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Chances' Choices: **An Interactive Module to Study Human Genetics**

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Chances' Choices is an interactive human genetics module designed by GENESYtems that uses pedigrees to study a large number of human genetic disorders and genetic issues with a fictional family. The story opens with Paul and Stacy Chance and their newborn daughter, Michelle, who has just been diagnosed as having PKU. The storyline continues involving additional family members with both biochemical and behavioral genetic disorders. With the introduction of each new member, a descriptive narrative sets the scene involving the students into the story. Along with a description of the biochemical malfunctions, each disorder is discussed in detail and methods of treatment are outlined. Moral and ethical issues are interwoven into the narrative and many discussion questions are generated.

The topics covered include PKU, hemophilia, alcoholism, high risk pregnancies, prenatal diagnostic procedures, familial hypercholesterolemia, Fragile X Syndrome, HLA testing, prenatal screening, twinning, consanguinity, Tay Sachs, and Huntington Disease. The material is best used in a laboratory/discussion setting. Although no wet-lab procedures are used, pedigrees can be generated for hands-on activities or critical-thinking techniques can be used for small-group discussions and presentations (either oral or written).

Chances' Choices is commercial available for \$50 US from Education Division, Foundation for Blood Research, P.O. Box 190, Scarborough, ME 04074.

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AIDS Testing: A Demonstration/Problem

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The World Health Organization estimates that by the year 2000 a cumulative total of 40 million men, women, and children will have been infected by HIV (human immunodeficiency virus), the primary causative agent of AIDS (Acquired Immunodeficiency Syndrome) (Culliton, 1991). Medical and social problems associated with AIDS on a worldwide scale will be very much a matter of concern for the foreseeable future. To encourage students to think about the current state of our understanding and our public policy with respect to this disease, we have developed a short demonstration/problem for students that involves the western blot method for diagnosing exposure to HIV (this method is the most definitive test for HIV commonly used at this time). Using HIV western blots from our local hospital testing service, we present the students with three blots (in the form of a color xerox): a positive and a negative control and a third blot for them to interpret. With the support of accompanying background text on the method, the students can then determine whether the third blot result is positive, negative, or indeterminate.

We use this demonstration/problem in the context of a protein gel electrophoresis laboratory. In this laboratory there are short intervals during which the students wait for centrifuge runs to be completed. The demonstration/problem functions (1) to constructively fill some of that time, (2) to stimulate group discussion of AIDS and the ethics of AIDS testing, and (3) to connect the students' laboratory work (gel electrophoresis) with the application of biotechnology in the real world.

I would be glad to send a copy of the blots and supporting text on request. Below are references we have found useful as TA background for the discussion of AIDS in this laboratory.

- Culliton, B. J. 1991. AIDS against the rest of the world. *Nature*, 352:15.
Gallo, R. C., and L. Montagnier. 1988. AIDS in 1988. *Scientific American*, 259(4):41-48.
(Basic background with useful figures.)
Gunderson, M., D. J. Mayo, and F. S. Rhame. 1989. AIDS: Testing and privacy. University of Utah Press, Salt Lake City, Utah, 241 pages.

The Use of Humor to Help Promote Critical Thinking in a General Biology Classroom

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In an effort to promote critical thinking among general biology students, a series of cartoons were collected for each of the major topics covered in a general biology course. Cartoons were used as an attention-gathering device. One question and five multiple-choice answers for the question were written for each cartoon. The cartoon, question, and answers were all made into a transparency. The transparencies were projected, and the students were asked to identify an interpretation, a conclusion, an assumption, and/or an observation from the given answers. All analyses were based on the cartoon being used. An *interpretation* is defined as an explanation of a situation that is based on no data. By contrast, a *conclusion* is an explanation of a situation which is based on data. An *observation* is what can be experimentally measured, and an *assumption* is a belief based on no evidence. If the student is asked to identify a correct answer, he or she is also asked to explain why the one answer is correct and why the other answers are incorrect. According to Piagetian theory a concept is completed when a student can justify his or her answer.

Use of Chives for the Study of Meiosis¹

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Chives, *Allium schoenoprasum*, can easily be grown in a garden or in a flower pot. Chives in pots can be “forced” to produce flowers in the winter by exposing the plants to increased light exposure. The inflorescence of chives is an umbel, and within the floral head one can find buds at different stages of development. The chromosomes (8 pairs) are relatively large and easily stained with orcein or hematoxylin without pretreatment or fixation (although fixed materials may be used).

