In [23]:

```
import pandas as pd
import numpy as np
import seaborn as sns
import missingno as msno
```

In [24]:

```
df=pd.read_csv("UpdatedStudentsPerformance.csv")
```

In [25]:

```
df
```

Out[25]:

	gender	race/ethnicity	parental level of education	lunch	test preparation course	math score	reading score	writing score
0	female	group B	bachelor's degree	standard	none	72.0	72.0	74.0
1	female	group C	some college	standard	completed	69.0	90.0	88.0
2	female	group B	master's degree	standard	none	90.0	95.0	93.0
3	male	group A	associate's degree	free/reduced	none	47.0	57.0	44.0
4	male	group C	some college	standard	none	76.0	78.0	75.0
...	...	...	...	...	...	...	...	...
995	female	group E	master's degree	standard	completed	88.0	99.0	95.0
996	male	group C	high school	free/reduced	none	62.0	55.0	55.0
997	female	group C	high school	free/reduced	completed	59.0	71.0	65.0
998	female	group D	some college	standard	completed	68.0	78.0	77.0
999	female	group D	some college	free/reduced	none	77.0	86.0	86.0

1000 rows × 8 columns

In [26]:

```
#performing all basic operations
#shape,size,min ,max,describe,std,quantile,dtypes etc
df.shape
```

Out[26]:

```
(1000, 8)
```

In [27]:

```
df.size  #rows*col=size
```

Out[27]:

```
8000
```

In [28]:
```
df.describe()
```

Out[28]:

	math score	reading score	writing score
count	990.000000	985.000000	989.000000
mean	66.208081	69.261929	68.142568
std	15.103724	14.634171	15.199780
min	0.000000	17.000000	10.000000
25%	57.000000	59.000000	58.000000
50%	66.000000	70.000000	69.000000
75%	77.000000	80.000000	79.000000
max	100.000000	100.000000	100.000000

In [29]:
```
df.min()
```

Out[29]:
```
gender                                           f
race/ethnicity                             group A
parental level of education    associate's degree
lunch                                 free/reduced
test preparation course                  completed
math score                                     0.0
reading score                                 17.0
writing score                                 10.0
dtype: object
```

In [30]:
```
df.max()
```

Out[30]:
```
gender                                     male
race/ethnicity                          group E
parental level of education    some high school
lunch                                  standard
test preparation course                    none
math score                                100.0
reading score                             100.0
writing score                             100.0
dtype: object
```

In [31]:
```
df.std()
```

```
/tmp/ipykernel_12977/3390915376.py:1: FutureWarning: The default value
of numeric_only in DataFrame.std is deprecated. In a future version, i
t will default to False. In addition, specifying 'numeric_only=None' i
s deprecated. Select only valid columns or specify the value of numeri
c_only to silence this warning.
  df.std()
```

Out[31]:
```
math score       15.103724
reading score    14.634171
writing score    15.199780
dtype: float64
```

In [32]:

```
df.dtypes
```

Out[32]:

```
gender                         object
race/ethnicity                 object
parental level of education    object
lunch                          object
test preparation course        object
math score                    float64
reading score                 float64
writing score                 float64
dtype: object
```

In [33]:

```
#checking for missing data
df.isna().sum()
```

Out[33]:

