

id	value
AG.AGR.TRAC.NO	Agricultural machinery, tractors
AG.CON.FERT.PT.ZS	Fertilizer consumption (% of ferti
AG.CON.FERT.ZS	Fertilizer consumption (kilograms
AG.LND.AGRI.K2	Agricultural land (sq. km)
AG.LND.AGRI.ZS	Agricultural land (% of land area)
AG.LND.ARBL.HA	Arable land (hectares)
AG.LND.ARBL.HA.PC	Arable land (hectares per person)
AG.LND.ARBL.ZS	Arable land (% of land area)
AG.LND.CREL.HA	Land under cereal production (hect
AG.LND.CROP.ZS	Permanent cropland (% of land area
AG.LND.EL5M.RU.K2	Rural land area where elevation is
AG.LND.EL5M.RU.ZS	Rural land area where elevation is
AG.LND.EL5M.UR.K2	Urban land area where elevation is
AG.LND.EL5M.UR.ZS	Urban land area where elevation is
AG.LND.EL5M.ZS	Land area where elevation is below
AG.LND.FRST.K2	Forest area (sq. km)
AG.LND.FRST.ZS	Forest area (% of land area)
AG.LND.IRIG.AG.ZS	Agricultural irrigated land (% of
AG.LND.PRCP.MM	Average precipitation in depth (mm
AG.LND.TOTL.K2	Land area (sq. km)

```
HCI_data = pd.read_csv('HCI.csv')
print(list(HCI_data.columns))
HCI_data
```

['Country Name', 'WB Code', 'Region', 'Income Group', 'Probability of Survival to Age 5', 'Expected Years of School', 'Harmonized Test Scores', 'Learn

Country Name	object	WB Code	object	Region	object	Income Group	object	Probability of Surv...	float	Expected Years of ...	float	Har
Afghanistan	0.6%	AFG	0.6%	Europe & Central A...	27.6%	High income	32.8%	0.88 - 1.0		4.2 - 13.9		305
Albania	0.6%	ALB	0.6%	Sub-Saharan Africa	24.1%	Upper middle in...	27%					
172 others	98.9%	172 others	98.9%	5 others	48.3%	2 others	40.2%					

0	Afghanistan	AFG	South Asia	Low income	0.94					8.9		355
1	Albania	ALB	Europe & Central Asia	Upper middle income	0.99					12.9		434
2	Algeria	DZA	Middle East & North Africa	Lower middle income	0.98					11.8		374
3	Angola	AGO	Sub-Saharan Africa	Lower middle income	0.92					8.1		326
4	Antigua and Barbuda	ATG	Latin America & Caribbean	High income	0.99					13		407

Expand rows 5 - 168

169	Vietnam	VNM	East Asia & Pacific	Lower middle income	0.98					12.9		519
170	West Bank and Gaza	PSE	Middle East & North Africa	Lower middle income	0.98					12.2		412
171	Yemen, Rep.	YEM	Middle East & North Africa	Low income	0.95					8.1		321
172	Zambia	ZMB	Sub-Saharan Africa	Lower middle income	0.94					8.8		358
173	Zimbabwe	ZWE	Sub-Saharan Africa	Lower middle income	0.95					11.1		396

174 rows x 13 columns

```
def linreg(table,x,y):
    res=linregress(table.dropna()[x], table.dropna()[y])
    print('Correlation:', res.rvalue), print('P-Value:', res.pvalue)
```