Use a dissecting needle or forceps to crush immature buds in a drop of stain to release microspore mother cells from the anthers. Remove as much of the debris as possible. Many cells undergoing meiosis will be left suspended in the stain, and by the time the debris is removed the chromosomes within those cells will be adequately stained (perhaps even overly stained). If hematoxylin is used, a drop of 45% acetic acid should be added to destain the cells. Add a cover glass. Blot away the excess liquid, but be careful to avoid adding very much pressure to the cover glass because the chromosomes are somewhat fragile. Observe the slide at low and high dry magnifications. Once the preparation is scanned with the compound microscope it may be obvious that some pressure on the cover glass is needed in order to spread the arms of the chromosomes. This will be especially true when viewing cells in the earliest stages of meiosis. Use oil immersion to observe greater detail.

Prepare the orcein by gently boiling 1 g of synthetic orcein for 2–5 minutes in a mixture of 45 ml of acetic acid plus 55 ml of water. Prepare the hematoxylin by dissolving 2 g of hematoxylin in 50 ml of 45% acetic acid to which is added 0.5 g of iron alum ([ferric ammonium sulfate] $\text{Fe}(\text{NH}_4)(\text{SO}_4)_2 \cdot 12\text{H}_2\text{O}$). Filter after 24 hours, and store in a brown bottle for 2–6 weeks.

Robinson, A. 1982. Teaching meiosis with chives. *Journal of Heredity*, 73:379–380.

Robinson, A., and T. Peck. 1990. Postmeiotic mitosis in chives. *Journal of Heredity*, 81:399–400.

Wittmann, W. 1962. Aceto-iron haematoxylin for staining chromosomes in squashes of plant material. *Stain Technology*, 37:27–30.

1. This exercise was first presented as a major workshop at the 8th Workshop/Conference of the Association for Biology Laboratory Education (ABLE), Cornell University (1986), and will appear in *Tested Studies for Laboratory Teaching*, Volume 8 (in preparation). A revised methodology was published in *Laboratory Collection to Accompany Campbell's BIOLOGY* (J. E. Goodenough, Benjamin/Cummings Publishing Co., 1988, pages 19–21).

A Training Program for Graduate Assistants Who Are Non-Native Speakers of English

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The increasing number of non-native speakers of English (NNSEs) among graduate assistants and adjunct faculty presents new challenges to those who supervise laboratory education. Presented here is an overview of a training program for NNSE graduate assistants which comprises three components: cross-cultural communication, pedagogy, and language. Additionally, selected sources of information about such programs are provided.

For at least a decade, the number of graduate assistants who are non-native speakers of English (NNSEs) has steadily increased. The result often is that students complain about not being able to understand their teaching assistants (TAs). Additionally, there are potential problems in safety, as the NNSEs do not themselves understand the safety procedures and regulations or are unable to communicate them effectively to their students.

The University of Wyoming instituted a training program for NNSE graduate assistants in 1982. Since 1985, the program has been mandatory for all new NNSE graduate assistants. They must successfully complete the program in order to be certified to teach undergraduate students in any teaching assignment, including laboratories, recitations, discussions, and grading assignments which call for interaction with the students. The program is organized around three major themes: cross-cultural communication, pedagogy, and language.

Cross-Cultural Communication

Cross-cultural communication takes into account the way people of different cultures expect communication to take place. For the purposes of the training program, the emphasis is on classroom-related communication. For example, are students expected to ask questions of the teacher? In some cultures, the answer is “no.” In China, students ask questions of the teacher only if they wish to signal that they doubt the teacher's knowledge or have lost respect for the teacher. In Korea, students who ask questions are viewed as unbearable “showoffs” or are considered unbalanced. However in tertiary systems in North America, students certainly expect to be able to ask questions, even to challenge their teachers. Thus it is imperative that a Chinese or Korean TA understand that questioning by students is not an insult but rather quite normal behavior. This is part of the larger area of student-teacher interactions: When and under what circumstances are teachers expected to work with students one-on-one? What is the responsibility of the students? What are the expectations of students concerning the classroom behaviors of their teachers? How do students address teachers? What does it signify if the teacher calls a student by her or his first name? (In some countries, such personal recognition would signal that the teacher has determined that the student is outstanding, and the student might then decide she or he doesn't have to perform

any more in the class. A NNSE TA from such a country would probably never call students by their first names, which the students might interrupt as unfriendly behavior.)

An important part of cross-cultural communication is non-verbal communication. For example, in North American culture it is expected that the listener will look at the speaker. The speaker is also expected to establish occasional eye contact with the listener. If the speaker never does that, the listener will unconsciously interpret that to mean that she or he does not have to “attend” to the speaker, does not have to pay attention, and will quit listening. An open body posture (full front to the listener) indicates a willingness to be interrupted or to accept questions. A closed body posture (turned part way from the listener) is a signal that the speaker does not expect the listener to speak, and thus discourages students from asking questions or even from answering those questions the TA might ask. Additionally, the NNSE TA needs to be able to “read” the non-verbal cues of the students, those which indicate confusion or puzzlement, boredom, interest, etc.

