

AP<sup>®</sup> Computer Science A

# ACCESS TO EDUCATION

Student Workbook



AP<sup>®</sup> with WE Service



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# Getting to Know the Topic

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## Access to Education: Globally

In 2015, through the Sustainable Development Goals, the United Nations established SDG 4 which aims to “Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.” While there has been progress toward achieving this goal, approximately 262 million children and youth were out of school in 2017. Poverty, lack of access to quality health care, geography, gender, child labor, and food insecurity are some factors that prevent children from attending school.

## Fast Facts

- ▶ An estimated 40% of people are taught in a language they don’t speak or fully understand.
- ▶ In 2016, approximately 750 million adults were illiterate—two thirds of them women.
- ▶ Globally, only 85% of primary school teachers are trained to educate students.

## Taking Action Globally

There are a number of ways that students can take action in their own school and community to help developing communities around the world improve their access to education. Some ideas include:

- ▶ Volunteer at an organization that works for global issues—many organizations offer ways to get involved on their websites and in their offices
- ▶ Collect supplies (in consultation with the organization) or raise funds for an organization that will share the outcomes of the donations
- ▶ Create a campaign writing letters to the United Nations, government bodies, and other leaders to ask for added resources on the issue

Another option is to support and fundraise for WE Villages program. Students can support this program by visiting [WE.org/we-schools/program/campaigns](https://www.weschools.org/we-schools/program/campaigns) to get ideas and resources for taking action on global education issues.



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**In 2015, 617 million students across the world were not achieving minimum proficiency levels in reading and mathematics.**

# Getting to Know the Topic

## Access to Education: Locally

In the United States, despite a doubling of spending since the mid-1970s, average educational attainment has stagnated. Education is also highly correlated with employment and workforce participation. High school dropouts today have 3.5 times the unemployment rate of college graduates. More than 50 percent of high school dropouts are not in the labor force and an additional 19 percent are looking for work. Male high school dropouts are 47 times more likely to be incarcerated than a college graduate.

The issues are highlighted even further when comparing educational statistics and outcomes of other industrialized nations with those of the United States. American 15-year-olds trail nearly all other OECD countries in math and science. The U.S. ranks 27 out of 29 wealthy countries in the proportion of college students with degrees in science or engineering.

## Fast Facts

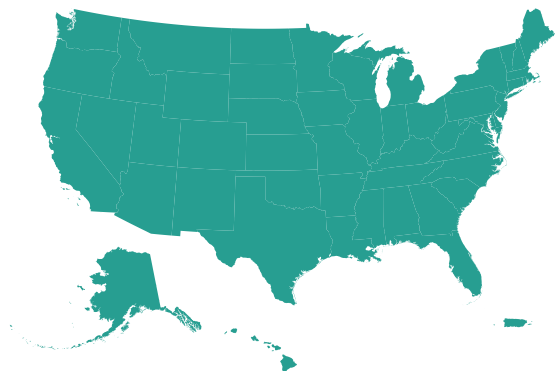
- ▶ According to the National Assessment of Educational Programming (NAEP), only 25% of 12th grade students are “proficient” or “advanced” in math.
- ▶ As of 2019, the United States was experiencing a 307,000 job shortfall in public education, according to the Economic Policy Institute.
- ▶ Only 37% of high school dropouts indicated their school tried to talk them into staying.

## Taking Action Locally

Within their local or national community, students can:

- ▶ Work with a local organization addressing the topic
- ▶ Collect educational resources—like books, notepads, pens, and backpacks—and donate them for distribution to benefit students in need
- ▶ Create and deliver an educational workshop to raise awareness about educational topics and their local impact with a strong call to action that leads to enacting change

With both their global and local actions, encourage students to be creative with the ideas they develop through their action plans.



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**Of high-poverty schools,  
45% receive state & local  
funds below what is typical  
for other schools in their  
district.**



NAME: \_\_\_\_\_

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## Problem Tree

(1 of 1)

In your Problem Tree graphic organizer, start by writing the problem in the trunk of the tree, and then look at the causes and effects of an issue. Keep digging to go deeper on the issue to find its supporting and root causes.

