An attention-grabbing product from the Harry Potter series—Bertie Bott’s Every Flavor Beans—is a fun tool for teaching students about classification.

By David T. Crowther
W ant to teach classification in an engaging, fun-filled way that capitalizes on the Harry Potter craze and models good science instruction by following the 5E learning cycle (Bybee and Landes 1990)? Sound impossible? It’s not!

In this lesson, students use Bertie Bott’s Every Flavor Beans—a “wild” candy written about in the Harry Potter books and now available in stores—to learn about classification and dichotomous keys. In these activities, students sort jelly beans according to a key and then construct a key for a “new” flavor of beans. Students then build on their knowledge by classifying buttons and constructing their own dichotomous key.

The lesson follows the 5E learning cycle, in which lessons are constructed to address various phases—Engage, Explore, Explain, Elaborate, and Evaluate. Although I used Bertie Bott’s beans because of Harry Potter’s enormous popularity with both students and adults, a variety pack of any type of gourmet jelly beans will work for these classification activities, provided there are variations among the beans (i.e., some jelly beans have spots and some are solid) and that you make your own key.

Always consider student allergies when bringing any food item into the classroom.

Most recently, I conducted the lesson with a group of university education majors, however, I’ve also used the lesson successfully with students of all ages. Students in upper grades can do the activity to learn more specifically about classification and dichotomous keys, but students in kindergarten through the primary grades can also learn to sort jelly beans based upon their physical characteristics to develop a foundation of understanding of classification upon which to build in later years.

About Dichotomous Keys

In classifying both living and nonliving things, scientists have tried to provide an order to life so that we can better understand the world in which we live. All living organisms are organized (classified) according to genetic relationships. Currently the classification system contains eight levels: Domain, Kingdom, Phylum, Class, Order, Family, Genus, and Species.

Shared patterns and physical characteristics among related organisms can be organized and denoted in a classification tool called a dichotomous key. The key—used to identify organisms—is based on the premise an organism either possesses an observed physical characteristic or does not possess the characteristic. For example, when attempting to identify a flowering plant with a key, you might see:

1A Petals red go to 4
1B Petals orange go to 5

Once a characteristic is recognized in the key, a person follows the other physical characteristics until it has been isolated and identified on the key. New organisms are not found on an existing key; therefore, the key must be adapted in order to accommodate the new organism.

The following exercises aim to introduce students to the classification system in a fun way.

Engagement

Creating Interest

The 5E learning cycle begins with Engagement, which accesses students’ background knowledge and generates interest in the topic. To pique student interest in the upcoming activities, I like to begin by reading a children’s literature book on sorting. Two books that accomplish this task quite well are: The Button Box by Margarette S. Reid and Sorting by Henry Pluckrose. After reading one or both of these books, we have a brief discussion on how we sort things.

Next, we conduct a short (about 10 minutes) introductory activity: Select six students with distinctive characteristics (e.g., two with blonde hair, two with brown hair, and two with black hair) and have them stand in the front of the classroom. Have students organize the children into three groups and discuss the characteristics by which they “classified” their classmates. When dividing the group of volunteers, be sure to model “dichotomy” language.

For example, I might say, “The classification characteristic is brown hair, so we have a group of students that possesses the characteristic of brown hair and we have a group of students that does not possess the characteristic of brown hair.” Students always enjoy this activity and soon begin using classification terminology and looking for unique characteristics among their classmates to classify.

Exploration

Hands-On Inquiry

Once students’ interest has been tapped, the Exploration phase begins—this is the point at which students delve deeper into the topic with a hands-on, heads-on inquiry-based activity. I usually begin this phase by reading a passage from Harry Potter and the Sorcerer’s Stone (Rowling 1998)—when Harry is on the “Hogwarts Express” and has purchased some treats from the cart:

“He finally tore his eyes away from the druidess Cliodna, who was

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Figure 1.

Bertie Bott’s Every Flavor Beans dichotomous key.

| 1a. Bean is green | go to line 2 | 11a. Bean is dark brown | Dirt |
| 1b. Bean is NOT green | go to line 6 | 11b. Bean is light brown with dark brown spots | Toasted Marshmallow |
| 2a. Bean is light white/cream green w/brown spots | Booger | 12a. Bean is yellow/cream and may or may not have spots | go to 13 |
| 2b. Bean is NOT light white/cream green w/brown spots | go to 3 | 12b. Bean is NOT yellow/cream | go to 16 |
| 3a. Bean is lime green without spots | go to 4 | 13a. Bean is cream with yellow spots | Buttered Popcorn |
| 3b. Bean is lime green or darker and may have spots or not | go to 5 | 13b. Bean is NOT cream with yellow spots | go to 14 |
| 4a. Bean is light lime green | Grass | 14a. Bean is brownish yellow cream | Ear Wax |
| 4b. Bean is medium lime green | Green Apple | 14b. Bean is NOT brownish yellow cream | go to 15 |
| 5a. Bean is dark green w/red swirls | Watermelon | Spinach |
| 5b. Bean is lime green w/spots | | |
| 6a. Bean is gray | Black Pepper | go to 7 |
| 6b. Bean is NOT gray | go to 7 | 15a. Bean is bright yellow | Lemon Drop |
| 7a. Bean is dark white | Sardine | go to 8 |
| 7b. Bean is NOT dark white | go to 8 | 15b. Bean is yellow with brown spots | Banana |
| 8a. Bean is blue | Blueberry | go to 9 |
| 8b. Bean is NOT blue | go to 9 | 16a. Bean is pink with or w/out spots | go to 17 |
| 9a. Bean is dark purple | Grape Jelly | go to 10 |
| 9b. Bean is NOT dark purple | go to 10 | 16b. Bean is NOT pink | go to 18 |
| 10a. Bean is brown or light brown and may have spots | go to 11 | 17a. Bean is light pink | Bubble Gum |
| 10b. Bean is NOT brown | go to 12 | 17b. Bean is pink w/spots | Tutti-Fruitti |
| | | 18a. Bean is orange w/spots | Vomit |
| | | 18b. Bean is NOT orange w/spots | go to 19 |
| | | 19a. Bean is red w/spots | Cinnamon |
| | | 19b. Bean is plain red | Cherry |

**Note: Watch for new species!!

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scratching her nose, to open a bag of Bertie Bott’s Every Flavor Beans.

‘You want to be careful with those,’ Ron warned Harry. ‘When they say every flavor, they mean every flavor—you know, you get all the ordinary ones like chocolate and peppermint and marmalade, but then you can get spinach and liver and tripe. George reckons he had a booger-flavored one once.’

Ron picked up a green bean, looked at it carefully, and bit into a corner. ‘Bleargh—see? Sprouts.’

They had a good time eating the Every Flavor Beans. Harry got toast, coconut, baked bean, strawberry, curry, grass, coffee, sardine, and was even brave enough to nibble the end off a funny gray one Ron wouldn’t touch, which turned out to be pepper.” (pp. 103–104)

The passage always grabs students. They’re eager to find out what we’re going to do with the “beans,” so we begin the activity right away. For this activity, each group of three students will need:

• A small (3 oz) cup filled with about 10 Bertie Bott’s Every Flavor Beans (1/2 pound total for a class of 30
students) and one jelly bean not found on the Bertie Bott’s key. (I try to make sure that every group gets a nice selection of disgusting flavors and normal flavors from the box.);

• A copy of the Bertie Bott’s dichotomous key (Figure 1). A classification key that uses regular-flavored Jelly Belly gourmet jelly beans (Figure 2, page 22) is also available—or you can make your own key to any brand jelly bean; and

• A sheet of paper and a pencil.

I usually model how to use the dichotomous key once using a single Bertie Bott’s bean and have students follow along. I like to use the dark-white colored bean as the example. I have a student taste it and they quickly respond to the “fishy” flavor. This usually gets a good reaction with the class.

I then state, “It sure would be nice to know what flavor it was going to be before we taste the candy! Let’s try to identify the nasty flavor of this bean.” We then go through the key and identify the dark white bean as salmon. The class catches on right away and immediately the orange beans with spots are discarded, they are vomit flavored!

Students continue to identify the beans in their cup using the dichotomous key. A good exploration of classifying and taste-testing beans takes 10 to 15 minutes.

Be sure to circulate the room and question kids on how the taste compares to the key identification. Once students are almost finished, they inevitably realize one jelly bean (the “new species”) is not on the key. I ask them to follow the format of the key and construct an addition so that the new “species” fits within the construct of the dichotomous key.

This is quite easy for most upper-grade students, as they are able to follow the pattern of the dichotomous key and find the right place for the new flavor. Sometimes, students get a little confused trying to renumber the key, but I emphasize to students that the bean’s description is more important than the numbering.

Explanation
Making Connections
After the bean activity comes the Explanation phase, when the content of the lesson is conveyed and reaffirmed. This phase is accomplished best through teacher-guided questions.

For example, in this case, after sorting beans and making modifications to the key to fit the new jelly bean, we discuss the following questions. In this way, I assess students’ understanding of classification and how to use a dichotomous key.

• What did you use to determine what flavor of bean you had? (A physical characteristic, i.e., the bean’s color.)

• What did you do to determine if you were correct? (Taste the bean.)

• What other things do we classify? (Plants, animals, fungi, and bacteria. In the nonliving world, we classify rocks, minerals, and landforms.)

• Why would we want to classify things? (Humans classify all things—living and nonliving—in order to understand about our world, and new species are still being found today!)

The last question gets students talking about classification. At this point, if working with younger students I usually introduce the taxonomic system generally, by discussing that living things are grouped together by shared characteristics.

If, however, I’m working with older students or preservice teachers, the discussion is more in depth, covering the taxonomic system originated by Carolus Linnaeus. With older students, we usually go through one or two organism’s classification, such as shown in the example below.