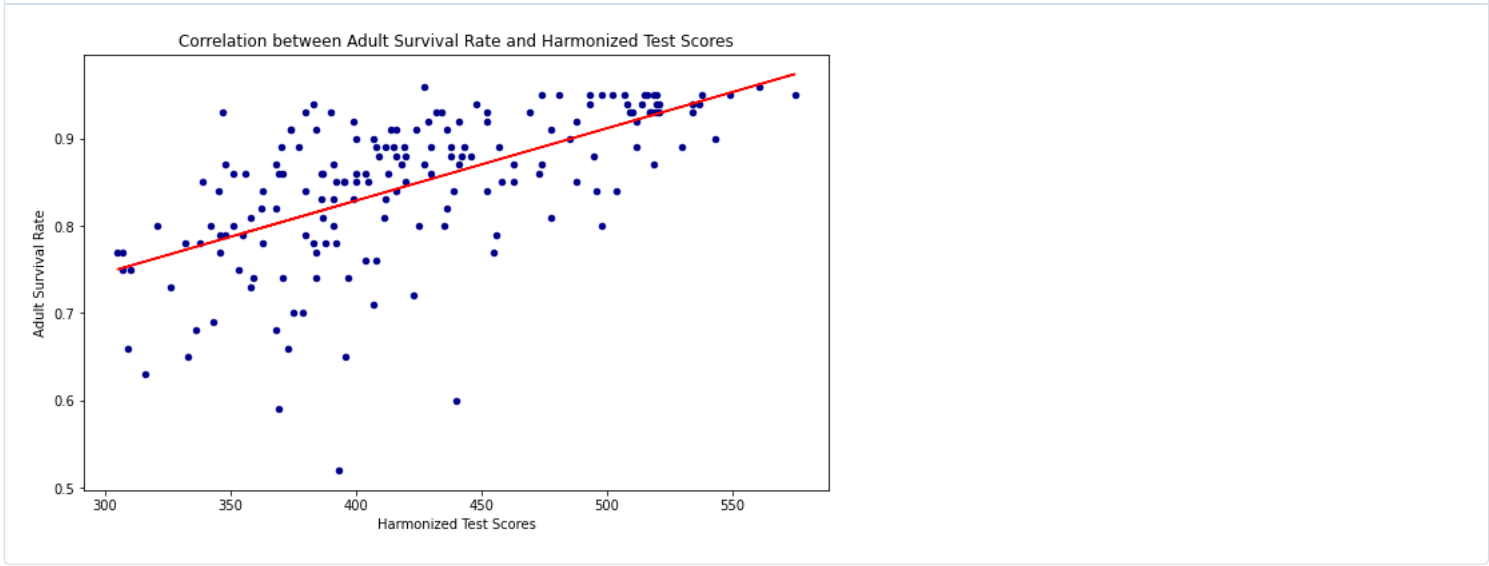
```
plt.xlabel(x)
plt.ylabel(y)
plt.plot(table[x], res.intercept + res.slope*table[x], 'r', label='fitted line')

HCI_data.plot(kind='scatter', x='Harmonized Test Scores', y='Adult Survival Rate', figsize=(10, 6), color='darkblue')

plt.title('Correlation between Adult Survival Rate and Harmonized Test Scores')
plt.xlabel('Harmonized Test Scores')
plt.ylabel('Adult Survival Rate')

linreg(HCI_data, 'Harmonized Test Scores', 'Adult Survival Rate')
plt.show()
```

Correlation: 0.6153470804816563
P-Value: 1.648997379615839e-19





```
edu_spending = wb.data.DataFrame('NY.ADJ.AEDU.GN.ZS')
percent_gni_spending=edu_spending['YR2010']
#HCI_data.merge('region', 'NY.ADJ.AEDU.GN.ZS')
country_code=HCI_data['WB Code'].fillna(0)

percent_gni_spending = percent_gni_spending[:len(country_code)]

HCI_data.insert(3, 'GNI Spending on Education', list(percent_gni_spending))
HCI_data
```

	Country Name	object	WB Code	object	Region	object	GNI Spending on Ed...	float	Income Group	object	Probability of Surv...	float	Exp...
	Afghanistan	0.6%	AFG	0.6%	Europe & Central A...	27.6%	0.53888079544	- 23.62883	High income	32.8%	0.88 - 1.0		4.2
	Albania	0.6%	ALB	0.6%	Sub-Saharan Africa	24.1%			Upper middle in...	27%			
	172 others	98.9%	172 others	98.9%	5 others	48.3%			2 others	40.2%			
0	Afghanistan		AFG		South Asia		6.58		Low income		0.94		8.9
1	Albania		ALB		Europe & Central Asia		4.51243103403928		Upper middle income		0.99		12.0
2	Algeria		DZA		Middle East & North Africa		2.84483636363068		Lower middle income		0.98		11.0
3	Angola		AGO		Sub-Saharan Africa		1.87551846409296		Lower middle income		0.92		8.1
4	Antigua and Barbuda		ATG		Latin America & Caribbean		3.57		High income		0.99		13
Expand rows 5 - 168													
169	Vietnam		VNM		East Asia & Pacific		4.99016196968434		Lower middle income		0.98		12.0
170	West Bank and Gaza		PSE		Middle East & North Africa		4.85493423281321		Lower middle income		0.98		12.0
171	Yemen, Rep.		YEM		Middle East & North Africa		8.34		Low income		0.95		8.1

