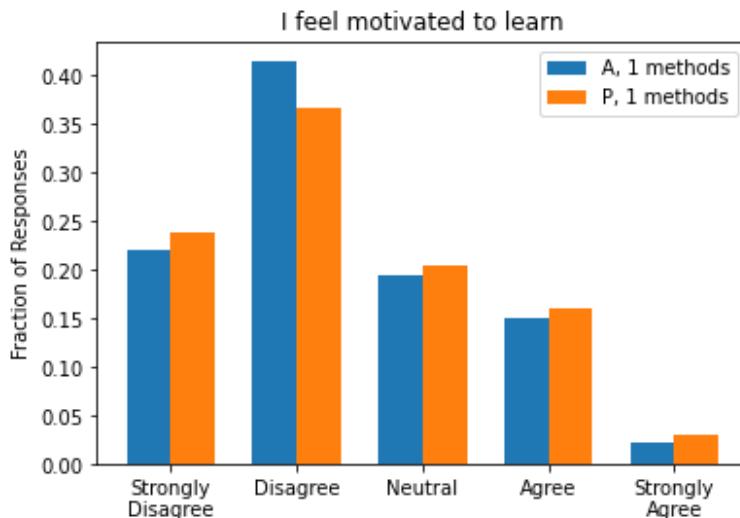
	question	AF, 2 methods median (n = 118)	P, 2 methods median (n = 127)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	-0.166	0.462	0.282
1	remote_motivated	2.0	2.0	-0.093	0.475	0.489
2	remote_satisfied	3.0	3.0	0.134	0.538	0.282
3	remote_engaging	3.0	3.0	0.174	0.551	0.153
4	remote_distracted	4.0	4.0	0.0485	0.499	0.97
5	remote_questions	3.0	3.0	0.235	0.567	0.0617

```
In [ ]: # among 1 type, controlled for number of methods
ugltype = [ugcat1, ugcatt, ugcatt3]
ugltype_sum = []
for num in [1, 2]:
    for i in range(3):
        for j in range(i+1, 3):
            a = ugltype[i][ugltype[i]['num_methods'] == num]
            b = ugltype[j][ugltype[j]['num_methods'] == num]
            a.name = f'{ugltype[i].name}, {num} methods'
            b.name = f'{ugltype[j].name}, {num} methods'
            subset_ls.append(a)
            subset_name.append(a.name)
            subset_ls.append(b)
            subset_name.append(b.name)
            print(a.name, a.shape[0], b.name, b.shape[0])
            ugltype_sum.append(mwu_comparison(b, a))
```

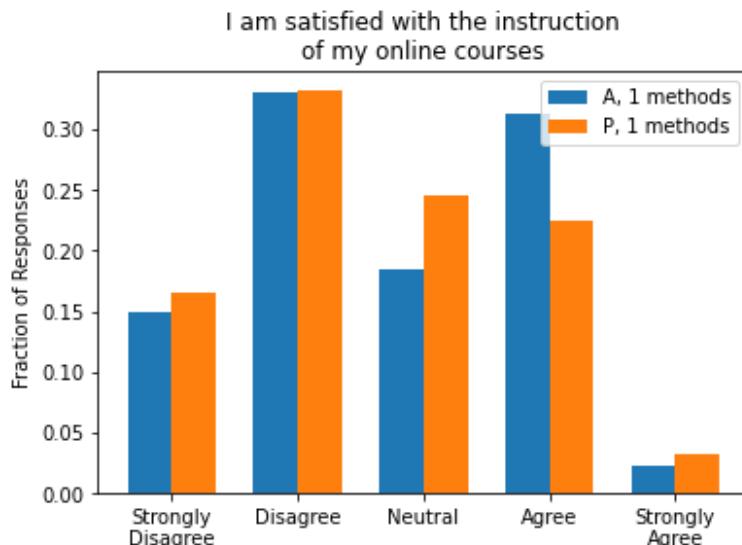
P, 1 methods 591 A, 1 methods 227



A, 1 methods shape: (227, 43), P, 1 methods shape: (591, 43)
MWU results: MannwhitneyuResult(statistic=69904.0, pvalue=0.3337295135
04747)
A, 1 methods median: 2.0
P, 1 methods median: 2.0
cohens d: 0.0669
f: 0.521



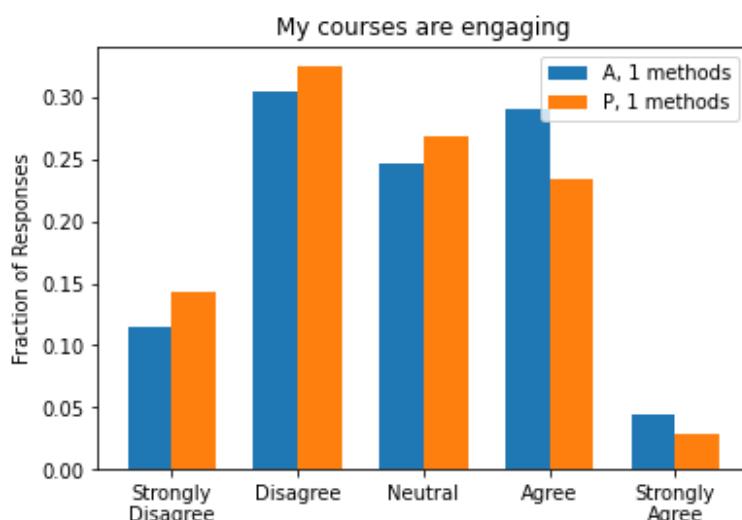
A, 1 methods shape: (227, 43), P, 1 methods shape: (591, 43)
MWU results: MannwhitneyuResult(statistic=66078.0, pvalue=0.7305324643
292737)
A, 1 methods median: 2.0
P, 1 methods median: 2.0
cohens d: -0.0366
f: 0.493



```

A, 1 methods shape: (227, 43), P, 1 methods shape: (591, 43)
MWU results: MannwhitneyuResult(statistic=70557.0, pvalue=0.2338015945
5831628)
A, 1 methods median: 3.0
P, 1 methods median: 3.0
cohens d: 0.0911
f: 0.526

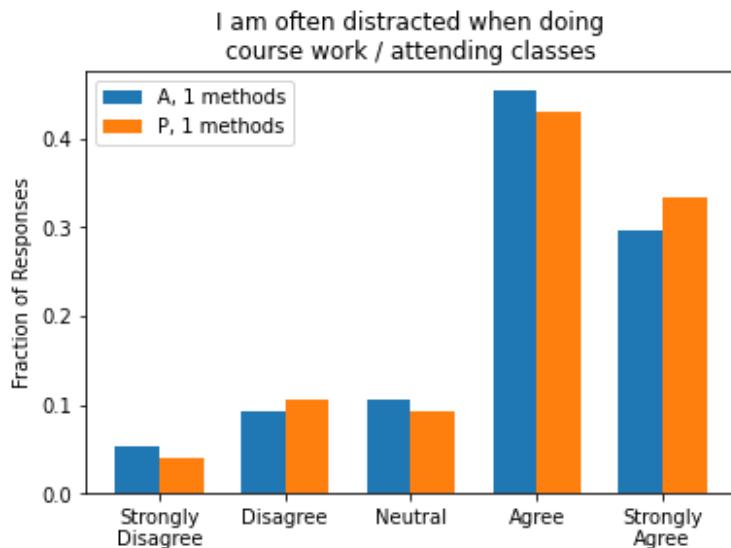
```



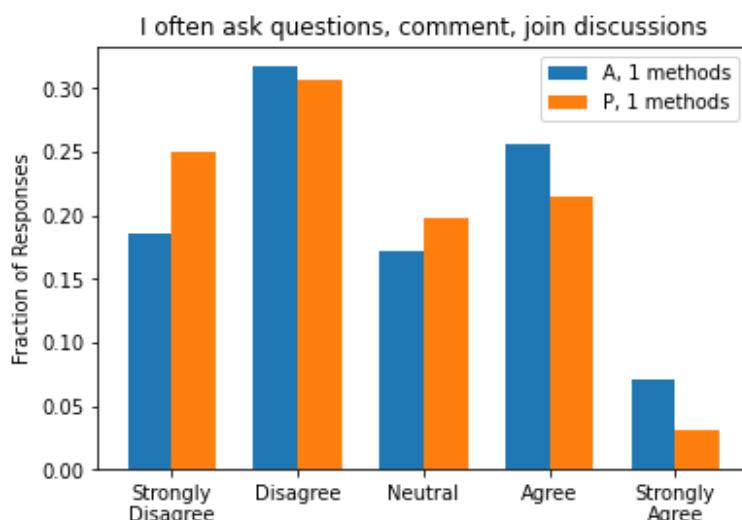
```

A, 1 methods shape: (227, 43), P, 1 methods shape: (591, 43)
MWU results: MannwhitneyuResult(statistic=72713.0, pvalue=0.0536877130
5494417)
A, 1 methods median: 3.0
P, 1 methods median: 3.0
cohens d: 0.155
f: 0.542

```

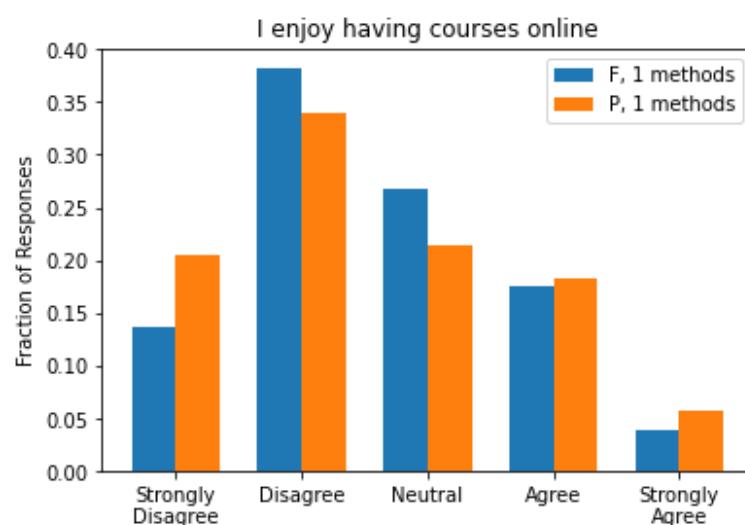


A, 1 methods shape: (227, 43), P, 1 methods shape: (591, 43)
 MWU results: MannwhitneyuResult(statistic=64470.5, pvalue=0.3586430801
 852928)
 A, 1 methods median: 4.0
 P, 1 methods median: 4.0
 cohens d: -0.0619
 f: 0.481

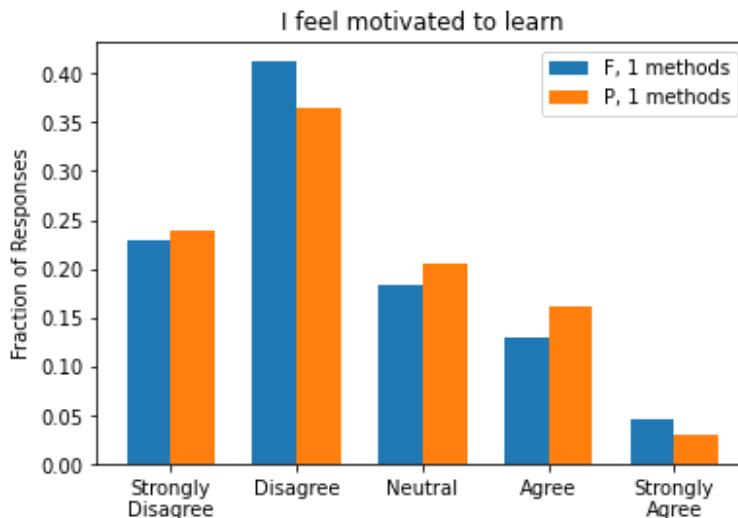


A, 1 methods shape: (227, 43), P, 1 methods shape: (591, 43)
 MWU results: MannwhitneyuResult(statistic=74255.5, pvalue=0.0144012745
 52080165)
 A, 1 methods median: 2.0
 P, 1 methods median: 2.0
 cohens d: 0.203
 f: 0.553

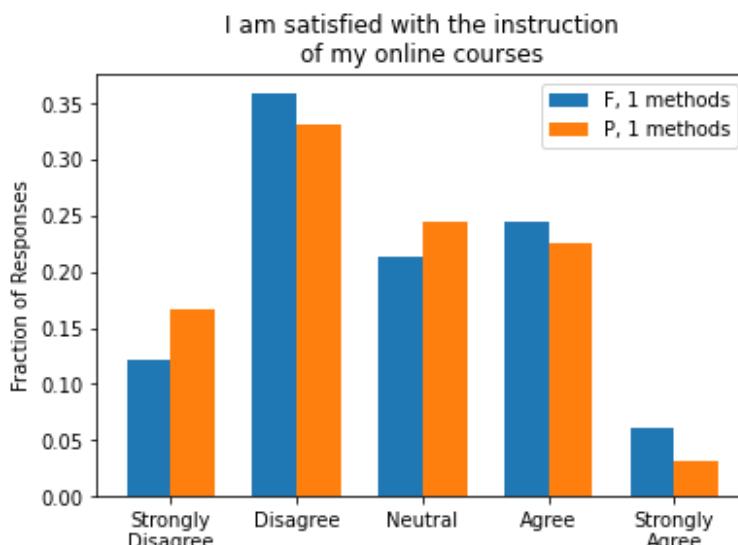
P, 1 methods 591 F, 1 methods 131



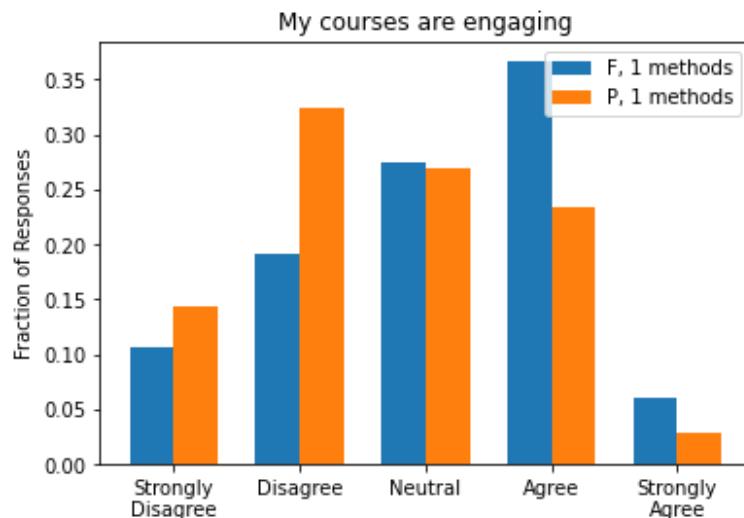
F, 1 methods shape: (131, 43), P, 1 methods shape: (591, 43)
 MWU results: MannwhitneyuResult(statistic=40095.5, pvalue=0.5070057699
 908357)
 F, 1 methods median: 2.0
 P, 1 methods median: 2.0
 cohens d: 0.041
 f: 0.518



F, 1 methods shape: (131, 43), P, 1 methods shape: (591, 43)
 MWU results: MannwhitneyuResult(statistic=38006.5, pvalue=0.7345146197
 966002)
 F, 1 methods median: 2.0
 P, 1 methods median: 2.0
 cohens d: -0.0252
 f: 0.491



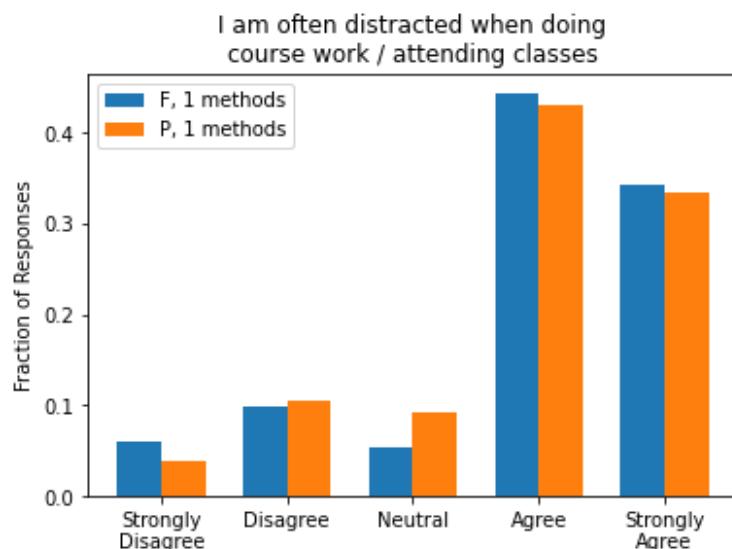
F, 1 methods shape: (131, 43), P, 1 methods shape: (591, 43)
 MWU results: MannwhitneyuResult(statistic=41086.0, pvalue=0.2547267520
 5223305)
 F, 1 methods median: 3.0
 P, 1 methods median: 3.0
 cohens d: 0.124
 f: 0.531



```

F, 1 methods shape: (131, 43), P, 1 methods shape: (591, 43)
MWU results: MannwhitneyuResult(statistic=46854.0, pvalue=9.5233130345
00546e-05)
F, 1 methods median: 3.0
P, 1 methods median: 3.0
cohens d: 0.376
f: 0.605

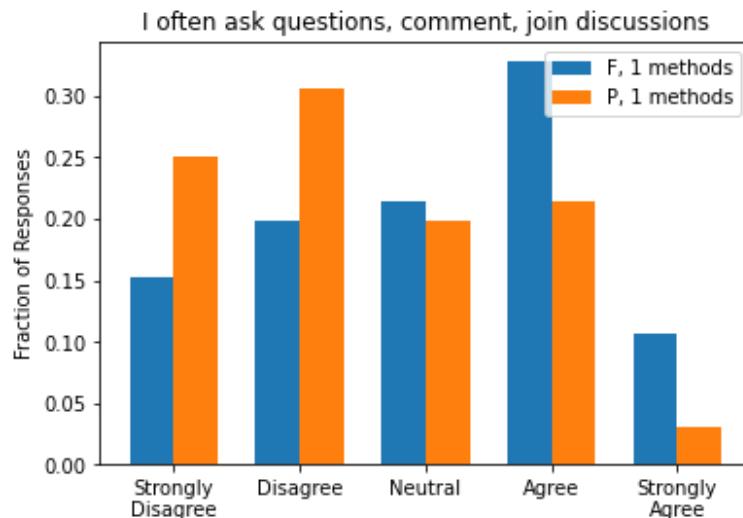
```



```

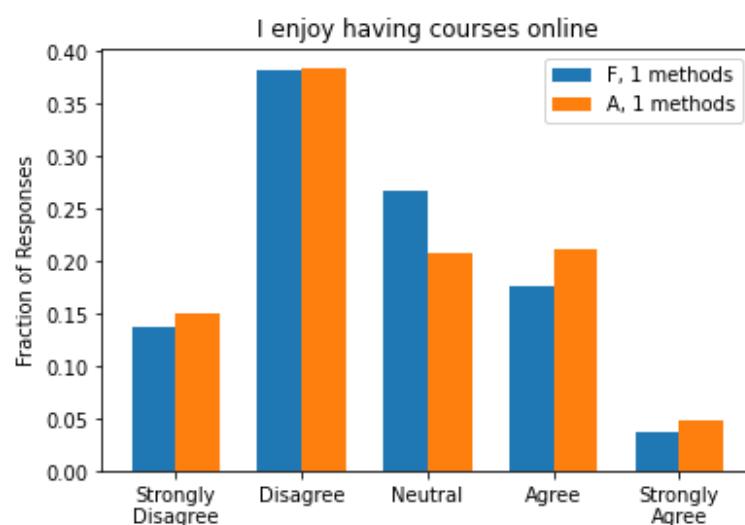
F, 1 methods shape: (131, 43), P, 1 methods shape: (591, 43)
MWU results: MannwhitneyuResult(statistic=39230.0, pvalue=0.7978035550
172008)
F, 1 methods median: 4.0
P, 1 methods median: 4.0
cohens d: -0.00481
f: 0.507

```

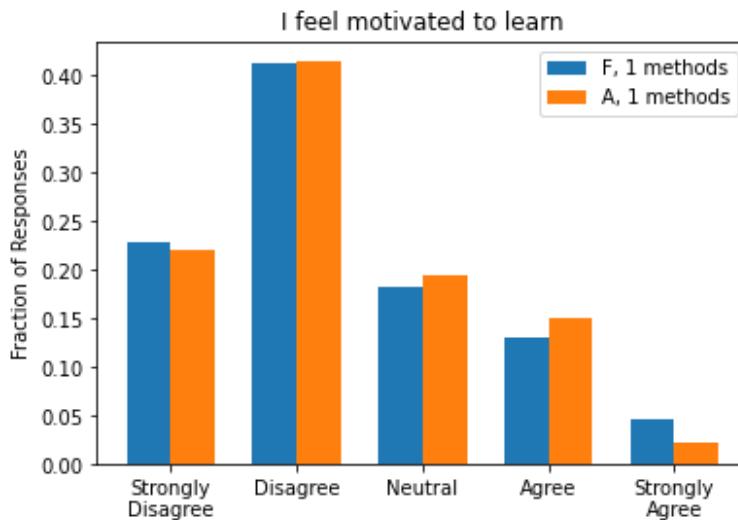


```
F, 1 methods shape: (131, 43), P, 1 methods shape: (591, 43)
MWU results:  MannwhitneyuResult(statistic=48587.5, pvalue=2.4756498148
888354e-06)
F, 1 methods median: 3.0
P, 1 methods median: 2.0
cohens d: 0.481
f: 0.628
```

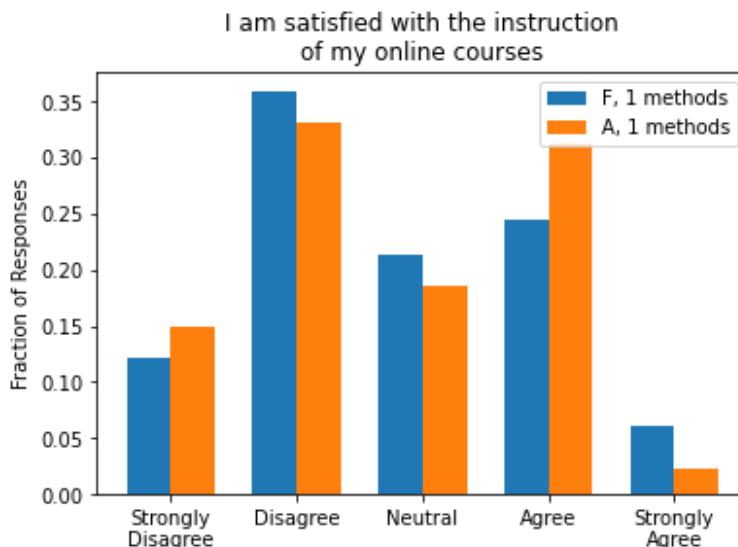
A, 1 methods 227 F, 1 methods 131



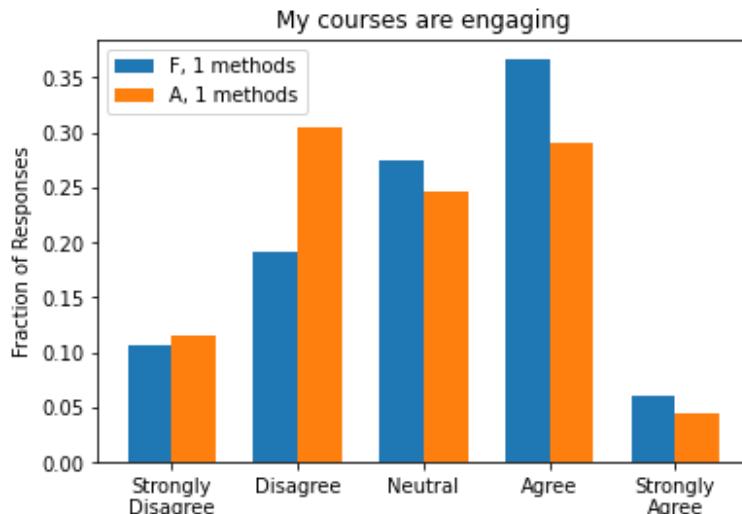
F, 1 methods shape: (131, 43), A, 1 methods shape: (227, 43)
 MWU results: MannwhitneyuResult(statistic=14762.0, pvalue=0.9067775245
 0448)
 F, 1 methods median: 2.0
 A, 1 methods median: 2.0
 cohens d: -0.0275
 f: 0.496



F, 1 methods shape: (131, 43), A, 1 methods shape: (227, 43)
 MWU results: MannwhitneyuResult(statistic=14804.0, pvalue=0.9432449539
 63908)
 F, 1 methods median: 2.0
 A, 1 methods median: 2.0
 cohens d: 0.0111
 f: 0.498



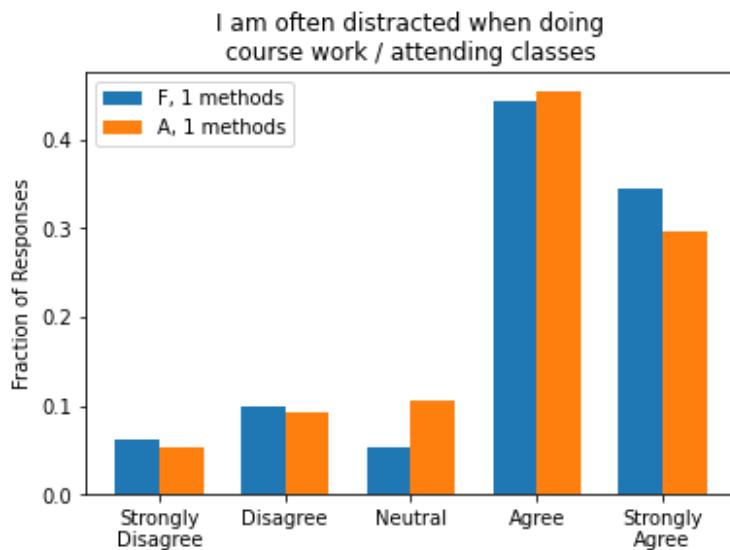
F, 1 methods shape: (131, 43), A, 1 methods shape: (227, 43)
 MWU results: MannwhitneyuResult(statistic=15036.5, pvalue=0.8536140576
 276374)
 F, 1 methods median: 3.0
 A, 1 methods median: 3.0
 cohens d: 0.0324
 f: 0.506



```

F, 1 methods shape: (131, 43), A, 1 methods shape: (227, 43)
MWU results: MannwhitneyuResult(statistic=16730.5, pvalue=0.0408264150
18743734)
F, 1 methods median: 3.0
A, 1 methods median: 3.0
cohens d: 0.216
f: 0.563

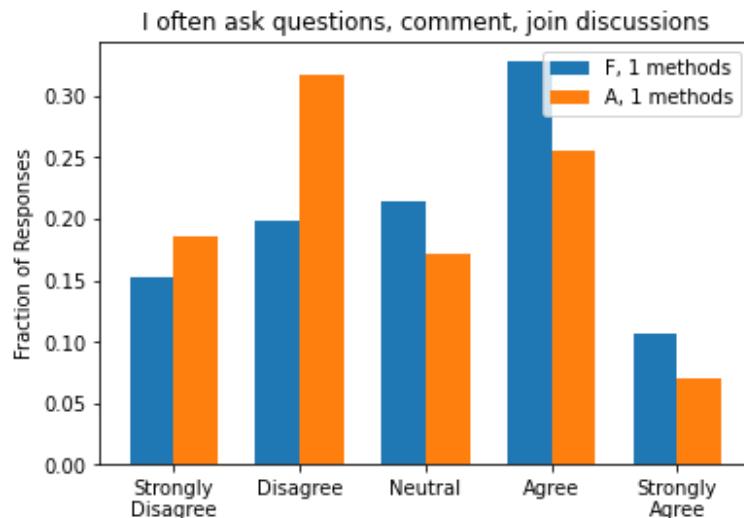
```



```

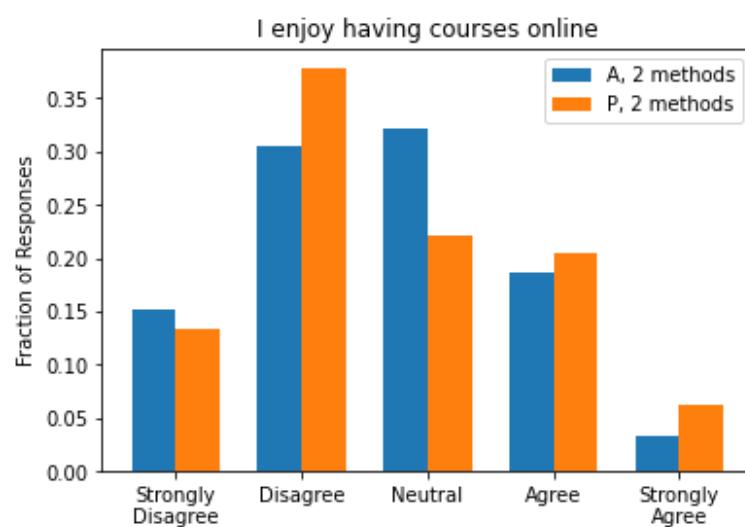
F, 1 methods shape: (131, 43), A, 1 methods shape: (227, 43)
MWU results: MannwhitneyuResult(statistic=15656.0, pvalue=0.3728700969
8050144)
F, 1 methods median: 4.0
A, 1 methods median: 4.0
cohens d: 0.0555
f: 0.526

