Teacher Notes - World Economic maps

Learner outcomes: These lessons help students gain a basic understanding of general world patterns of life expectancy, literacy, economic activity, and per-capita income. These general patterns can then be used to help interpret a wide variety of other features about the world, including historic events, modern world trade, disease, migration, and even terrorism.

An important secondary objective is to help students add to their knowledge of placenames, in a way that is more interesting than just being given a list of names and map locations to memorize. For this purpose, you could print the map layers that show country names separately, to encourage the kind of side-by-side comparison that helps students fix the locations in memory, along with the first three questions on any or all of the individual topic maps – life expectancy, literacy, agriculture, and income.

Background: Textbooks usually show demographic information with complicated multi-colored *choropleth* maps.

> Definition: To make a **choropleth map**, the mapmaker colors entire countries according to some average measure that applies to the whole country – for example, all of Russia may be colored pink because the average life expectancy of the country is 70 years.

Choropleth maps are relatively easy to make, especially with modern GIS (Geographic Information System) software. Unfortunately, studies of visual perception show that the intricate and often arbitrary nature of country borders can produce such a high level of visual "noise" that many students fail to perceive the overall pattern on a map. To help students create a more durable mental image, it is advisable to have them construct the map. When we ask students to do that, however, we should keep reminding ourselves (and the students!) that the goal is to understand the pattern, not just to make the map. For this reason, we should try to make the map quickly and easily, so that the working memory of students is not fully occupied with the details of tracing borders and coloring irregular shapes. Showing the data for individual countries in simple, easy-to-color boxes can help teachers keep the focus on trying to identify broad alignments, clusters, gradients, and other patterns on the maps

These maps show data for just 44 of the countries in the world. Larger symbols and numbers show the 12 countries with the largest populations. The maps also show another 32 countries that are regionally important and generally similar to the countries around them. The choice of 44 countries is based on informal classroom tests that tried to identify a reasonable middle ground between complexity and over-simplification. On the one hand, the goal is to identify important world patterns. On the other hand, it is unreasonable to try to memorize data about all 203 countries in the world. Putting the focus on just one fifth of the countries makes it easier to see regional patterns. These patterns, in turn, are easier to remember than the numbers for individual countries. The discussion should therefore focus on trying to identify and describe the patterns – the clusters of high and low scores, the trends as you go from one place to another, and the geographic associations with other features (e.g. coastlines, latitude, mountains, or historic events such as wars, past empires, or colonial relationships).

Preparation: Open BI1 World Economic clickable maps. Depending on your students' background, you may want to print copies of the map layer that shows world regions and/or the layer that shows country names. Remember the secondary objective of this lesson, namely to increase the placename knowledge of students. This is why this lesson is provided as a clickable pdf with nearly two dozen layers of information. These layers can be made visible or invisible in many different combinations, so that you can customize the maps that different students might need. Other clickable maps may also be useful resources – especially the simplified climate map and the ancient cities and temperature maps.

Extension: Students can find a wealth of additional country data from sources such as the CIA Factbook (https://www.cia.gov/library/publications/the-world-factbook/)
or the Population Reference Bureau (http://www.prb.org/DataFinder/Topic.aspx?cat=3)

In fact, the biggest problem is limiting the scope of inquiry. After all, the point is to gain good mental images of a few important kids of information, and then to know how to find additional information if needed.

Map 1: GNI/c (Gross National Income per capita, adjusted for purchasing power)

Mathematically, this is the most complicated measure. First, you add up the value of all forms of income from sale of goods, labor, or various forms of rent and interest. Then, you divide the sum by the total population to get income per person. Then you adjust that figure according to the purchasing power of the local currency. Finally, you convert the result to dollars so that different countries can be compared. The result is a measure of wealth, but it still has problems – if people trade things or favors rather than selling them, the result does not appear in these calculations, and yet people's lives are better because of the trades. Likewise, if people simply pay high amounts of rent for land or houses, it shows up as income for someone even though the people are not necessarily better off than people who do not pay as much.

