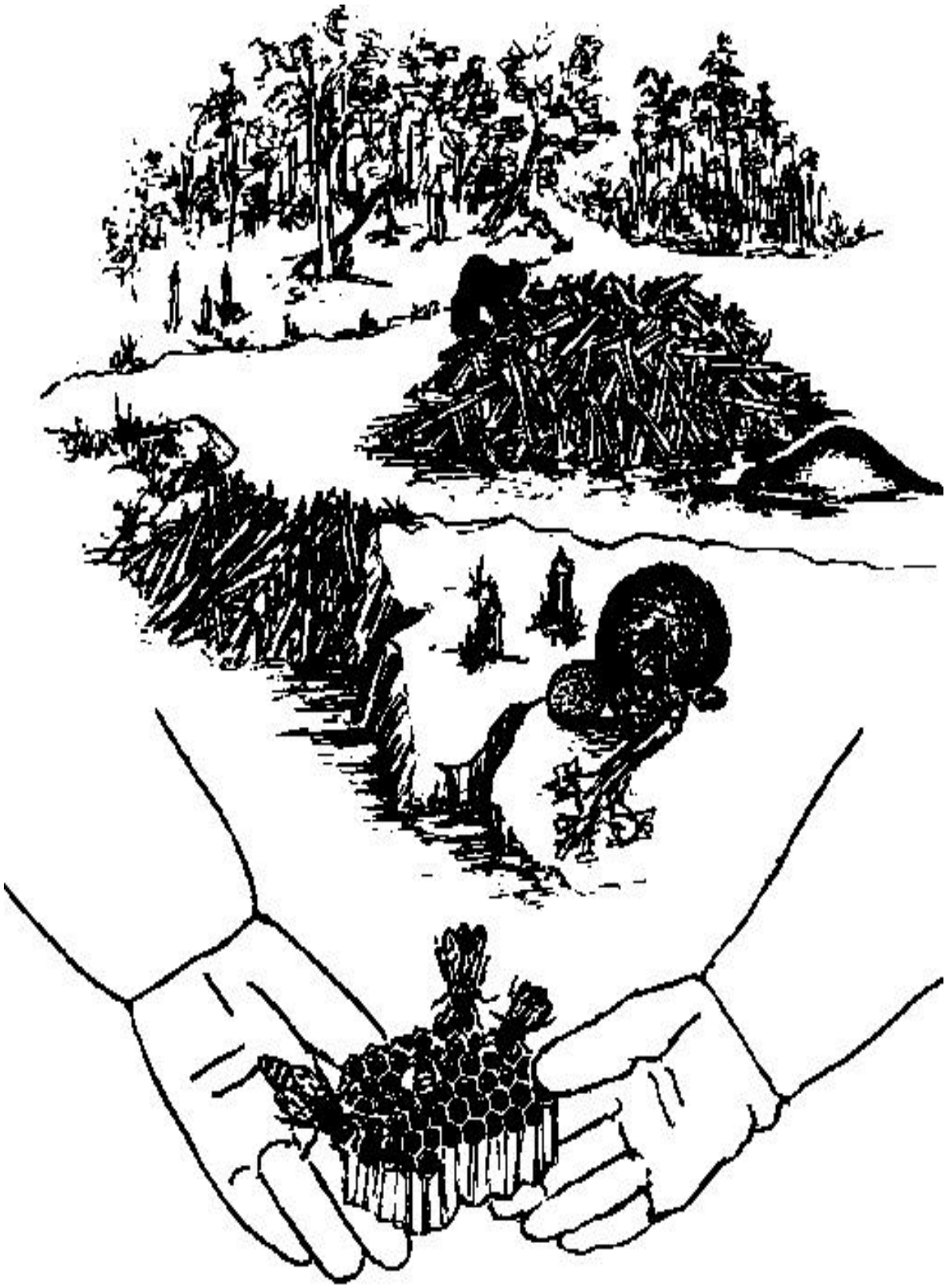

Architect of the Future

Ivadene Dhority

Laurence Brown: Engineering Visions in Harmony with Nature

Laurence Brown grew up in Hanaaglii (Carson, New Mexico) with many children his own age. Laurence is Tabaaha (water's edge Clan) and born for the Nashashi (Bear Clan). He lived in an area known as the Checkerboard Reservation, since it is not connected to the Navajo Reservation. He lived next door to his grandparents with his two brothers and sister. Since both of his parents worked during the day, Laurence, his brothers, sister, and cousins, who lived nearby, were cared for by his grandparents, who chiefly spoke Navajo. As a child, Navajo was his primary language even though he learned English at the same time.