```

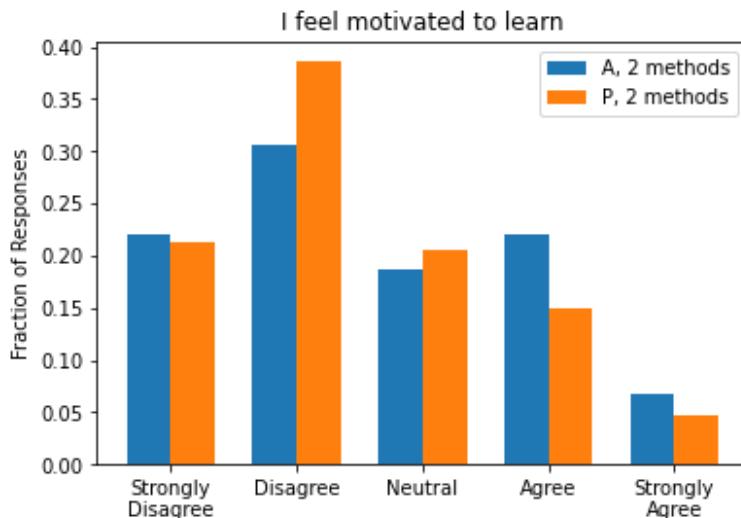


```
F, 1 methods shape: (131, 43), A, 1 methods shape: (227, 43)
MWU results: MannwhitneyuResult(statistic=17078.0, pvalue=0.0159704354
44921167)
F, 1 methods median: 3.0
A, 1 methods median: 2.0
cohens d: 0.265
f: 0.574
```

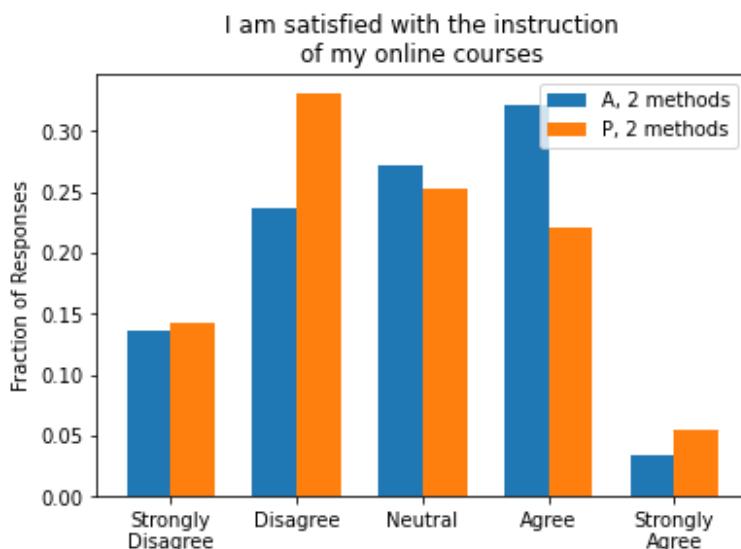
P, 2 methods 127 A, 2 methods 59



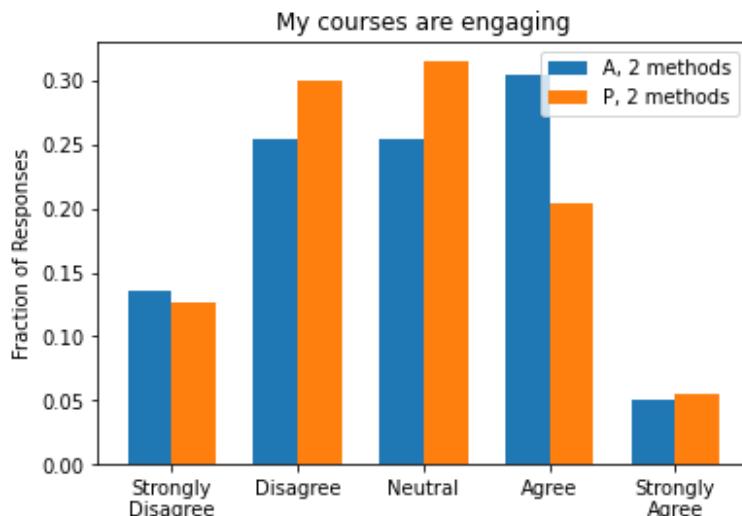
A, 2 methods shape: (59, 43), P, 2 methods shape: (127, 43)
 MWU results: MannwhitneyuResult(statistic=3727.5, pvalue=0.95519312867
 92203)
 A, 2 methods median: 3.0
 P, 2 methods median: 2.0
 cohens d: -0.0369
 f: 0.497



A, 2 methods shape: (59, 43), P, 2 methods shape: (127, 43)
 MWU results: MannwhitneyuResult(statistic=4027.0, pvalue=0.39555603838
 529885)
 A, 2 methods median: 2.0
 P, 2 methods median: 2.0
 cohens d: 0.152
 f: 0.537



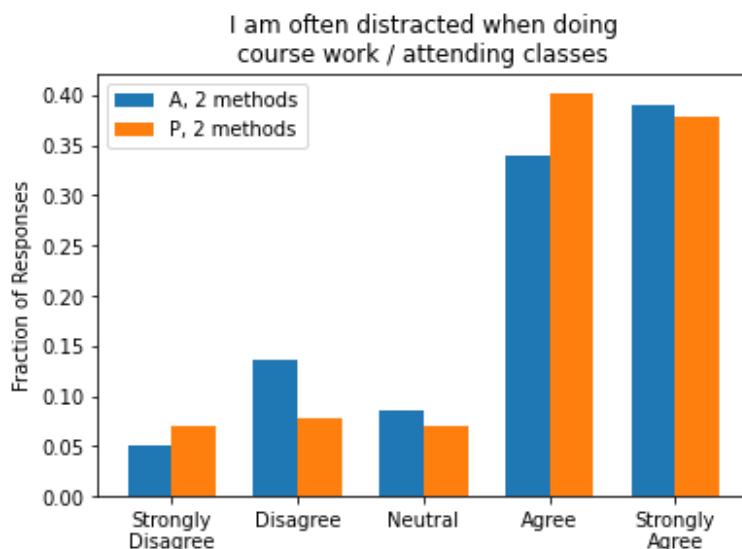
A, 2 methods shape: (59, 43), P, 2 methods shape: (127, 43)
 MWU results: MannwhitneyuResult(statistic=4095.0, pvalue=0.29264918983
 22281)
 A, 2 methods median: 3.0
 P, 2 methods median: 3.0
 cohens d: 0.147
 f: 0.547



```

A, 2 methods shape: (59, 43), P, 2 methods shape: (127, 43)
MWU results: MannwhitneyuResult(statistic=3995.5, pvalue=0.45212397531
65516)
A, 2 methods median: 3.0
P, 2 methods median: 3.0
cohens d: 0.106
f: 0.533

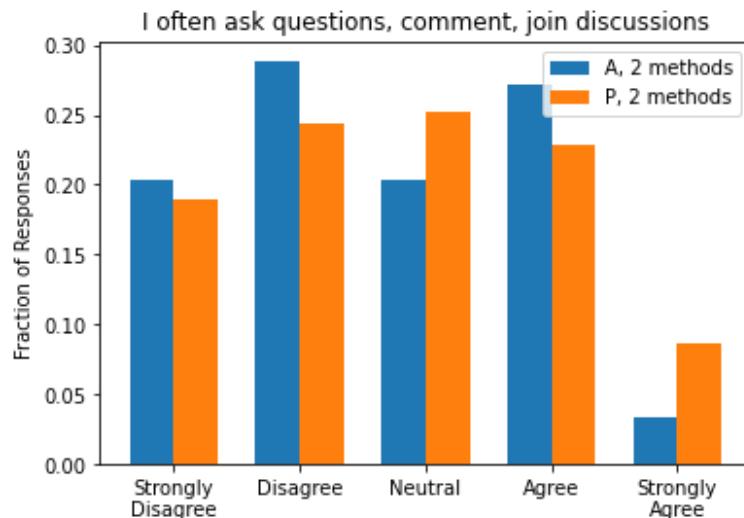
```



```

A, 2 methods shape: (59, 43), P, 2 methods shape: (127, 43)
MWU results: MannwhitneyuResult(statistic=3682.0, pvalue=0.84238376450
24179)
A, 2 methods median: 4.0
P, 2 methods median: 4.0
cohens d: -0.0465
f: 0.491

```



A, 2 methods shape: (59, 43), P, 2 methods shape: (127, 43)

MWU results: MannwhitneyuResult(statistic=3534.5, pvalue=0.5249430576195349)

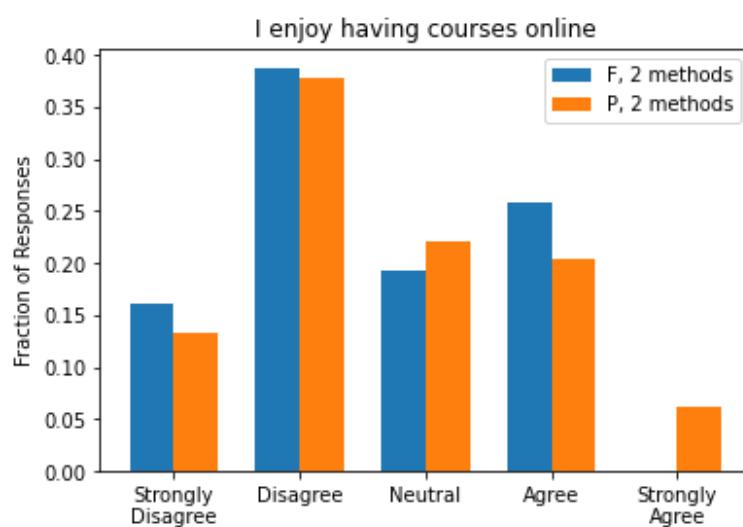
A, 2 methods median: 3.0

P, 2 methods median: 3.0

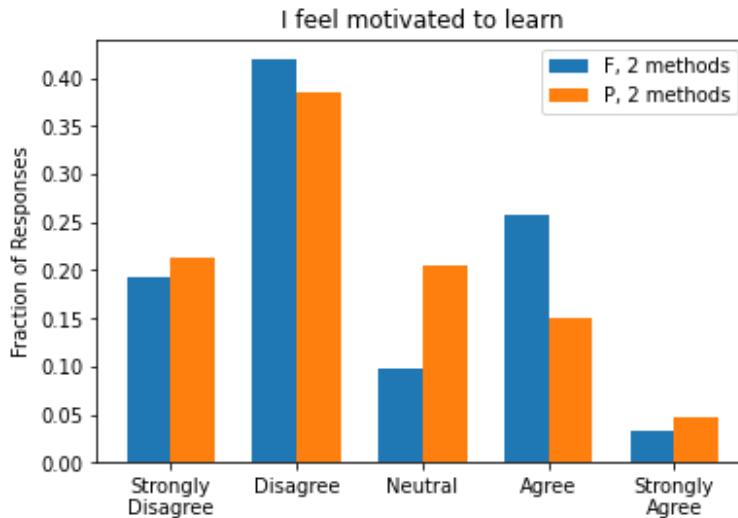
cohens d: -0.111

f: 0.472

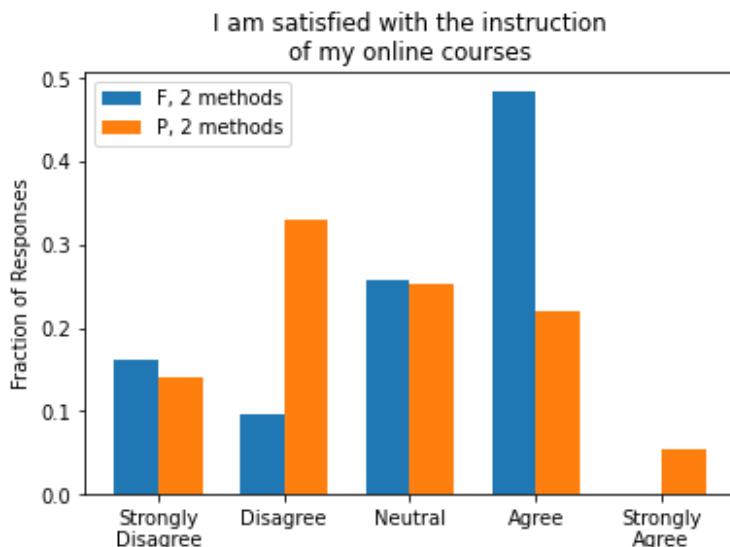
P, 2 methods 127 F, 2 methods 31



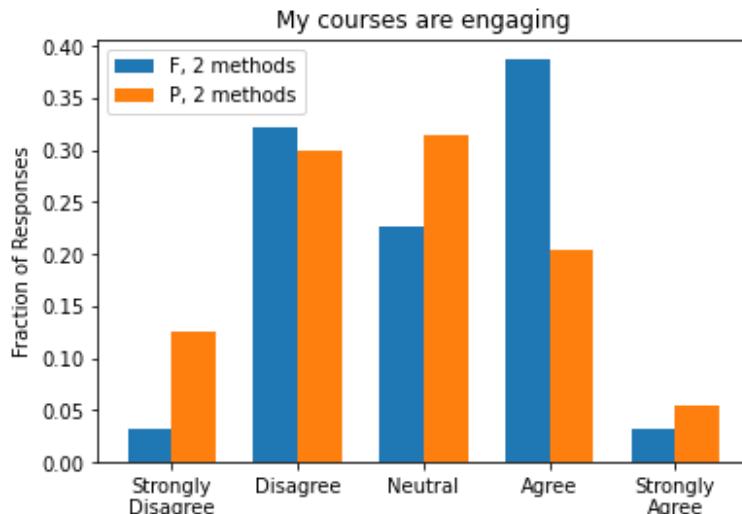
F, 2 methods shape: (31, 43), P, 2 methods shape: (127, 43)
 MWU results: MannwhitneyuResult(statistic=1856.5, pvalue=0.61126165858
 40128)
 F, 2 methods median: 2.0
 P, 2 methods median: 2.0
 cohens d: -0.122
 f: 0.472



F, 2 methods shape: (31, 43), P, 2 methods shape: (127, 43)
 MWU results: MannwhitneyuResult(statistic=2033.5, pvalue=0.76834019521
 41402)
 F, 2 methods median: 2.0
 P, 2 methods median: 2.0
 cohens d: 0.0732
 f: 0.517



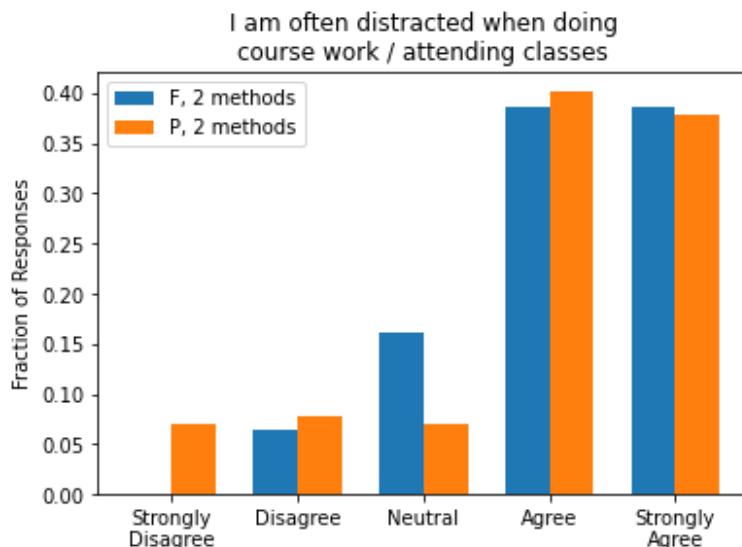
F, 2 methods shape: (31, 43), P, 2 methods shape: (127, 43)
 MWU results: MannwhitneyuResult(statistic=2360.0, pvalue=0.07702955199
 919524)
 F, 2 methods median: 3.0
 P, 2 methods median: 3.0
 cohens d: 0.309
 f: 0.599



```

F, 2 methods shape: (31, 43), P, 2 methods shape: (127, 43)
MWU results: MannwhitneyuResult(statistic=2283.5, pvalue=0.15341551338
595807)
F, 2 methods median: 3.0
P, 2 methods median: 3.0
cohens d: 0.281
f: 0.58

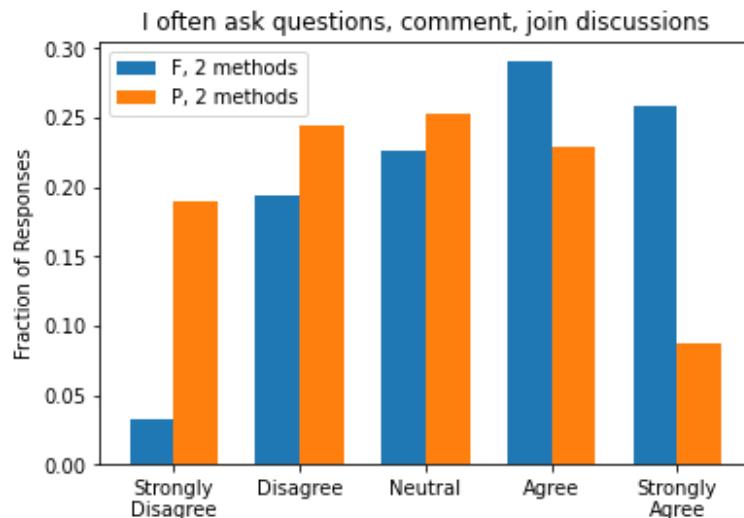
```



```

F, 2 methods shape: (31, 43), P, 2 methods shape: (127, 43)
MWU results: MannwhitneyuResult(statistic=2023.5, pvalue=0.79927283080
99587)
F, 2 methods median: 4.0
P, 2 methods median: 4.0
cohens d: 0.14
f: 0.514

```



F, 2 methods shape: (31, 43), P, 2 methods shape: (127, 43)

MWU results: MannwhitneyuResult(statistic=2631.5, pvalue=0.00295842350
2585144)

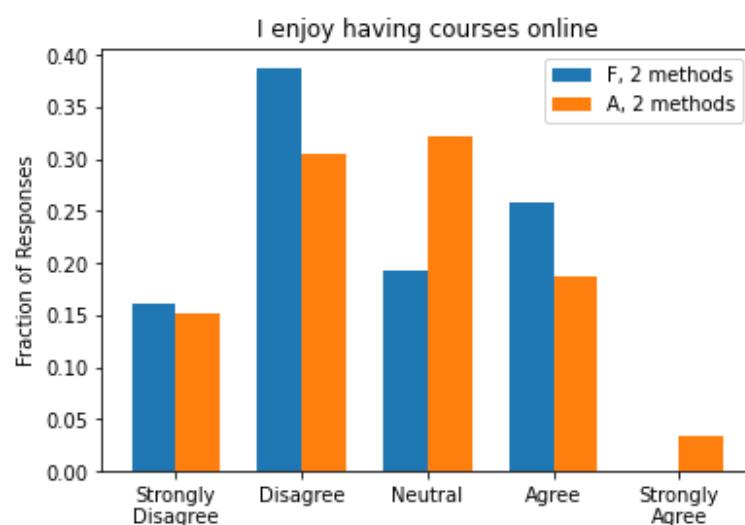
F, 2 methods median: 4.0

P, 2 methods median: 3.0

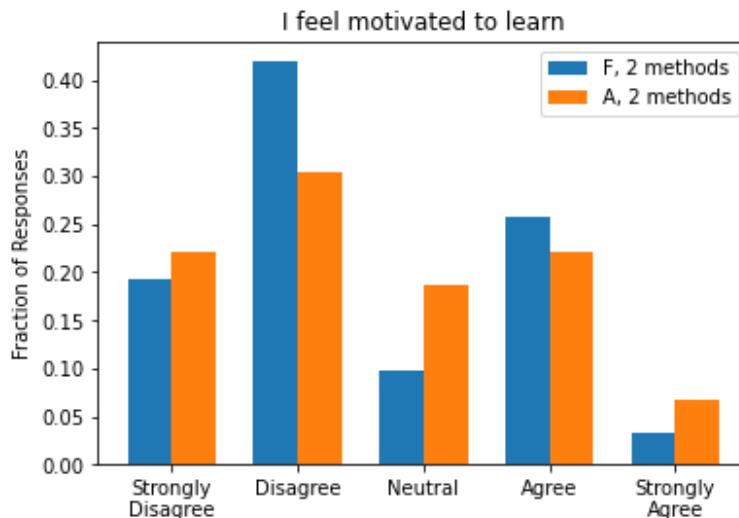
cohens d: 0.626

f: 0.668

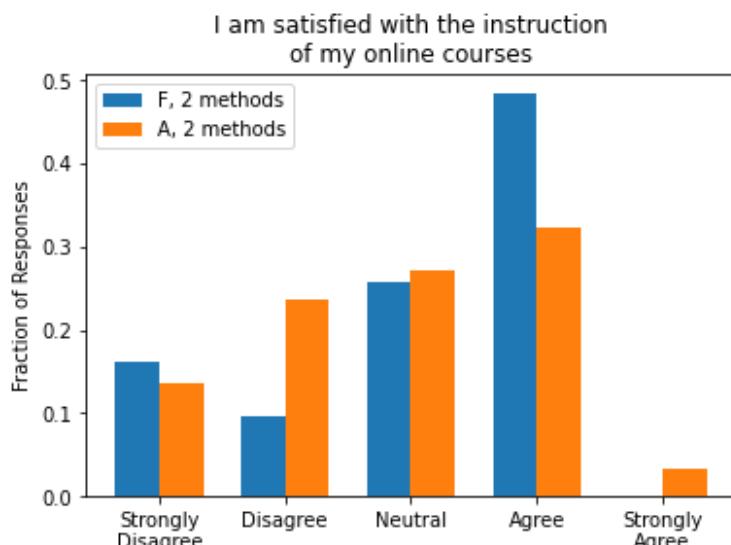
A, 2 methods 59 F, 2 methods 31



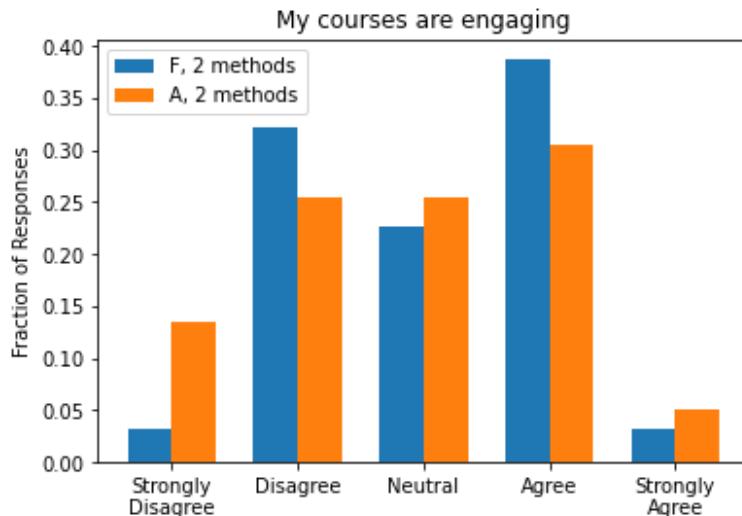
F, 2 methods shape: (31, 43), A, 2 methods shape: (59, 43)
 MWU results: MannwhitneyuResult(statistic=869.5, pvalue=0.694954593367
 6187)
 F, 2 methods median: 2.0
 A, 2 methods median: 3.0
 cohens d: -0.0901
 f: 0.475



F, 2 methods shape: (31, 43), A, 2 methods shape: (59, 43)
 MWU results: MannwhitneyuResult(statistic=879.5, pvalue=0.761702744516
 4412)
 F, 2 methods median: 2.0
 A, 2 methods median: 2.0
 cohens d: -0.0768
 f: 0.481



F, 2 methods shape: (31, 43), A, 2 methods shape: (59, 43)
 MWU results: MannwhitneyuResult(statistic=1017.5, pvalue=0.36354145987
 766817)
 F, 2 methods median: 3.0
 A, 2 methods median: 3.0
 cohens d: 0.164
 f: 0.556



F, 2 methods shape: (31, 43), A, 2 methods shape: (59, 43)

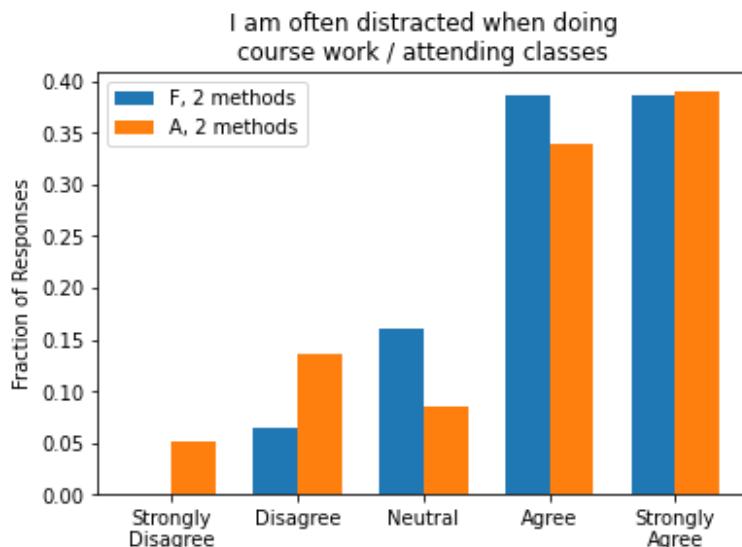
MWU results: MannwhitneyuResult(statistic=994.0, pvalue=0.485738824362
7997)

F, 2 methods median: 3.0

A, 2 methods median: 3.0

cohens d: 0.167

f: 0.543



F, 2 methods shape: (31, 43), A, 2 methods shape: (59, 43)

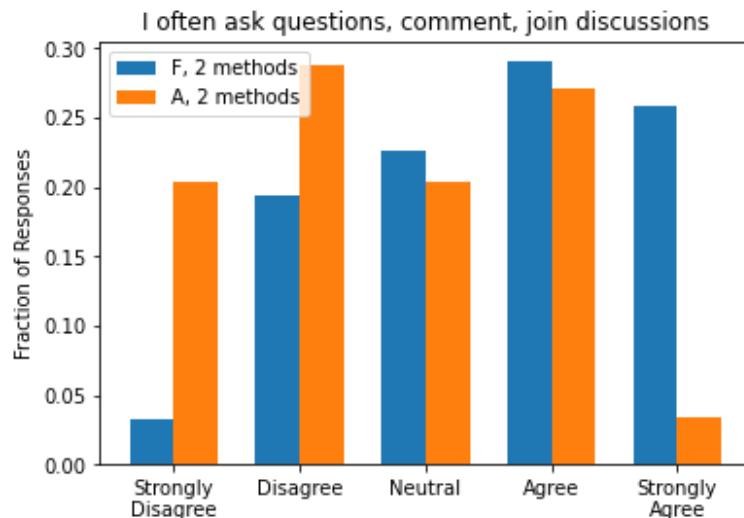
MWU results: MannwhitneyuResult(statistic=963.5, pvalue=0.663088134679
848)

F, 2 methods median: 4.0

A, 2 methods median: 4.0

cohens d: 0.192

f: 0.527



F, 2 methods shape: (31, 43), A, 2 methods shape: (59, 43)

MWU results: MannwhitneyuResult(statistic=1279.0, pvalue=0.00150324523
22258283)

F, 2 methods median: 4.0

A, 2 methods median: 3.0

cohens d: 0.764

f: 0.699

```
In [ ]: ug1type_sum[0]
```

Out[]:

	question	A, 1 methods median (n = 227)	P, 1 methods median (n = 591)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	0.0669	0.521	0.334
1	remote_motivated	2.0	2.0	-0.0366	0.493	0.731
2	remote_satisfied	3.0	3.0	0.0911	0.526	0.234
3	remote_engaging	3.0	3.0	0.155	0.542	0.0537
4	remote_distracted	4.0	4.0	-0.0619	0.481	0.359
5	remote_questions	2.0	2.0	0.203	0.553	0.0144