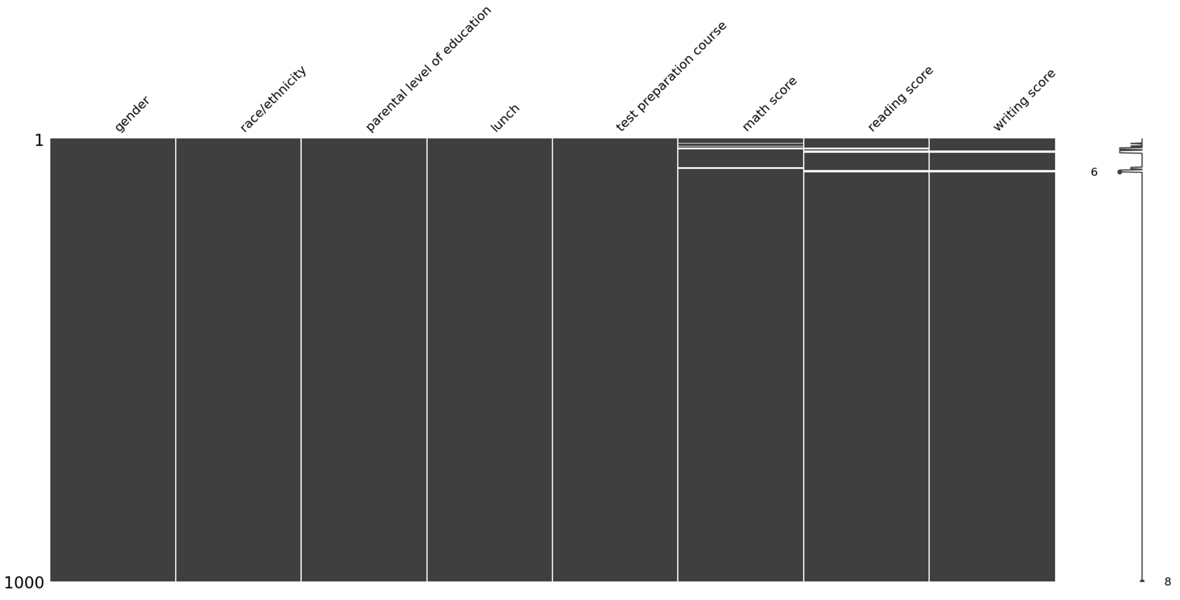
```
gender                          0
race/ethnicity                  0
parental level of education     0
lunch                           0
test preparation course         0
math score                     10
reading score                  15
writing score                  11
dtype: int64
```

In [34]:

```
msno.matrix(df)
```

Out[34]:

```
<AxesSubplot: >
```



In [13]:
```
#filling the missing data
df=df.fillna(df.mean())
```

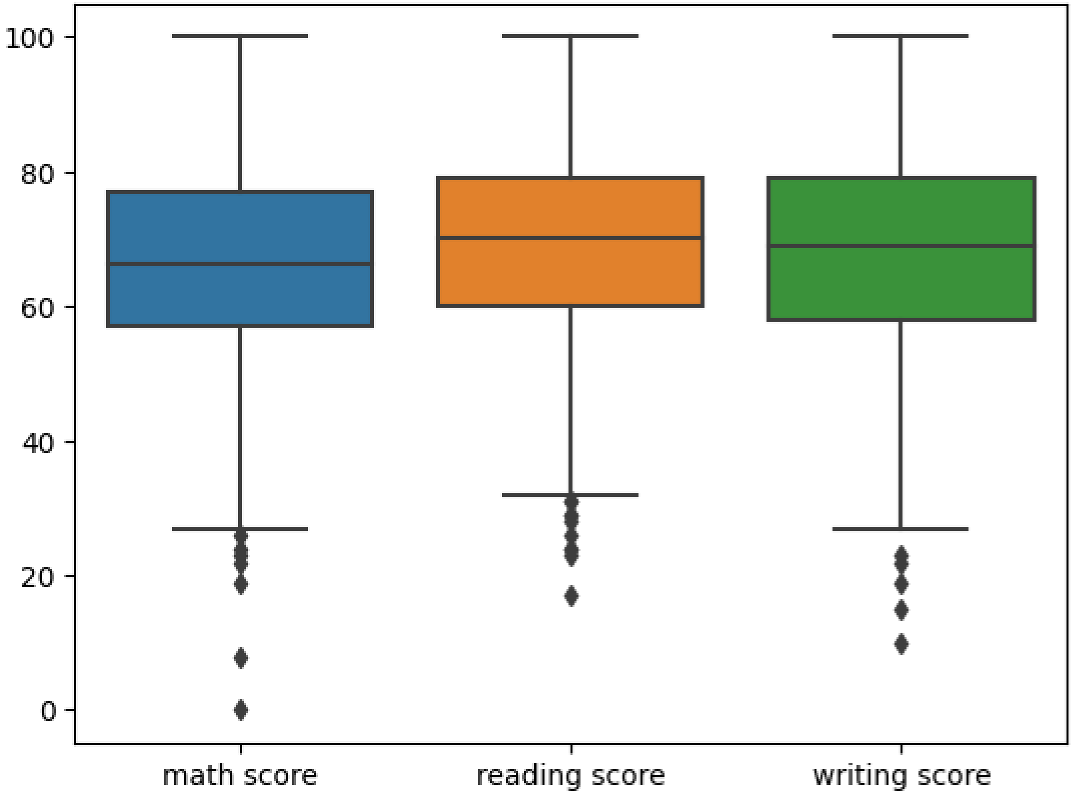
```
/tmp/ipykernel_12977/959476727.py:2: FutureWarning: The default value
of numeric_only in DataFrame.mean is deprecated. In a future version,
it will default to False. In addition, specifying 'numeric_only=None'
is deprecated. Select only valid columns or specify the value of numer
ic_only to silence this warning.
  df=df.fillna(df.mean())
```

In [14]:
```
df.isna().sum()
```

Out[14]:
```
gender                         0
race/ethnicity                 0
parental level of education    0
lunch                          0
test preparation course        0
math score                     0
reading score                  0
writing score                  0
dtype: int64
```

In [16]:
```
sns.boxplot(df)
```

Out[16]:
```
<AxesSubplot: >
```



In [35]:
```
dfnew=pd.concat([df['math score'],df['reading score'],df['writing score
```

In [36]:
```
dfnew
```

Out[36]:

	math score	reading score	writing score
0	72.0	72.0	74.0
1	69.0	90.0	88.0
2	90.0	95.0	93.0
3	47.0	57.0	44.0
4	76.0	78.0	75.0
...	...	...	...
995	88.0	99.0	95.0
996	62.0	55.0	55.0
997	59.0	71.0	65.0
998	68.0	78.0	77.0
999	77.0	86.0	86.0

1000 rows × 3 columns

In [37]:
```
#method used to remove outliers
#IQR , Zscore etc
#We are using IQR Inter Quantile Range
Q1=dfnew.quantile(0.25) #25 percent of value
Q3=dfnew.quantile(0.75) #75 percent of value
IQR=Q3-Q1
print(IQR)
```

```
math score       20.0
reading score    21.0
writing score    21.0
dtype: float64
```

In [38]:
```
low=Q1-1.5*IQR
high=Q3+1.5*IQR
print(low,high)
```

```
math score       27.0
reading score    27.5
writing score    26.5
dtype: float64 math score       107.0
reading score    111.5
writing score    110.5
dtype: float64
```

In [39]:

```
newdf=dfnew[~((dfnew<low)|(dfnew>high)).any(axis=1)]
newdf
```

Out[39]:

	math score	reading score	writing score
0	72.0	72.0	74.0
1	69.0	90.0	88.0
2	90.0	95.0	93.0
3	47.0	57.0	44.0
4	76.0	78.0	75.0
...	...	...	...
995	88.0	99.0	95.0
996	62.0	55.0	55.0
997	59.0	71.0	65.0
998	68.0	78.0	77.0
999	77.0	86.0	86.0

990 rows × 3 columns

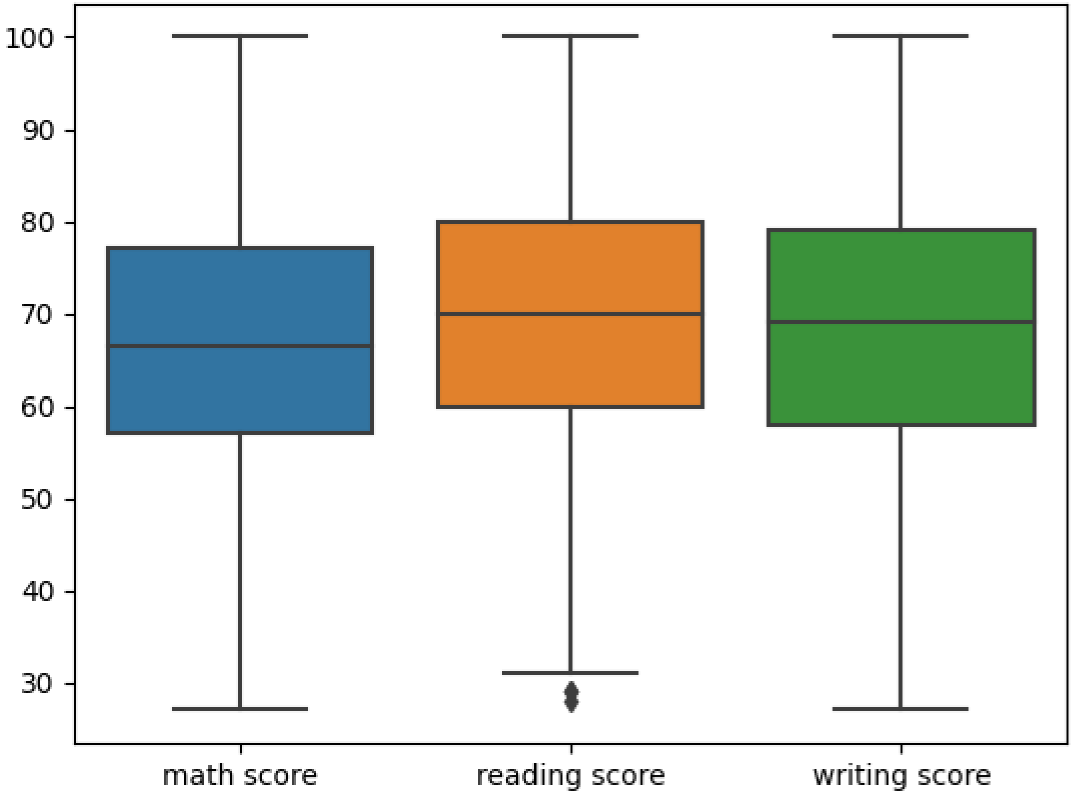
In [40]:

```
print(dfnew.shape)
print(newdf.shape)
```

```
(1000, 3)
(990, 3)
```

```
In [41]: #again checking for outiers
         sns.boxplot(newdf)
```

```
Out[41]: <AxesSubplot: >
```



```
In [43]: #Normalize it using min max scaler
         from sklearn.preprocessing import MinMaxScaler
         scaler =MinMaxScaler()
         newdf=scaler.fit_transform(newdf)
```

```
In [44]: newdf
```

```
Out[44]: array([[0.61643836, 0.61111111, 0.64383562],
                [0.57534247, 0.86111111, 0.83561644],
                [0.8630137 , 0.93055556, 0.90410959],
                ...,
                [0.43835616, 0.59722222, 0.52054795],
                [0.56164384, 0.69444444, 0.68493151],
                [0.68493151, 0.80555556, 0.80821918]])
```

```
In [45]: newdf=pd.DataFrame(newdf,columns=['math','reading','writing'])
```

In [46]:
```
newdf
```

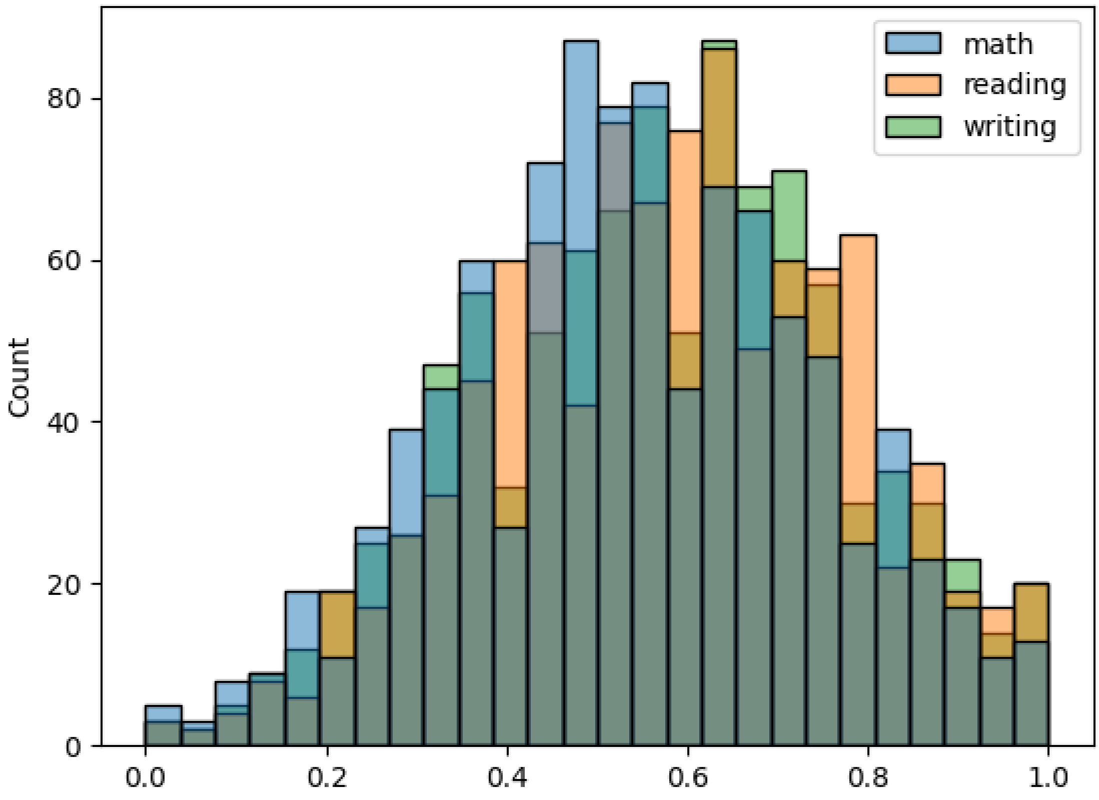
Out[46]:

	math	reading	writing
0	0.616438	0.611111	0.643836
1	0.575342	0.861111	0.835616
2	0.863014	0.930556	0.904110
3	0.273973	0.402778	0.232877
4	0.671233	0.694444	0.657534
...	...	...	...
985	0.835616	0.986111	0.931507
986	0.479452	0.375000	0.383562
987	0.438356	0.597222	0.520548
988	0.561644	0.694444	0.684932
989	0.684932	0.805556	0.808219