Country Name object		WB Code object	Region object	GNI Spending on Ed... floa...	Income Group object	Probability of Surv... flo...	Exp...
Afghanistan 0.6%		AFG 0.6%	Europe & Central A... 27.6%	0.53888079544 - 23.62883	High income 32.8%	0.88 - 1.0	4.2
Albania 0.6%		ALB 0.6%	Sub-Saharan Africa 24.1%		Upper middle in... 27%		
172 others 98.9%		172 others 98.9%	5 others 48.3%		2 others 40.2%		
172	Zambia	ZMB	Sub-Saharan Africa	0.53888079544	Lower middle income	0.94	8.8
173	Zimbabwe	ZWE	Sub-Saharan Africa	3.4	Lower middle income	0.95	11.
174 rows x 14 columns							

wb.economy.DataFrame()

name object		aggregate object	longitude float64	latitude float64	region object	adminregion object	lendingType object	incomeLe...
Aruba 0.4%		False 81.6%	-175.216 - 179.089567	-41.2865 - 64.1836	ECS 21.8%	48.5%	LNK 27.4%	HIC
Africa Eastern and... 0.4%		True 18.4%			18.4%	SSA 17.7%	IBD 26.3%	LMC
264 others 99.2%					6 others 59.8%	5 others 33.8%	3 others 46.2%	4 others
ABW	Aruba	False	-70.0167	12.5167	LCN		LNK	HIC
AFE	Africa Eastern and Southern	True	nan	nan				
AFG	Afghanistan	False	69.1761	34.5228	SAS	SAS	IDK	LIC
AFW	Africa Western and Central	True	nan	nan				
AGO	Angola	False	13.242	-8.81155	SSF	SSA	IBD	LMC
Expand rows 5 - 260								
XKX	Kosovo	False	20.926	42.565	ECS	ECA	IDK	UMC
YEM	Yemen, Rep.	False	44.2075	15.352	MEA	MNA	IDK	LIC
ZAF	South Africa	False	28.1871	-25.746	SSF	SSA	IBD	UMC
ZMB	Zambia	False	28.2937	-15.3982	SSF	SSA	IDK	LMC
ZWE	Zimbabwe	False	31.0672	-17.8312	SSF	SSA	IDB	LMC
266 rows x 9 columns								