In []: ug1type_sum[1]

Out[]:

	question	F, 1 methods median (n = 131)	P, 1 methods median (n = 591)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	0.041	0.518	0.507
1	remote_motivated	2.0	2.0	-0.0252	0.491	0.735
2	remote_satisfied	3.0	3.0	0.124	0.531	0.255
3	remote_engaging	3.0	3.0	0.376	0.605	9.52e-05
4	remote_distracted	4.0	4.0	-0.00481	0.507	0.798
5	remote_questions	3.0	2.0	0.481	0.628	2.48e-06

In []: ug1type_sum[2]

Out[]:

	question	F, 1 methods median (n = 131)	A, 1 methods median (n = 227)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	-0.0275	0.496	0.907
1	remote_motivated	2.0	2.0	0.0111	0.498	0.943
2	remote_satisfied	3.0	3.0	0.0324	0.506	0.854
3	remote_engaging	3.0	3.0	0.216	0.563	0.0408
4	remote_distracted	4.0	4.0	0.0555	0.526	0.373
5	remote_questions	3.0	2.0	0.265	0.574	0.016

In []: ug1type_sum[3]

Out[]:

	question	A, 2 methods median (n = 59)	P, 2 methods median (n = 127)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	-0.0369	0.497	0.955
1	remote_motivated	2.0	2.0	0.152	0.537	0.396
2	remote_satisfied	3.0	3.0	0.147	0.547	0.293
3	remote_engaging	3.0	3.0	0.106	0.533	0.452
4	remote_distracted	4.0	4.0	-0.0465	0.491	0.842
5	remote_questions	3.0	3.0	-0.111	0.472	0.525

In []: uglytype_sum[4]

Out[]:

	question	F, 2 methods median (n = 31)	P, 2 methods median (n = 127)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	-0.122	0.472	0.611
1	remote_motivated	2.0	2.0	0.0732	0.517	0.768
2	remote_satisfied	3.0	3.0	0.309	0.599	0.077
3	remote_engaging	3.0	3.0	0.281	0.58	0.153
4	remote_distracted	4.0	4.0	0.14	0.514	0.799
5	remote_questions	4.0	3.0	0.626	0.668	0.00296

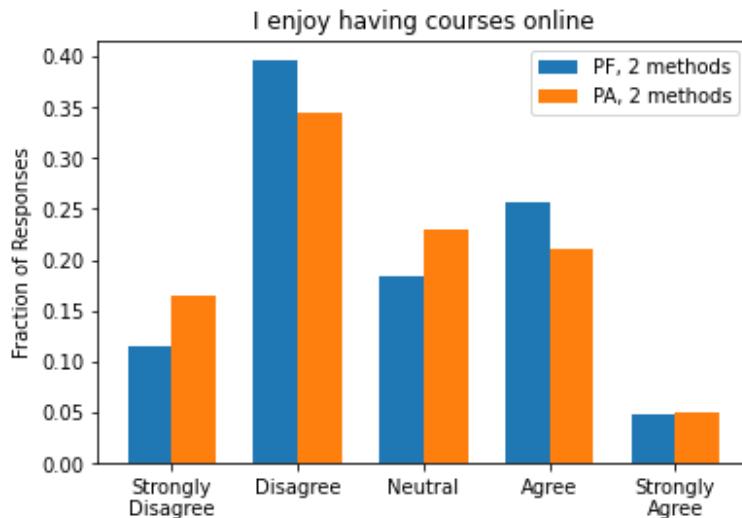
In []: uglytype_sum[5]

Out[]:

	question	F, 2 methods median (n = 31)	A, 2 methods median (n = 59)	cohens d	f	p-value
0	remote_enjoy	2.0	3.0	-0.0901	0.475	0.695
1	remote_motivated	2.0	2.0	-0.0768	0.481	0.762
2	remote_satisfied	3.0	3.0	0.164	0.556	0.364
3	remote_engaging	3.0	3.0	0.167	0.543	0.486
4	remote_distracted	4.0	4.0	0.192	0.527	0.663
5	remote_questions	4.0	3.0	0.764	0.699	0.0015

```
In [ ]: ug2type = [ugcat4, ugcat5, ugcat6]
ug2type_sum = []
for num in [2, 3, 4]:
    for i in range(3):
        for j in range(i+1, 3):
            a = ug2type[i][ug2type[i]['num_methods']==num]
            b = ug2type[j][ug2type[j]['num_methods']==num]
            a.name = f'{ug2type[i].name}, {num} methods'
            b.name = f'{ug2type[j].name}, {num} methods'
            subset_ls.append(a)
            subset_name.append(a.name)
            subset_ls.append(b)
            subset_name.append(b.name)
            print(a.name, a.shape[0], b.name, b.shape[0])
            ug2type_sum.append(mwu_comparison(b, a))
```

PA, 2 methods 432 PF, 2 methods 250



PF, 2 methods shape: (250, 43), PA, 2 methods shape: (432, 43)

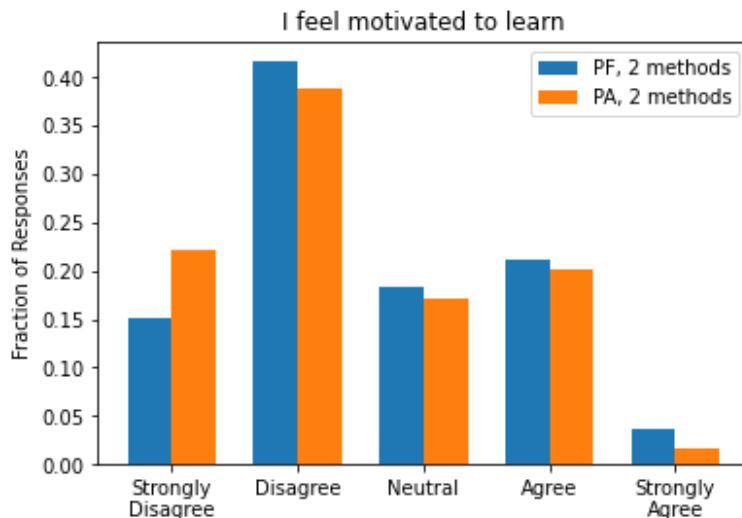
MWU results: MannwhitneyuResult(statistic=56211.0, pvalue=0.3545127264
6917453)

PF, 2 methods median: 2.0

PA, 2 methods median: 2.0

cohens d: 0.0755

f: 0.52



PF, 2 methods shape: (250, 43), PA, 2 methods shape: (432, 43)

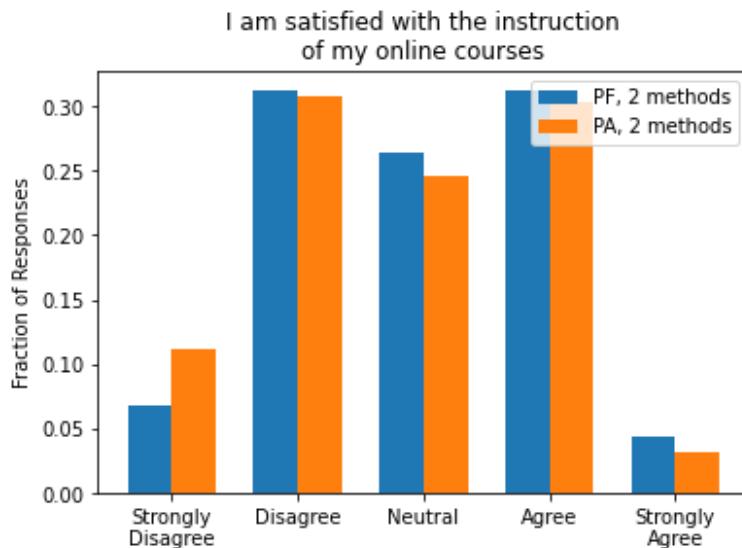
MWU results: MannwhitneyuResult(statistic=58466.0, pvalue=0.0596950602
232104)

PF, 2 methods median: 2.0

PA, 2 methods median: 2.0

cohens d: 0.15

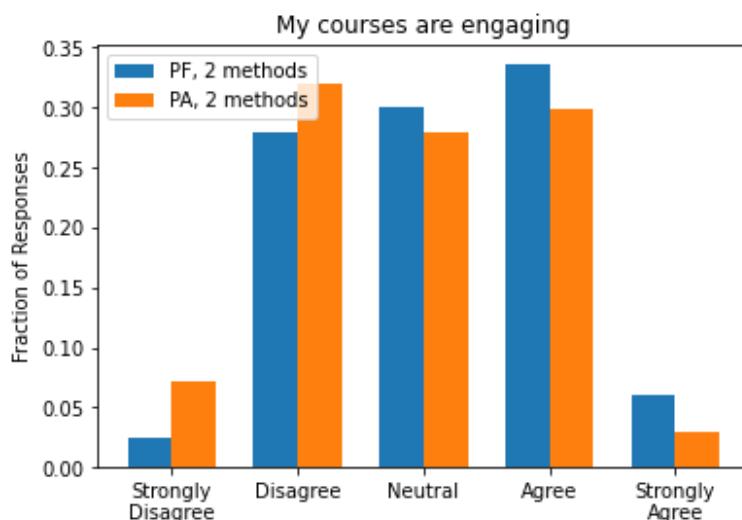
f: 0.541



```

PF, 2 methods shape: (250, 43), PA, 2 methods shape: (432, 43)
MWU results: MannwhitneyuResult(statistic=56953.0, pvalue=0.2155592372
1791048)
PF, 2 methods median: 3.0
PA, 2 methods median: 3.0
cohens d: 0.107
f: 0.527

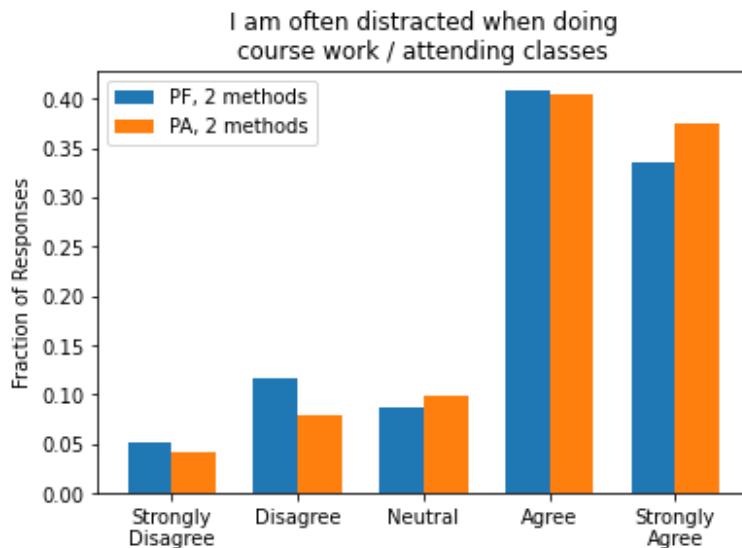
```



```

PF, 2 methods shape: (250, 43), PA, 2 methods shape: (432, 43)
MWU results: MannwhitneyuResult(statistic=60466.0, pvalue=0.0064704528
35711779)
PF, 2 methods median: 3.0
PA, 2 methods median: 3.0
cohens d: 0.234
f: 0.56

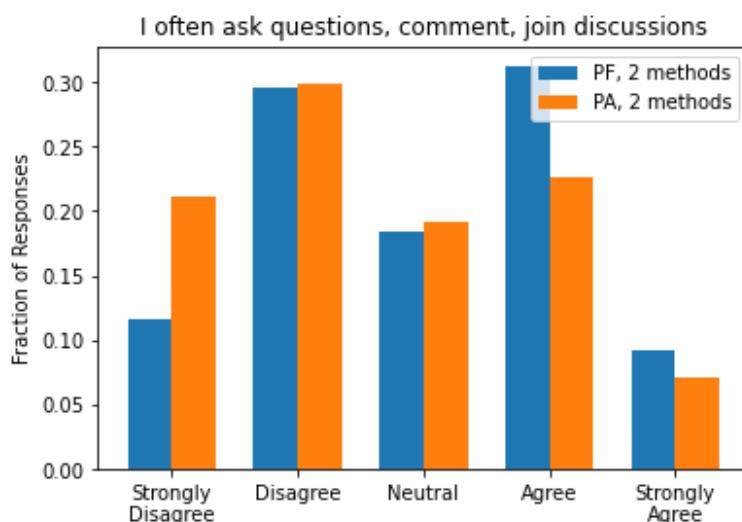
```



```

PF, 2 methods shape: (250, 43), PA, 2 methods shape: (432, 43)
MWU results: MannwhitneyuResult(statistic=50848.0, pvalue=0.1764711431
9684143)
PF, 2 methods median: 4.0
PA, 2 methods median: 4.0
cohens d: -0.12
f: 0.471

```

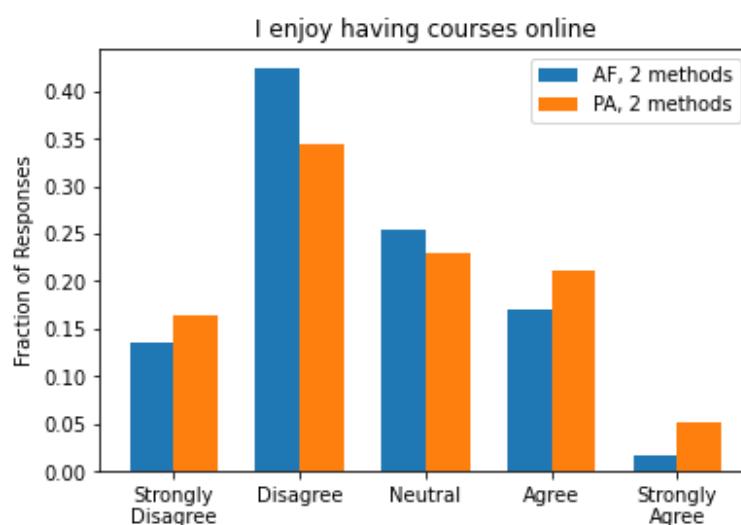


```

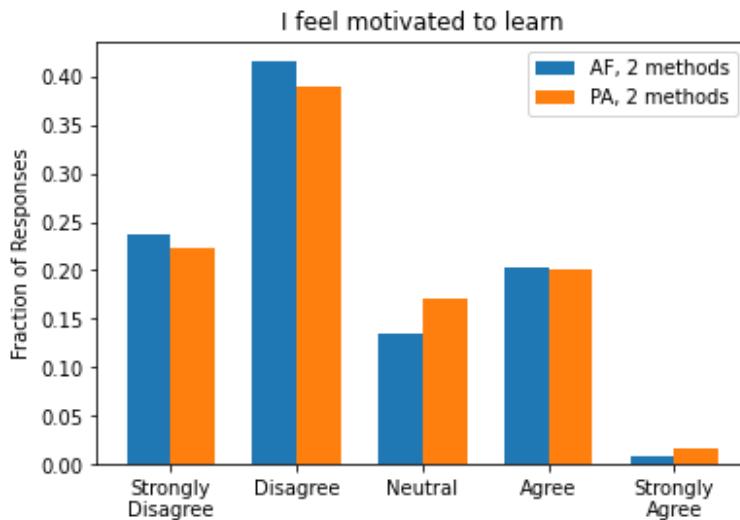
PF, 2 methods shape: (250, 43), PA, 2 methods shape: (432, 43)
MWU results: MannwhitneyuResult(statistic=61891.0, pvalue=0.0010527603
631881812)
PF, 2 methods median: 3.0
PA, 2 methods median: 2.0
cohens d: 0.259
f: 0.573

```

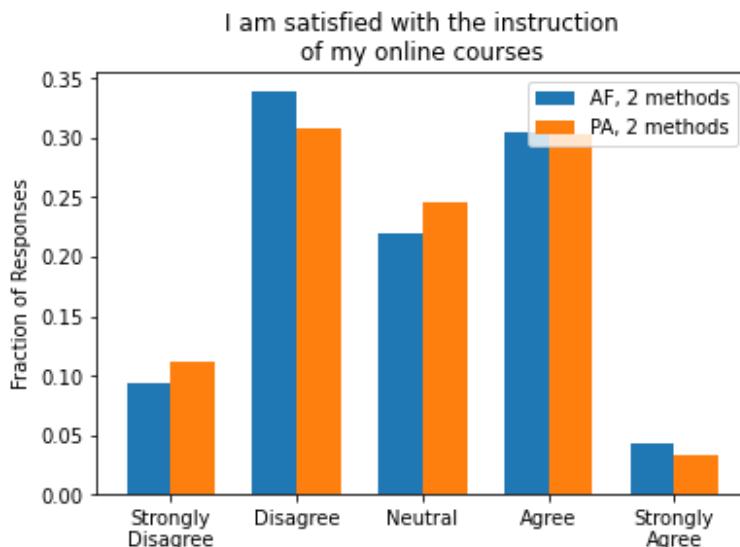
PA, 2 methods 432 AF, 2 methods 118



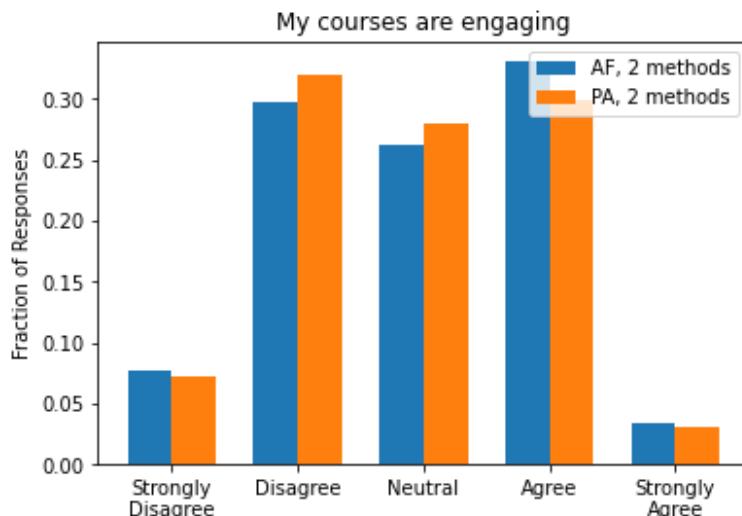
AF, 2 methods shape: (118, 43), PA, 2 methods shape: (432, 43)
 MWU results: MannwhitneyuResult(statistic=24060.0, pvalue=0.3326189653
 4872437)
 AF, 2 methods median: 2.0
 PA, 2 methods median: 2.0
 cohens d: -0.118
 f: 0.472



AF, 2 methods shape: (118, 43), PA, 2 methods shape: (432, 43)
 MWU results: MannwhitneyuResult(statistic=24564.5, pvalue=0.5281284331
 32981)
 AF, 2 methods median: 2.0
 PA, 2 methods median: 2.0
 cohens d: -0.0643
 f: 0.482



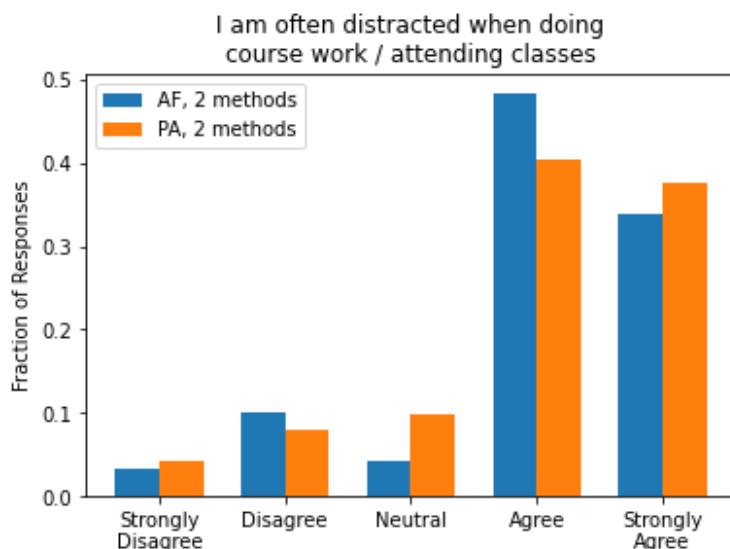
AF, 2 methods shape: (118, 43), PA, 2 methods shape: (432, 43)
 MWU results: MannwhitneyuResult(statistic=25743.0, pvalue=0.8627398067
 758747)
 AF, 2 methods median: 3.0
 PA, 2 methods median: 3.0
 cohens d: 0.0245
 f: 0.505



```

AF, 2 methods shape: (118, 43), PA, 2 methods shape: (432, 43)
MWU results: MannwhitneyuResult(statistic=26281.5, pvalue=0.5886938265
681956)
AF, 2 methods median: 3.0
PA, 2 methods median: 3.0
cohens d: 0.0526
f: 0.516

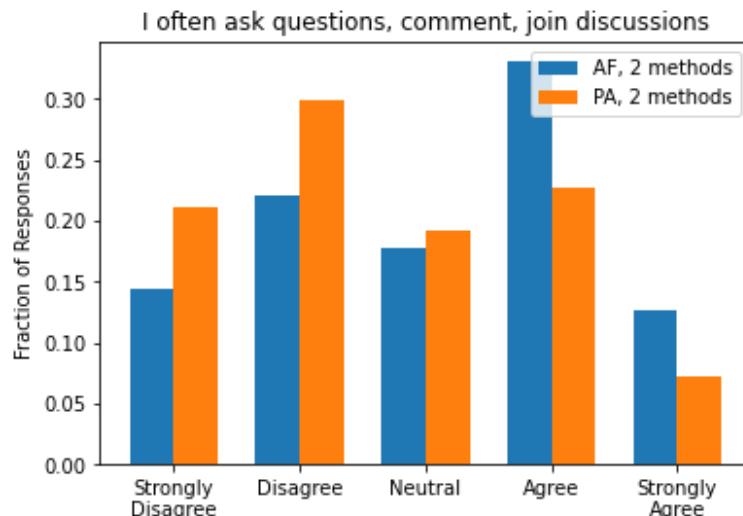
```



```

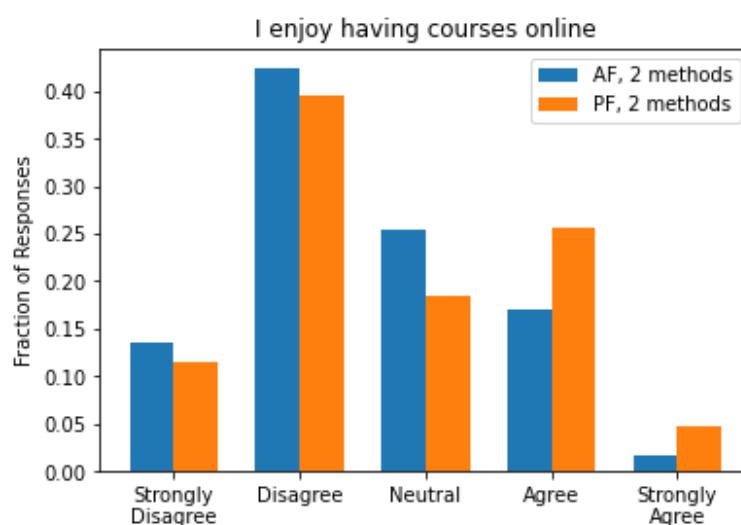
AF, 2 methods shape: (118, 43), PA, 2 methods shape: (432, 43)
MWU results: MannwhitneyuResult(statistic=25266.0, pvalue=0.8769352184
841063)
AF, 2 methods median: 4.0
PA, 2 methods median: 4.0
cohens d: -0.00142
f: 0.496

```

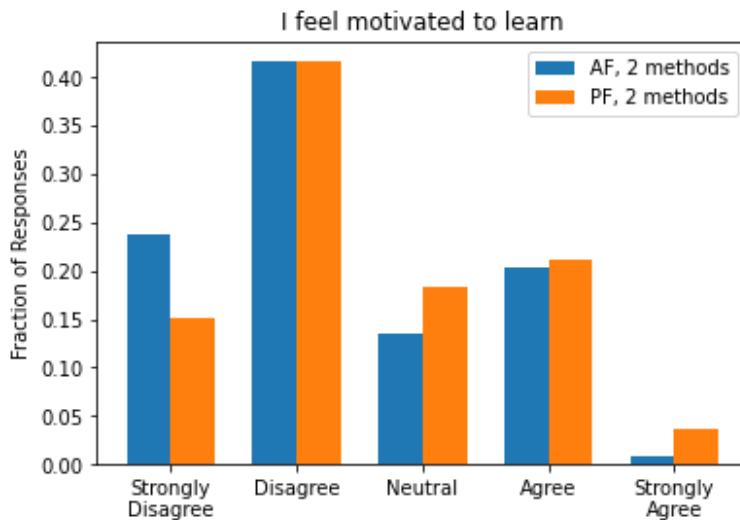


```
AF, 2 methods shape: (118, 43), PA, 2 methods shape: (432, 43)
MWU results: MannwhitneyuResult(statistic=30283.5, pvalue=0.0012808174
021266387)
AF, 2 methods median: 3.0
PA, 2 methods median: 2.0
cohens d: 0.341
f: 0.594
```

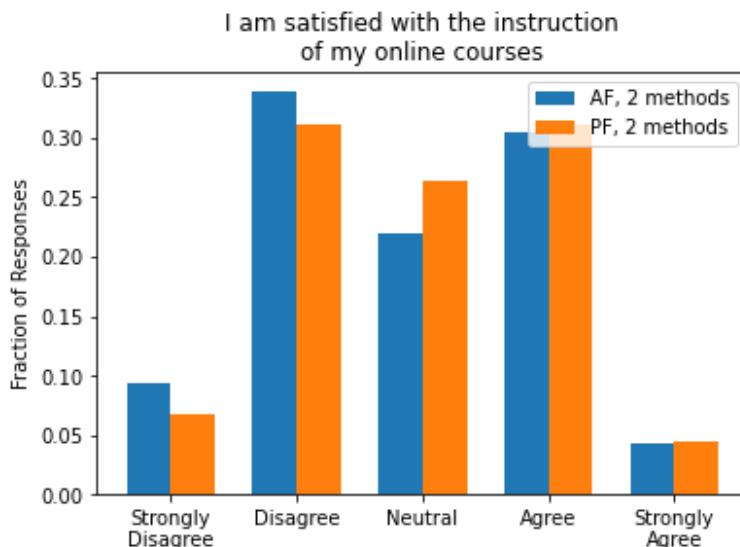
PF, 2 methods 250 AF, 2 methods 118



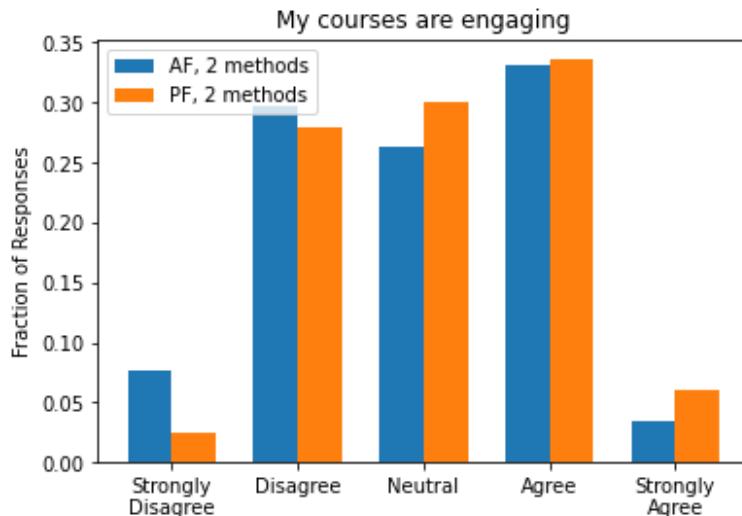
AF, 2 methods shape: (118, 43), PF, 2 methods shape: (250, 43)
 MWU results: MannwhitneyuResult(statistic=13295.0, pvalue=0.1096065494
 9476832)
 AF, 2 methods median: 2.0
 PF, 2 methods median: 2.0
 cohens d: -0.201
 f: 0.451



AF, 2 methods shape: (118, 43), PF, 2 methods shape: (250, 43)
 MWU results: MannwhitneyuResult(statistic=12975.5, pvalue=0.0506719048
 7155522)
 AF, 2 methods median: 2.0
 PF, 2 methods median: 2.0
 cohens d: -0.215
 f: 0.44