990 rows × 3 columns

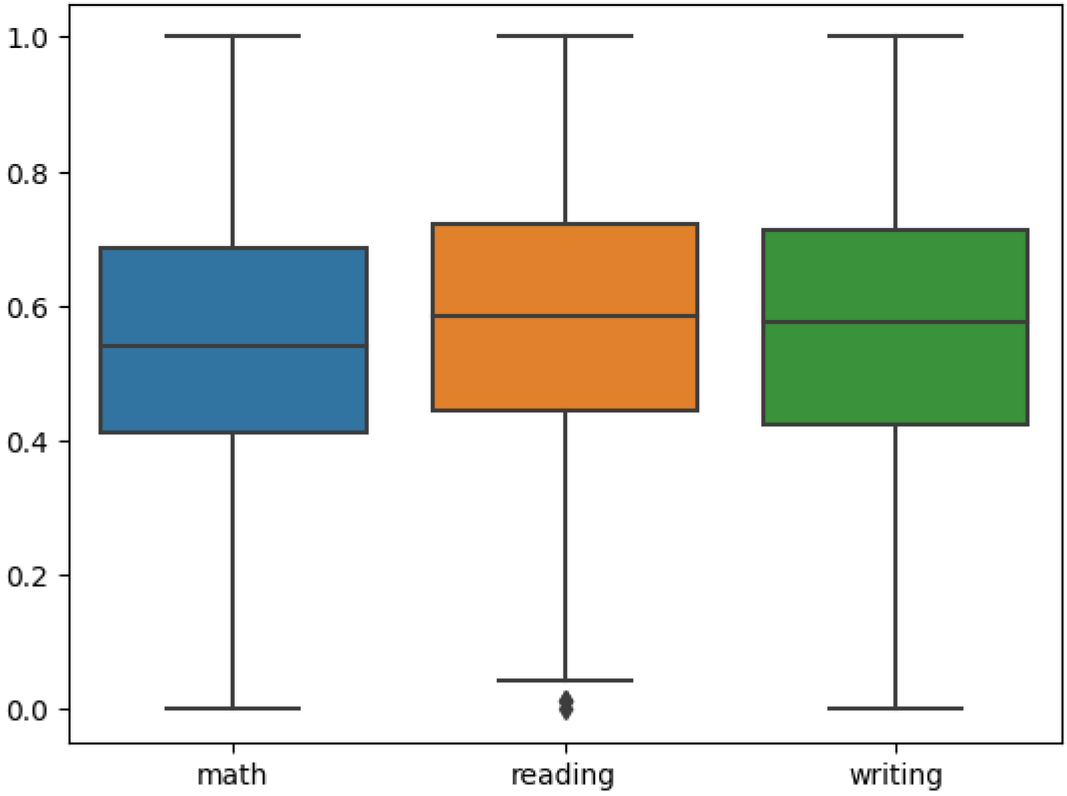
In [47]:
```
sns.histplot(newdf)
```

Out[47]:
```
<AxesSubplot: ylabel='Count'>
```



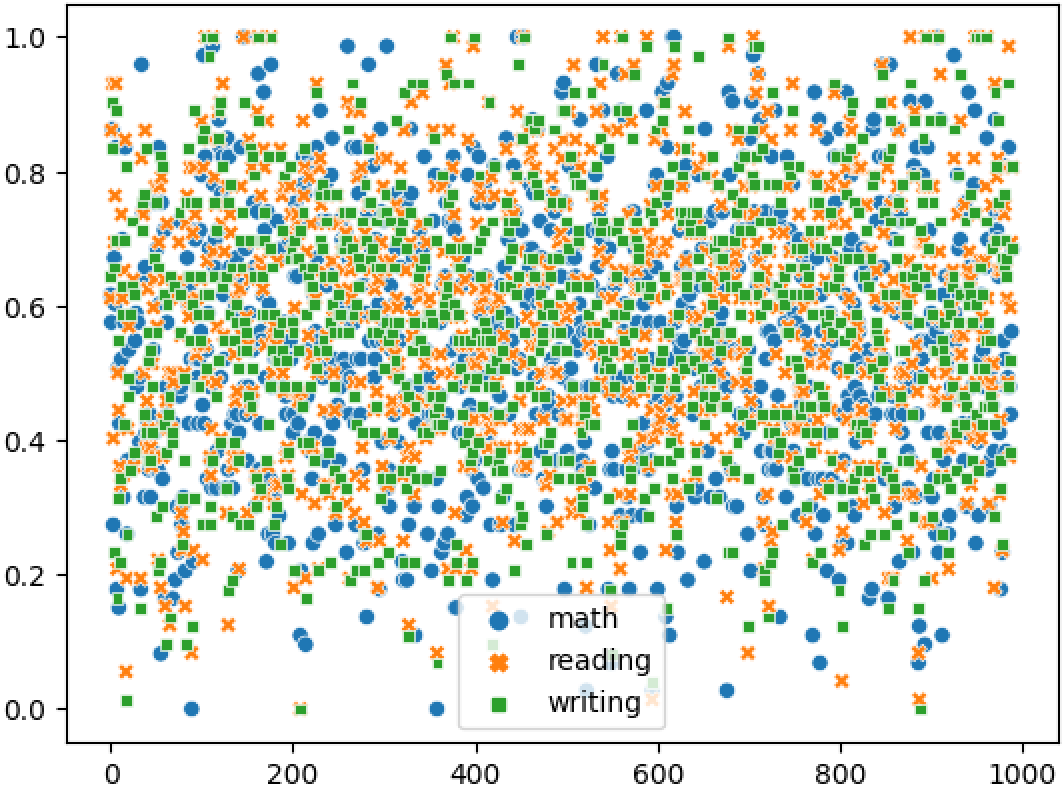
```
In [49]: sns.boxplot(newdf)
```

```
Out[49]: <AxesSubplot: >
```