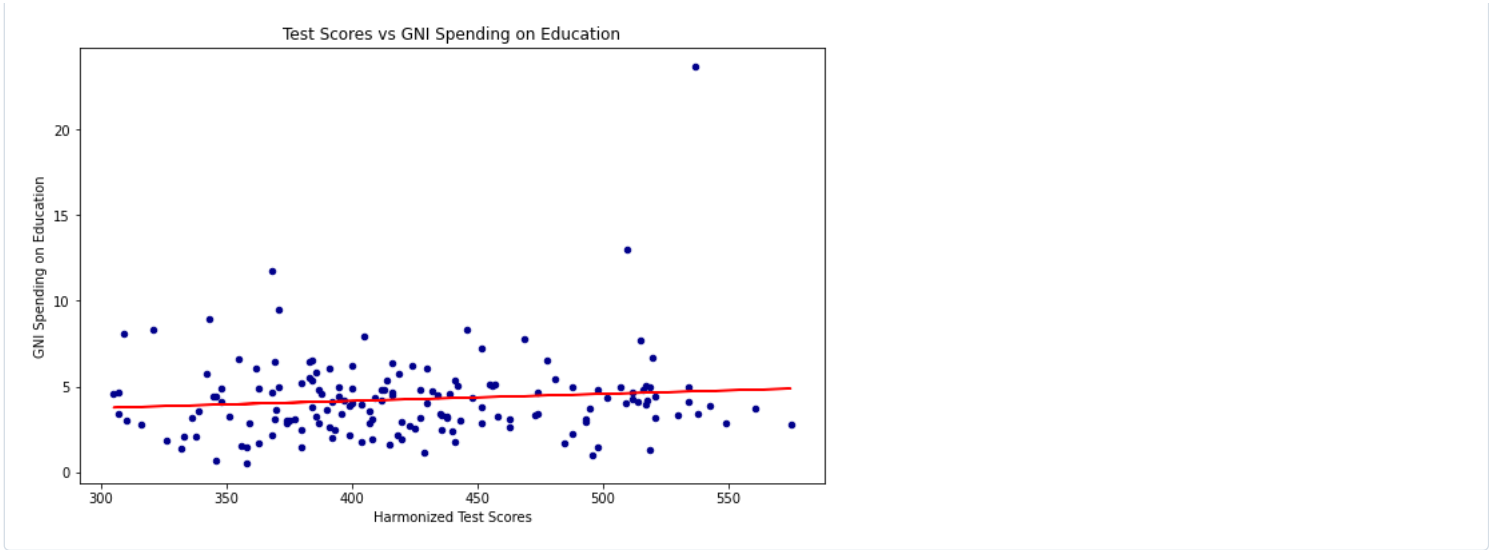
Visualization of HCI_data

```
HCI_data.plot(kind='scatter', x='Harmonized Test Scores', y='GNI Spending on Education', figsize=(10, 6), color='darkblue')

plt.title('Test Scores vs GNI Spending on Education')
plt.xlabel('Learning-Adjusted Years of School')
plt.ylabel('GNI Spending on Education')

linreg(HCI_data, 'Harmonized Test Scores', 'GNI Spending on Education')
plt.show()
```

Correlation: 0.10395515637604857
P-Value: 0.18802067905666314



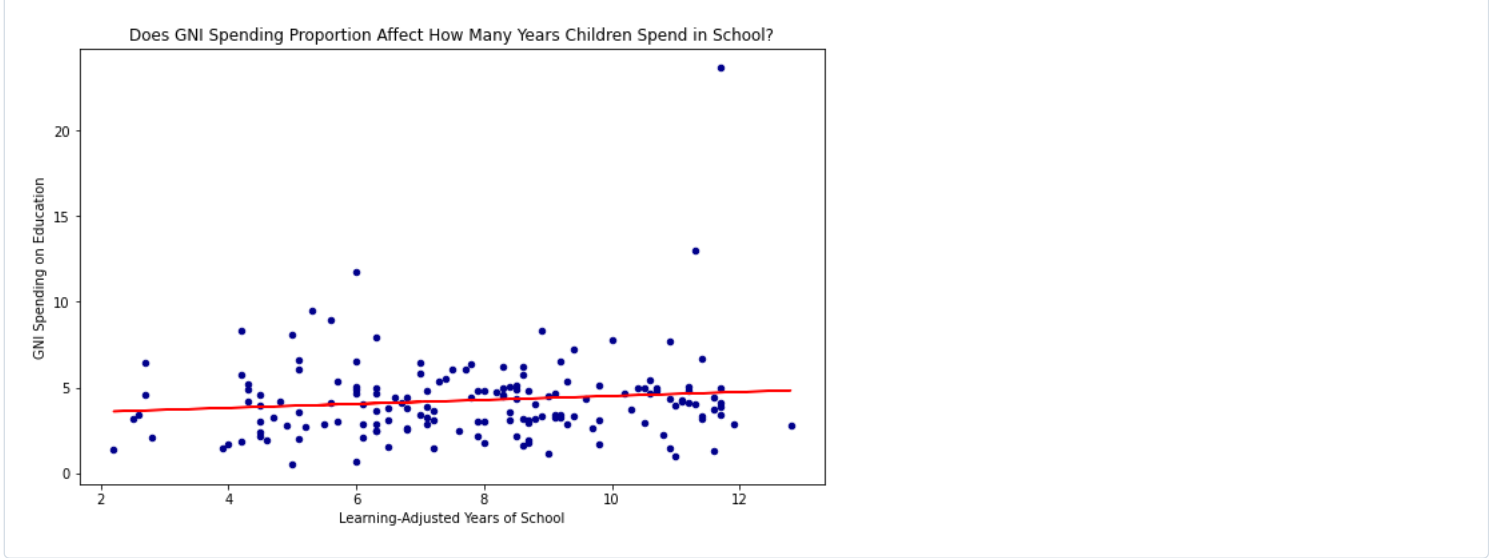
```
HCI_data.plot(kind='scatter', x='Learning-Adjusted Years of School', y='GNI Spending on Education', figsize=(10, 6), color='darkblue')

plt.title('Does GNI Spending Proportion Affect How Many Years Children Spend in School?')
plt.xlabel('Learning-Adjusted Years of School')
plt.ylabel('GNI Spending on Education')

linreg(HCI_data, 'Learning-Adjusted Years of School', 'GNI Spending on Education')

plt.show()
```