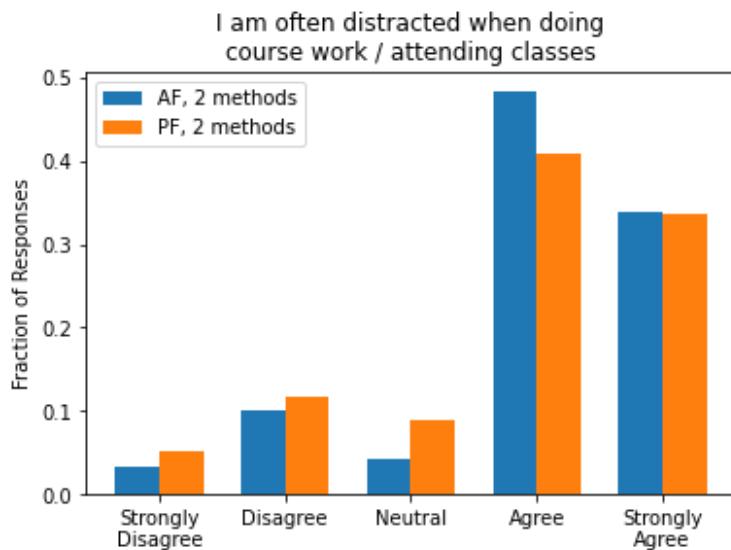
AF, 2 methods shape: (118, 43), PF, 2 methods shape: (250, 43)
 MWU results: MannwhitneyuResult(statistic=14084.0, pvalue=0.4665980864
 0203104)
 AF, 2 methods median: 3.0
 PF, 2 methods median: 3.0
 cohens d: -0.0832
 f: 0.477



```

AF, 2 methods shape: (118, 43), PF, 2 methods shape: (250, 43)
MWU results: MannwhitneyuResult(statistic=13477.5, pvalue=0.1627355305
217737)
AF, 2 methods median: 3.0
PF, 2 methods median: 3.0
cohens d: -0.18
f: 0.457

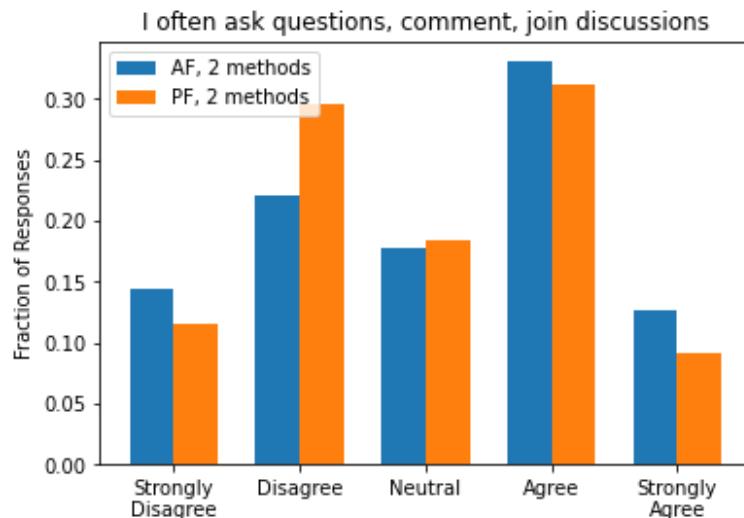
```



```

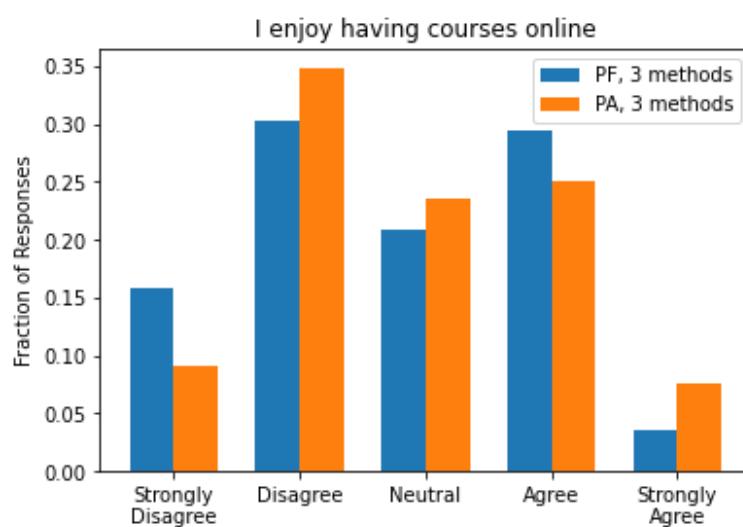
AF, 2 methods shape: (118, 43), PF, 2 methods shape: (250, 43)
MWU results: MannwhitneyuResult(statistic=15496.0, pvalue=0.4038472669
843858)
AF, 2 methods median: 4.0
PF, 2 methods median: 4.0
cohens d: 0.117
f: 0.525

```

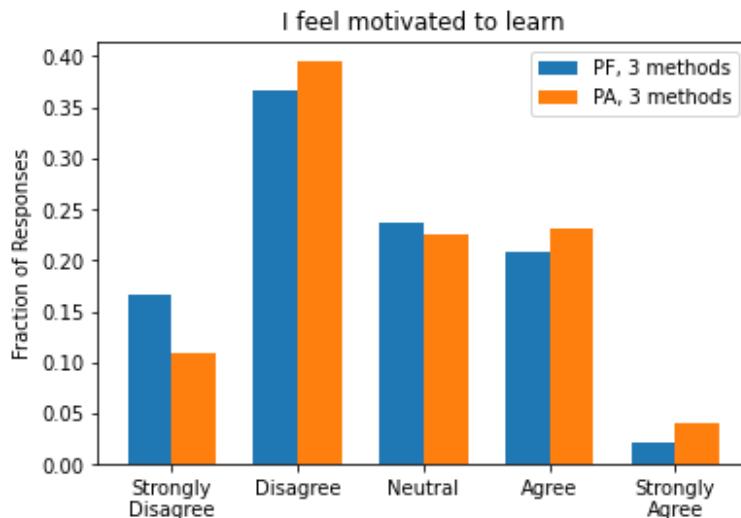


```
AF, 2 methods shape: (118, 43), PF, 2 methods shape: (250, 43)
MWU results: MannwhitneyuResult(statistic=15518.0, pvalue=0.4055659648
151716)
AF, 2 methods median: 3.0
PF, 2 methods median: 3.0
cohens d: 0.0882
f: 0.526
```

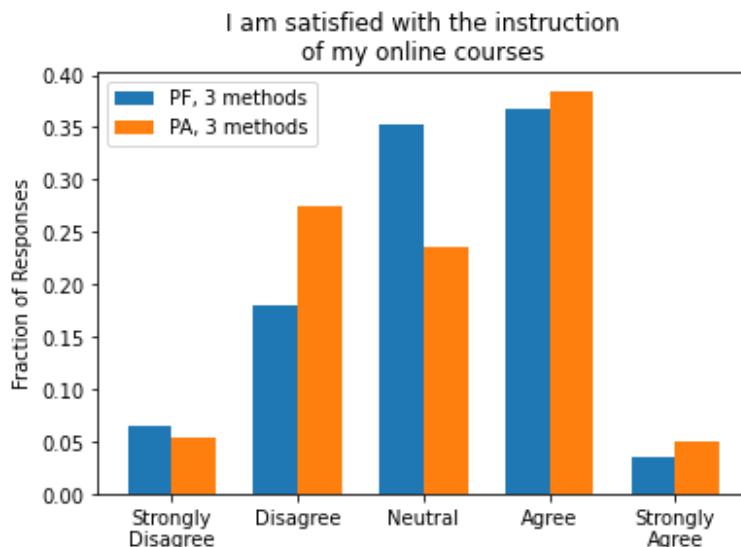
PA, 3 methods 276 PF, 3 methods 139



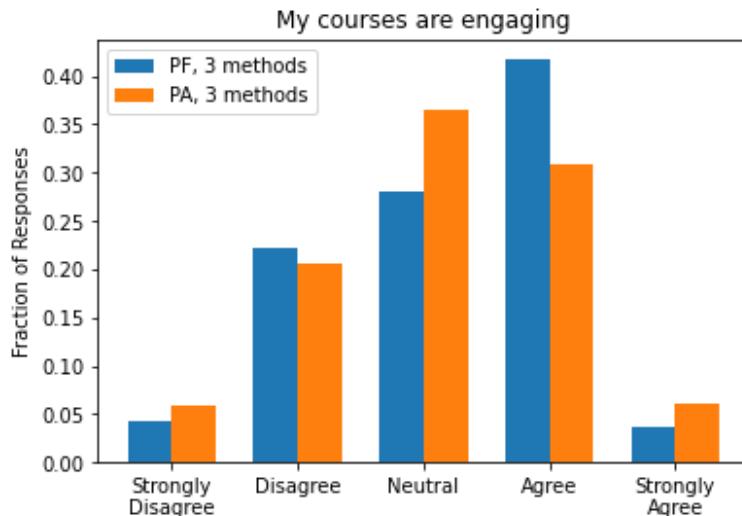
PF, 3 methods shape: (139, 43), PA, 3 methods shape: (276, 43)
 MWU results: MannwhitneyuResult(statistic=18160.5, pvalue=0.3589267858
 0986304)
 PF, 3 methods median: 3.0
 PA, 3 methods median: 3.0
 cohens d: -0.111
 f: 0.473



PF, 3 methods shape: (139, 43), PA, 3 methods shape: (276, 43)
 MWU results: MannwhitneyuResult(statistic=17833.0, pvalue=0.2221335034
 4150096)
 PF, 3 methods median: 2.0
 PA, 3 methods median: 2.0
 cohens d: -0.136
 f: 0.465



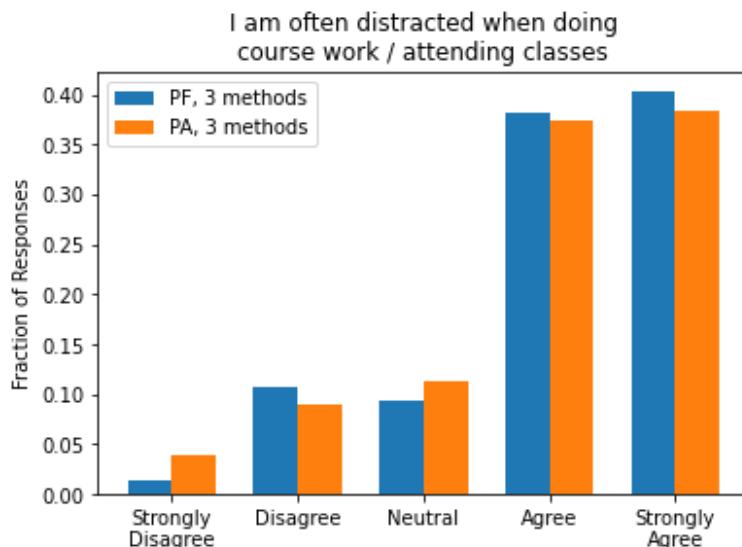
PF, 3 methods shape: (139, 43), PA, 3 methods shape: (276, 43)
 MWU results: MannwhitneyuResult(statistic=19448.0, pvalue=0.8093370278
 586051)
 PF, 3 methods median: 3.0
 PA, 3 methods median: 3.0
 cohens d: 0.0277
 f: 0.507



```

PF, 3 methods shape: (139, 43), PA, 3 methods shape: (276, 43)
MWU results: MannwhitneyuResult(statistic=20138.5, pvalue=0.3850741963
999822)
PF, 3 methods median: 3.0
PA, 3 methods median: 3.0
cohens d: 0.0724
f: 0.525

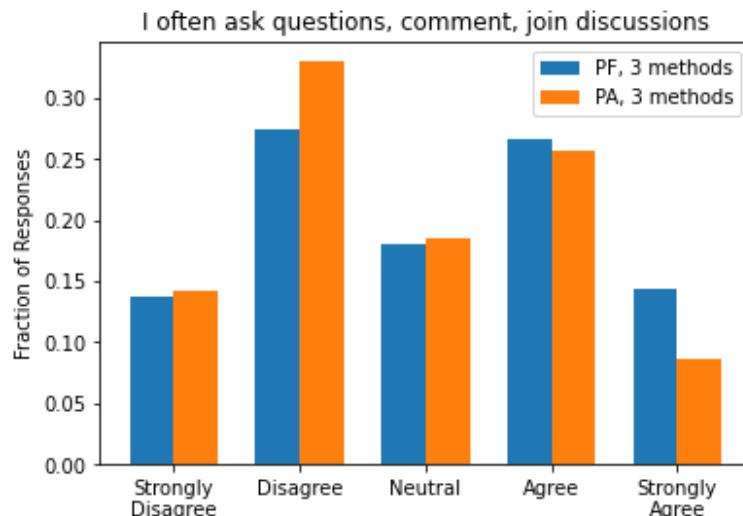
```



```

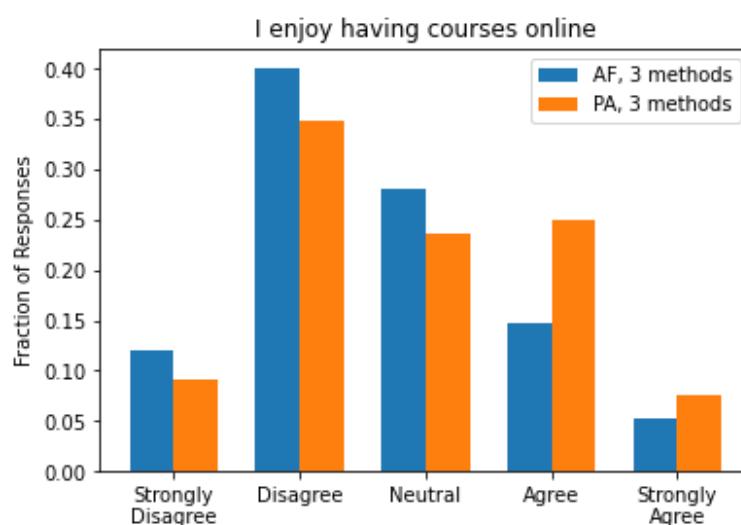
PF, 3 methods shape: (139, 43), PA, 3 methods shape: (276, 43)
MWU results: MannwhitneyuResult(statistic=19801.5, pvalue=0.5683608142
932983)
PF, 3 methods median: 4.0
PA, 3 methods median: 4.0
cohens d: 0.0734
f: 0.516

```

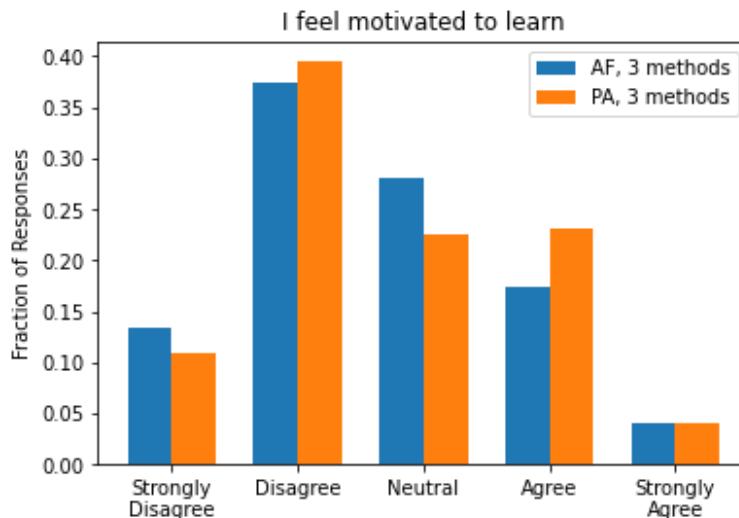


```
PF, 3 methods shape: (139, 43), PA, 3 methods shape: (276, 43)
MWU results: MannwhitneyuResult(statistic=20759.5, pvalue=0.1589193959
7217952)
PF, 3 methods median: 3.0
PA, 3 methods median: 3.0
cohens d: 0.152
f: 0.541
```

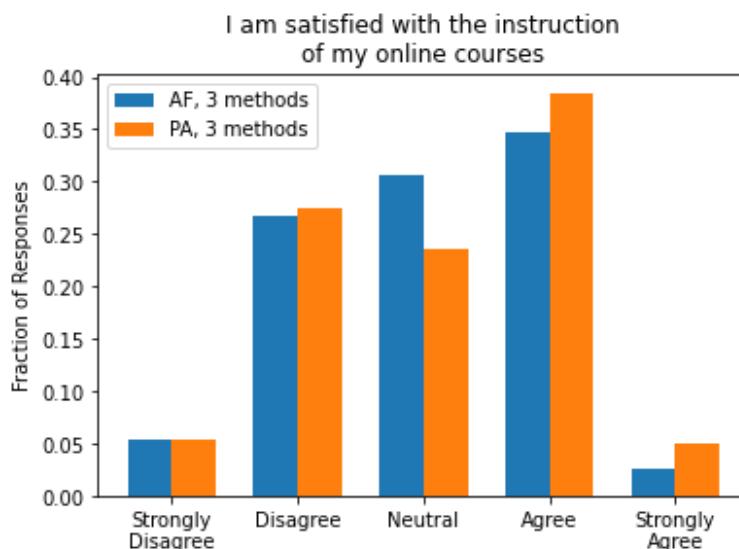
PA, 3 methods 276 AF, 3 methods 75



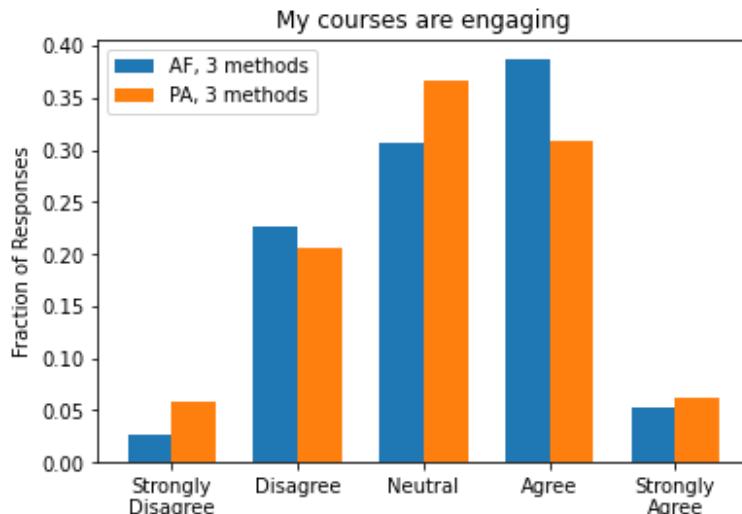
AF, 3 methods shape: (75, 43), PA, 3 methods shape: (276, 43)
 MWU results: MannwhitneyuResult(statistic=9013.5, pvalue=0.07478689249
 71564)
 AF, 3 methods median: 2.0
 PA, 3 methods median: 3.0
 cohens d: -0.235
 f: 0.435



AF, 3 methods shape: (75, 43), PA, 3 methods shape: (276, 43)
 MWU results: MannwhitneyuResult(statistic=9926.5, pvalue=0.57042301834
 63894)
 AF, 3 methods median: 2.0
 PA, 3 methods median: 2.0
 cohens d: -0.0809
 f: 0.48



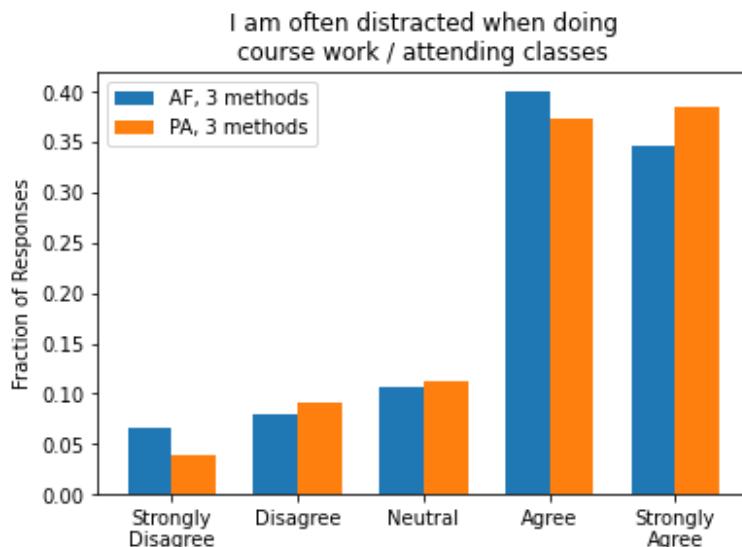
AF, 3 methods shape: (75, 43), PA, 3 methods shape: (276, 43)
 MWU results: MannwhitneyuResult(statistic=9902.5, pvalue=0.54768961726
 54789)
 AF, 3 methods median: 3.0
 PA, 3 methods median: 3.0
 cohens d: -0.0731
 f: 0.478



```

AF, 3 methods shape: (75, 43), PA, 3 methods shape: (276, 43)
MWU results: MannwhitneyuResult(statistic=10961.5, pvalue=0.4115926452
035038)
AF, 3 methods median: 3.0
PA, 3 methods median: 3.0
cohens d: 0.106
f: 0.53

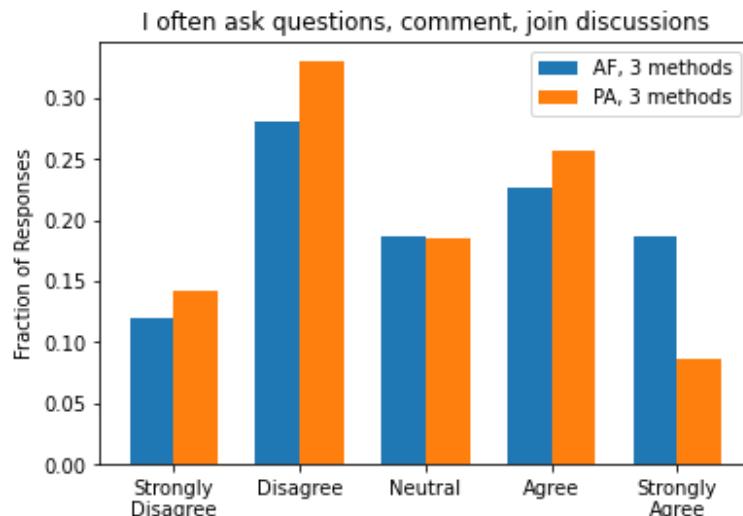
```



```

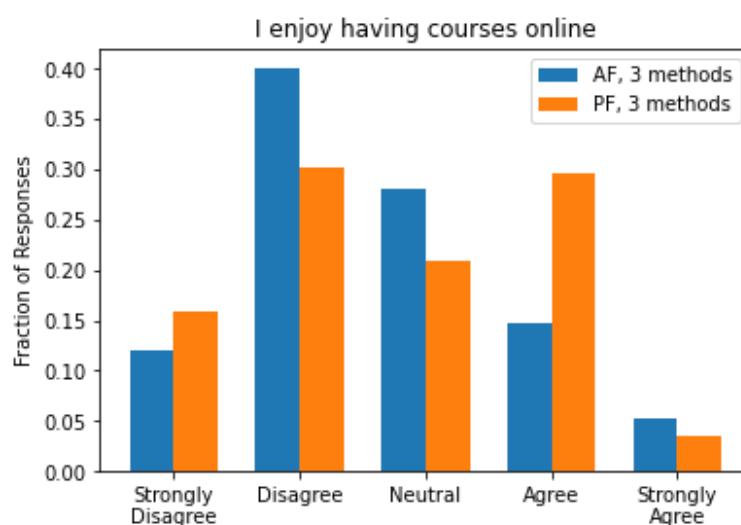
AF, 3 methods shape: (75, 43), PA, 3 methods shape: (276, 43)
MWU results: MannwhitneyuResult(statistic=9933.5, pvalue=0.57152460862
21394)
AF, 3 methods median: 4.0
PA, 3 methods median: 4.0
cohens d: -0.0813
f: 0.48

```

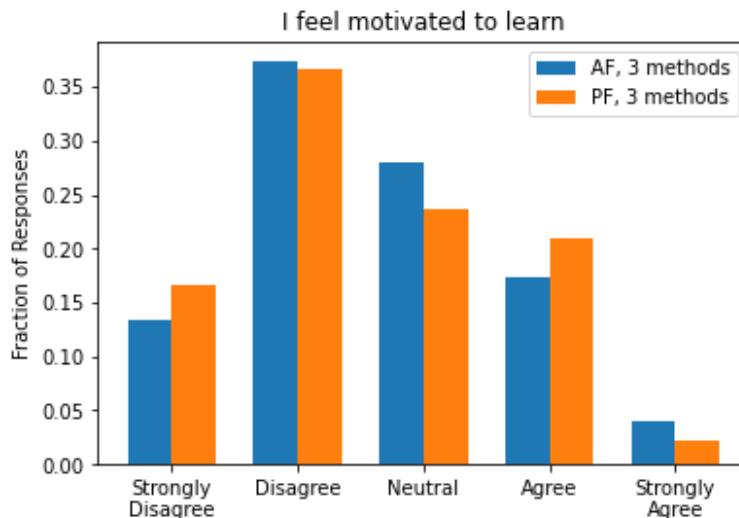


```
AF, 3 methods shape: (75, 43), PA, 3 methods shape: (276, 43)
MWU results: MannwhitneyuResult(statistic=11503.5, pvalue=0.1272903862
509429)
AF, 3 methods median: 3.0
PA, 3 methods median: 3.0
cohens d: 0.211
f: 0.556
```

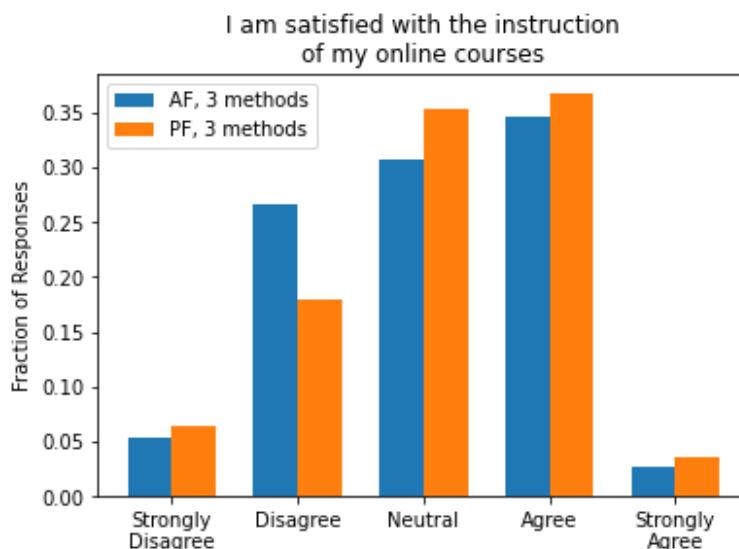
PF, 3 methods 139 AF, 3 methods 75



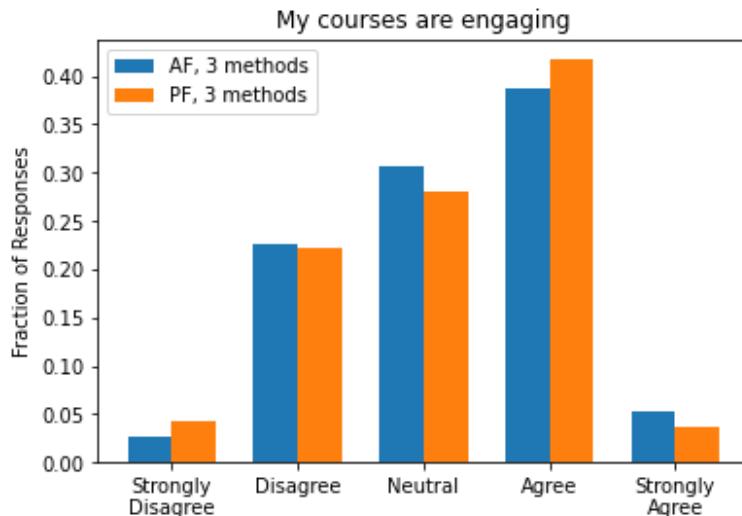
AF, 3 methods shape: (75, 43), PF, 3 methods shape: (139, 43)
 MWU results: MannwhitneyuResult(statistic=4832.0, pvalue=0.36234390588
 727694)
 AF, 3 methods median: 2.0
 PF, 3 methods median: 3.0
 cohens d: -0.121
 f: 0.464



AF, 3 methods shape: (75, 43), PF, 3 methods shape: (139, 43)
 MWU results: MannwhitneyuResult(statistic=5365.5, pvalue=0.71331728688
 7013)
 AF, 3 methods median: 2.0
 PF, 3 methods median: 2.0
 cohens d: 0.056
 f: 0.515