### Leaves/branches: Effects

These are the results created by the problem. At first, this part of the issue appears easy to tackle, but when leaves and branches are trimmed, they grow back quickly. Consider the multi-layered effects, or “effects of effects,” that can arise when a problem goes unaddressed. Always ask: “Then what happens?”

Ex. The spread of contagious diseases.

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### Trunk: Problem

This is the key issue that is being studied. Because it is not as apparent as the leaves, the core problem itself sometimes takes a little longer to identify.

Ex. The basic problem is access to health care but you may wish to have students break down the problem more specifically (e.g., vaccines).

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### Roots: Causes

These are the situations or factors that have led to the problem. When exploring the root causes of a problem, ask yourself “Why does this problem exist?” Dig deeper to consider the “causes of causes”—the multiple layers of factors that contribute to a problem.

Ex. Poverty and health education.

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## Needs Assessment

The following series of questions helps you to analyze and identify ongoing areas of need within organizations addressing your issue.

1. Identify 3-5 organizations working on issues related to the issue your team is working on.

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2. What does each organization do well in response to the issue and/or related issues?

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3. What could each organization do better in its response?

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4. What areas of need related to access to your issue have you learned about that each organization is NOT addressing?

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5. Considering all 3-5 organizations, where are there ongoing needs that are not being adequately addressed?

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6. Considering all 3-5 organizations, where are there ongoing needs that are being addressed successfully, and to which you can add further efforts to support the issue?

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## Solution Tree

(1 of 1)

In your Solution Tree graphic organizer, start by rewriting the problem from your Problem Tree, and reframing it as a goal at the trunk of the tree. Then consider the different solutions (the roots) and possible outcomes of the solutions (the branches).

### Leaves/branches: Outcomes

These are the results created by the solution. Results may appear as straightforward as having achieved goals, but when you consider the ripple effects and outcomes of sustainable results, the impact is far-reaching and long-lasting. Always ask: "Then what happens?"

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### Trunk: Problem

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### Trunk: Goal

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### Roots: Solutions

These are the actions needed to solve the problem and achieve the goal stated at the center of the Solution Tree. When exploring solutions, ask yourself "How will this solve the problem?" Dig deeper to think holistically, so that you are looking beyond the short-term and addressing not only the symptoms of the problem but the root causes as well.

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Solution Tree Worksheet: Copyright © 2018 WE. All rights reserved.





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## Programming Concepts

Complete the chart below by addressing the following:

- ▶ Identify five programming concepts (e.g., if statements).
- ▶ Include example program code that demonstrate each concept, and that were used in your app development.
- ▶ Reproduce an equivalent code segment in Java.
- ▶ Briefly explain the purpose of the program code.

APP INVENTOR CONCEPT	CODE SYNTAX	JAVA CODE EQUIVALENT	PURPOSE OF CODE?



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## Activity: Question Class

You will apply your knowledge of object-oriented programming in Java to complete the methods in the following two classes. Develop questions and answers for trivia about access to education.

```
1 public class Question
2 {
3     private String question;
4     private String answer;
5     public Question ()
6     {
7
8     }
9
10    public Question(String q, String a)
11    {
12
13    }
14
15    public String getQuestion()
16    {
17
18    }
19
20    public String getAnswer()
21    {
22
23    }
24
25    public void setQuestion(String q)
26    {
27
28    }
29
30    public void setAnswer(String a)
31    {
32
33    }
34 }
```

## Activity: Trivia

```
1  import java.util.*;
2
3  public class Trivia
4  {
5      public ArrayList<Question>listOfQuestions;
6      public int totalCorrect;
7
8      public Trivia(ArrayList <Question> qs)
9      {
10
11      }
12
13     public void play()
14     {
15
16     }
17
18     public String getAnswer(Question q)
19     {
20
21     }
22
23     public boolean checkAnswer(Question q, String ans)
24     {
25
26     }
27
28     public void upDateScore()
29     {
30
31     }
32
33     public int getScore()
34     {
35
36     }
37 }
```