Correlation: 0.1152402710161861
P-Value: 0.1442129164997901



<http://nces.ed.gov/programs/coe/indicator/cmd#3>

```
edu_test = pd.read_excel('edu_spending.xlsx')
edu_test
```

gdp edu 2 - API_SE.XP... o...				
Country Name	0.4%	Unnamed: 1 object	Unnamed: 2 object	Unnamed: 3 object
Country Code	0.4%	Country Code	Government expendi...	SE.XPD.PRIM.PC...
Aruba	0.4%	ABW	Indicator Name	Indicator Code
264 others	99.2%	264 others	Indicator Code	10.67458
				196 others
				78.2%
0	Country Name	Country Code	Indicator Name	Indicator Code
				Last
1	Aruba	ABW	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS
				17.08119

gdp edu 2 - API_SE.XP... 0...		Unnamed: 1 object	Unnamed: 2 object	Unnamed: 3 object	Unnamed: 4 object
Country Name 0.4%		Country Code .. 0.4%	Government expendi... .. 99.6%	SE.XPD.PRIM.PC... .. 99.6%	SE.XPD.PRIM.PC... .. 20.7%
Aruba 0.4%		ABW 0.4%	Indicator Name 0.4%	Indicator Code 0.4%	10.67458 1.1%
264 others 99.2%		264 others ... 99.2%			196 others 78.2%
2	Afghanistan	AFG	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	10.25174
3	Africa Western and Central	AFW	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	10.67458
4	Angola	AGO	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	SE.XPD.PRIM.PC.ZS
Expand rows 5 - 260					
261	Kosovo	XKX	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	SE.XPD.PRIM.PC.ZS
262	Yemen, Rep.	YEM	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	18.05957
263	South Africa	ZAF	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	17.94111
264	Zambia	ZMB	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	12.88822
265	Zimbabwe	ZWE	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	14.00009
266 rows × 5 columns					

edu2 = edu_test.rename(columns={'Unnamed: 1':'WB Code', 'Unnamed: 4':'Spending per Student (thousands USD)'}) edu2					
gdp edu 2 - API_SE.XP... 0...		WB Code object	Unnamed: 2 object	Unnamed: 3 object	Spending per Student... ob...
Country Name 0.4%		Country Code .. 0.4%	Government expendi... .. 99.6%	SE.XPD.PRIM.PC... .. 99.6%	SE.XPD.PRIM.PC.ZS 20.7%
Aruba 0.4%		ABW 0.4%	Indicator Name 0.4%	Indicator Code 0.4%	10.67458 1.1%
264 others 99.2%		264 others ... 99.2%			196 others 78.2%
0	Country Name	Country Code	Indicator Name	Indicator Code	Last
1	Aruba	ABW	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	17.08119
2	Afghanistan	AFG	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	10.25174
3	Africa Western and Central	AFW	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	10.67458
4	Angola	AGO	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	SE.XPD.PRIM.PC.ZS
Expand rows 5 - 260					
261	Kosovo	XKX	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	SE.XPD.PRIM.PC.ZS
262	Yemen, Rep.	YEM	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	18.05957