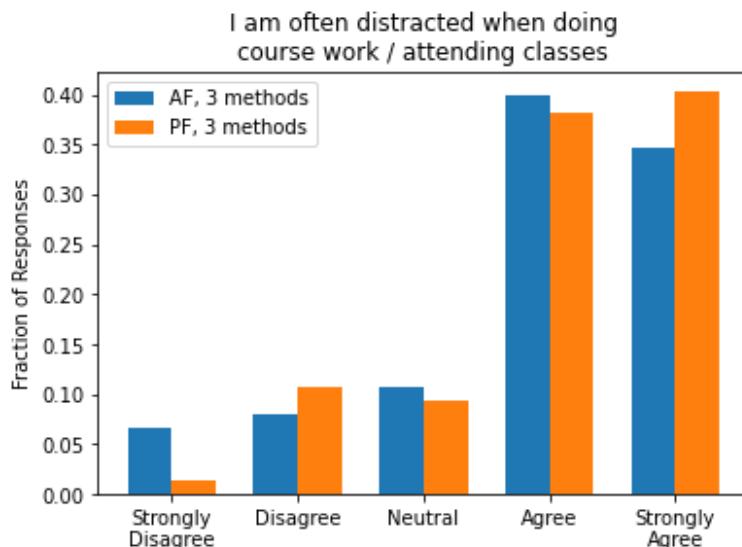
AF, 3 methods shape: (75, 43), PF, 3 methods shape: (139, 43)
 MWU results: MannwhitneyuResult(statistic=4887.5, pvalue=0.43015834094
 85066)
 AF, 3 methods median: 3.0
 PF, 3 methods median: 3.0
 cohens d: -0.106
 f: 0.469



```

AF, 3 methods shape: (75, 43), PF, 3 methods shape: (139, 43)
MWU results: MannwhitneyuResult(statistic=5262.0, pvalue=0.90471746553
26973)
AF, 3 methods median: 3.0
PF, 3 methods median: 3.0
cohens d: 0.0349
f: 0.505

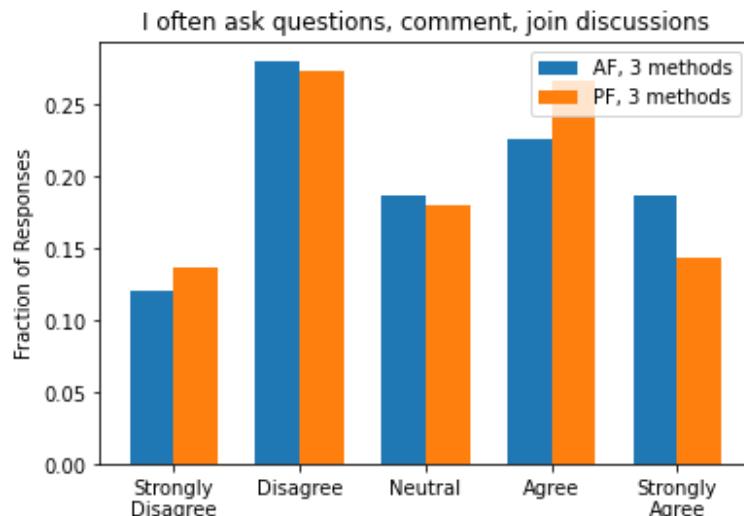
```



```

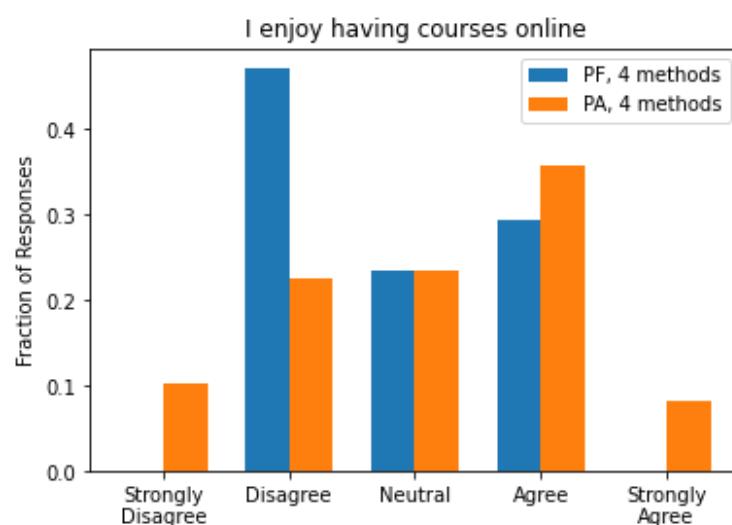
AF, 3 methods shape: (75, 43), PF, 3 methods shape: (139, 43)
MWU results: MannwhitneyuResult(statistic=4831.0, pvalue=0.34829491221
66361)
AF, 3 methods median: 4.0
PF, 3 methods median: 4.0
cohens d: -0.157
f: 0.463

```

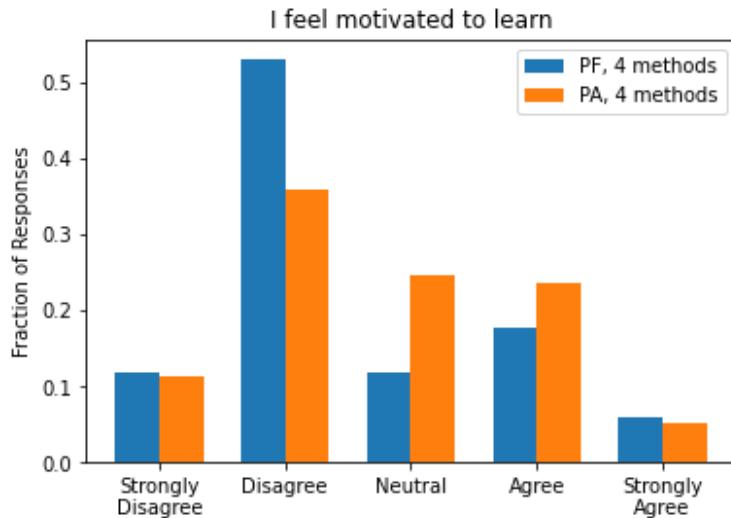


```
AF, 3 methods shape: (75, 43), PF, 3 methods shape: (139, 43)
MWU results: MannwhitneyuResult(statistic=5371.0, pvalue=0.70769978069
81158)
AF, 3 methods median: 3.0
PF, 3 methods median: 3.0
cohens d: 0.0558
f: 0.515
```

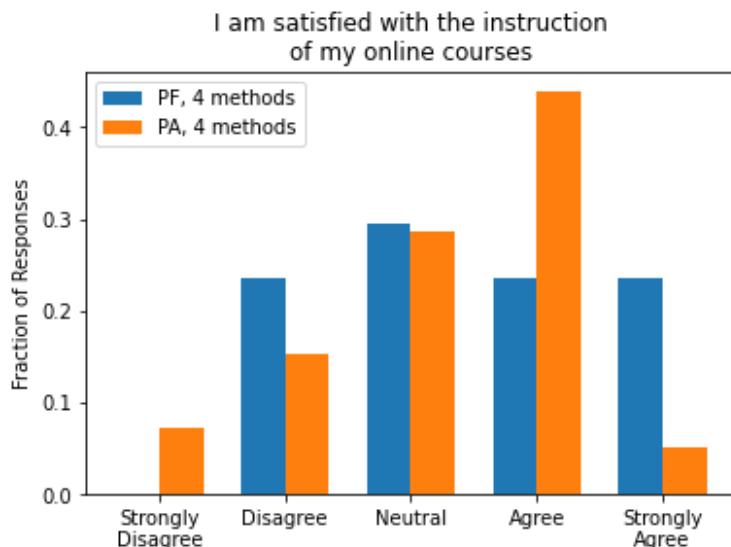
PA, 4 methods 98 PF, 4 methods 17



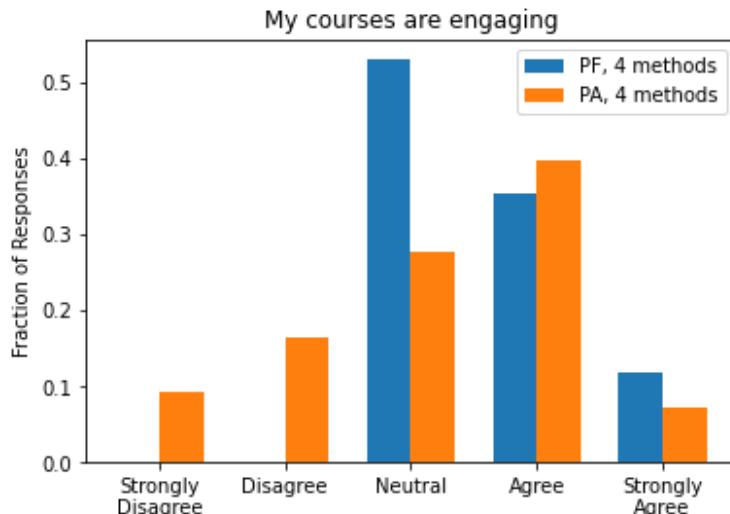
PF, 4 methods shape: (17, 43), PA, 4 methods shape: (98, 43)
 MWU results: MannwhitneyuResult(statistic=704.5, pvalue=0.294641961158
 23726)
 PF, 4 methods median: 3.0
 PA, 4 methods median: 3.0
 cohens d: -0.24
 f: 0.423



PF, 4 methods shape: (17, 43), PA, 4 methods shape: (98, 43)
 MWU results: MannwhitneyuResult(statistic=723.5, pvalue=0.370363166298
 3101)
 PF, 4 methods median: 2.0
 PA, 4 methods median: 3.0
 cohens d: -0.205
 f: 0.434



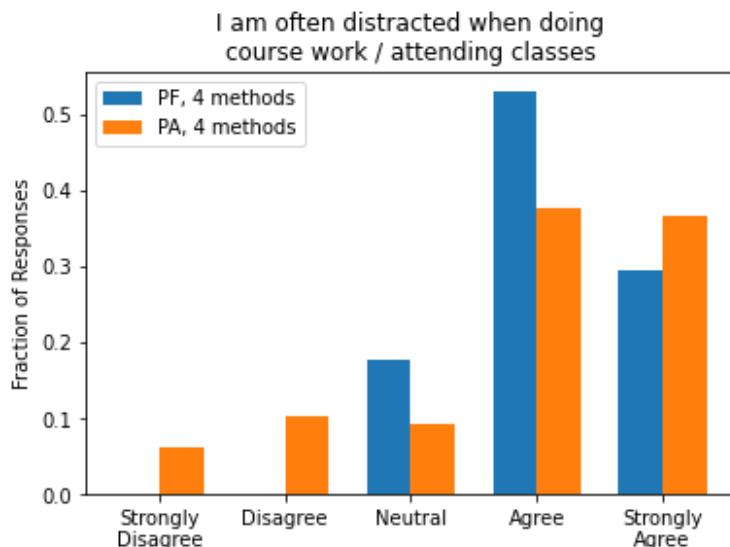
PF, 4 methods shape: (17, 43), PA, 4 methods shape: (98, 43)
 MWU results: MannwhitneyuResult(statistic=906.0, pvalue=0.547698360244
 3681)
 PF, 4 methods median: 3.0
 PA, 4 methods median: 3.0
 cohens d: 0.219
 f: 0.544



```

PF, 4 methods shape: (17, 43), PA, 4 methods shape: (98, 43)
MWU results: MannwhitneyuResult(statistic=964.5, pvalue=0.278094365998
2479)
PF, 4 methods median: 3.0
PA, 4 methods median: 3.0
cohens d: 0.377
f: 0.579

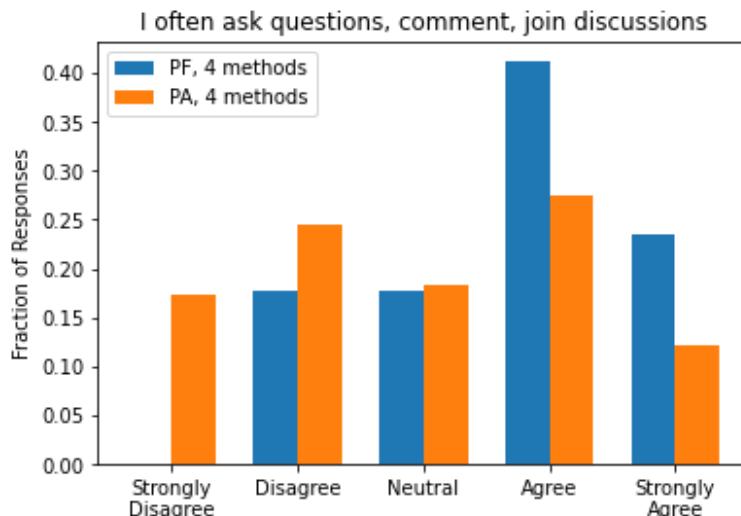
```



```

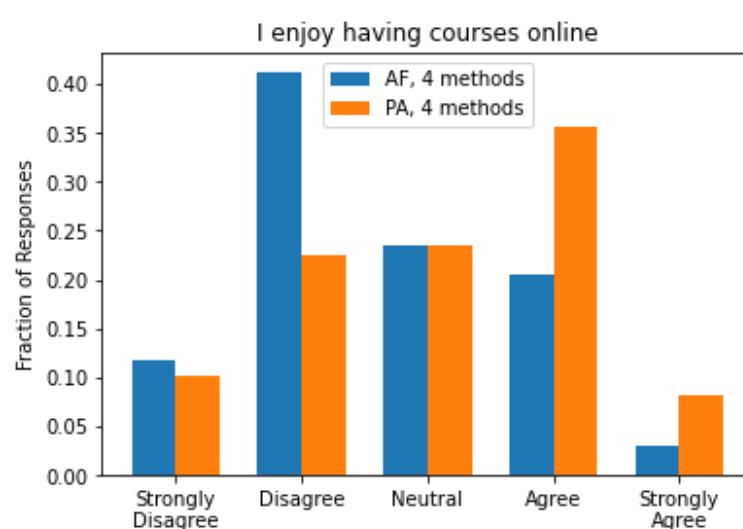
PF, 4 methods shape: (17, 43), PA, 4 methods shape: (98, 43)
MWU results: MannwhitneyuResult(statistic=853.0, pvalue=0.870528630220
2346)
PF, 4 methods median: 4.0
PA, 4 methods median: 4.0
cohens d: 0.203
f: 0.512

```

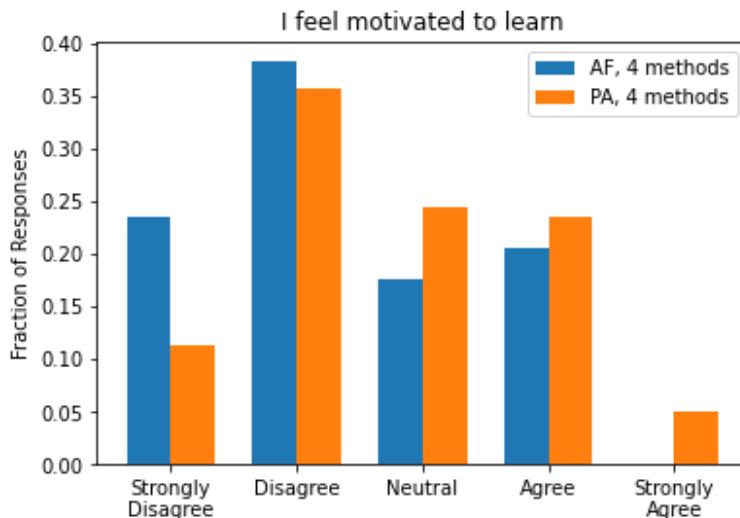


```
PF, 4 methods shape: (17, 43), PA, 4 methods shape: (98, 43)
MWU results: MannwhitneyuResult(statistic=1112.5, pvalue=0.02404024816
1135567)
PF, 4 methods median: 4.0
PA, 4 methods median: 3.0
cohens d: 0.609
f: 0.668
```

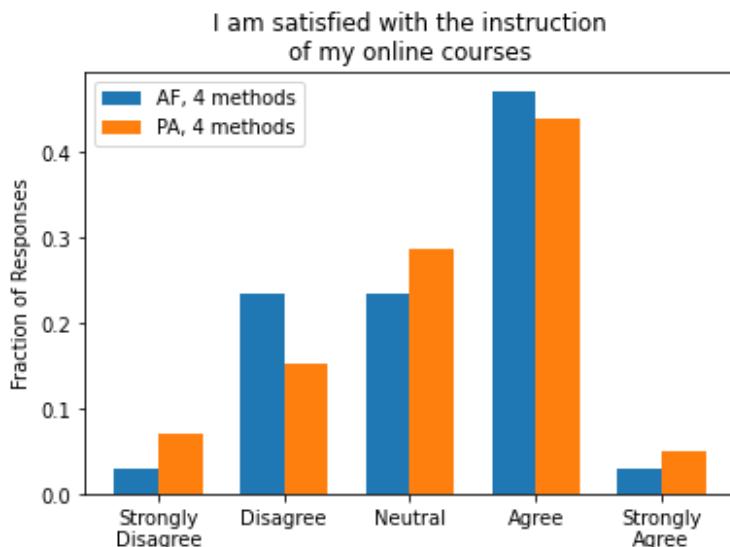
PA, 4 methods 98 AF, 4 methods 34



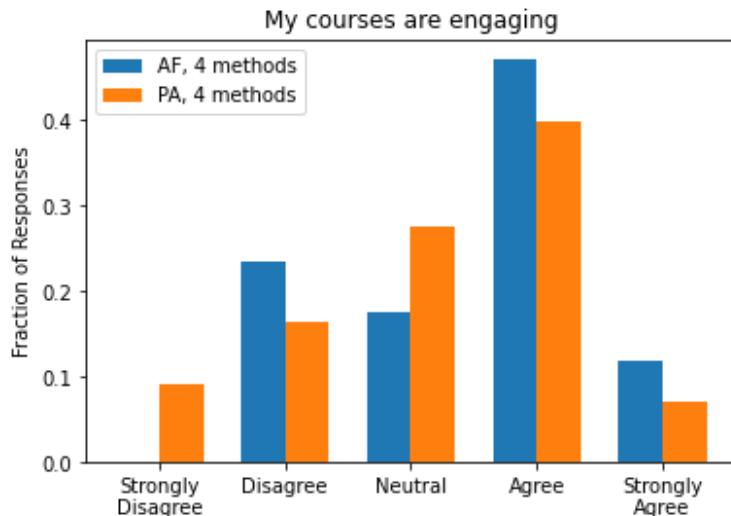
AF, 4 methods shape: (34, 43), PA, 4 methods shape: (98, 43)
 MWU results: MannwhitneyuResult(statistic=1263.5, pvalue=0.03034262864
 828406)
 AF, 4 methods median: 2.0
 PA, 4 methods median: 3.0
 cohens d: -0.422
 f: 0.379



AF, 4 methods shape: (34, 43), PA, 4 methods shape: (98, 43)
 MWU results: MannwhitneyuResult(statistic=1333.0, pvalue=0.07208722756
 661953)
 AF, 4 methods median: 2.0
 PA, 4 methods median: 3.0
 cohens d: -0.37
 f: 0.4



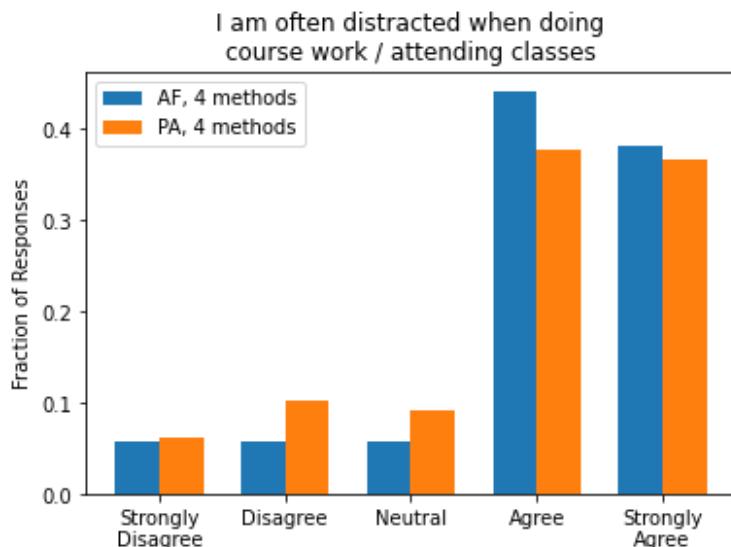
AF, 4 methods shape: (34, 43), PA, 4 methods shape: (98, 43)
 MWU results: MannwhitneyuResult(statistic=1647.0, pvalue=0.91848665799
 87654)
 AF, 4 methods median: 3.5
 PA, 4 methods median: 3.0
 cohens d: -0.00959
 f: 0.494



```

AF, 4 methods shape: (34, 43), PA, 4 methods shape: (98, 43)
MWU results: MannwhitneyuResult(statistic=1889.0, pvalue=0.22362170600
871978)
AF, 4 methods median: 4.0
PA, 4 methods median: 3.0
cohens d: 0.26
f: 0.567

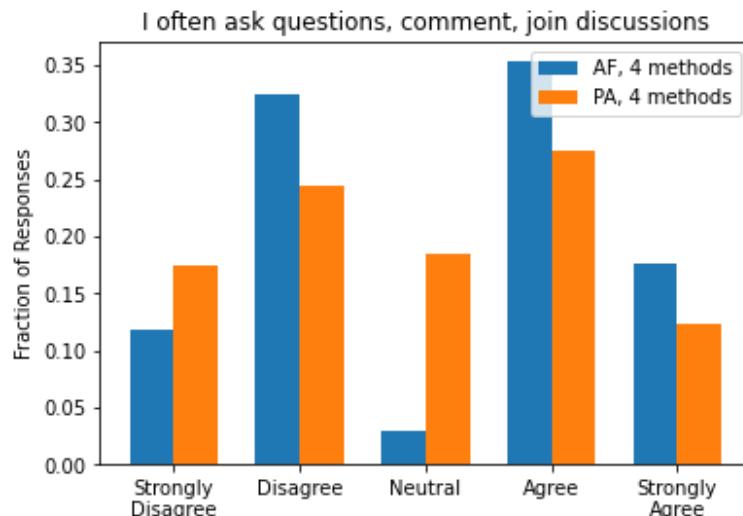
```



```

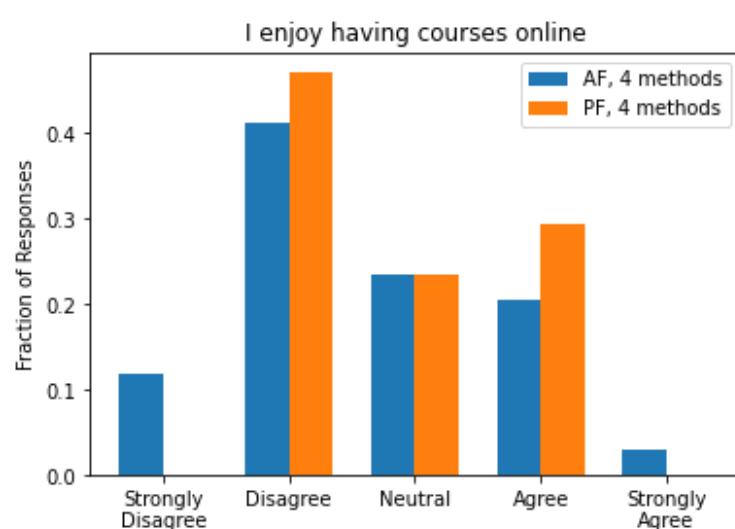
AF, 4 methods shape: (34, 43), PA, 4 methods shape: (98, 43)
MWU results: MannwhitneyuResult(statistic=1761.5, pvalue=0.59949239414
44432)
AF, 4 methods median: 4.0
PA, 4 methods median: 4.0
cohens d: 0.121
f: 0.529

```

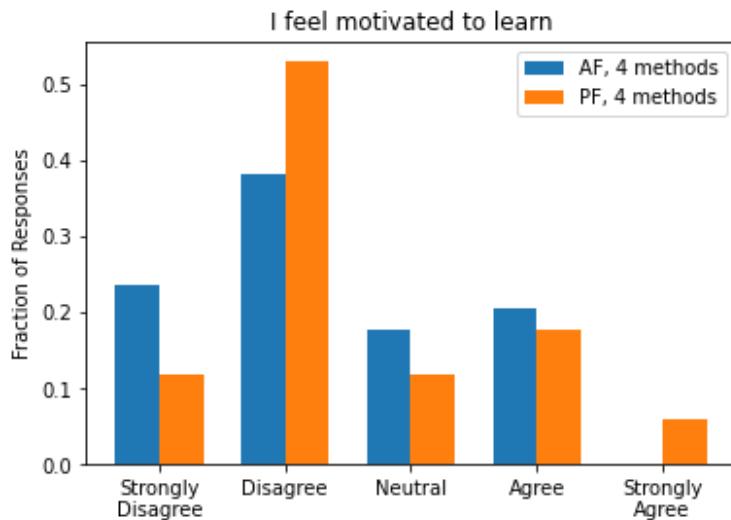


```
AF, 4 methods shape: (34, 43), PA, 4 methods shape: (98, 43)
MWU results: MannwhitneyuResult(statistic=1825.0, pvalue=0.39645703043
578595)
AF, 4 methods median: 4.0
PA, 4 methods median: 3.0
cohens d: 0.165
f: 0.548
```

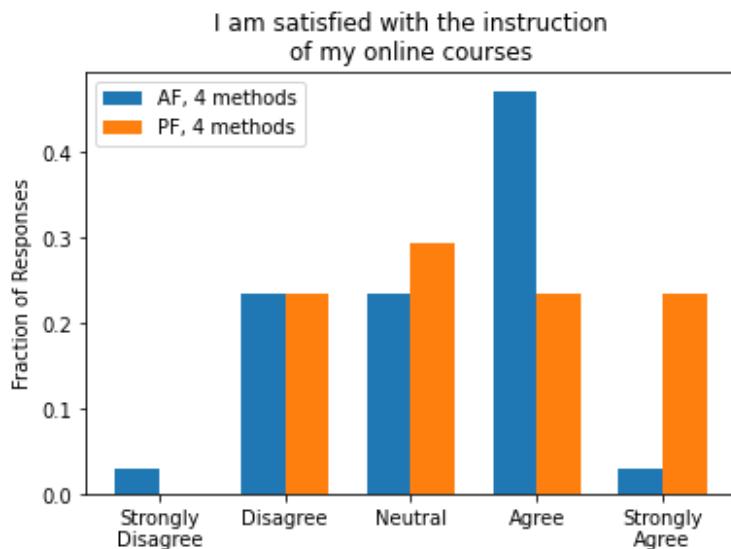
PF, 4 methods 17 AF, 4 methods 34



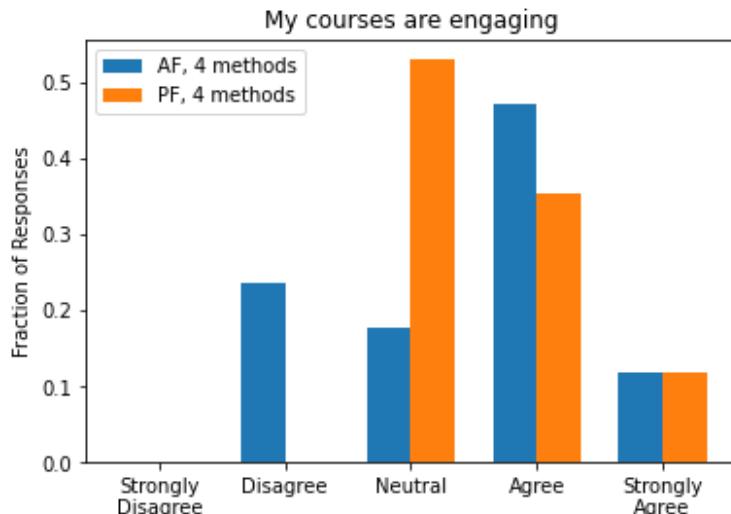
AF, 4 methods shape: (34, 43), PF, 4 methods shape: (17, 43)
 MWU results: MannwhitneyuResult(statistic=254.5, pvalue=0.472323868083
 86073)
 AF, 4 methods median: 2.0
 PF, 4 methods median: 3.0
 cohens d: -0.207
 f: 0.44



AF, 4 methods shape: (34, 43), PF, 4 methods shape: (17, 43)
 MWU results: MannwhitneyuResult(statistic=266.0, pvalue=0.635783746003
 9919)
 AF, 4 methods median: 2.0
 PF, 4 methods median: 2.0
 cohens d: -0.162
 f: 0.46