In our research, we have found that questions and questioning are at the center of the classroom communication behavior of North American academic culture. Admittedly, students sometimes are reluctant to ask questions. But they insist that it is their right to do so if they wish. And if the verbal and/or non-verbal communication of the teacher signals to them that the teacher does not want questions or rejects them, they become very dissatisfied.

Pedagogy

Pedagogy as presented in our training program focuses on contrastive educational systems. Every culture has a philosophy and purpose of education which is tacitly understood by the members of that culture. But most people cannot articulate their culture's philosophy and purpose quickly. We begin by raising to a conscious level the NNSE's understanding of the philosophy and purpose of education of their own culture and then use contrastive analysis to show how those are or are not like the philosophy and purpose of education in this culture. This is an important step in their understanding of their duties as TAs since the expectations for the behaviors of students and teachers are directly related to them. At one end of the spectrum is the culture which has the philosophy that education is the passing on of known truths for the purpose of maintaining truth. Thus teachers (knowers of truth) have the responsibility to present the truth in its purest form. Students have the responsibility of learning the truth exactly as it is given to them; usually this means exact memorization of what the teacher has given them, without questioning. At the opposite extreme is the education system which has the philosophy that education means learning to learn for the purpose of having an educated populace capable of making intelligent decisions. In this system, the teacher is the facilitator, the “coach,” or the guide. Students are expected to question, to challenge, to weigh the evidence, to reach decisions on their own. Admittedly, these are the extremes. But, again, it should be apparent what happens if a teacher from the first culture is faced with a class of students from the second.

In addition to information about the United States education system in general, including some background about students' experiences in elementary and secondary schools, admissions policies in tertiary educational systems, and the differences between public and private schools, we give NNSEs assignments which are designed to help them gain specific information about the institution, for example, the demographics of our student body, school traditions, and teacher/student expectations. These will vary from institution to institution. For example, in some universities in California, it may be acceptable for students to arrive quite late to class or leave early; at the University of Wyoming it is not. We also help them learn discipline-specific information, such as preferred teaching styles, the emphasis placed on teaching, and something about the openness of faculty in that discipline to innovation and change relating to teaching. We know from our research

that students have formed their ideas about how the various disciplines differ in these matters. Students will consider a business management teacher unprepared if she or he does not come to class with a stack of prepared overheads ready to use and instead writes the information on the board. The same students get extremely upset if a math teacher uses overheads instead of the board. It is important for the NNSE TAs to teach in ways held to be appropriate by the discipline; otherwise they may be held up to ridicule by not only students but also the faculty for whom they work.

The last part of the pedagogy section focuses on information specific to the departments in which they will teach. NNSE graduate students need to know how to determine the informal power structure of the department and how to find out about departmental traditions, such as how graduate students are expected to address faculty and whether the invitation to the departmental tea is really a command performance. Failure to take part in the departmental traditions may spell failure for the NNSE graduate assistant as both teacher and student.

Language

The language part of the course begins with general proficiency. If students are not at a level roughly equivalent with a score of 250 on TSE (Test of Spoken English, Educational Testing Service), they are first placed in an oral skills class. If they have the necessary minimum proficiency to be in the training program, they will work primarily on public speaking skills, including non-verbal communication items like using the board or overhead projector effectively. We individualize the language training given each NNSE graduate assistant by focusing on the key vocabulary and routines (the words and phrases used repeatedly) of the discipline in which she or he will teach. And we also work on whatever participant-specific language needs we identify from four screening tests and their videotaped micro-teaching segments which they present every third day during the 3-week program. These may include production of specific sounds, grammar (for example, verb-subject agreement), or the pronunciation of key vocabulary.

A very important part of the work in language is devoted to listening comprehension. Just as our students are not used to listening to people who speak other dialects of English, we find that our NNSE TAs have had little experience listening to native speakers of American English. It is imperative that they be able to understand their students and their supervisors if they are to be effective teachers. One area of interest in this regard is reduced forms, the utterance “whaddya say” for the written form “what did you say,” for example.

Evaluation

At the end of the 3-week intensive training program held in August, those NNSE graduate assistants who are certified may teach, beginning with the fall semester. NNSE graduate assistants who are assigned teaching duties are visited in their laboratories or classrooms during the fall semester. Feedback after each visit is given to both the student and the student's supervisor. Individual NNSE TAs are also evaluated by processes initiated within the specific departments in which they teach. Departments have shared those student evaluations with us. There has been a definite decrease in the number of complaints in the student evaluations about NNSE TAs since the program was made mandatory. In addition, anecdotal evidence from the departments which have historically had the most NNSE TAs affirms that there has been a significant decline in the numbers of complaints received in the departmental offices.