gdp edu 2 - API_SE.XP... o...		WB Code object	Unnamed: 2 object	Unnamed: 3 object	Spending per Student... ob...
Country Name 0.4%		Country Code 0.4%	Government expendi... 99.6%	SE.XPD.PRIM.PC. 99.6%	SE.XPD.PRIM.PC.ZS 20.7%
Aruba 0.4%		ABW 0.4%	Indicator Name 0.4%	Indicator Code 0.4%	10.67458 1.1%
264 others 99.2%		264 others ... 99.2%			196 others 78.2%
263	South Africa	ZAF	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	17.94111
264	Zambia	ZMB	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	12.88822
265	Zimbabwe	ZWE	Government expenditure per student, primary (% of GDP per capita)	SE.XPD.PRIM.PC.ZS	14.00009
266 rows × 5 columns					

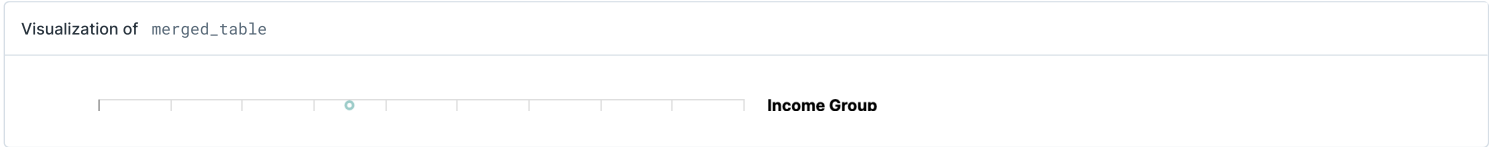
```
merged_table = pd.merge(HCI_data, edu2, on=['WB Code'])
merged_table = merged_table[merged_table['Spending per Student (thousands USD)']!= 'SE.XPD.PRIM.PC.ZS']
merged_table=merged_table.astype({'Spending per Student (thousands USD)': float})
merged_table

#merged_table_v2=merged_table.insert(0, "Spending per student(US Dollars)", new_1st, True)
```

Country Name object		WB Code object	Region object	GNI Spending on Ed... floa...	Income Group object	Probability of Surv... flo...	Ex
Afghanistan 0.7%		AFG 0.7%	Sub-Saharan Africa 26%	0.53888079544 - 23.62883	High income 36%	0.88 - 1.0	4.
Albania 0.7%		ALB 0.7%	Europe & Central A... .. 24.7%		Lower middle inc... .. 25.3%		
148 others 98.7%		148 others .98.7%	5 others 49.3%		2 others 38.7%		
0	Afghanistan	AFG	South Asia	6.58	Low income	0.94	8
1	Albania	ALB	Europe & Central Asia	4.51243103403928	Upper middle income	0.99	12
2	Algeria	DZA	Middle East & North Africa	2.84483636363068	Lower middle income	0.98	11
4	Antigua and Barbuda	ATG	Latin America & Caribbean	3.57	High income	0.99	13
5	Argentina	ARG	Latin America & Caribbean	3.11299593313267	Upper middle income	0.99	12
Expand rows 5 - 144							
168	Vanuatu	VUT	East Asia & Pacific	4.11	Lower middle income	0.97	10
169	Vietnam	VNM	East Asia & Pacific	4.99016196968434	Lower middle income	0.98	12
171	Yemen, Rep.	YEM	Middle East & North Africa	8.34	Low income	0.95	8
172	Zambia	ZMB	Sub-Saharan Africa	0.53888079544	Lower middle income	0.94	8
173	Zimbabwe	ZWE	Sub-Saharan Africa	3.4	Lower middle income	0.95	11

Country Name object	WB Code object	Region object	GNI Spending on Ed... floa...	Income Group object	Probability of Surv... floa...	Es
Afghanistan 0.7%	AFG 0.7%	Sub-Saharan Africa 26%	0.53888079544 - 23.62883	High income 36%	0.88 - 1.0	4.
Albania 0.7%	ALB 0.7%	Europe & Central A... 24.7%		Lower middle inc... 25.3%		
148 others 98.7%	148 others 98.7%	5 others 49.3%		2 others 38.7%		