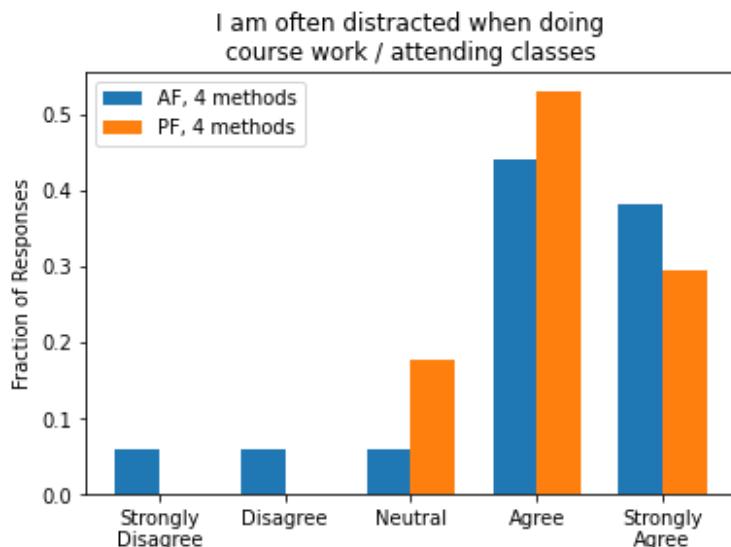
AF, 4 methods shape: (34, 43), PF, 4 methods shape: (17, 43)
 MWU results: MannwhitneyuResult(statistic=259.0, pvalue=0.536522168741
 29)
 AF, 4 methods median: 3.5
 PF, 4 methods median: 3.0
 cohens d: -0.232
 f: 0.448



```

AF, 4 methods shape: (34, 43), PF, 4 methods shape: (17, 43)
MWU results: MannwhitneyuResult(statistic=283.0, pvalue=0.907218724066
5176)
AF, 4 methods median: 4.0
PF, 4 methods median: 3.0
cohens d: -0.129
f: 0.49

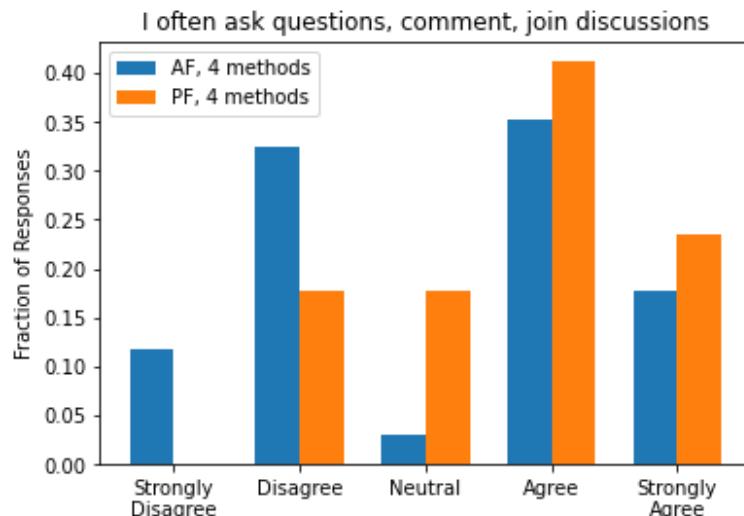
```



```

AF, 4 methods shape: (34, 43), PF, 4 methods shape: (17, 43)
MWU results: MannwhitneyuResult(statistic=304.0, pvalue=0.753478933704
1479)
AF, 4 methods median: 4.0
PF, 4 methods median: 4.0
cohens d: -0.0885
f: 0.526

```



```
AF, 4 methods shape: (34, 43), PF, 4 methods shape: (17, 43)
MWU results: MannwhitneyuResult(statistic=225.0, pvalue=0.185761228192
07075)
AF, 4 methods median: 4.0
PF, 4 methods median: 4.0
cohens d: -0.438
f: 0.389
```

```
In [ ]: ug2type_sum[0]
```

Out[]:

	question	PF, 2 methods median (n = 250)	PA, 2 methods median (n = 432)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	0.0755	0.52	0.355
1	remote_motivated	2.0	2.0	0.15	0.541	0.0597
2	remote_satisfied	3.0	3.0	0.107	0.527	0.216
3	remote_engaging	3.0	3.0	0.234	0.56	0.00647
4	remote_distracted	4.0	4.0	-0.12	0.471	0.176
5	remote_questions	3.0	2.0	0.259	0.573	0.00105

In []: ug2type_sum[1]

Out[]:

	question	AF, 2 methods median (n = 118)	PA, 2 methods median (n = 432)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	-0.118	0.472	0.333
1	remote_motivated	2.0	2.0	-0.0643	0.482	0.528
2	remote_satisfied	3.0	3.0	0.0245	0.505	0.863
3	remote_engaging	3.0	3.0	0.0526	0.516	0.589
4	remote_distracted	4.0	4.0	-0.00142	0.496	0.877
5	remote_questions	3.0	2.0	0.341	0.594	0.00128

In []: ug2type_sum[2]

Out[]:

	question	AF, 2 methods median (n = 118)	PF, 2 methods median (n = 250)	cohens d	f	p-value
0	remote_enjoy	2.0	2.0	-0.201	0.451	0.11
1	remote_motivated	2.0	2.0	-0.215	0.44	0.0507
2	remote_satisfied	3.0	3.0	-0.0832	0.477	0.467
3	remote_engaging	3.0	3.0	-0.18	0.457	0.163
4	remote_distracted	4.0	4.0	0.117	0.525	0.404
5	remote_questions	3.0	3.0	0.0882	0.526	0.406

In []: ug2type_sum[3]

Out[]:

	question	PF, 3 methods median (n = 139)	PA, 3 methods median (n = 276)	cohens d	f	p-value
0	remote_enjoy	3.0	3.0	-0.111	0.473	0.359
1	remote_motivated	2.0	2.0	-0.136	0.465	0.222
2	remote_satisfied	3.0	3.0	0.0277	0.507	0.809
3	remote_engaging	3.0	3.0	0.0724	0.525	0.385
4	remote_distracted	4.0	4.0	0.0734	0.516	0.568
5	remote_questions	3.0	3.0	0.152	0.541	0.159

In []: ug2type_sum[4]

Out[]:

	question	AF, 3 methods median (n = 75)	PA, 3 methods median (n = 276)	cohens d	f	p-value
0	remote_enjoy	2.0	3.0	-0.235	0.435	0.0748
1	remote_motivated	2.0	2.0	-0.0809	0.48	0.57
2	remote_satisfied	3.0	3.0	-0.0731	0.478	0.548
3	remote_engaging	3.0	3.0	0.106	0.53	0.412
4	remote_distracted	4.0	4.0	-0.0813	0.48	0.572
5	remote_questions	3.0	3.0	0.211	0.556	0.127

In []: ug2type_sum[5]

Out[]:

	question	AF, 3 methods median (n = 75)	PF, 3 methods median (n = 139)	cohens d	f	p-value
0	remote_enjoy	2.0	3.0	-0.121	0.464	0.362
1	remote_motivated	2.0	2.0	0.056	0.515	0.713
2	remote_satisfied	3.0	3.0	-0.106	0.469	0.43
3	remote_engaging	3.0	3.0	0.0349	0.505	0.905
4	remote_distracted	4.0	4.0	-0.157	0.463	0.348
5	remote_questions	3.0	3.0	0.0558	0.515	0.708

In []: ug2type_sum[6]

Out[]:

	question	PF, 4 methods median (n = 17)	PA, 4 methods median (n = 98)	cohens d	f	p-value
0	remote_enjoy	3.0	3.0	-0.24	0.423	0.295
1	remote_motivated	2.0	3.0	-0.205	0.434	0.37
2	remote_satisfied	3.0	3.0	0.219	0.544	0.548
3	remote_engaging	3.0	3.0	0.377	0.579	0.278
4	remote_distracted	4.0	4.0	0.203	0.512	0.871
5	remote_questions	4.0	3.0	0.609	0.668	0.024

In []: ug2type_sum[7]

Out[]:

	question	AF, 4 methods median (n = 34)	PA, 4 methods median (n = 98)	cohens d	f	p-value
0	remote_enjoy	2.0	3.0	-0.422	0.379	0.0303
1	remote_motivated	2.0	3.0	-0.37	0.4	0.0721
2	remote_satisfied	3.5	3.0	-0.00959	0.494	0.918
3	remote_engaging	4.0	3.0	0.26	0.567	0.224
4	remote_distracted	4.0	4.0	0.121	0.529	0.599
5	remote_questions	4.0	3.0	0.165	0.548	0.396

In []: ug2type_sum[8]

Out[]:

	question	AF, 4 methods median (n = 34)	PF, 4 methods median (n = 17)	cohens d	f	p-value
0	remote_enjoy	2.0	3.0	-0.207	0.44	0.472
1	remote_motivated	2.0	2.0	-0.162	0.46	0.636
2	remote_satisfied	3.5	3.0	-0.232	0.448	0.537
3	remote_engaging	4.0	3.0	-0.129	0.49	0.907
4	remote_distracted	4.0	4.0	-0.0885	0.526	0.753
5	remote_questions	4.0	4.0	-0.438	0.389	0.186

In []: for cat in ugcats:
print(cat.name)
print(np.mean(cat['num_methods']))

```
P
1.134387351778656
A
1.1189710610932475
F
1.1839080459770115
PA
2.5676646706586825
PF
2.402439024390244
AF
2.5617021276595744
PAF
4.216681776971895
```

```
In [ ]: for cat in ugcats_o:  
    print(cat.name)  
    print(np.mean(cat['num_techniques']))
```

```
L  
1.4150943396226414  
I  
1.3356766256590509  
A  
1.0421686746987953  
LI  
3.0134680134680134  
LA  
2.5047021943573666  
IA  
2.418848167539267  
LIA  
4.518100890207715
```

Preliminary Analysis

```
In [ ]: print('Number of countries:', len(ug['country'].unique()))
```

```
Number of countries: 95
```

Plotting functions

```
In [ ]: def pie_plots(ds, col, title, colors, n, legend_x, title_y):
    count = pd.DataFrame(ds[col].value_counts(normalize=True)).reset_index()
    count.columns = [col, 'proportion']
    # count[col][count['proportion'] < 0.001] = 'Other'
    count[col].loc[n:] = 'Other'
    labels = count[col]
    values = count['proportion']
    # fig = go.Figure(data=[go.Pie(labels=labels, values=values, title={'text': title, 'position': 'middle center'}, textinfo='label+percent', marker={'colors': px.colors.sequential.Viridis}))])
    # fig.marker(colors=px.colors.sequential.Cividis)
    fig = go.Figure(data=[go.Pie(labels=labels, values=values, textinfo='label+percent', marker={'colors': colors})])
    )
    fig.update_layout(
        font=dict(
            family="sans-serif",
            size=16,
            # color="black"
        ),
        legend=dict(
            x=legend_x,
            y=0.95,
            traceorder="normal",
            font=dict(
                family="sans-serif",
                size=14,
                # color="black"
            ),
            title = title, title_x=0.5, title_y = title_y,
            paper_bgcolor = 'rgba(0,0,0,0)',
            plot_bgcolor = 'rgba(0,0,0,0)'
        )
    )
    return fig
```

```
In [ ]: def bar_plot(ds1, ds2, col, title, y_title, leg1, leg2):
    count = pd.DataFrame(ds1[col].value_counts(normalize=True)).reset_index()
    count.columns = [col, 'proportion']
    # count[col][count['proportion'] < 0.001] = 'Other'
    # count[col].loc[n:] = 'Other'
    count = count[count[col]>=0]
    # print(count)
    x = count[col]
    y = count['proportion']

    count_ = pd.DataFrame(ds2[col].value_counts(normalize=True)).reset_index()
    count_.columns = [col, 'proportion']
    # count_[col][count_['proportion'] < 0.001] = 'Other'
    # count_[col].loc[n:] = 'Other'
    count_ = count_[count_[col]>=0]
    x_ = count_[col]
    y_ = count_['proportion']

    smed = ds1[col].median()
    amed = ds2[col].median()

    fig = go.Figure(data=[go.Bar(name=leg1, x=x, y=y, marker_color='#26828e', width=[0.4]*5, orientation='v'), \
                          go.Bar(name=leg2, x=x_, y=y_, marker_color='#b5d2e2b', width=[0.4]*5, orientation='v'), \
                          go.Scatter(y=[0,0.45],x=[smed,smed], line={'color': 'salmon', 'width': 3, 'dash': 'dashdot'}, name=f'{leg1} median'), \
                          go.Scatter(y=[0,0.45],x=[amed,amed], line={'color': 'salmon', 'width': 3, 'dash': 'dot'}, name=f'{leg2} median')])
    fig.update_layout(
        autosize=False,
        width=1000,
        height=700,
        title=title,
        title_x =0.5,
        title_y = 0.95,
        font=dict(
            family="sans-serif",
            size=16,
            # color="black"
        ),
        xaxis=dict(
            title=y_title,
            titlefont_size=16,
            tickfont_size=14,
        ),
        yaxis=dict(
            title='Proportion of Responses',
            titlefont_size=16,
            tickfont_size=14,
        ),
        legend=dict(

```

```

x=0.8,
y=1.0,
font=dict(
    family="sans-serif",
    size=14,
    # color="black"
),
bgcolor='rgba(255, 255, 255, 0)',
bordercolor='rgba(255, 255, 255, 0)',
traceorder='reversed'
),

barmode='group',
bargap=0.15, # gap between bars of adjacent location coordinates.
bargroupgap=0.1, # gap between bars of the same location coordinate.
paper_bgcolor = 'rgba(0,0,0,0)',
plot_bgcolor = 'rgba(0,0,0,0)'
)
return fig
# fig.write_image('bartest.png', scale=3)
# files.download('bartest.png')

```

Descriptive stats

In []: `print('Shape of undergrad dataset: ', ug.shape)
ug.head()`

Shape of undergrad dataset: (4789, 43)

Out[]:

		index	level	country	is_online	first_survey	primary_mode	preferred_mode	why_n
0	4	Undergraduate (studying for associates or bach...		United Kingdom	Yes	No	recorded	recorded	Easi follow look
1	6	Undergraduate (studying for associates or bach...		United Kingdom	Yes	No	live	live	Most si to norm provic ro
2	9	Undergraduate (studying for associates or bach...		United Kingdom	Yes	Yes	recorded	live	It is i intera
3	13	Undergraduate (studying for associates or bach...		United Kingdom	Yes	Yes	live	live	Allows i convers to flow qu
4	15	Undergraduate (studying for associates or bach...		Czech Republic	Yes	Yes	live	live	

Plotting the data

```
In [ ]: # plot pie charts to show percentages of responses
pie_texts = {'cols': ['is_online_short', 'country', 'primary_mode', 'preferred_mode', 'preference'], \
             'titles': ['Online learning', 'Countries', 'Primary Mode of Learning', 'Preferred Mode of Learning', 'Preferred Type of Learning'], \
             'colors': [[ '#440154', '#35b779', '#fde725'], ['#440154', '#3e4989', '#26828e', '#35b779', '#b5de2b'], ['#440154', '#31688e', '#35b779', '#fde725'], ['#440154', '#31688e', '#35b779', '#fde725'], ['#440154', '#35b779']], \
             'legend_x': [0.75, 0.75, 0.75, 0.75, 0.65], 'title_y': [0.05, 0.9, 0.9, 0.9, 0.9]}

for i in range(len(pie_texts['cols'])):
    fig = pie_plots(ug, pie_texts['cols'][i], pie_texts['titles'][i], pie_texts['colors'][i], 10, pie_texts['legend_x'][i], pie_texts['title_y'][i])
    fig.show()
    # fig.write_image(f'pie_all_{i}.png', width = 1500, scale=3)
    # files.download(f'pie_all_{i}.png')
```

/usr/local/lib/python3.6/dist-packages/pandas/core/indexing.py:670: SettingWithCopyWarning:

A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy


```
In [ ]: # Plot bar charts to show likert scores proportions

scores_title = [f'Level of {i} for Remote Learning' for i in ['Enjoyment', 'Motivation', 'Satisfaction', 'Engagement', 'Distraction', 'Active Participation']]
scores_title.extend(['Number of Methods Used in Classes', 'Number of Techniques Used outside of Classes'])

y_title = [f'Level of {i}' for i in ['Enjoyment', 'Motivation', 'Satisfaction', 'Engagement', 'Distraction', 'Active Participation']]
y_title.extend(['Number of Methods Used in Classes', 'Number of Techniques Used outside of Classes'])

bar_texts = {'cols': ['remote_enjoy', 'remote_motivated', 'remote_satisfied', 'remote_engaging', 'remote_distracted', \
                      'remote_questions', 'num_methods', 'num_techniques'], \
             'title': scores_title, \
             'y_title': y_title, 'legend': [['Synchronous', 'Asynchronous'], ['Prefer Remote', 'Prefer In-person']]}

for i in range(len(bar_texts['cols'])):
    fig = bar_plot(ug[ug['primary_mode']=='live'], ug[ug['primary_mode']!= 'live'], bar_texts['cols'][i], \
                  bar_texts['title'][i], bar_texts['y_title'][i], bar_texts['legend'][0][0], bar_texts['legend'][0][1])
    fig.show()
    # fig.write_image(f'bar_sync_async_{i}.png', scale=3)
    # files.download(f'bar_sync_async_{i}.png')
```



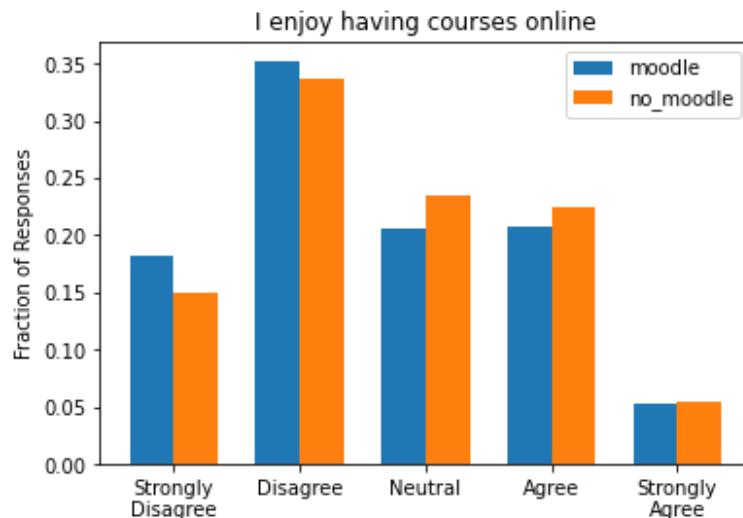
```
In [ ]: for i in range(len(bar_texts['cols'])):
    fig = bar_plot(ug[ug['preference']=='Online Courses'], ug[ug['preference']=='In-person Courses'], bar_texts['cols'][i],\
                   bar_texts['title'][i], bar_texts['y_title'][i], bar_texts['legend'][1][0], bar_texts['legend'][1][1])
    fig.show()
    # fig.write_image(f'bar_prefer_remote_inperson_{i}.png', scale=3)
    # files.download(f'bar_prefer_remote_inperson_{i}.png')
```



```
In [ ]: for i in range(len(bar_texts['cols'])):
    fig = bar_plot(ug[ug['primary_mode']=='live'], ug[ug['primary_mode']!=
    'live'], bar_texts['cols'][i], \
        bar_texts['title'][i], bar_texts['y_title'][i], bar_texts['le
    gend'][0][0], bar_texts['legend'][0][1])
    fig.show()
```



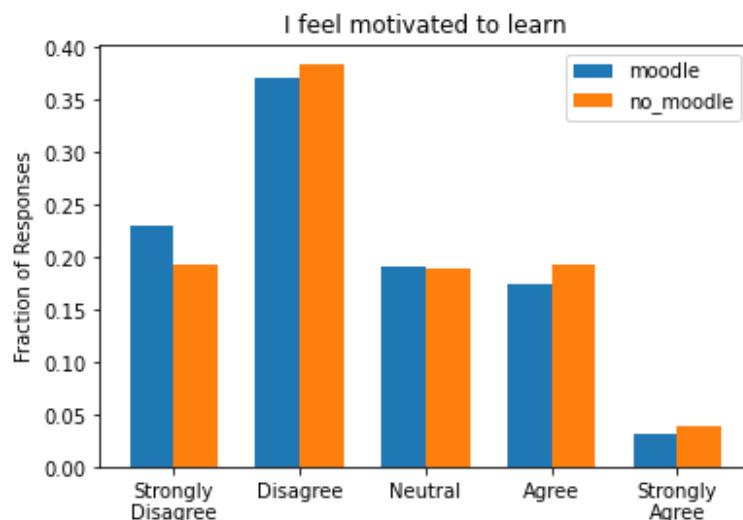
```
In [ ]: moodle = ug[ug['platforms_used'].str.contains("moodle", case=False) == True]
moodle.name = "moodle"
no_moodle = ug[ug['platforms_used'].str.contains("moodle", case=False) == False]
no_moodle.name = "no_moodle"
subset_ls.append(moodle)
subset_ls.append(no_moodle)
subset_name.append(moodle.name)
subset_name.append(no_moodle.name)
mwu_comparison(moodle, no_moodle)
```



```

moodle shape: (1385, 43), no_moodle shape: (3404, 43)
MWU results: MannwhitneyuResult(statistic=2233176.0, pvalue=0.00307912
03635236906)
moodle median: 2.0
no_moodle median: 3.0
cohens d: -0.0896
f: 0.474

```

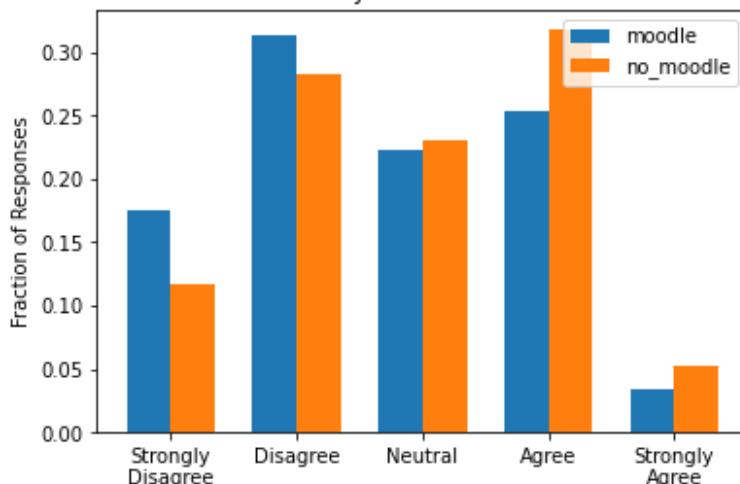


```

moodle shape: (1385, 43), no_moodle shape: (3404, 43)
MWU results: MannwhitneyuResult(statistic=2247270.0, pvalue=0.00830304
5483735807)
moodle median: 2.0
no_moodle median: 2.0
cohens d: -0.0841
f: 0.477

```

**I am satisfied with the instruction
of my online courses**

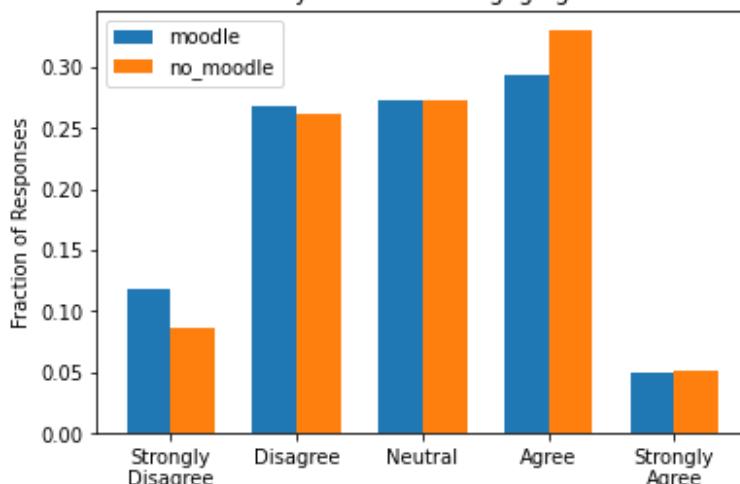


```

moodle shape: (1385, 43), no_moodle shape: (3404, 43)
MWU results: MannwhitneyuResult(statistic=2071203.5, pvalue=8.89132695
61197e-12)
moodle median: 3.0
no_moodle median: 3.0
cohens d: -0.221
f: 0.439

```

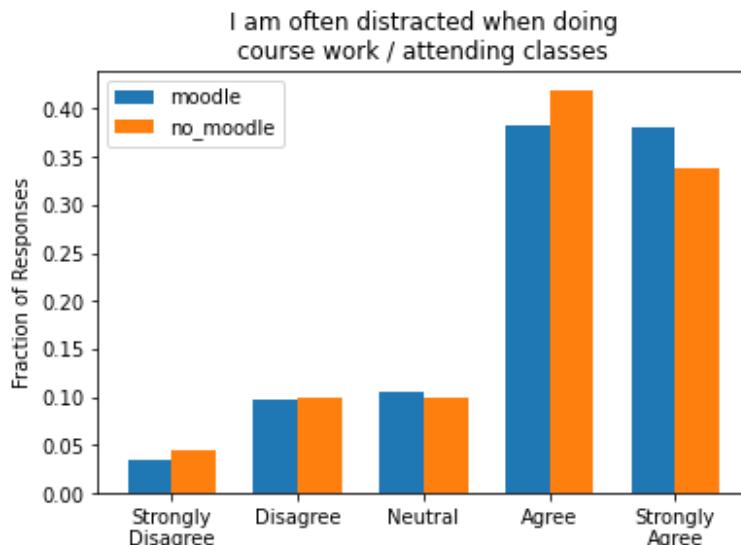
My courses are engaging



```

moodle shape: (1385, 43), no_moodle shape: (3404, 43)
MWU results: MannwhitneyuResult(statistic=2225947.5, pvalue=0.00167768
72185604603)
moodle median: 3.0
no_moodle median: 3.0
cohens d: -0.103
f: 0.472

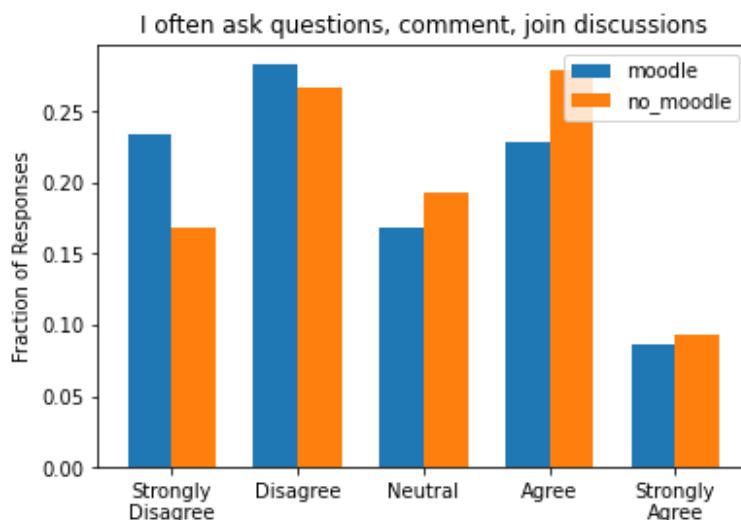
```



```

moodle shape: (1385, 43), no_moodle shape: (3404, 43)
MWU results: MannwhitneyuResult(statistic=2454190.5, pvalue=0.01767248
9101460378)
moodle median: 4.0
no_moodle median: 4.0
cohens d: 0.0682
f: 0.521

```



```

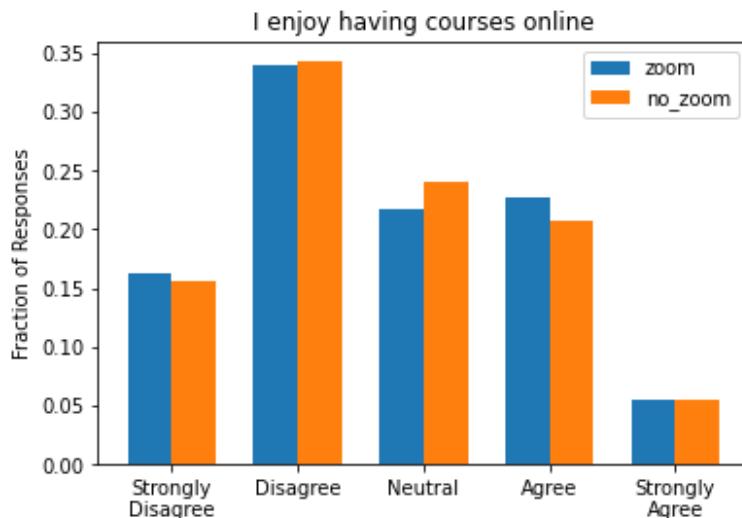
moodle shape: (1385, 43), no_moodle shape: (3404, 43)
MWU results: MannwhitneyuResult(statistic=2126909.0, pvalue=4.90658626
4582401e-08)
moodle median: 2.0
no_moodle median: 3.0
cohens d: -0.171
f: 0.451