Additionally, the training program has had a positive effect on the performance of NNSE TAs as graduate students. Before the program was mandated, the Dean of the Graduate School received an average of a dozen requests a year to reduce the course load of new NNSE TAs. Since the

program has been mandated, the Dean has not received a single such request. We infer from this that the orientation to the educational system and the language and cross-cultural communication training they have received has enabled them to cope better with the combined stresses of being both a student and a teacher in an educational system which is often quite different from the one they have previously been accustomed to.

Additional Sources of Information

Below is a brief list of some sources of information concerning training programs for NNSE teaching assistants. It is not meant to be exhaustive; rather, it suggests some points of departure for those who are interested in further information on the subject.

Textbook for students:

Byrd, P., J. Constantinides, and M. Pennington. 1989. *The foreign teaching assistant's manual*. Collier Macmillan, New York, 193 pages (ISBN 0-02-317590-7). (Includes sections on profiles of American students and teachers, backgrounds to US education, presenting in class or lab, using audiovisual aids, preparing tests, grading, practice for teaching, observing classes to learn about teaching, and hearing and pronouncing American English.)

Conference proceedings:

Chisum, N. (Editor.) 1987. *Institutional responsibilities and responses in the employment and education of teaching assistants: Readings from a national conference*. The Ohio State Center for Teaching Excellence, Columbus, Ohio, 374 pages. (Contains papers presented at the first National Conference on Teaching Assistants, held at Ohio State University, November, 1986. One section, of 15 papers, is on "International Teaching Assistants" with descriptions of programs, suggestions for methods and curriculum, and methods of testing.)

Nyquist, J., et al. (Editors.) 1991. *Preparing the professoriate of tomorrow to teach: Selected readings in TA training*. Kendall/Hunt Publishing Company, Dubuque, Iowa, 457 pages (ISBN 0-8403-6374-5). (Selected papers from the second National Conference on Teaching Assistants held in Seattle in November, 1989. Again, there is a section on international teaching assistants. There are also a few papers specifically on the special needs of laboratory assistants.)

[A third national conference was held in November, 1991. The proceedings from it will be available probably in 1992. For information, contact Marilla Svinicki, Director, Center for Teaching Effectiveness, Main 2200, The University of Texas at Austin, Austin, TX 78712-1111.]

Books:

Bailey, K., F. Pialorsi, and J. Zukowski/Faust. (Editors.) 1984. *Foreign teaching assistants in U.S. universities*. National Association for Foreign Student Affairs, Washington, D.C., 133 pages (ISBN 0-912207-03-5).

Nyquist, J., R. Abbot, and D. Wulff. (Editors.) 1989. *Teaching assistant training in the 1990s*. Jossey-Bass Inc., Publishers, San Francisco, CA, 138 pages (ISBN 1-55542-858-4). (Included are three chapters specifically on international TAs.)

Videotapes:

Smith, R. *You and your international teaching assistant*. Available on loan from NAFSA: Association for International Educators, 1875 N.W. Connecticut Ave., Suite 1000, Washington, D.C. 20009-5728. (Discusses the strengths and problems of international TAs, with hints for undergraduate students for dealing with their TAs.)

What's on the midterm, Dr. Brown? Available on loan from NAFSA (see address below). (Useful in a NNSE TA training program to show expected teacher/students behaviors in American post-secondary educational settings. It is useful also for orientation of graduate students as students.)

[Several videotapes of presentations made at the first National Conference on TAs are available through the Center for Teaching Excellence at The Ohio State University, Columbus, OH 43210. Contact Nancy Chisum for a list of available tapes.]

Organizations/Conferences:

Both NAFSA: Association for International Educators and TESOL (Teachers of English to Speakers of Other Languages) often have sessions at their state, regional, and national conferences on training NNSE TAs. For information, contact the national office of each organization.

NAFSA: Association of International Educators, 1875 N.W. Connecticut Ave., Suite 1000, Washington, D.C. 20009-5728, (202) 462-4811.

TESOL, Suite 3000, 1600 Cameron St., Alexandria, VA 22314, (703) 836-0774.

Consultants:

NAFSA's Field Service offers a consultation service on a cost-sharing basis to any institution in the United States which is involved in international exchange. Some of the consultants in English as a second language (ESL) are experienced in NNSE TA training. For information about the Consultant Service contact Bill Carroll at NAFSA (address above).