Domain: Eukarya
Division: Animal
Phylum: Chordata
Class: Aves
Order: Passeriformes
Family: Emberidae
Genus: Sternella
Species: neglecta
Common name: Meadow Lark

Reading the Harry Potter passage always grabs students’ attention. They’re eager to find out what we’re going to do with the “beans.”
The bean is…
1a. yellow, orange, red, or pink go to line 2
1b. blue, purple, or green, go to line 16
1c. black or brown go to line 24
2a. yellow or orange go to line 3
2b. pink or red go to line 11
3a. yellow go to line 4
3b. orange go to line 7
4a. solid yellow go to line 5
4b. yellow w/ brown spots Top Banana
4c. yellow w/ white or yellow spots Lemon Drop
4d. white w/ yellow spots Buttered Popcorn
4e. yellow w/ green spots Mango
5a. dark yellow go to line 6
5b. bright or pale yellow Pina Colada
6a. bright yellow Crushed Pineapple
6b. pale yellow go to line 8
7a. solid orange go to line 9
7b. orange with red spots Peach
8a. bright orange go to line 10
8b. light or pale orange go to line 11
9a. orange, orange Orange Juice
9b. creamy orange Orange Sherbet
10a. light orange go to line 12
10b. pale orange Tangerine
11a. pink go to line 13
11b. red go to line 14
12a. bright pink Cotton Candy
12b. light pink Bubble Gum
12c. pale orange pink Pink Grapefruit
12d. pink w/ red spots Strawberry Daiquiri
13a. solid red Sizzling Cinnamon
13b. red w/ light spots Strawberry Jam
13c. red w/ dark spots Very Cherry
14a. bright red Red Apple
14b. red go to line 15
14c. dark red Raspberry
15a. deep red Cinnamon
15b. cinnamon red go to line 16
16a. blue or purple go to line 17
16b. green go to line 20
17a. purple go to line 18
17b. blue go to line 19
18a. purple or lavender Island Punch
18b. dark or blackish purple Grape Jelly
18c. purple with spots Plum
19a. bright blue Berry Blue
19b. dark blue Blueberry
20a. solid green go to line 21
20b. green w/ spots go to line 22
21a. dark green go to line 23
21b. light or pale green Jalapeno
22a. dark green w/ red spots Watermelon
22b. pale green w/ dark spots Juicy Pear
22c. light green w/ green spots Margarita
23a. bright green Green Apple
23b. light green Kiwi
23c. yellow green Lemon Lime
24a. black go to line 25
24b. brown go to line 26
25a. black Licorice
25b. dull purple black Wild Blackberry
25c. shiny purple black Dr. Pepper
26a. brown go to line 27
26b. light brown go to line 28
26c. dark brown w/ spots Cappuccino
27a. brown go to line 29
27b. dark brown A&W Root Beer
27c. dark brown Chocolate Pudding
28a. light brown Caramel Apple
28b. light orange-brown Peanut Butter
28c. pale brownish-white Café Latte

** Note: Watch for new species!

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The jelly beans in this key were selected from Jelly Belly’s official flavors for 2003. The classification lesson based on jelly beans was created by myself and a colleague, Kathleen Jacobitz, at the University of Nebraska–Lincoln, and adapted from an idea presented by Karen Reynolds at San Jose State University.
Finally, with both older and younger students, we discuss that the classification system changes as advances in technology allow scientists to make new discoveries about the genetic relationships between organisms.

**Elaboration**

**Extending Content Learning**

The next phase of the learning cycle allows for both practice and application to a new context. The Elaboration phase—usually another hands-on, heads-on inquiry activity—allows for content to be extended or explored in a different setting.

During this activity (about 30–45 minutes) students practice their classifying skills using buttons. Each group of three students will need:

- 6 different buttons in a sealable plastic bag (about 100 buttons total for a class of 30); and
- lined paper or a science journal and a pencil to construct a dichotomous key.

Give each group a bag of six assorted buttons. Have the students sort the buttons into three groups.

Have the groups use the six buttons to construct a dichotomous key, using a large characteristic (e.g., four holes in button, two holes in button, or shank) to begin the process. Then have them subgroup and continue to construct the key using the Bertie Bott’s key as a guide. Bring the activity to a close by having the different groups share the characteristics they used for classification.

**Evaluation**

**Assessing Understandings**

The final phase, Evaluation, is conducted throughout the classification lesson and activities. Formative assessment occurs as I monitor, question, and observe that children understand classification. As a summative assessment, I have students construct their own dichotomous key following the button classification activity.

After students make their dichotomous keys, have them switch keys and buttons to see if they can properly key out the buttons using another group’s dichotomous key. Basically, if the key works and the students have used a dichotomy for division, the key is correct.

Classification is something that children naturally do. They sort their socks, arrange their pencil boxes, and, on occasion, even clean their rooms. As children develop their process skills they eventually begin to sort things using more sophisticated criteria, such as physical characteristics. This activity is fun way for students to practice the art of classification and learn about the construction of dichotomous keys.

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**Resources**


**Internet**

Jelly Bean Sources
www.jellybelly.com
www.bulkcandystore.com
www.justborn.com/products/tb.html