```

Out[]:

	question	moodle median (n = 1385)	no_moodle median (n = 3404)	cohens d	f	p-value
0	remote_enjoy	2.0	3.0	-0.0896	0.474	0.00308
1	remote_motivated	2.0	2.0	-0.0841	0.477	0.0083
2	remote_satisfied	3.0	3.0	-0.221	0.439	8.89e-12
3	remote_engaging	3.0	3.0	-0.103	0.472	0.00168
4	remote_distracted	4.0	4.0	0.0682	0.521	0.0177
5	remote_questions	2.0	3.0	-0.171	0.451	4.91e-08

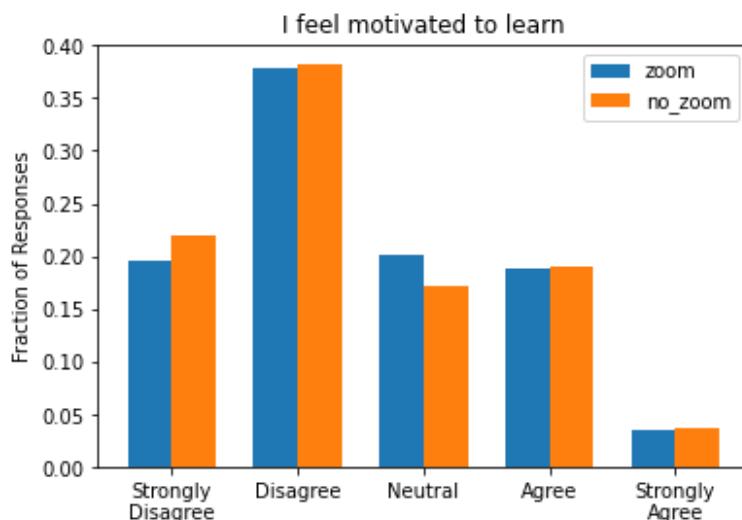
```
In [ ]: zoom = ug[ug['platforms_used'].str.contains("zoom", case=False) == True]
zoom.name = "zoom"
no_zoom = ug[ug['platforms_used'].str.contains("zoom", case=False) == False]
no_zoom.name = "no_zoom"
subset_ls.append(zoom)
subset_ls.append(no_zoom)
subset_name.append(zoom.name)
subset_name.append(no_zoom.name)
mwu_comparison(zoom, no_zoom)
```



```

zoom shape: (2945, 43), no_zoom shape: (1844, 43)
MWU results: MannwhitneyuResult(statistic=2721894.5, pvalue=0.88332185
91111959)
zoom median: 2.0
no_zoom median: 3.0
cohens d: 0.00659
f: 0.501

```

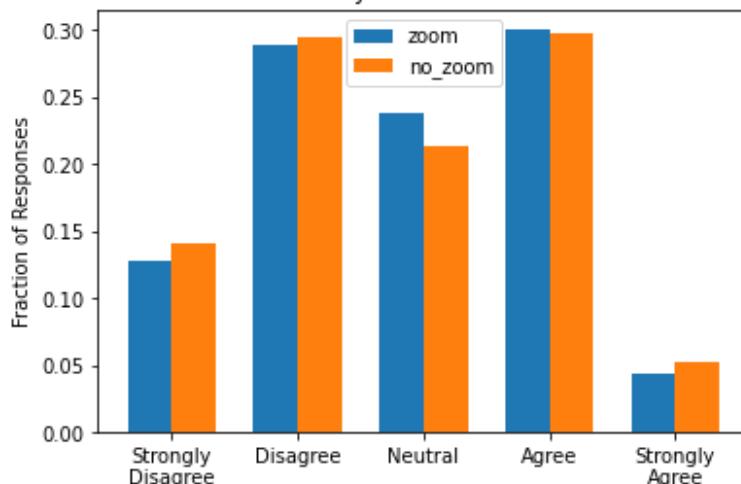


```

zoom shape: (2945, 43), no_zoom shape: (1844, 43)
MWU results: MannwhitneyuResult(statistic=2788413.0, pvalue=0.10208107
665074394)
zoom median: 2.0
no_zoom median: 2.0
cohens d: 0.0395
f: 0.513

```

I am satisfied with the instruction of my online courses

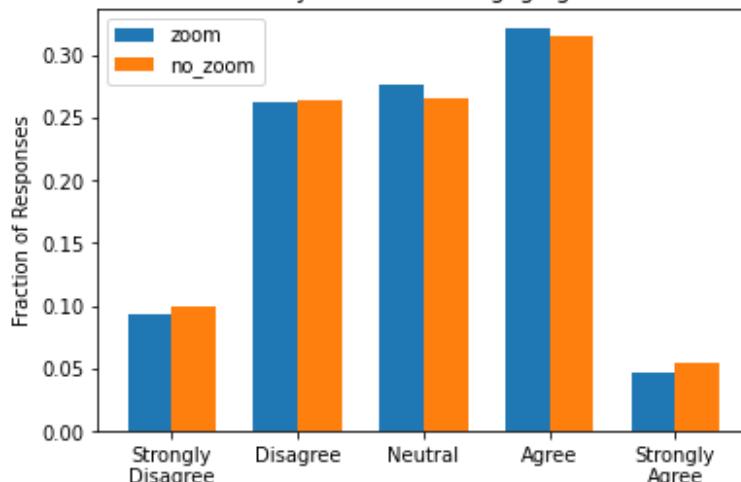


```

zoom shape: (2945, 43), no_zoom shape: (1844, 43)
MWU results: MannwhitneyuResult(statistic=2739261.0, pvalue=0.59421980
75155309)
zoom median: 3.0
no_zoom median: 3.0
cohens d: 0.0144
f: 0.504

```

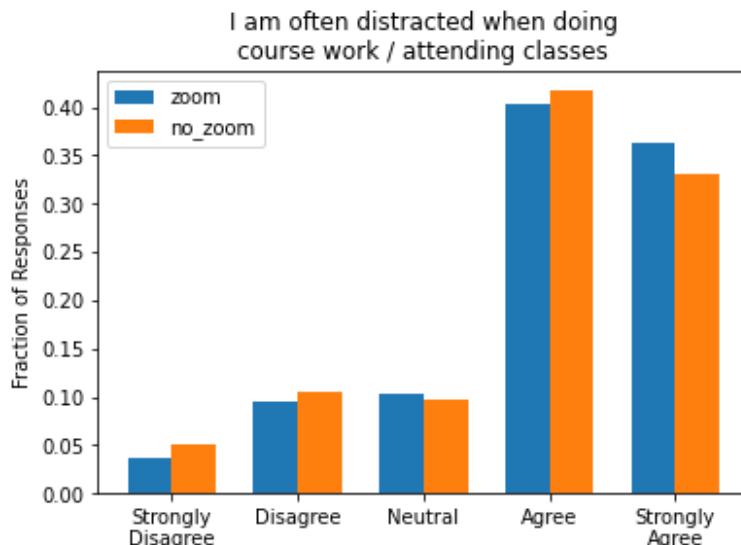
My courses are engaging



```

zoom shape: (2945, 43), no_zoom shape: (1844, 43)
MWU results: MannwhitneyuResult(statistic=2726670.5, pvalue=0.79972999
13466464)
zoom median: 3.0
no_zoom median: 3.0
cohens d: 0.00761
f: 0.502

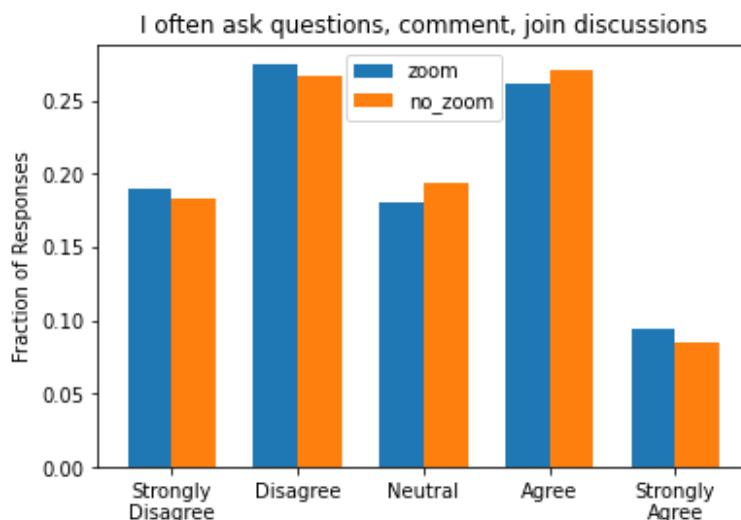
```



```

zoom shape: (2945, 43), no_zoom shape: (1844, 43)
MWU results: MannwhitneyuResult(statistic=2819055.5, pvalue=0.01795262
9071214775)
zoom median: 4.0
no_zoom median: 4.0
cohens d: 0.076
f: 0.519

```



```

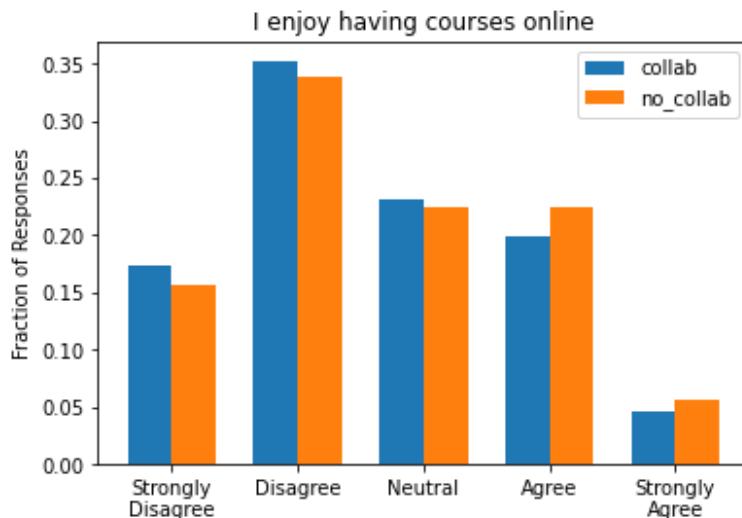
zoom shape: (2945, 43), no_zoom shape: (1844, 43)
MWU results: MannwhitneyuResult(statistic=2698886.5, pvalue=0.71743226
95390263)
zoom median: 3.0
no_zoom median: 3.0
cohens d: -0.00873
f: 0.497

```

Out[]:

	question	zoom median (n = 2945)	no_zoom median (n = 1844)	cohens d	f	p-value
0	remote_enjoy	2.0	3.0	0.00659	0.501	0.883
1	remote_motivated	2.0	2.0	0.0395	0.513	0.102
2	remote_satisfied	3.0	3.0	0.0144	0.504	0.594
3	remote_engaging	3.0	3.0	0.00761	0.502	0.8
4	remote_distracted	4.0	4.0	0.076	0.519	0.018
5	remote_questions	3.0	3.0	-0.00873	0.497	0.717

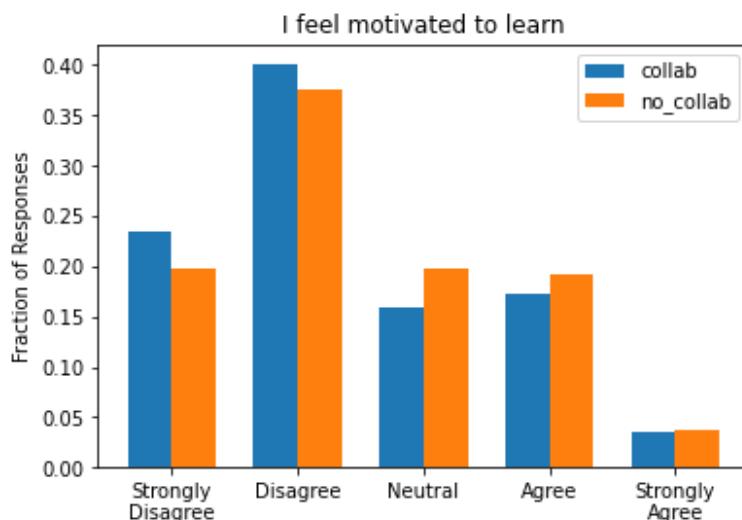
```
In [ ]: collab = ug[ug['platforms_used'].str.contains("collab", case=False) == True]
collab.name = "collab"
no_collab = ug[ug['platforms_used'].str.contains("collab", case=False) == False]
no_collab.name = "no_collab"
subset_ls.append(collab)
subset_ls.append(no_collab)
subset_name.append(collab.name)
subset_name.append(no_collab.name)
mwu_comparison(collab, no_collab)
```



```

collab shape: (961, 43), no_collab shape: (3828, 43)
MWU results: MannwhitneyuResult(statistic=1757415.0, pvalue=0.02693941
0195121784)
collab median: 2.0
no_collab median: 3.0
cohens d: -0.0824
f: 0.478

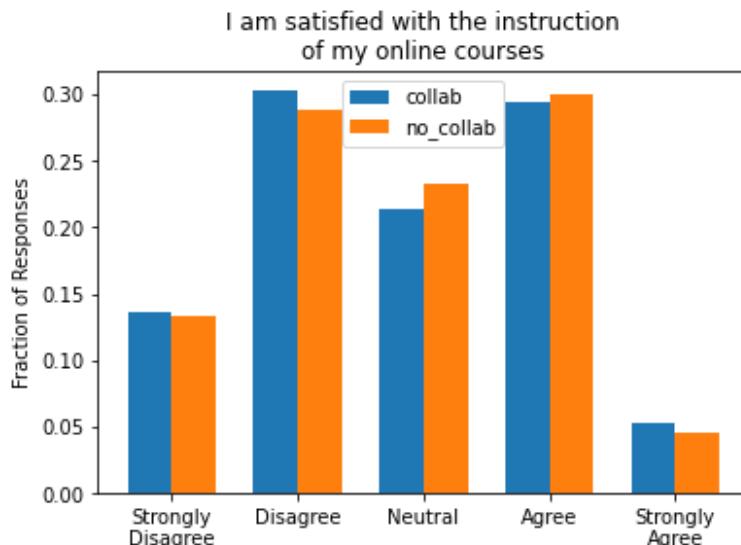
```



```

collab shape: (961, 43), no_collab shape: (3828, 43)
MWU results: MannwhitneyuResult(statistic=1713685.0, pvalue=0.00064082
15818618482)
collab median: 2.0
no_collab median: 2.0
cohens d: -0.115
f: 0.466

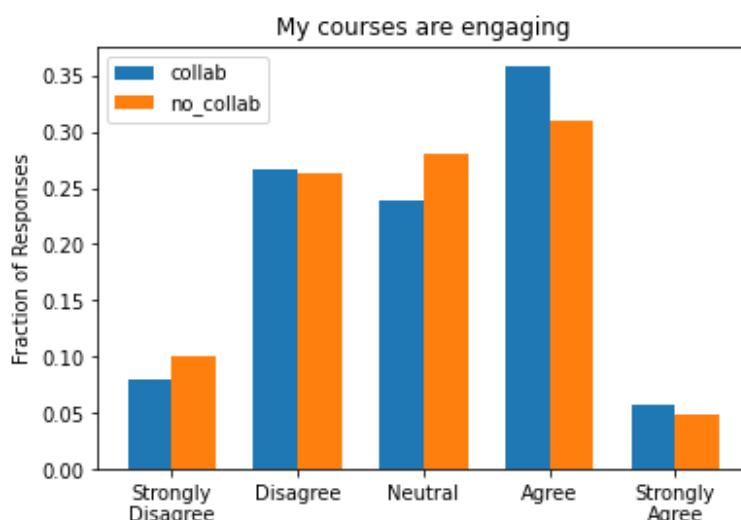
```



```

collab shape: (961, 43), no_collab shape: (3828, 43)
MWU results: MannwhitneyuResult(statistic=1825365.0, pvalue=0.70563377
04711189)
collab median: 3.0
no_collab median: 3.0
cohens d: -0.0113
f: 0.496

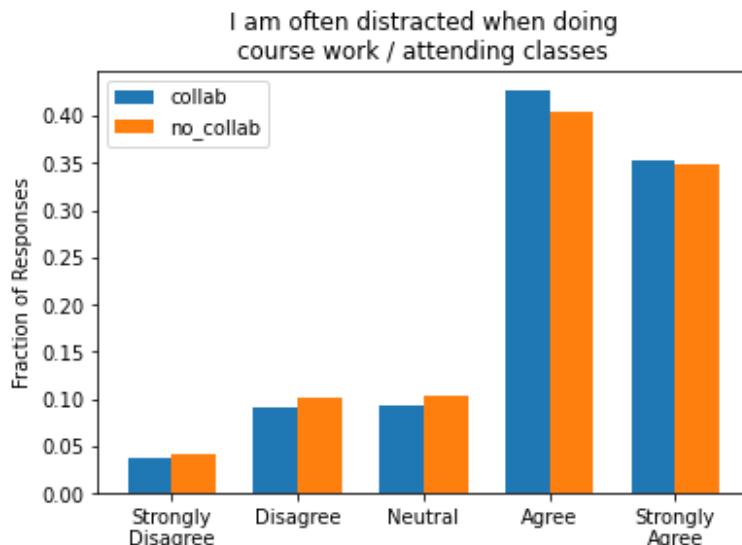
```



```

collab shape: (961, 43), no_collab shape: (3828, 43)
MWU results: MannwhitneyuResult(statistic=1938035.0, pvalue=0.00752036
3358009659)
collab median: 3.0
no_collab median: 3.0
cohens d: 0.0962
f: 0.527

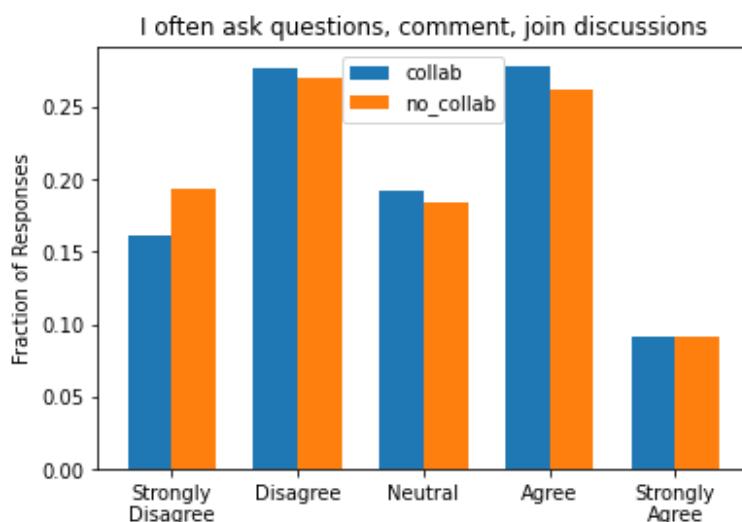
```



```

collab shape: (961, 43), no_collab shape: (3828, 43)
MWU results: MannwhitneyuResult(statistic=1875479.5, pvalue=0.31680224
656197264)
collab median: 4.0
no_collab median: 4.0
cohens d: 0.0458
f: 0.51

```



```

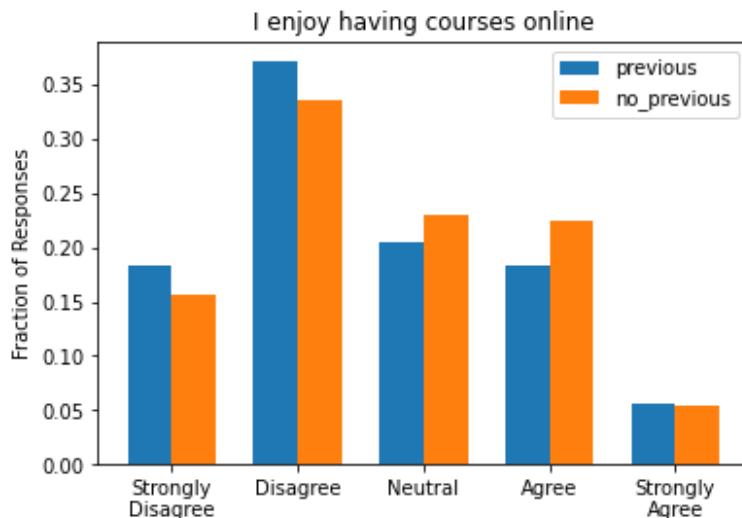
collab shape: (961, 43), no_collab shape: (3828, 43)
MWU results: MannwhitneyuResult(statistic=1902629.0, pvalue=0.08986016
4125456)
collab median: 3.0
no_collab median: 3.0
cohens d: 0.0596
f: 0.517

```

Out[]:

	question	collab median (n = 961)	no_collab median (n = 3828)	cohens d	f	p-value
0	remote_enjoy	2.0	3.0	-0.0824	0.478	0.0269
1	remote_motivated	2.0	2.0	-0.115	0.466	0.000641
2	remote_satisfied	3.0	3.0	-0.0113	0.496	0.706
3	remote_engaging	3.0	3.0	0.0962	0.527	0.00752
4	remote_distracted	4.0	4.0	0.0458	0.51	0.317
5	remote_questions	3.0	3.0	0.0596	0.517	0.0899

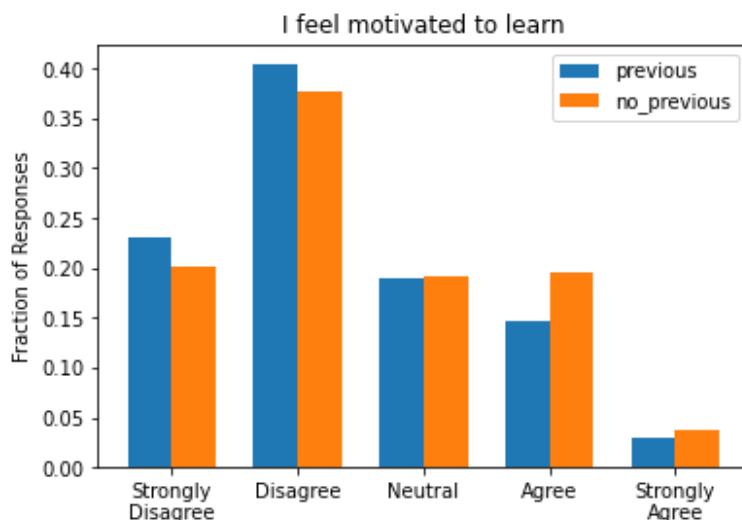
```
In [ ]: previous = ug[ug['platforms_used'].str.contains("previous", case=False)
          == True]
previous.name = "previous"
no_previous = ug[ug['platforms_used'].str.contains("previous", case=False
          == False)]
no_previous.name = "no_previous"
subset_ls.append(previous)
subset_ls.append(no_previous)
subset_name.append(previous.name)
subset_name.append(no_previous.name)
mwu_comparison(previous, no_previous)
```



```

previous shape: (641, 43), no_previous shape: (4148, 43)
MWU results: MannwhitneyuResult(statistic=1240590.0, pvalue=0.00477808
004732621)
previous median: 2.0
no_previous median: 3.0
cohens d: -0.113
f: 0.467

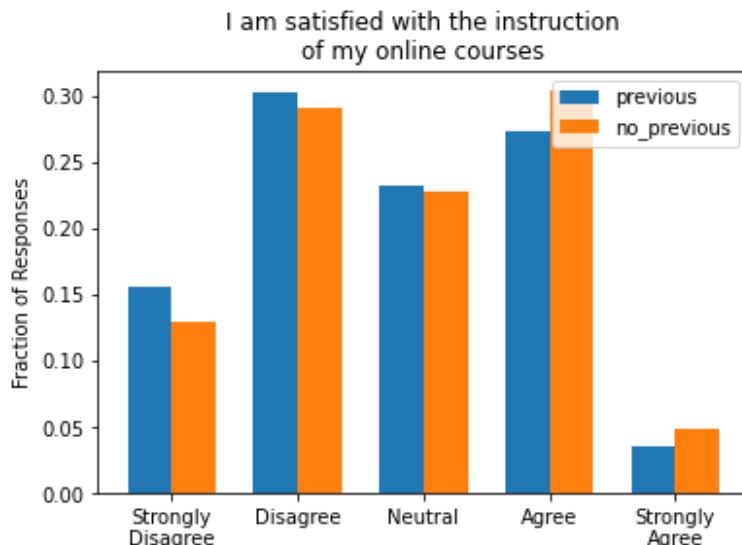
```



```

previous shape: (641, 43), no_previous shape: (4148, 43)
MWU results: MannwhitneyuResult(statistic=1231272.5, pvalue=0.00171000
40246557722)
previous median: 2.0
no_previous median: 2.0
cohens d: -0.136
f: 0.463

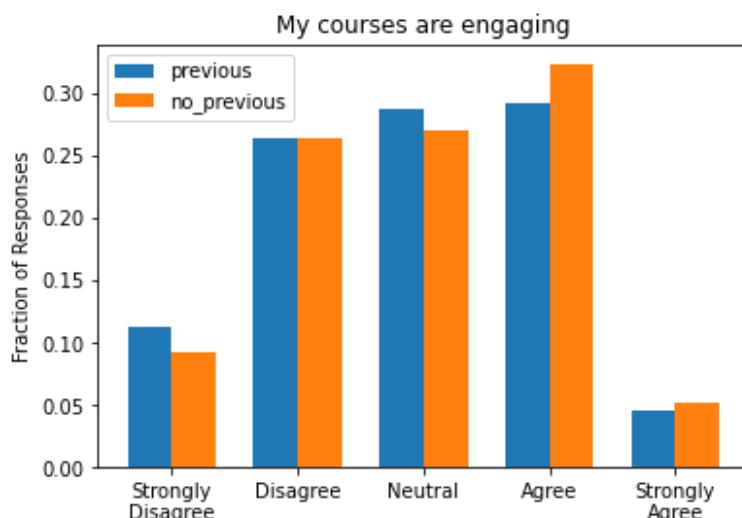
```



```

previous shape: (641, 43), no_previous shape: (4148, 43)
MWU results: MannwhitneyuResult(statistic=1251203.5, pvalue=0.01296503
140333683)
previous median: 3.0
no_previous median: 3.0
cohens d: -0.107
f: 0.471

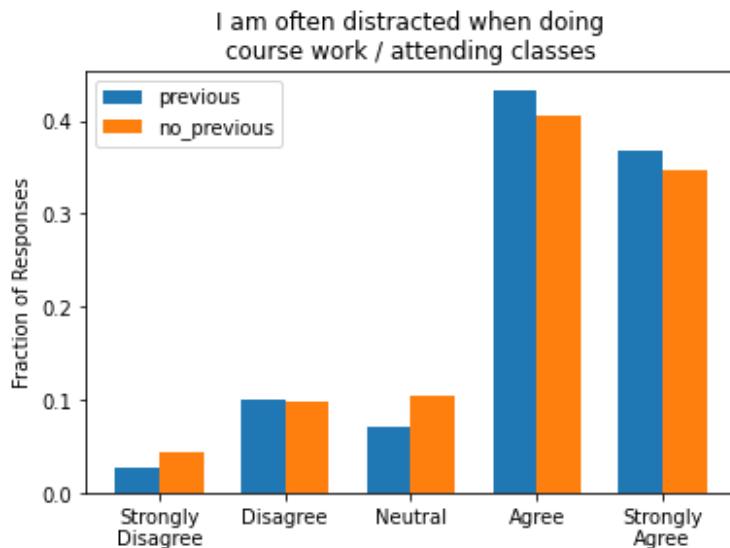
```



```

previous shape: (641, 43), no_previous shape: (4148, 43)
MWU results: MannwhitneyuResult(statistic=1274172.0, pvalue=0.07829994
33543294)
previous median: 3.0
no_previous median: 3.0
cohens d: -0.076
f: 0.479

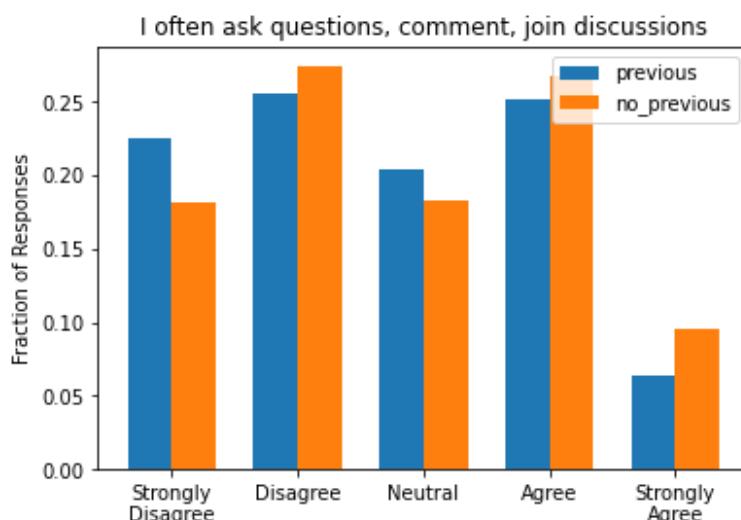
```



```

previous shape: (641, 43), no_previous shape: (4148, 43)
MWU results: MannwhitneyuResult(statistic=1390205.0, pvalue=0.04761385
223558721)
previous median: 4.0
no_previous median: 4.0
cohens d: 0.0919
f: 0.523