## Activity: Social Issues Game

```
1  import java.util.*;
2  public class SocialIssuesGame
3  {
4      public static void main(String[] args)
5      {
6          ArrayList <Question> myQuestions = new ArrayList <Question>();
7          myQuestions.add(new Question("What is your name?", "Veronica"));
8          myQuestions.add(
9              new Question("Access to education is available for everyone?", "false"));
10
11         Trivia game = new Trivia(myQuestions);
12         game.play();
13     }
14 }
```







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## Working Independently

Many encoded strings contain *delimiters*. A delimiter is a non-empty string that acts as a boundary between different parts of a larger string. The delimiters involved in this question occur in pairs that must be *balanced*, with each pair having an open delimiter and a close delimiter. There will be only one type of delimiter for each string. The following are examples of delimiters.

### Example 1

Expressions in mathematics use open parentheses "(" and close parentheses ")" as delimiters. For each open parenthesis, there must be a matching close parenthesis.

$(x + y) * 5$  is a valid mathematical expression.

$(x + (y)$  is NOT a valid mathematical expression because there are more open delimiters than close delimiters.

### Example 2

HTML uses `<B>` and `</B>` as delimiters. For each open delimiter `<B>`, there must be a matching close delimiter `</B>`.

`<B> Make this text bold </B>` is valid HTML.

`<B> Make this text bold </UB>` is NOT valid HTML because there is one open delimiter and no matching close delimiter.

## AP<sup>®</sup> Computer Science A Free-Response Questions

In this question, you will write two methods in the following `Delimiters` class.

```
public class Delimiters
{
    /** The open and close delimiters. */
    private String openDel;
    private String closeDel;

    /** Constructs a Delimiters object where open is the open delimiter and close is the
     * close delimiter.
     * Precondition: open and close are non-empty strings.
     */
    public Delimiters(String open, String close)
    {
        openDel = open;
        closeDel = close;
    }

    /** Returns an ArrayList of delimiters from the array tokens, as described in part (a). */
    public ArrayList<String> getDelimitersList(String[] tokens)
    { /* to be implemented in part (a) */ }

    /** Returns true if the delimiters are balanced and false otherwise, as described in part (b).
     * Precondition: delimiters contains only valid open and closedelimiters.
     */
    public boolean isBalanced(ArrayList<String> delimiters)
    { /* to be implemented in part (b) */ }

    // There may be instance variables, constructors, and methods that are not shown.
}
```



## AP<sup>®</sup> Computer Science A Free-Response Questions

- (a) A string containing text and possibly delimiters has been split into *tokens* and stored in `String[] tokens`. Each token is either an open delimiter, a close delimiter, or a substring that is not a delimiter. You will write the method `getDelimitersList`, which returns an `ArrayList` containing all the open and close delimiters found in `tokens` in their original order.

The following examples show the contents of an `ArrayList` returned by `getDelimitersList` for different open and close delimiters and different `tokens` arrays.

### Example 1

```

openDel: "("
closeDel: ")"

tokens:


|     |         |    |        |
|-----|---------|----|--------|
| "(" | "x + y" | )" | " * 5" |
|-----|---------|----|--------|


ArrayList
of delimiters:


|     |    |
|-----|----|
| "(" | )" |
|-----|----|


```

### Example 2

```

openDel: "<q>"
closeDel: "</q>"

tokens:


|       |      |        |      |        |
|-------|------|--------|------|--------|
| "<q>" | "yy" | "</q>" | "zz" | "</q>" |
|-------|------|--------|------|--------|


ArrayList
of delimiters:


|       |        |        |
|-------|--------|--------|
| "<q>" | "</q>" | "</q>" |
|-------|--------|--------|


```

Class information for this question

```

public class Delimiters
private String openDel
private String closeDel

public Delimiters(String open, String close)
public ArrayList<String> getDelimitersList(String[] tokens)
    public boolean isBalanced(ArrayList<String> delimiters)

```

# AP<sup>®</sup> Computer Science A Free-Response Questions

Complete method `getDelimitersList` below.

```
/** Returns an ArrayList of delimiters from the array tokens, as described in part (a). */  
public ArrayList<String> getDelimitersList(String[] tokens)
```

- (b) Write the method `isBalanced`, which returns `true` when the delimiters are balanced and returns `false` otherwise. The delimiters are balanced when both of the following conditions are satisfied; otherwise, they are not balanced.
1. When traversing the `ArrayList` from the first element to the last element, there is no point at which there are more close delimiters than open delimiters at or before that point.
  2. The total number of open delimiters is equal to the total number of close delimiters.