When Laurence entered first grade, both of his parents began working at a boarding school. His family moved to the school campus which was two miles west of the home of his grandparents. When he was in the third grade, his father died and his mother became the sole support of the family. His mother remarried after his freshman year of high school. His mother, stepfather, and two youngest half-brothers still live at the boarding school where his mother is the head supervisor. His stepfather is an operator at a gas company.

Although the family lived on the campus of the boarding school, his brothers, sister, and he attended the public school in Bloomfield, New Mexico. To get to school, they traveled 30 to 50 miles by bus. As Laurence reflected on this, he realized that most non-Navajo students did not have that long bus trip each day to attend school.

The distance to Bloomfield did not keep Laurence from being an active participant in school activities. He began playing sports and the trumpet during his junior high school years. In high school, he was a member of varsity football, basketball, and track teams. He was also captain of both the football and basketball teams. These activities helped him to become a competitive individual and realize the importance and hard work required to work on a team and be a leader.

During high school he had a variety of summer jobs in addition to his responsibility of herding sheep. He worked a variety of jobs including painter, groundskeeper, and hod carrier (a very physical job, carrying “mud” for the masons who were laying bricks and blocks). These physical jobs encouraged him to look for occupations where he could use more brain

power and less muscle.

He applied for and got a teacher's aide job in a first grade classroom. He assisted the teacher every morning, attended his classes in the afternoon, and then practiced sports. Laurence felt that he could help the teacher with the incoming Navajo children who were attending school for the first time and sometimes had some difficulty with the English language.

After graduation he began making plans to attend college and obtain a degree in chemical engineering (Ch.E.). He decided to attend New Mexico State University (N.M.S.U). Laurence chose chemical engineering because of the challenge and prospects for a good salary. He assumed that if he could handle the Ch.E., then he would be able to handle any other discipline, if he should decide to change his area of specialization.

Laurence learned that chemical engineers invented many new, marketable materials. For instance, the search for synthetic rubber led to several fascinating discoveries such as Silly Putty which led to a million dollar novelty industry. At DuPont scientists working with organic molecules called polymers discovered that thin strands of the material could be pulled to the thickness of a silky thread resulting in a man-made textile, Dacron polyester. While investigating the strength of this new material, they invented yet another clear polymer film which they called Mylar. Compact audio and video discs are made from Mylartm polymer. The clear tough material used in the production of windshields and scuba diving masks are examples of the rapidly growing plastics industry.

The search for new materials provides one of the most dynamic frontiers for science. Engineers and chemists explore new materials for fuel, construction, building, and eating. Weekly we hear the announcements of amazing new substances like metals that behave like glass, plastics that conduct electricity, windows that resist shattering, and hundreds of products that can be used at home, work, and school.

In many cases, scientists design new materials atom by atom. They have learned that certain arrangements of atoms produce materials with predictable properties. For example, certain groups of metal atoms provide good electrical conductivity and particle chains of carbon atoms create strong, flexible fibers. Many useful materials from plywood to super glue were designed and developed by chemical and material engineers.

One of Laurence's summer jobs during college was working with the Four Corners Pipeline Company (Atlantic Richfield—-ARCO). He was able to go out in the field with engineers to observe and to help them with

their daily tasks like maintaining pump stations, repairing pipelines, and testing equipment.

In his sophomore year he began to realize the importance of good grades. . . unlike his first semester where he still had his old habits of sometimes skipping classes and always sitting in the back of the room. After his first semester, Laurence had begun to sit at the front of the class and attend every class session. This made a terrific difference, since he could no longer be distracted. He achieved academic honors and made the Dean's List for two semesters. As a result of his hard work in class, he was selected to be a participant in "Mobil's Week in the Business World," sponsored by the Mobil Oil Company.

The program influenced Laurence a great deal because it gave him confidence in his abilities as one of 28 students who were selected from across the United States. The group was flown to New York City to the headquarters of Mobil Oil for one week where the individuals discussed their short and long term goals. They also toured a research facility and a refinery. They were taken to Broadway shows and given special treatment on every occasion. As a result of this program Laurence was offered summer employment with Mobil at a refinery. He worked as a lab technician doing standard testing of petroleum products.

Laurence's next job was with the IBM corporation. That job was seven months in duration and coordinated with N.M.S.U. so that he missed the spring semester of 1983 but he was still considered a full time student. He was supposed to return to summer school at N.M.S.U. after that job, but instead he took six weeks and traveled throughout the United States with another student who was working at IBM. He returned to New Mexico State University for the fall semester. The nine month break from school was very good for him, since he returned to school with new enthusiasm. Because of the work that he had done, he looked forward to his upcoming classes. After his work experiences, he decided that he had chosen the correct discipline, since he would be able to find employment in various industries such as petroleum, computers, and pharmaceuticals.

After the following year of school, he wanted to explore new areas of chemical engineering and a new part of the country, so he interviewed with Hercules Chemical Company. He was fortunate to be selected to be a part of the Hercules Minority Engineering program. Through that program, Laurence was awarded a thousand dollar scholarship per semester and guaranteed summer employment for the remainder of his undergraduate studies. As a result, he obtained a job in Delaware at the Hercules Research and Development facility, thus exposing him to a whole new area

of chemical engineering and permitting him to travel to the east coast.

For his last summer job at college he returned to IBM. Laurence took this job with IBM rather than Hercules because he thought that he might want to live in the San Francisco Bay area when he completed his degree. After working there for the summer, he realized that he did not want to settle there, as it was too expensive and very crowded. He had also started to miss his family and culture.

With all his work experience in the many areas of chemical engineering, he had a clear and solid picture of where he would like to work, what he wanted to do and for whom he wanted to work. He decided he wanted to stay in the Southwest and that he wanted to work for IBM. When he graduated with a Bachelor of Science degree in Chemical Engineering, he went to work for IBM in Tucson, Arizona, as a test engineer. During his career at IBM, he was able to develop in professional and personal areas.

Although he was working at his professional career, Laurence was asked by the Equal Opportunity division to work with the community as a role model speaker for American Indian students and to bring students to the IBM facility for tours. He found that type of work with the Native American community very rewarding, since he had always had difficulty locating other Native Americans at his summer jobs. Through that work, he found that he might be able to help others by sharing his experiences with them, so that they might motivate themselves to achieve high goals and learn the value of education.

Through IBM, Laurence was asked to recruit American Indian professionals at the national American Indian Science and Engineering Society (AISES) conference. He was asked to speak to students at the University of Arizona and Arizona State University at their AISES chapter meetings, and he found that the information about his summer employment was valuable from both cultural and professional standpoints for the students. Since that time he has become a lifetime member of AISES and it has become a large factor in his life. AISES believes in assisting American Indian students in many areas of academics and in their careers. Laurence has found this work to be very rewarding and has decided to continue assisting Native American students whenever the opportunity is provided him.

Since his resignation from IBM, Laurence has been employed as a member of the technical staff by Sandia National Laboratories in Albuquerque, New Mexico. As part of his employment with Sandia, he participated in their “One Year on Campus” program. For this program, he

had to complete his Masters degree in one year at Stanford University in the Materials Engineering program. He completed the program and returned to Albuquerque.

He has been involved with the Science Advisors program at Teec Nos Pos, arizona; Crownpoint, New Mexico; and Navajo Academy in Farmington, New Mexico. In this capacity he has helped teachers with chemistry lessons on materials and basic structure of matter, adhesion of specific materials, and action and reaction. He has also participated in a number of career and science fairs as a recruiter and judge through American Indian Outreach at Sandia. Laurence has been appointed as co-chairman of the Career/Science Fair committee.

Although Laurence grew up in a single parent home which could not provide the financial support for his education, he was able to pay for his education through scholarships and grants. The education alone has provided him with the ability to help his family, himself, and other Native American people. In the future, he plans to remain at Sandia in his technical position and to stay actively involved in doing what he can to help his people.

Discussion Questions:

1. Why did Laurence decide to attend college?

2. What lesson did Laurence learn during his sophomore year in college?

3. What job experiences did he have while he was in high school? in college?

4. What special things did he get to do because of his good grades?

5. How did Laurence help kids?

Illustrations: Engineers in nature, beaver, and honeybees on page 1.

Science

Mystery Mixture

Objective:

Students will identify the properties of each mystery mixture.

Materials:

- plastic containers with lids (margarine or cottage cheese tubs work well).
- ingredients listed in recipes below

Exploration:

Students in groups of three or four are given recipes and materials. They are instructed to try to identify the properties of the mystery mixtures.

Recipes:

1. **Glurch**

   1/2 cup of liquid laundry starch
   1/4 cup of white Elmer'stm glue.
   1/2 teaspoon of salt

Mix the laundry starch and salt first, then add glue, stirring continually. Once a lump of material forms (making it difficult to stir), squeeze remaining liquid from the lump and dispose of this liquid in the trash or a separate "waste sludge" container. The rubbery material that remains is Glurch.

2. **Oobleck**

   1 1/2 cups of dry cornstarch
   1/2 cup of water

Add cornstarch slowly to the water (as if making gravy), mixing with fingers until all the powder is wet. It may take a little less or a little more cornstarch to get the right consistency. The material should be liquid enough to drip slowly from your fingers, yet feel solid when pressed on the surface (in your container).

Seminar:

Have the students in each group test the substances.

Which substance holds its shape best?
Which substance bounces best?
Which substance leaves a mark on your hand?
Which substance stretches the farthest?
Which substance flows faster when cooled?
Which substance changes the most over a period of time?

Invention:

The teacher will review the definition of a property (a characteristic unique to a substance). The new mixtures are colloids. Colloids include many interesting materials ranging from meringue to smoke and protoplasm to mayonnaise. All of these products have something in common, they have one material suspended within a second material.

As an example, remember a day when tiny droplets of water floated suspended in the air. The droplets could be felt, but they were not large enough to fall as rain. That fog is a colloid in the sky. Homogenized milk, formed when cream is broken into tiny droplets that can float within the watery portion of the milk, is another common colloid.

Application:

1. Compare and analyze the effect of different ingredients on the final product. How does each ingredient affect the resulting material?

2. After making these materials, have each group compare the properties of their material with that of Silly Putty.

3. Form a Materials Olympics where one or several characteristics (flow, bounce, or stretch) are tested between the groups that have varied the recipes.

Now that the students have become product engineers, they may study the Glurch in a systematic way. This is a form of product improvement. These are suggestions for things that they might do to change the product.

- Make two Glurches: one that bounces three inches and another that bounces only 1/2 inch when dropped from three feet.
- Make two Glurches: one that flows twice as fast as the other when held pinched between finger and thumb.
- Make two Glurches: one that tears and one that stretches when pulled apart.
- Make two Glurches: one that is smooth and one that is lumpy.
- Make Glurch to some specifications that you and another student invent.

Hints: How to alter Glurch to meet the challenges.

1. Change the proportions of ingredients.

2. Delete an ingredient or add something new (for example, flour).

3. Substitute a new ingredient for an old one (for example, rubber cement for glue, starch powder for liquid starch.

4. Change the production procedures in some way such as:
    - stirring or kneading different lengths of time.
    - kneading the Glurch inside or outside the pool of excess starch.
    - changing sequence in which ingredients are added.
    - extending the production process by heating or cooling or simply allowing Glurch to sit undisturbed.