```



```

previous shape: (641, 43), no_previous shape: (4148, 43)
MWU results: MannwhitneyuResult(statistic=1244691.0, pvalue=0.00754061
94642052135)
previous median: 3.0
no_previous median: 3.0
cohens d: -0.116
f: 0.468

```

Out[]:

	question	previous median (n = 641)	no_previous median (n = 4148)	cohens d	f	p-value
0	remote_enjoy	2.0	3.0	-0.113	0.467	0.00478
1	remote_motivated	2.0	2.0	-0.136	0.463	0.00171
2	remote_satisfied	3.0	3.0	-0.107	0.471	0.013
3	remote_engaging	3.0	3.0	-0.076	0.479	0.0783
4	remote_distracted	4.0	4.0	0.0919	0.523	0.0476
5	remote_questions	3.0	3.0	-0.116	0.468	0.00754

```
In [ ]: def mwu_one_col(x, col, plat):
    for i in range(len(plat)-1):
        for j in range(i+1, len(plat)):
            a = x[col][(x['platforms_used'].str.contains(plat[i], case=False)) & (x['platforms_used'].str.contains(plat[j], case=False))]
            b = x[col][(x['platforms_used'].str.contains(plat[i], case=False)) & (x['platforms_used'].str.contains(plat[j], case=False)) == False]
            a.name = f'{col}, {plat[i]} and {plat[j]}'
            b.name = f'{col}, not ({plat[i]} and {plat[j]})'
            amed = "{:.3}".format(a.median())
            bmed = "{:.3}".format(b.median())
            d = "{:.3}".format(cohens_d(a,b))
            mwu = stats.mannwhitneyu(a,b, alternative='greater')
            U_a = mwu[0]
            p = "{:.3}".format(mwu[1])
            f = "{:.3}".format(eff(U_a, len(a), len(b)))
            # eta2 = "{:.3}".format(mwu[1] / (a.shape[0] + b.shape[0] - 1))

            print(f'{a.name} size: {len(a)}, {b.name} size: {len(b)}')
            print('MWU results: ', mwu)

            print(f'{a.name} median: {amed}')
            print(f'{b.name} median: {bmed}')
            print(f'cohens d: {d}')
            print(f'f: {f}')
            print(f'p: {p}')
            print('-----')

plats = [['Collaborate', 'Email', 'Moodle', 'Previous'], ['Collaborate', 'Moodle', 'Previous'], ['Zoom', 'Moodle', 'Previous'], ['Zoom', 'Collaborate', 'Email', 'Moodle'], ['Zoom', 'Teams', 'Google', 'Collaborate', 'Moodle', 'Discord']]
cols = ["remote_enjoy", "remote_motivated", "remote_satisfied", "remote_engaging", "remote_questions"]

for i in range(5):
    print('-----')
    mwu_one_col(ug, cols[i], plats[i])
```

remote_enjoy, Collaborate and Email size: 158, remote_enjoy, not (Collaborate and Email) size: 4631
MWU results: MannwhitneyuResult(statistic=324748.5, pvalue=0.993582845
6292253)
remote_enjoy, Collaborate and Email median: 2.0
remote_enjoy, not (Collaborate and Email) median: 3.0
cohens d: -0.204
f: 0.444
p: 0.994

remote_enjoy, Collaborate and Moodle size: 148, remote_enjoy, not (Collaborate and Moodle) size: 4641
MWU results: MannwhitneyuResult(statistic=338159.0, pvalue=0.629166676
4470679)
remote_enjoy, Collaborate and Moodle median: 2.0
remote_enjoy, not (Collaborate and Moodle) median: 2.0
cohens d: -0.03
f: 0.492
p: 0.629

remote_enjoy, Collaborate and Previous size: 116, remote_enjoy, not (Collaborate and Previous) size: 4673
MWU results: MannwhitneyuResult(statistic=235506.0, pvalue=0.993773388
4706257)
remote_enjoy, Collaborate and Previous median: 2.0
remote_enjoy, not (Collaborate and Previous) median: 3.0
cohens d: -0.236
f: 0.434
p: 0.994

remote_enjoy, Email and Moodle size: 266, remote_enjoy, not (Email and Moodle) size: 4523
MWU results: MannwhitneyuResult(statistic=549954.0, pvalue=0.992584651
3341159)
remote_enjoy, Email and Moodle median: 2.0
remote_enjoy, not (Email and Moodle) median: 3.0
cohens d: -0.146
f: 0.457
p: 0.993

remote_enjoy, Email and Previous size: 114, remote_enjoy, not (Email and Previous) size: 4675
MWU results: MannwhitneyuResult(statistic=246108.5, pvalue=0.925742188
7413537)
remote_enjoy, Email and Previous median: 2.0
remote_enjoy, not (Email and Previous) median: 3.0
cohens d: -0.127
f: 0.462
p: 0.926

remote_enjoy, Moodle and Previous size: 145, remote_enjoy, not (Moodle and Previous) size: 4644
MWU results: MannwhitneyuResult(statistic=300848.5, pvalue=0.988149974
3159133)
remote_enjoy, Moodle and Previous median: 2.0
remote_enjoy, not (Moodle and Previous) median: 3.0
cohens d: -0.186
f: 0.447
p: 0.988

remote_motivated, Collaborate and Moodle size: 148, remote_motivated, n

```
ot (Collaborate and Moodle) size: 4641
MWU results: MannwhitneyuResult(statistic=325477.5, pvalue=0.870525011
1197559)
remote_motivated, Collaborate and Moodle median: 2.0
remote_motivated, not (Collaborate and Moodle) median: 2.0
cohens d: -0.0862
f: 0.474
p: 0.871
-----
remote_motivated, Collaborate and Previous size: 116, remote_motivated,
not (Collaborate and Previous) size: 4673
MWU results: MannwhitneyuResult(statistic=236137.0, pvalue=0.993235721
8990938)
remote_motivated, Collaborate and Previous median: 2.0
remote_motivated, not (Collaborate and Previous) median: 2.0
cohens d: -0.235
f: 0.436
p: 0.993
-----
remote_motivated, Moodle and Previous size: 145, remote_motivated, not
(Moodle and Previous) size: 4644
MWU results: MannwhitneyuResult(statistic=311384.0, pvalue=0.945946576
0517409)
remote_motivated, Moodle and Previous median: 2.0
remote_motivated, not (Moodle and Previous) median: 2.0
cohens d: -0.149
f: 0.462
p: 0.946
-----
-----
remote_satisfied, Zoom and Moodle size: 1381, remote_satisfied, not (Zo
om and Moodle) size: 3408
MWU results: MannwhitneyuResult(statistic=2073422.5, pvalue=0.99999999
99880299)
remote_satisfied, Zoom and Moodle median: 3.0
remote_satisfied, not (Zoom and Moodle) median: 3.0
cohens d: -0.216
f: 0.441
p: 1.0
-----
remote_satisfied, Zoom and Previous size: 289, remote_satisfied, not (Z
oom and Previous) size: 4500
MWU results: MannwhitneyuResult(statistic=605799.0, pvalue=0.978244043
2020859)
remote_satisfied, Zoom and Previous median: 3.0
remote_satisfied, not (Zoom and Previous) median: 3.0
cohens d: -0.122
f: 0.466
p: 0.978
-----
remote_satisfied, Moodle and Previous size: 145, remote_satisfied, not
(Moodle and Previous) size: 4644
MWU results: MannwhitneyuResult(statistic=269705.0, pvalue=0.999988195
6483333)
remote_satisfied, Moodle and Previous median: 2.0
remote_satisfied, not (Moodle and Previous) median: 3.0
cohens d: -0.353
f: 0.401
p: 1.0
-----
-----
remote_engaging, Zoom and Collaborate size: 316, remote_engaging, not
(Zoom and Collaborate) size: 4473
```

```
MWU results: MannwhitneyuResult(statistic=735876.0, pvalue=0.101438332
86062048)
remote_engaging, Zoom and Collaborate median: 3.0
remote_engaging, not (Zoom and Collaborate) median: 3.0
cohens d: 0.0725
f: 0.521
p: 0.101
-----
remote_engaging, Zoom and Email size: 603, remote_engaging, not (Zoom a
nd Email) size: 4186
MWU results: MannwhitneyuResult(statistic=1186159.5, pvalue=0.99347722
56606589)
remote_engaging, Zoom and Email median: 3.0
remote_engaging, not (Zoom and Email) median: 3.0
cohens d: -0.105
f: 0.47
p: 0.993
-----
remote_engaging, Zoom and Moodle size: 1381, remote_engaging, not (Zoom
and Moodle) size: 3408
MWU results: MannwhitneyuResult(statistic=2226703.5, pvalue=0.99877634
92106813)
remote_engaging, Zoom and Moodle median: 3.0
remote_engaging, not (Zoom and Moodle) median: 3.0
cohens d: -0.0996
f: 0.473
p: 0.999
-----
remote_engaging, Collaborate and Email size: 158, remote_engaging, not
(Collaborate and Email) size: 4631
MWU results: MannwhitneyuResult(statistic=364747.0, pvalue=0.526692775
0554287)
remote_engaging, Collaborate and Email median: 3.0
remote_engaging, not (Collaborate and Email) median: 3.0
cohens d: -0.021
f: 0.498
p: 0.527
-----
remote_engaging, Collaborate and Moodle size: 148, remote_engaging, not
(Collaborate and Moodle) size: 4641
MWU results: MannwhitneyuResult(statistic=362028.0, pvalue=0.121904175
38357068)
remote_engaging, Collaborate and Moodle median: 3.0
remote_engaging, not (Collaborate and Moodle) median: 3.0
cohens d: 0.0917
f: 0.527
p: 0.122
-----
remote_engaging, Email and Moodle size: 266, remote_engaging, not (Email
and Moodle) size: 4523
MWU results: MannwhitneyuResult(statistic=539286.0, pvalue=0.998408423
7991014)
remote_engaging, Email and Moodle median: 3.0
remote_engaging, not (Email and Moodle) median: 3.0
cohens d: -0.187
f: 0.448
p: 0.998
-----
-----
remote_questions, Zoom and Teams size: 497, remote_questions, not (Zoom
and Teams) size: 4292
MWU results: MannwhitneyuResult(statistic=1112402.0, pvalue=0.05330086
1107193696)
```

```
remote_questions, Zoom and Teams median: 3.0
remote_questions, not (Zoom and Teams) median: 3.0
cohens d: 0.0793
f: 0.521
p: 0.0533
-----
remote_questions, Zoom and Google size: 143, remote_questions, not (Zoom and Google) size: 4646
MWU results: MannwhitneyuResult(statistic=387286.5, pvalue=0.0002550834080350806)
remote_questions, Zoom and Google median: 3.0
remote_questions, not (Zoom and Google) median: 3.0
cohens d: 0.293
f: 0.583
p: 0.000255
-----
remote_questions, Zoom and Collaborate size: 316, remote_questions, not (Zoom and Collaborate) size: 4473
MWU results: MannwhitneyuResult(statistic=728624.5, pvalue=0.17191252789149009)
remote_questions, Zoom and Collaborate median: 3.0
remote_questions, not (Zoom and Collaborate) median: 3.0
cohens d: 0.0529
f: 0.515
p: 0.172
-----
remote_questions, Zoom and Moodle size: 1381, remote_questions, not (Zoom and Moodle) size: 3408
MWU results: MannwhitneyuResult(statistic=2122989.5, pvalue=0.9999999757024505)
remote_questions, Zoom and Moodle median: 2.0
remote_questions, not (Zoom and Moodle) median: 3.0
cohens d: -0.171
f: 0.451
p: 1.0
-----
remote_questions, Zoom and Discord size: 46, remote_questions, not (Zoom and Discord) size: 4743
MWU results: MannwhitneyuResult(statistic=125976.5, pvalue=0.03152959121785689)
remote_questions, Zoom and Discord median: 3.5
remote_questions, not (Zoom and Discord) median: 3.0
cohens d: 0.279
f: 0.577
p: 0.0315
-----
remote_questions, Teams and Google size: 25, remote_questions, not (Teams and Google) size: 4764
MWU results: MannwhitneyuResult(statistic=71966.0, pvalue=0.032182516917785606)
remote_questions, Teams and Google median: 3.0
remote_questions, not (Teams and Google) median: 3.0
cohens d: 0.379
f: 0.604
p: 0.0322
-----
remote_questions, Teams and Collaborate size: 116, remote_questions, not (Teams and Collaborate) size: 4673
MWU results: MannwhitneyuResult(statistic=287602.5, pvalue=0.12364194868684247)
remote_questions, Teams and Collaborate median: 3.0
remote_questions, not (Teams and Collaborate) median: 3.0
cohens d: 0.105
```

```
f: 0.531
p: 0.124
-----
remote_questions, Teams and Moodle size: 256, remote_questions, not (Teams and Moodle) size: 4533
MWU results: MannwhitneyuResult(statistic=570474.5, pvalue=0.679156366
0614409)
remote_questions, Teams and Moodle median: 3.0
remote_questions, not (Teams and Moodle) median: 3.0
cohens d: -0.0264
f: 0.492
p: 0.679
-----
remote_questions, Teams and Discord size: 8, remote_questions, not (Teams and Discord) size: 4781
MWU results: MannwhitneyuResult(statistic=20536.0, pvalue=0.3552926237
9423243)
remote_questions, Teams and Discord median: 3.0
remote_questions, not (Teams and Discord) median: 3.0
cohens d: 0.157
f: 0.537
p: 0.355
-----
remote_questions, Google and Collaborate size: 32, remote_questions, not (Google and Collaborate) size: 4757
MWU results: MannwhitneyuResult(statistic=84300.5, pvalue=0.1402969743
4785288)
remote_questions, Google and Collaborate median: 4.0
remote_questions, not (Google and Collaborate) median: 3.0
cohens d: 0.183
f: 0.554
p: 0.14
-----
remote_questions, Google and Moodle size: 44, remote_questions, not (Google and Moodle) size: 4745
MWU results: MannwhitneyuResult(statistic=121258.0, pvalue=0.028851028
218583517)
remote_questions, Google and Moodle median: 4.0
remote_questions, not (Google and Moodle) median: 3.0
cohens d: 0.285
f: 0.581
p: 0.0289
-----
remote_questions, Google and Discord size: 5, remote_questions, not (Google and Discord) size: 4784
MWU results: MannwhitneyuResult(statistic=14252.5, pvalue=0.2230516716
976108)
remote_questions, Google and Discord median: 3.0
remote_questions, not (Google and Discord) median: 3.0
cohens d: 0.315
f: 0.596
p: 0.223
-----
remote_questions, Collaborate and Moodle size: 148, remote_questions, not (Collaborate and Moodle) size: 4641
MWU results: MannwhitneyuResult(statistic=356199.5, pvalue=0.214213006
1008709)
remote_questions, Collaborate and Moodle median: 3.0
remote_questions, not (Collaborate and Moodle) median: 3.0
cohens d: 0.0628
f: 0.519
p: 0.214
-----
```

```

remote_questions, Collaborate and Discord size: 16, remote_questions, not (Collaborate and Discord) size: 4773
MWU results: MannwhitneyuResult(statistic=46714.0, pvalue=0.0562685316
49039694)
remote_questions, Collaborate and Discord median: 4.0
remote_questions, not (Collaborate and Discord) median: 3.0
cohens d: 0.404
f: 0.612
p: 0.0563
-----
remote_questions, Moodle and Discord size: 20, remote_questions, not (Moodle and Discord) size: 4769
MWU results: MannwhitneyuResult(statistic=49813.5, pvalue=0.3618838168
857903)
remote_questions, Moodle and Discord median: 3.0
remote_questions, not (Moodle and Discord) median: 3.0
cohens d: 0.0782
f: 0.522
p: 0.362
-----

```

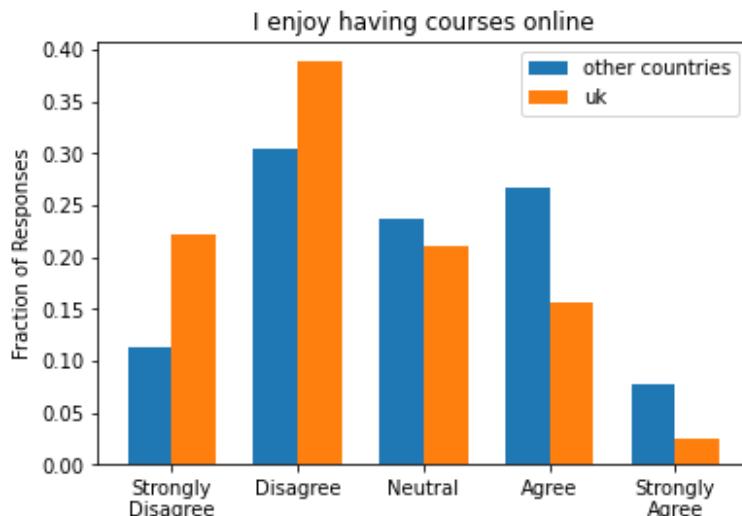
UK vs. others

In []: ug['country'].unique()

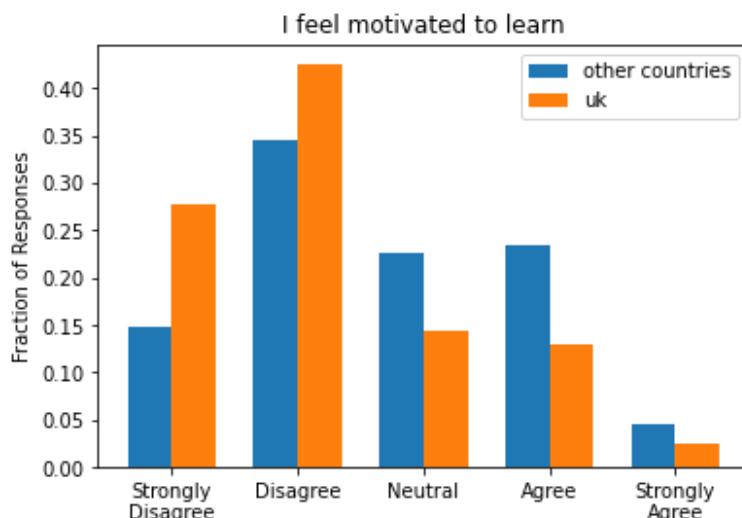
Out[]: array(['United Kingdom', 'Czech Republic', 'United States', 'Netherlands',
 'Spain', 'Germany', 'Canada', 'Denmark', 'Greece', 'Ireland',
 'South Africa', 'Belgium', 'India', 'Poland', 'Argentina',
 'Portugal', 'Norway', 'Italy', 'Malaysia', 'Slovenia', 'Singapore',
 'Sri Lanka', 'New Zealand', 'Turkey', 'Mexico', 'Lithuania',
 'Chile', 'Georgia', 'Finland', 'Sweden', 'France', 'Hungary',
 'Malta', 'Austria', 'Saudi Arabia', 'Serbia', 'Romania',
 'Pakistan', 'Croatia', 'Switzerland', 'Belarus', 'Uruguay',
 'Latvia', 'United Arab Emirates', 'Slovakia', 'China', 'Morocco',
 'Brazil', 'Egypt', 'Russia', 'Colombia', 'Maldives', 'El Salvador',
 'Mauritius', 'Iceland', 'Namibia', 'Australia', 'Ukraine',
 'Lebanon', 'Korea, South', 'Cyprus', 'Philippines', 'Peru',
 'Israel', 'Dominican Republic', 'Estonia', 'Paraguay',
 'Bosnia and Herzegovina', 'Azerbaijan', 'Algeria', 'Venezuela',
 'Kenya', 'Bangladesh', 'Jordan', 'Qatar', 'Oman', 'Kazakhstan',
 'Iraq', 'Japan', 'Honduras', 'Trinidad and Tobago', 'Bulgaria',
 'Ecuador', 'Vietnam', 'Rwanda', 'Indonesia', 'Taiwan', 'Cambodia',
 'Guatemala', 'Tunisia', 'Iran', 'Sudan', 'Nepal', 'Vatican City',
 'Kosovo'], dtype=object)

```
In [ ]: uk = ug[ug['country'] == 'United Kingdom']
non_uk = ug[ug['country'] != 'United Kingdom']
uk.name = 'uk'
non_uk.name = 'other countries'
subset_ls.append(uk)
subset_ls.append(non_uk)
subset_name.append(uk.name)
subset_name.append(non_uk.name)

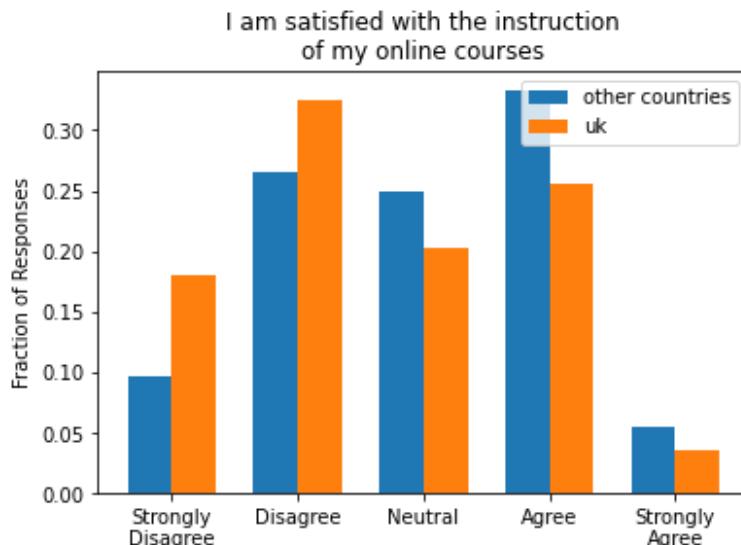
mwu_comparison(non_uk, uk)
```



other countries shape: (2711, 43), uk shape: (2078, 43)
 MWU results: MannwhitneyuResult(statistic=3527919.0, pvalue=2.64394156
 $49867025e-54$)
 other countries median: 3.0
 uk median: 2.0
 cohens d: 0.469
 f: 0.626



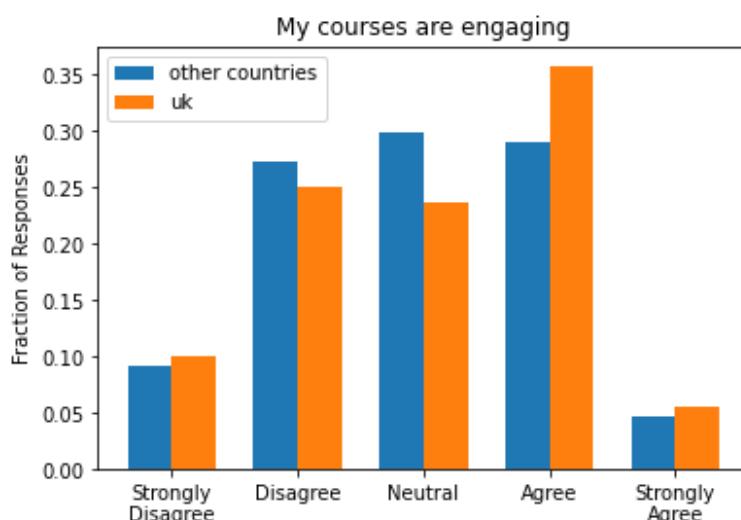
other countries shape: (2711, 43), uk shape: (2078, 43)
 MWU results: MannwhitneyuResult(statistic=3511736.0, pvalue=1.49377755
 $43613288e-52$)
 other countries median: 3.0
 uk median: 2.0
 cohens d: 0.443
 f: 0.623



```

other countries shape: (2711, 43), uk shape: (2078, 43)
MWU results: MannwhitneyuResult(statistic=3287663.5, pvalue=9.03487620
704005e-25)
other countries median: 3.0
uk median: 2.0
cohens d: 0.305
f: 0.584

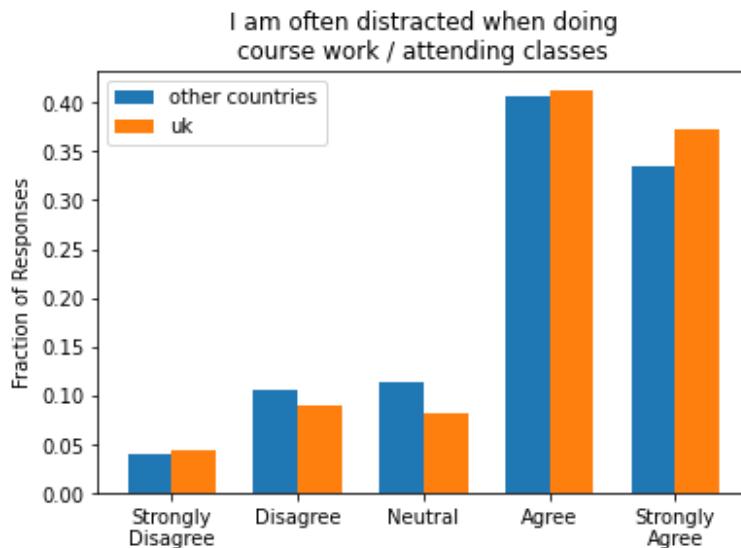
```



```

other countries shape: (2711, 43), uk shape: (2078, 43)
MWU results: MannwhitneyuResult(statistic=2665883.5, pvalue=0.00096097
65756780185)
other countries median: 3.0
uk median: 3.0
cohens d: -0.0858
f: 0.473

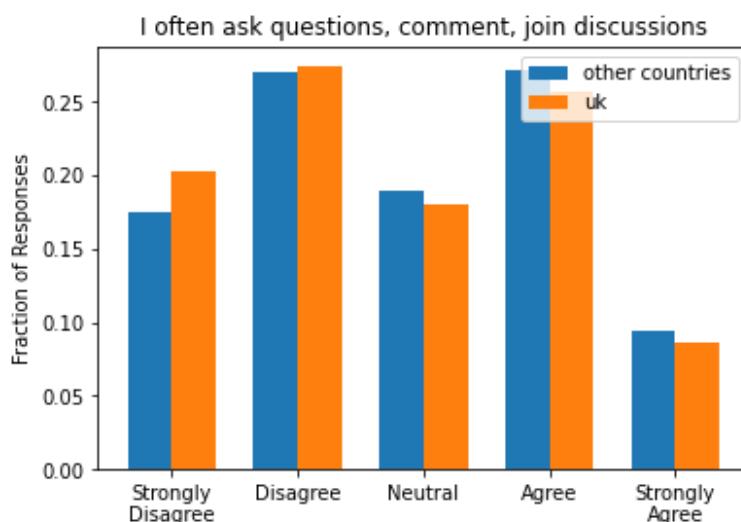
```



```

other countries shape: (2711, 43), uk shape: (2078, 43)
MWU results: MannwhitneyuResult(statistic=2668249.0, pvalue=0.00088459
23976776841)
other countries median: 4.0
uk median: 4.0
cohens d: -0.0811
f: 0.474

```



```

other countries shape: (2711, 43), uk shape: (2078, 43)
MWU results: MannwhitneyuResult(statistic=2932068.0, pvalue=0.01247465
152450563)
other countries median: 3.0
uk median: 3.0
cohens d: 0.0723
f: 0.52

```

Out[]:

	question	other countries median (n = 2711)	uk median (n = 2078)	cohens d	f	p-value
0	remote_enjoy	3.0	2.0	0.469	0.626	2.64e-54
1	remote_motivated	3.0	2.0	0.443	0.623	1.49e-52
2	remote_satisfied	3.0	2.0	0.305	0.584	9.03e-25
3	remote_engaging	3.0	3.0	-0.0858	0.473	0.000961
4	remote_distracted	4.0	4.0	-0.0811	0.474	0.000885
5	remote_questions	3.0	3.0	0.0723	0.52	0.0125

In []: