

Group C Programs

12-16 years

Sustainability program

Food Chain game

Part 1:

Students are in groups

- Photos of different animals are attached to the back of each student
- Through Yes/No questions each student tries to discover what is the animal attached to his/her back

Part 2:

- After each student discovers what is the animal on his/her back
- Students work together to form different food chains and food webs

Examples of animal photos:



Remote Sensing

Which is which activity?

Students try matching description in text with its satellite images.

Example:

Description in text:

Five bridges across a river. Three of the bridges also pass over islands in the river



Matching Satellite image:

Darwin program

Evolution by Natural Selection

Materials

1. 2-3 yards of black fabric for habitat (should be faux bear fur, or some other rough fabric) (one per class).
2. Yards of red cloth for habitat (should be furry fleece with a different texture than the black habitat) (one per class). The size of the habitat should accommodate half the students in your class.
3. 7-10 mm black, red and white small paper circles (200 of each color per class)
4. Plastic forks, knives, and spoons for hunter implements (one for each student)
5. Cups for hunter's stomachs (one per student). To make the hunting task a little more challenging, you can use small plastic test tubes, or the small plastic tubes that florists put at the ends of roses.
6. Calculator to calculate percent numbers, and a timer for timing 30-second feeding time.

Aim

In this natural selection activity, students will play a simulation game to demonstrate how natural selection works. In addition, introductory materials, graphing the data, and analyzing the results will be introduced and carried out.

Steps

1. Before class, count out 2 batches of paper circles with 30 paper circle of each color in each batch. (If you have a particularly large class, you may want to have 40 paper circles of each color in each batch.) Prepare two charts on the board for recording the numbers of each type of paper circle and hunter in both of the habitats for all three generations. For each class, you will need two copies of the data sheet.
2. During class, disperse one batch of paper circles in each habitat.
3. When you are ready to begin the simulation, divide the class in half (with each half of students becoming the hunters on one habitat type) and give each student a fork, spoon or knife (one-third each). Explain the rules of the game to the students again.
4. They will have 30 seconds in which to feed. (You may need to adjust this number of seconds, depending on the number of students you have, cloth size, etc).
 - a) During this time, they must try and pick up as many paper circles as possible and transfer them to their cups. They must pick up the paper circle with their feeding tool and put it in the cup.
 - b) They must keep their cups upright at all times and are not permitted to tilt the cups and shovel paper circles into them.
 - c) Competition for resources is fair (and acceptable) but once a paper circle is on a feeding tool, it is off limits.
5. Start the feeding, and call Stop after 30 seconds.

6. After the students perform the feeding step, they will count how many paper circles they have in their cups. Students from each habitat type will then line up separately in order of how many paper circles they have in their stomachs (least to greatest).
7. Once they are in line, you or your assistants should go down the line of students and record how many paper circles of each color were eaten and how many survived. Since each surviving paper circle is joined by two offspring, the number of paper circle to add to each cloth/habitat type will be twice the number of surviving paper circle for each color.
It is important that students stay in order during this process so it is easy to perform step number 8. You may also need to remind students not to put the paper circles they have “eaten” back onto the habitats. Those paper circles are dead and cannot reproduce.
8. When the paper circle counting is finalized, it is time to determine which hunters will get to survive and reproduce, i.e., which ones caught enough paper circles. For each habitat, have the students stay in line. Half of the students in each habitat who “ate” the most paper circles will survive and reproduce. The other half of the students who “ate” the fewest paper circles will die and be “reborn” as children of the half of the students who survived. Start with the person with the lowest number of paper circles, apologize that they did not eat enough to survive, and tell them that they are now the offspring of a hunter who survived. Give the student the same implement as the person with the highest number of paper circles. Work your way up the line of students, matching each low person with the next person from the high end of the line. If you have an odd number of students, the student in the middle survives but does not reproduce. Record how many hunters of each type there are in the next generation after all the implements have been changed.
9. When everyone has their new implements, it is time to count out the new paper circles and collect them from the stomachs of the hunters. Remember these paper circles are dead and are not to be added back to the habitat. Assign students to help, and it will happen quickly.
10. Kernel the habitats with the new paper circles and begin the second round.
11. After the second round is completed, and all the counting and recording is concluded (remember to get hunter numbers for generation 3), the students should be seated. write the data on the board, then have the students record the data on their worksheet.