Consider a `Delimiters` object for which `openDel` is `"<sup>"` and `closeDel` is `"</sup>"`. The examples below show different `ArrayList` objects that could be returned by calls to `getDelimitersList` and the value that would be returned by a call to `isBalanced`.

### Example 1

The following example shows an `ArrayList` for which `isBalanced` returns `true`. As tokens are examined from first to last, the number of open delimiters is always greater than or equal to the number of close delimiters. After examining all tokens, there are an equal number of open and close delimiters.

"<sup>"	"<sup>"	"</sup>"	"<sup>"	"</sup>"	"</sup>"
---------	---------	----------	---------	----------	----------

### Example 2

The following example shows an `ArrayList` for which `isBalanced` returns `false`.

"<sup>"	"</sup>"	"</sup>"	"<sup>"
---------	----------	----------	---------



When starting from the left, at this point, condition 1 is violated.

### Example 3

The following example shows an `ArrayList` for which `isBalanced` returns `false`.

"</sup>"
----------



At this point, condition 1 is violated.

### Example 4

The following example shows an `ArrayList` for which `isBalanced` returns `false` because the second condition is violated. After examining all tokens, there are not an equal number of open and close delimiters.

"<sup>"	"<sup>"	"</sup>"
---------	---------	----------

## AP<sup>®</sup> Computer Science A Free-Response Questions

Class information for this question

```
public class Delimiters
private String openDel
private String closeDel

public Delimiters(String open, String close)
public ArrayList<String> getDelimitersList(String[] tokens)
public boolean isBalanced(ArrayList<String> delimiters)
```

Complete method `isBalanced` below.

```
/** Returns true if the delimiters are balanced and false otherwise, as described in part (b).
 * Precondition: delimiters contains only valid open and close delimiters.
 */
public boolean isBalanced(ArrayList<String> delimiters)
```



# Approaches to Taking Action Information Sheet

DIRECT SERVICE		
<b>WHAT IS IT?</b>	Personally engaging with and providing hands-on service to those in need (usually in conjunction with an organization).	
<b>EXAMPLE GOAL</b>	By the end of the semester, we will support a local food bank and shelter by packing and serving food to people in the community. We will also visit our neighboring elementary school and teach a lesson on food insecurity in our community.	
<b>ACTIONS</b>	<ul style="list-style-type: none"> <li>Reach out to local shelters and food banks to arrange a day for the class to visit and provide hands-on support</li> <li>Once a date has been decided, make sure students all have permission to travel to the food bank (if during school hours)</li> </ul>	<ul style="list-style-type: none"> <li>Connect with teachers/administration at local elementary school and arrange to visit a classroom to teach a lesson to young students on food insecurity</li> <li>Create and print worksheets to use with younger students</li> </ul>
INDIRECT SERVICE		
<b>WHAT IS IT?</b>	Channeling resources to the needs of a community—locally, nationally, or internationally.	
<b>EXAMPLE GOAL</b>	By the end of the year, we will create a storage and donation system for local families in need, where they can access furniture and other household items. We will develop a system for donations, pick-ups, and inventory.	
<b>ACTIONS</b>	<ul style="list-style-type: none"> <li>Conduct research into which items are most needed by community members (e.g., bed frames, dining tables, household goods, etc.)</li> <li>Reach out to local businesses to try to get a storage space donated</li> <li>Connect with school social workers/administration to gain their support</li> <li>Put up flyers around school and in the community, asking for donations (list specific items needed), including instructions on how/where to donate</li> </ul>	<ul style="list-style-type: none"> <li>Develop an online database for tracking donations and pick-ups, and maintaining inventory</li> <li>Share pick-up information with local shelters, churches, community centers, etc.</li> <li>Share the donation system with school social workers, so that they can maintain the project in future years</li> </ul>
ADVOCACY		
<b>WHAT IS IT?</b>	Educating others about an issue to increase visibility and following up with an action that focuses on enacting change. Actions around advocacy often look like raising awareness, but without a strong call to action within the initiative as a whole. Educating others is not considered service in and of itself.	
<b>EXAMPLE GOAL</b>	Through an informative art piece, we will educate our school community about the waste created by single-use plastic water bottles, and the impact they have on the environment. Then, we will sell reusable water bottles at school, and the proceeds from the sale will go toward clean water projects in developing countries.	
<b>ACTIONS</b>	<ul style="list-style-type: none"> <li>Research the impact of single-use plastic water bottles around the school and in the local community</li> <li>Plan out and create a 3D sculpture that incorporates informative text on the issue of single-use plastics</li> <li>Seek permission from school administration to display the piece in a common area of the school</li> </ul>	<ul style="list-style-type: none"> <li>Design and order water bottles to sell at school</li> <li>Research and select an international organization that focuses on clean water projects</li> <li>Organize a selling schedule for the water bottles, donate profits</li> </ul>



NAME: \_\_\_\_\_

TEAM MEMBERS: \_\_\_\_\_

## Creating the Action Plan

This outline serves as a basic template for your action plan. Use additional space and resources to help you build out each part with the right amount of detail and flow to ensure you have the strongest action plan that you and your team can implement with ease. Remember, this is your road map for your service project!

### TEAM GOAL:

### MEASURES OF SUCCESS:

### Required Network and Resources

In order to complete this goal, our team will need to develop the following network and access the following resources:

#### NETWORK:

#### RESOURCES:

### ROLES AND RESPONSIBILITIES

Each team member will take on the following roles and associated responsibilities:

### TIMELINE

Our team will use the following timeline to complete tasks and successfully carry out the action to meet our goal(s):



NAME: \_\_\_\_\_

TEAM MEMBERS: \_\_\_\_\_

## Five Action Planning Pitfalls Tip Sheet

Once your team has completed the major components of your action plan (creating your teams and setting goals, timeline, and network), review the five action planning pitfalls provided below to ensure these have been avoided. Review your plans—individually first, then together as a team. After the review, rework your action plans, if necessary.

### 1. Setting an unclear goal

The first and most important part of any action plan is defining the goal, or what you want to achieve. It should be clear and easy to understand, for example, “We want to collect 500 cans of food,” or “We want 200 people to learn about WE Villages.” If the goal is not clearly defined, proper planning will be difficult if not impossible. As a best practice, have a peer from another team review your goal to ensure it is as clear as you hope.

### 2. Planning unrealistic actions

After the goal is set, begin planning the actions necessary to achieve it. It is important that the steps make sense and are achievable. Do not plan unrealistic actions, such as working at times that will interfere with schoolwork, overestimating how many people can help out, or planning to go to places that would be difficult for you to reach. Consider each team member’s school and community schedule, such as work and extracurricular activities. Before planning an action, ask yourself, “Is this action realistic?”

### 3. Rushing the process

Do not be too hasty in planning actions. While you may be excited to start, proper planning takes time. The better the planning and organization, the more

success you will achieve. Even if it means slowing down to figure out details, do not rush and leave out important steps.

### 4. Not asking for help

Do not be afraid to ask for help. When a network is created, bigger goals can be achieved faster. Reach out to friends, parents, and mentors. People generally enjoy helping, especially if it is for a worthy cause.

### 5. Not learning from mistakes and giving up too quickly

We all make mistakes—it is normal and healthy. Mistakes allow us the opportunity to learn and grow. So, learn from the mistakes. Ask, “Why did this happen?” and “How can I avoid this problem next time?” Actively think about the mistakes and how it will be better the second time around. If something does not go as planned, do not stop!







# Want more?



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