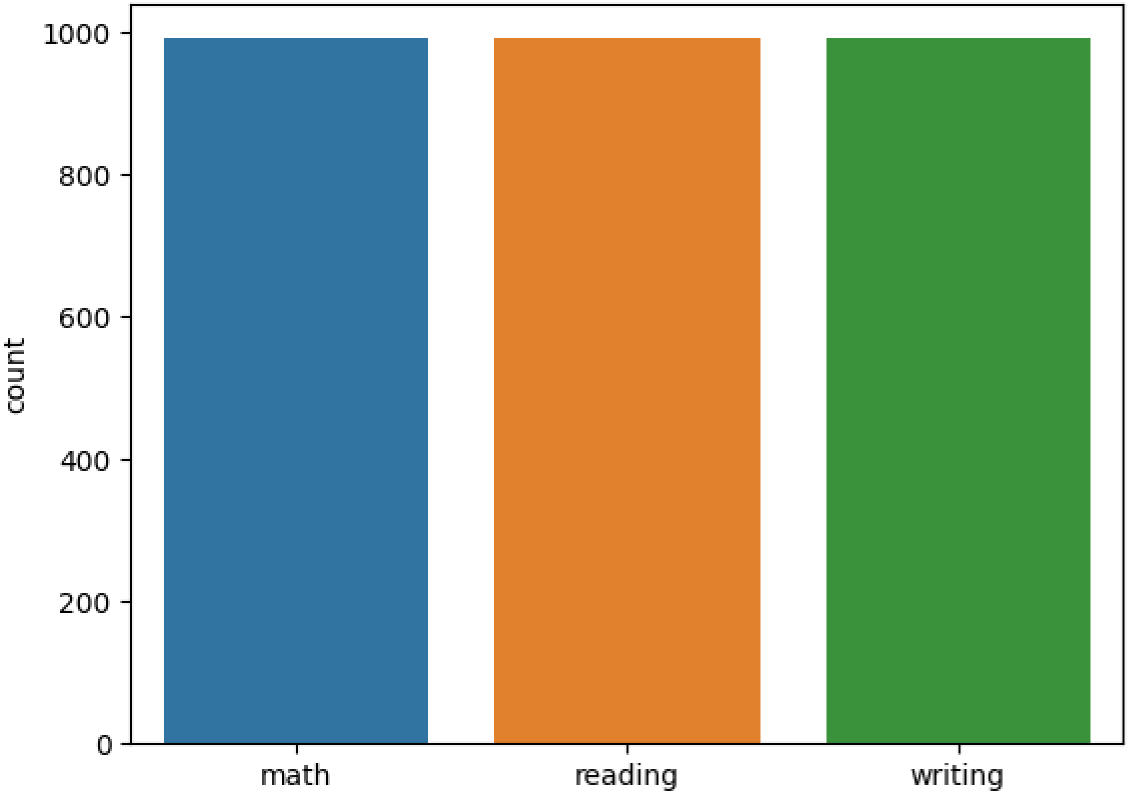
```
In [50]: sns.scatterplot(newdf)
```

```
Out[50]: <AxesSubplot: >
```



```
In [51]: sns.countplot(newdf)
```

```
Out[51]: <AxesSubplot: ylabel='count'>
```



```
In [ ]:
```

```
In [ ]:
```