Conclusion

Any system must include three necessary conditions for evolution by natural selection to occur, which are Variation in characteristics, Differences in fitness, and Heritability of characteristics.

Discoveries in Islamic Countries program

- **The Light Beam**

The favorite game of Nabil and his sister Fadila was to explain the things that occurred around them, the things that they observed around them or in them. They were therefore passionate than others of their time, a little magic mingled amidst them, like the day when they wanted to solve the secret of light . . .

That day, Nabil and Fadila had just set up a tent by the river bank. They had made it from an old green curtain, so that they were protected from the Sun, and were hidden from view in the middle of the papyrus. They were observing the countryside that they could see through a small opening, until Nabil asked his sister:

— Fadila, how can that big palm tree on the opposite bank of the river completely enter our tent so that we can see it with our eyes?

— Our eyes send it perhaps something that transforms it into a traced image, firstly until it enters the tent, then until they. . . Fadila interrupted. She looked at Nabil; it appeared to her that he had turned green.

— Nabil, do I look green to you, me as well?

— Yes, it is strange, look, even our clothes are not the same color!

He stretched his hand outside, and by the light of the day, it returned to its ordinary color. He raised his eyes to the Sun, but the pain forced him to stop and go back in the tent, angrily. Fadila mocked him:

— Nabil, if you could see your head, everything is green again! Why are you so furious?

— Because I cannot look directly at the Sun!

— It is because there are black spots in the middle of my eyes, which are not becoming any smaller. We are too young and our eyes have not yet learned how to adapt. Nabil did not appear convinced, besides he had not seen any adults looking directly into the Sun. Fadila changed the subject to deride her brother:

— At night, you know that you can see clearly without becoming a cat?

— If that is right, I would like to become a cat. The black circle in the middle of my eyes would be a fine line during the day and a big circle at night, and my eyes would shine so that I could see everything!

Nabil was smiling again but he was, as was Fadila, frustrated as their questions remained unanswered. It was then that a light wind blew inside the tent and a man with a white beard, wearing a turban and a long brown coat sat next to them:

— Hello, I am Abu Ali al-Hasan ibn al-Haytham. I have been listening to you for a short while and I believe I can help you. Return here at the same time tomorrow, and I will help you with the secret of the light, as I discovered it a long time ago.

The man disappeared as he came, with a puff of wind, inexplicably. Nabil and Fadila took down their tent and papyrus ties and returned home, impatient for the following day.

What happened the next day is not known to us, it was so long ago, the memory is lost! All we know is that Ibn al-Haytham was the first to know the secret of the light and how our eyes see. In one manner or another, just as he previously visited Nabil and Fadila, he visits us today and everyone who asks the same questions. In one way or another. . .

- **Pulmonary Circulation**

The favorite game of Nabil and his sister was to resolve problems which arose as they were observing what was going on around them, or in them. They were much more passionate about this than others of their time, a little magic was amongst them, as the day when they wondered why their heart beats were so strong inside their bodies when they were out of breath. . .

It all happened when they had escaped from one of their big sisters who they had teased. They reached unencumbered their place on the riverbank and they were very much out of breath. His arms on his hips, he interrupted his sister:

— Fadila, put your hands on your chest; can you feel something beating strongly?

— Yes, it is my heart that is beating strongly and I have difficulty breathing, I am breathing too.

— Me as well, Fadila, we must wait awhile.

However, he soon got his breath and said:

— Put your hands on your neck, it beats strongly there also.

— Yes, but I get the impression that it is slowing down, and at the same time we are breathing less rapidly!

— Yes, it is calming down, it is calming down, but I am wondering what is beating in my fingers?

— Nabil, it is blood!

— Blood, really? How can you be sure? You cannot see what is happening inside the body whilst you are living, that is the problem!

A little disappointed that their query could not be quickly answered, Nabil and Fadila left to walk along the riverbank and the irrigation canals that watered their fields.

Fadila stopped suddenly.

— Look Nabil! The water is joining each little piece of earth through these grooves!

If the current becomes too strong, it overflows! That makes me think that the blood which flows when we are injured. . .

— You have some bizarre ideas, Fadila! Here is the flowing water, and it comes from the river; whilst the blood, usually, stays in the body!

— I know that, I am only trying to understand! Then, I think you want to know as well, what happens inside our bodies!

It was then that Nabil and Fadila heard a massive thunder-clap of laughter. They turned around and saw a man whose clothes and turban were an immaculate white, as was his beard.

— You have heard everything we have said and you mock us. Who are you?

— It is not you that I am mocking, it is the savants whose books I have read, and they did not have as good ideas as you! I am Ibn al-Nafis, I directed a hospital to look after people, but I am also interested in the interior of the body of those who no longer exist.

— Ibn al-Nafis, would you like, please, to help us answer our questions?

— Yes, but not here; for it is excellent to reflect, but it is also necessary to observe.

Follow me, and you will understand how blood flows through the heart and lungs to keep us alive!

What happened next has not come down to us, as it happened a long time ago, the memory is lost! It only remains that Ibn al-Nafis was the first to discover how the blood continuously renews itself in us from the air that we breathe. In one way or another, just as he beforehand joined Nabil and Fadila, he will join all of us today and all those who ask the same questions. In one way or another. . .

- **The Rainbow**

The favorite game of Nabil and Fadila was to resolve questions which were suggested to them when they observed what happened around them, or inside them.

They were more passionate about this than others of their time; a little magic was there, just as the day when an immense arch in flamboyant colors rose up in front of them in the sky. . .

That day, Nabil and Fadila were chatting as they trotted along the field, not seeing that the sky was changing into big dark clouds. Suddenly surprised by the rain, they ran for shelter under a big Sycamore tree. They were against the tree trunk under cover of the leaves; they were dry. However, Fadila grumbled about her damp clothes. Her brother interrupted her:

— Stop grouching, Fadila, the Sun will soon return!

— You know that! Look, it always rains. . .

Nabil took three steps to the side and took a furtive glance behind him. He threw a malicious smile at his sister:

— Right in front of us, yes! Go around the trunk and look behind us; what do you see?

Fadila went around the tree trunk, then her expression lit up suddenly;

— Oh, the Sun is coming back! How can it rain, and. . .

She was interrupted by the great shout that Nabil made;

— Come back to the side Fadila, look!

In the sky there was still rain, a great colored arc illuminated the sky. Fadila remained silent in surprise at this prodigy, Nabil joyfully said:

— Look, all the colors are suspended in the sky!

Fadila had regained her composure and added attentively:

— No, I cannot see all the colors, only four: red on top, then yellow, green and blue at the bottom. . .

— Fadila looked again, can you see between the red and yellow there are other colors, and others still between the yellow and the green, and also between the green and the blue. I bet you there are at least . . . a dozen colors!

Fadila, could sense them better because the Sun was warming his back, became suddenly animated. She asked so many questions, all at the same time, that Nabil could not answer them:

— Who could say which one of us is right? Then, how were these colors suspended in the sky? How are they always in the same order? Is it necessary for it to rain and to have sunshine at the same time? Nabil, do you believe that one day we could know the answers?

Nabil had fixed his gaze on the sky. He made a sudden sign to his sister to be quiet.

Fadila raised her eyes and saw a man with a long coat the color of the sky and a turban of the color of the clouds who had appeared under the colored arc. It seemed that he too was suspended in the air, but he addressed Nabil and Fadila distinctly:

— Hello, I am Kamâl al-Dîn al-Fârisî. It appears to me that I have arrived at an opportune moment! Do you know that numerous savants have worked on the colors of the rainbow, and thanks to their efforts and their experiences, their secret has been divulged? Would you be interested in knowing them?

In front of their shining eyes Nabil and Fadila, silently smiled. He took some round vases from his coat which he lifted to the sky to fill them with rain water, and picked a spot in the shade near the Sycamore tree.

What then happened on that day is no longer known, it was a long time ago, the memory is lost in the sands of time! It only remains that Kamâl al-Dîn al-Fârisî had succeeded in being the first person to introduce the theory of the rainbow. In one way or another, as he had accompanied Nabil and Fadila long ago, he tags along all of us today who ask the same questions. In one way or another . . .

- **The Astrolabe**

The favorite game of Nabil and his sister Fadila was to resolve problems which they observed as they occurred around them, or inside them. They were more passionate about them than others of their time; a little magic was about them, just as the day when they were trying to capture the stars. . .

The Sun was just about to set. Lying by the riverbank, Nabil and Fadila watched the stars light up one by one in the sky.

Fadilla broke the silence in a dreamy voice:

— As the sky become darker, you could see more stars. I wonder if anyone has tried to count them before. . .

Then she became more animated and sat up to look around her:

— Nabil, where has the moon gone?

Nabil groaned. He liked to look at the show the stars put on, and had no inkling to move, he softly replied to his sister:

— It has to sulk, just like you sometimes!

Fadila was vexed:

— That is nasty! The moon has not yet risen! You believe maybe, that I do not know that the stars are on tour during the night?

Encouraged by the fact that he had annoyed his sister, Nabil picked up his train of thought and said:

— You know, then, that in the middle of them is one star that does not move!

Fadila was surprised by this statement, but she quickly reacted:

— If there is one, it will be easy to find! All you have to do is make a drawing of the stars, and return a little later and make another, compare the two and see which star has not moved!

— It will not be easy to draw the dome of the sky on a flat piece of paper! How can you be sure that it will be the same star on each of the drawings?

Under the cover of his teasing, Nabil asked Fadila some questions that he had wondered about himself. Fadila, who was making good of her sulk, thought about them. Finally, she said:

— If you made a scaled model of the sky, it would be as if you had captured the stars.

Fadila was interrupted. From the sky, there overflowed a long line of bearded people wearing turbans and wrapped up in long coats, all had suspended from their hands a metal disc covered in inscriptions, and had circles and stalks that were turning under their fingers. There was a continuous murmuring about them: “. . . aim . . . find the height of the star . . . know the day and the hour . . . calculate . . .”

Nabil and Fadila forgot their quarrel and called out to them in unison:

— Please, would you teach us how to use your instruments?

The men mirrored themselves in a circle, conferring with each other, then one of them spoke:

— I am Abu Ja'far Muhammad ibn Musa al-Khwârizmî and I speak for all of us.

We agreed to introduce you to the astrolabe, but only until the moon appears, for later on we will be too busy. Come now!

What happened next has not been passed on to us, it was a long time ago, the memory is lost! It only remains that the astrolabe, the “taker of the stars” has been around Islamic countries for a long time. It lets you know the time during the night, to find your bearings in the desert, and many other operations too. In one manner or another, as the astronomers grouped themselves around al-Khwârizmî, they introduced Nabil and Fadila to the astrolabe and its use, they will inform everyone today its secrets if they want to know them. In one way or another. . .

- **The Water Pump**

The favorite game of Nabil and his sister Fadila was to resolve the enigmas which occurred when they were observing what happened around them, or in them. They were more passionate about this, than others of their time were, a little magic was about them, like the day when they were trying to think of a machine that would draw up water for them.

It all started with their favorite walk along the riverbank. It was hot that day. They decided to leave the little dry path and went down into the middle of the reeds. Their feet in the water, Fadila closed her eyes while delighting in damping her face and neck.

Seeing her, Nabil, always ready to tease, suddenly had an idea. He wanted to agitate her and started by splashing her, making windmills with his arms on the water surface.

— Stop it right now Nabil, you are such an idiot!

— Didn't I do what you wanted? Are you not refreshed now?

Fadila, furious, climbed up the riverbank to seek refuge:

— I am soaked, but cunning as well! Up here you cannot splash me.

Nabil stopped directly. Effectively, even with the most vigorous of windmills he could not reach his sister. Puffed out, he went further into the rushes. In front of her scowling brother, Fadila came down from her refuge and approached him laughing:

— So Nabil, you are in the huff!

— No, not at all, I am thinking! I am thinking about inventing a machine to soak you, even up there!

What a good idea! It could water the fields, it would be more useful than annoying me! Come on stop making that face, I am going to help you. Firstly, we have to make a windmill on the riverbank that will take the water from the surface of the river. That you know how to do, because you know about windmills!

While Fadila was trying to dry her wet hair. Nabil replied to her with a grimace, then said:

— After that, we have to push the water further on, but how can we do it?

Fadila put her hand on his arm to signify to him, to be quiet. Coming out from behind the rushes, a man wearing a turban and a blue overcoat came to sit down near them.

He observed the course of the river quietly then spoke to them with a smile:

— I have been watching you since you were on the riverbank. Did you know that your games provide some interesting experiments, and that you have had some good ideas? I am al-Jazari and I have made the machine that you tried to imagine. If this interests you, I can explain how it works. Come on! The man got up and took out from his coat some plans with toothed wheels, beams and pipes. Nabil's and Fadila's eyes shone with curiosity. They got up in one bound and followed the man who disappeared with them in the rushes.

What happened next has not come down to us, it was such a long time ago, the memory is lost! It only remains that al-Jazari was the first to conceive the ingenious

machine to pump water . . . In one way or another, as he accompanied Nabila and Fadilla, he can accompany you today and all those who ask the same questions. In one way or another. . .

- **The Balance of Wisdom**

The favorite game of Nabil and his sister Fadila was to resolve the enigmas which occurred when they were observing what happened around them, or within them. They were more passionate about this, than others of their time were, a little magic was about them, like the day when they were making a sort of fishing rod so that they could plunge stones in the water.

That day, Nabil and Fadila were hanging around a small lake in the rushes, not far from their hiding hole on the river bank. They had tied together several long beams of rushes so that they were rigid, before fixing some string to one of its ends. Then they had the idea; the string was taut, to attach a stone and they enjoyed themselves by plunging it into the water and pulling it out as if they had caught a fish. Nabil became more and more active and finished by splashing his sister.

— Nabil stop, it is my turn! You are not achieving anything with the cane, I bet you never noticed that the stones are less heavy when they are plunged into the water.

To notice it, you have to put them in gently, like I do all the time!

— Anyway, I already know that. How do you think you can swim in water, otherwise? That would be impossible to do in the air!

Vexed by the supercilious manner of her brother, Fadila did not reply. She contented herself with issuing him with a challenge:

— Since you are so strong, can you show me how you can, without using your hands, plunge the stone in the water at the end of the string.

Very calmly, Nabil took the cane and held it out horizontally on his shoulder.

Behind him, the long part of the cane balanced out the other shorter part, at the end of which was the string and the stone.

— Not bad! Watch out, now, I will change the stone, I will put a bigger one on.

What do you think, should I move the cane on my shoulder backwards or forwards?

Nabil started to slide the cane, then it lost its balance, tangled up with the rushes strewn about the ground and fell in the water. Furious, he turned on his sister:

— Look, why are you giving me orders? You have not done it, with your little experiments!

Hiding her pleasure in outwitting her brother, Fadila looked at him knowingly:

— It is because you are bigger than me, so it is easier for you to balance!

— Oh well, if that is all, I am not a giant balance! Besides, I am going to make a proper one of them, like the merchants have! The stones that you chose will be passed without me having to do these ridiculous gymnastics. They will have trays at the ends of the strings to put them on, as this will be easier than tying them on!

Fadila found her brother's idea so good that she had no further wish to mock him:

— Well done Nabil! Your scales, will have two strings, excuse me, two trays?

— Perhaps, but in the commercial center, I have seen them with several trays, I wonder what they can be for. . .

— Well let us think about it and try several!

Occupied in thinking about how to achieve the object of their project, Nabil and Fadila had not seen the appearance of a man behind them whose clothes and turban were trimmed with gold threads, resplendent in the sunlight. He was carrying a leather bag full of mysterious objects and holding in one hand a receptacle full of water. On a

finger on his other hand, scales were suspended. The clanks of his numerous trays finally made Nabil and Fadila turn around, surprised, exclaiming in chorus:

— Oh! what nice scales!

— From what I heard of your conversation, I think they could teach you a lot. I am al-Khâzinî, and I have worked enjoyably to perfect this type of scales, as have several of my predecessors. I would be happy to offer them to you as a present, if you are ready to learn how they work.

A big smile lit up their faces, Nabil and Fadila silently nodded their heads. Their eyes were shining in curiosity, they approached the man with the gold trimmed clothes. He put the bowl with water in next to them, as well as other objects that he had with him in his bag, and started to assemble the scale with trays, explaining as he went along. . . What happened next has not come down to us, it was a long time ago, the memory is lost! It only remains that al-Khâzinî was the first one to perfect the scales with five trays, also known as “The Balance of Wisdom”. In one manner or another, as a long time ago he accompanied Nabil and Fadila, he will accompany today all of those who ask the same questions. In one way or another. . .

Creativity and Innovation program

- Multiple Intelligence Survey

<p>Likes to talk about books</p>  <p>1</p>	<p>Enjoys taking care of animals</p>  <p>2</p>	<p>Likes to make posters</p>  <p>3</p>	<p>Likes to hop, skip, jump, and run</p>  <p>4</p>
<p>Plays with measuring cups</p>  <p>5</p>	<p>Keeps a journal or diary</p>  <p>6</p>	<p>Tutors classmates or friends</p>  <p>7</p>	<p>Likes to talk about dreams</p>  <p>8</p>
<p>Makes scrapbooks or photo albums</p>  <p>9</p>	<p>Joins a sports team</p>  <p>10</p>	<p>Enjoys group projects</p>  <p>11</p>	<p>Likes quiet time</p>  <p>12</p>
<p>Enjoys role-playing</p>  <p>13</p>	<p>Hums, claps, clicks, bangs, and snaps</p>  <p>14</p>	<p>Likes to think alone and daydream</p>  <p>15</p>	<p>Likes to draw or read maps</p>  <p>16</p>
<p>Enjoys puzzles and mazes</p>  <p>17</p>	<p>Appreciates the words with music</p>  <p>18</p>	<p>Likes camping and the outdoors</p>  <p>19</p>	<p>Joins a band or orchestra</p>  <p>20</p>

<p>Likes to argue or debate</p>  <p>21</p>	<p>Likes to compare and contrast</p>  <p>22</p>	<p>Learns a second language</p>  <p>23</p>	<p>Composes music and songs</p>  <p>24</p>
<p>Spends time on the computer</p>  <p>25</p>	<p>Sets and reaches goals</p>  <p>26</p>	<p>Likes to take things apart</p>  <p>27</p>	<p>Classifies outdoor objects</p>  <p>28</p>
<p>Likes to ask questions</p>  <p>29</p>	<p>Creates new things</p>  <p>30</p>	<p>Writes letters to friends and family</p>  <p>31</p>	<p>Pretends and uses imagination</p>  <p>32</p>
<p>Wants to know family roots/origins</p>  <p>33</p>	<p>Likes to dance</p>  <p>34</p>	<p>Discusses things with others</p>  <p>35</p>	<p>Plants trees and grows gardens</p>  <p>36</p>

Multiple Intelligence Survey for Primary School Students

Directions:

Key

Word Smart	Math Smart	Self Smart	Picture Smart
1	5	8	3
6	22	12	9
23	25	15	16
31	29	26	17
		33	32

Music Smart	Body Smart	People Smart	Nature Smart
14	4	7	2
18	10	11	19
20	27	13	28
24	30	21	36
	34	35	

- **Scientific Method: Coin Lab**

How many drops of water can a coin hold?

You are a Scientist! Apply the Scientific Method as you work through this lab.

Purpose

To show how changes in procedures can lead to changes in results.

Materials

1. Two different coins
2. Paper towel
3. Eyedropper
4. Water
5. Lab Sheet

Procedure

1. Begin the Scientific Method Sheet, and continue it as you work through this experiment.
2. Place two different types of coins on a paper towel.
3. Use an eyedropper to put drops of water on the coins. Count how many drops each coin can hold before the water overflows.
4. Record findings on the Lab Sheet.

SCIENTIFIC METHOD SHEET

Complete the Parallel Flow Map for this lab. Write your ideas on the right side.