150 rows x 18 columns

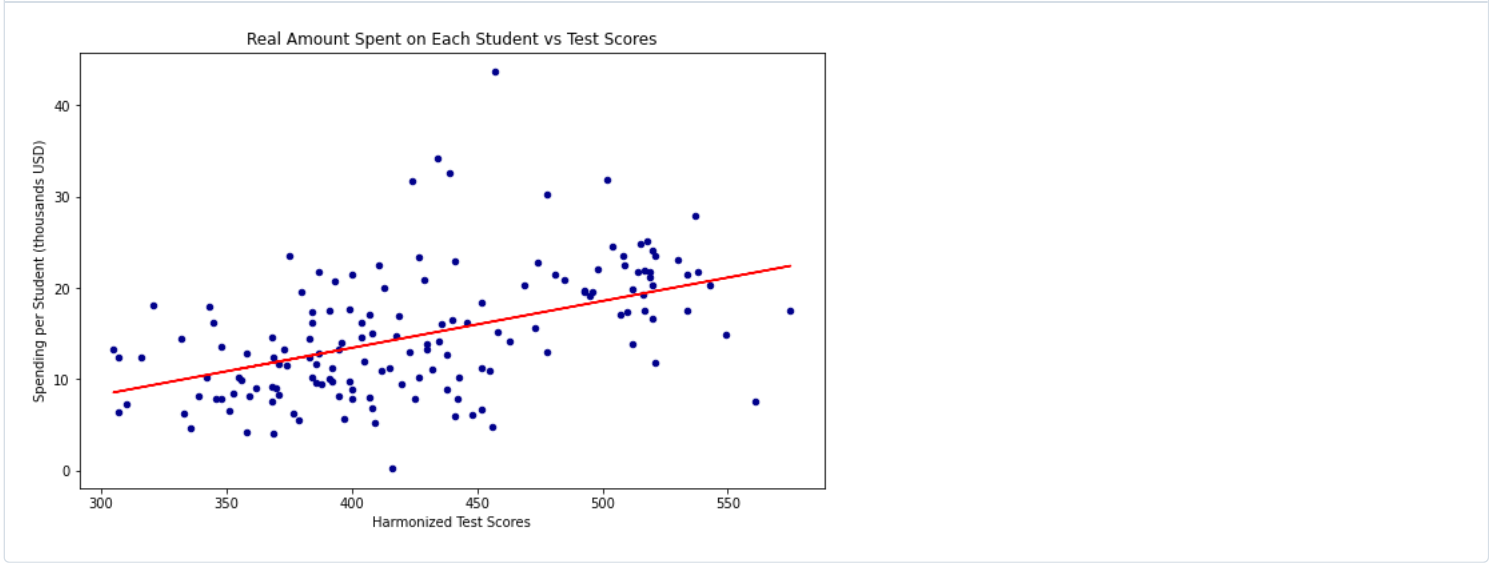


```
merged_table.plot(kind='scatter', x='Harmonized Test Scores', y='Spending per Student (thousands USD)', figsize=(10, 6), color='darkblue')

plt.title('Real Amount Spent on Each Student vs Test Scores')
plt.xlabel('Harmonized Test Scores')
plt.ylabel('Spending per Student (thousands USD)')

linreg(merged_table, 'Harmonized Test Scores', 'Spending per Student (thousands USD)')
plt.show()
```

Correlation: 0.4765811784750939
P-Value: 3.0192584012384235e-09



```
merged_table.plot(kind='scatter', x='Learning-Adjusted Years of School', y='Spending per Student (thousands USD)', figsize=(10, 6), color='darkblue')

plt.title('Real Amount Spent on Each Student vs Years in School')
plt.xlabel('Learning-Adjusted Years of School')
plt.ylabel('Spending per Student (thousands USD)')

linreg(merged_table, 'Learning-Adjusted Years of School', 'Spending per Student (thousands USD)')
plt.show()
```

Correlation: 0.4878141235904284
P-Value: 1.1230901902525408e-09