1. Australia has the highest income per person of these choices.
2. South Asia and Subsaharan Africa have lower income per person than the other two choices – (incomes in Subsaharan Africa (also called Africa South of the Sahara) are much lower than in the Mediterranean countries of North Africa).
3. The biggest absolute difference in income is between the United States and Mexico. Israel, however, has seven times as much income per person as Iraq – that is a much larger relative difference. This mathematical distinction between differences and ratios is worth exploring if you can do it in a way that also supports your math objectives, because it is difficult for a citizen to read a newspaper knowledgeably without understanding the difference.
4. Income in former Soviet and Warsaw Pact countries still lags far behind the average incomes in countries of Western Europe. The Mediterranean countries are in between (and in 2016, they are causing problems in the European Union because of their high debt).
5. High income is generally associated with high rates of literacy and low percentages of people in agriculture (because purchased machinery, fertilizer, and fuel can replace human labor). These relationships open a large number of related questions about cause-and-effect relationships and long-term sustainability. For example, how much should a society invest in education? How much energy use is justified, in light of the environmental risks posed by carbon dioxide and nitrogen? These questions go far beyond the information on these simple maps, but the basic demographic patterns on these maps provide an essential context for considering questions like these.

Map 2: Agriculture

The geography of food production is complicated by a somewhat different set of influences. The physical environment, for example, offers one category of complications. Only about one-eighth of the land on earth is capable of producing food with today's technology. The other seven-eighths are too cold, dry, steep, infertile, or disease-prone. Moreover, the favorable land is very unevenly divided among countries. The percentage of people working as farmers, however, is not a direct result of the amount of good land. The United States, for example, has the largest area of prime farmland in the world – more than twice as much as China, a country of about the same size. Yet less than one percent of workers in the U.S. have jobs on farms. China has 300 times as many farmers – more farmworkers than the United States has people! (Remember that China has 1.2 billion people, four times the population of the United States, but only half as much good land). This lesson is a preliminary exploration of reasons why countries might have different numbers of farmworkers even when they have similar amounts of farmland.

1. Australia has the smallest percentage of people working in agriculture. Africa has the largest.
2. Of the three options in question 2, Africa has the most countries with high percentages of people working in farming.
3. Of these choices, China has the largest percentage working on farms. The Multimedia unit on Coastal City and Interior Village highlights the enormous difference in living standards between commercial/industrial China and agricultural China. See also the units on Subsistence Farming in

Uganda and Trends in Food Production for other insights into this complicated relationship between farming and other sectors of a country's economy.

4. Inability to buy machines or fuel is the prime reason for a high percentage of people working in farming. That inability, however, may be a result of a lack of alternative jobs (and therefore other sources of income). It's a kind of chicken-and-egg situation, which tends to make solutions even harder to find (and sound-bite suggestions even less desirable).

5. People can work in factories, or in stores, schools, golf courses, opera houses, all the other service jobs in a modern economy. The percentage of people working in agriculture, therefore, is an indication of the degree of development of these other sectors of a country's economy.

6. Countries with high percentages working on farms tend to have low literacy and even more dramatically lower income per person. These personal characteristics, in turn, are powerful handicaps when people move to cities or other countries in order to find work.

Map 3: Life expectancy.

The average number of years that a person lives is an important measure of development in a country, because it seems to summarize many other features about that country. These features include infant mortality, childhood diseases, air and water quality, availability of nutritious food, access to medical care, safety from industrial or car accidents, other features of lifestyle, and so forth.

1. Europe is the continent with the highest average life expectancy.

2. Of the three options in question 2, South Asia and Subsaharan Africa have the lowest life expectancy.

3. The U.S. ranks 11th out of the 44 countries – top half but not top 10. It is second only to Japan among the 12 countries with the largest populations, however.

4. Life expectancy decreases as you go eastward in Europe. A variety of factors may contribute to this observed geographic trend, including:
   - more extreme climate (hotter summers, colder winters, less rain, more wind),
   - less productive cropland (more risk due to unseasonable frost or drought)
   - greater difficulty in participating in world trade (because transportation is more difficult and expensive from an interior location), and
   - the lingering effects of the Communist era (with its notoriously inefficient supply systems).

   Questions about life expectancy are not easy to answer – in fact, they may be among the most important questions to address in the post-Communist world. Conduct a brainstorming session to elicit hypotheses about factors that might contribute to longer life expectancy. Plausible possibilities include healthier lifestyles, but that's a kind of "grab-bag" answer that involves a number of separate variables, including more nutritious food, better access to medical care, political stability (living conditions in a refugee camp life are really hard on life expectancy!), physical environments that have less stress, fewer diseases or insect vectors, and so forth.

5. There is a noticeable geographic pattern, with life expectancy generally rising as you go away from the equator (up to a point, because at high latitude it is so cold that there aren't enough people living there to count!). The pattern is complicated, however, by a number of factors. One huge complication is the fact that European countries claimed colonies in many other parts of the world, and almost without exception, the former colonies are closer to the equator and now have lower life expectancies than the European countries that used to rule over them. The trend is far from uniform, however – life expectancies near the equator are low in Africa, medium in South Asia and Indonesia, and relatively high in South America – but all of those areas were claimed as colonies by various European powers. Obviously, colonial history cannot be the whole story.

   The bottom line is that the world pattern of life expectancy is a complicated one, with many causes and effects. For this reason, this map can serve as a good introduction to the topic of development.

Map 4: Literacy

The ability to read and write is essential for participation in a commercial economy and many other aspects of modern life. To get student attention, ask what it would be like if they could not write a text message or read an internet site for the rest of their lives. What other specific activities would also be more difficult?

1. Europe is the continent with the highest literacy rate. It is important, however, to note that a number of former colonies and even some of the countries hurt the most by World Wars, the Korean conflict, and the Vietnam War also have literacy rates above 90 percent today.

2. Of the three options in question 2, South Asia and Africa south of the Sahara have the lowest literacy rate.

3. Afghanistan has by far the lowest literacy rate among the countries shown on the map. A few smaller countries have lower rates (remember that this map shows only about one-fifth of all the countries in the world, although they have more than 98 percent of the total population.) Countries hard hit by 20th-century wars – Germany, Japan, Russia, Vietnam – have all achieved high literacy rates. The ongoing civil wars of the early 21st century, however, have had a great adverse effect in places like Afghanistan, Iraq, Somalia, Mali. Decades of war in Afghanistan, for example, have severely damaged this country's schools, highways, and other infrastructure. This fact, in turn, makes it much harder for the country to develop a solid economic base to support the people in a post-war world.

4. False. In general, literacy rates in former Communist countries are well above the world average, although not as high as in Western Europe, North America, Japan, or South Korea.

5. Literacy in former colonies ranges from 33 to 99 percent – in other words, some of both low and high. This fact makes it very difficult to make generalizations about the impact of colonialism, without considering many other factors. Awareness of this complexity, in turn, is a step toward a better understanding of world geography today – an essential citizenship skill, especially in an era when many political messages are simplistic "sound-bites."

6. The countries with the lowest literacy rates also tend to have low incomes per capita, large (not small) percentages working in agriculture, and low life expectancy. They also are likely to be landlocked (no port than can handle ocean-going ships). Lack of easy access to the ocean is a subtle but strong influence on a country's ability to participate in the world economy. Switzerland is a big exception to this rule – it's a landlocked country with high income per person – but the rule is valid in most other continents. For example, Paraguay and Bolivia are the poorest countries in South America; the interior of Africa has many of its poorest countries, from Chad to Zimbabwe; and Eurasia has a number of landlocked countries with serious economic challenges, including Bosnia, Macedonia, Moldova, Belarus, Turkmenistan, Uzbekistan, Mongolia, and Laos.

Another complicating factor is the fact that education is not equally available to boys and girls in many countries. In Pakistan, for example, the male literacy rate is ten percent higher than the national average; the female literacy rate is about ten percent lower. If you would like your students to explore this topic, The CIA Factbook or PBR.ORG have data about male and female literacy rates – the gap is more than 30 percent in many countries, particularly in Southwest Asia and Africa.