

Perspectives

Animals in Education

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A number of different views of the moral status of animals exist in today's society; some have been entrenched for many years. Two of the most widely held views are the humanitarian—humans should treat animals kindly and with consideration and should not be cruel; and the dominionistic—humans have been given dominion over other animals and we may do what we want with them provided that the consequences are not unfavorable to human beings (Kellert 1980). However, these attitudes are being called into question with increasing frequency.

The current resurgence of interest in animal "rights" (Singer 1975; Regan and Singer 1976; Clark 1977; Frey 1980) has resulted in much greater attention being paid to the distinction between warranted and unwarranted *exploitation* of animals as opposed to the simpler and more emotive concepts of kindness and cruelty (Fox and Rowan 1980). While it is important to foster behavior favoring kindness and discouraging cruelty, these concepts are not particularly useful in helping to resolve conflicts between human and animal interests, such as the use of animals in biomedical research and education. For example, we are not

being kind to a frog when we pith it for a classroom demonstration, but are we being cruel? For a small but vocal minority, the answer is an unequivocal "yes." For the majority, the answer is not so clear-cut, and this is where the concept of justified and unjustified exploitation is more useful in making social cost-benefit decisions. Education plays an important role in developing social consensus on such value-laden issues (Hoskins 1979; Kieffer 1979); but, to date, most educational efforts present very limited concepts of human/animal interactions. Animals are illustrated in their role in nature, or as anthropomorphized beings that behave and act very much like humans, or as useful didactic tools, especially in interactive situations between student and animal. Live animal studies are popular with teachers and students because the animal's immediate reaction to a stimulus provides positive reinforcement of learning and serves to stimulate interest and hold attention. However, maintenance of the animals in the classroom is not so welcome a past-time and neglect, particularly over holiday periods, can be a problem.

There is a difference between the study of animals in humane education curricula in elementary

grades and the use of animals in biology classes. In humane education classes, the animals are used to develop positive feelings and a humanitarian ethic (be kind, do not be cruel) towards our fellow creatures. In the biology classroom, the animal is perceived as a model of living processes and the prevailing attitude is that one should maintain a distance from the object of study so that emotions and sentiment do not interfere with accurate observation and the collection of data. Unfortunately, it is all too easy for the student to confuse scientific and humane purposes. Some students perceive the mere manipulation of an animal as "scientific" and the presence of an ethical concern for the animal's fate as emotional, unscientific, and, hence, undesirable.

Because many students become preoccupied with the mechanical elements of animal experimentation—rather than developing the self-critical and intuitive skills that are the basis of top-flight research—animal welfare advocates have raised questions about the use of vertebrates in school projects that do (or could) involve pain and/or distress. In contrast, the supporters of animal research point to the need to motivate, encourage, and nurture students who

show an interest in animal research so that they will pursue biomedical careers. Unfortunately, many of the arguments for or against the use of vertebrates in such projects are anecdotal and scattered. Well-designed studies to determine the truth or falsity of these assertions are few and far between. In an attempt to clarify the issues and, perhaps elucidate a few answers, a conference was organized on the use of vertebrates in secondary school and science fairs by the Institute for the Study of Animal Problems in connection with the Myrin Institute (McGiffin and Brownley 1980).

There were approximately forty invited participants, representing all viewpoints and including teachers, education researchers, biomedical scientists, science education administrators, and animal welfare advocates. In spite of the range of viewpoints and professions, the conference reached a relatively broad consensus when all present agreed that the study of live animals is an essential feature of biology education. This was perhaps best expressed by Mayer (1980) when he stated that he believed "in using animals to inculcate the kind of affective objectives that will stand the students in good stead, not only in the classroom, but what is more important outside the classroom as well. Only then will they come to develop that respect for all living things we must have if our current environment is to remain unscathed for future generations to possess and enjoy."

Another speaker stressed that animal studies involving hands-on experience provided a quality of perception that could not be obtained by other teaching methods but stressed that little evidence exists to demonstrate that this qualitative experience is necessary to develop biological literacy (Kelly 1980). Because few high school students will go on to further biological studies, the school biology curriculum should aim more at providing the general populace with an understanding of and respect

for living things than the development of such inert knowledge as techniques for dissecting rats or frogs. In fact, it is important that students are taught not only biological concepts, but also the place animals play in human psychological and cultural experiences. For example, the cultivation of empathy for animals does not simply mean describing what an animal does, one must also be able to predict what it might do in given circumstances (Kelly 1980). This requires a perspective on the animal that combines realism with respect and that is neither cold-bloodedly scientific nor overly emotional.

The participants seemed to agree in general terms with much of the argument relating to the objectives of biology education and the place of live animals within those objectives, though pleas were made for in-service training in animal care for biology teachers. The major disagreements came in the last part of the conference in the discussion on science fairs and extra-curricular biology projects. Those involved in the organization and operation of the International Science and Engineering Fair (ISEF) program strongly supported the right of accomplished students to explore more sophisticated techniques in animal research. On the other side, many of the participants argued that high school students too rarely understood what they were doing to be allowed to conduct unsupervised research projects on animals. In fact, it was the question of supervision that was central to the whole debate because the ISEF program relies so heavily on adult supervisors. Unfortunately, several of the participants with extensive experience in biology education and science fairs disagreed strongly with the ISEF organizers that the quality of adult supervision was adequate or that supervision safeguards against abuse (Mayer 1980; Rowsell 1980). For example, Mayer commented that a good deal of "animal experimentation is not only beyond the skill of the

student but frequently beyond the skill of the teacher. It ends up teaching no lesson except that animals suffer and die in inexperienced hands."

Several attempts were made to reach a compromise position regarding projects for science fairs that involved significant manipulation of the animal or its environment. However, the suggestion that such research projects should only be conducted in registered research facilities under the direct supervision of a trained biomedical research scientist did not find favor with the ISEF organizers. They believed this would discriminate against students who were not close to, and hence unable to use, such facilities. However, recent developments in the National Association of Biology Teachers may well render such debate academic. The Executive Board of the NABT adopted a policy that included an admonition that students doing projects with vertebrate animals should not undertake experimental procedures that would subject animals to pain or discomfort or interfere with their health in any way (NABT 1980). The National Science Teachers Association has also adopted a new code of practice on live animals that includes similar wording. If these codes are widely publicized and strictly enforced, the Dr. Kildare syndrome should disappear from the biology classroom.

However, a number of pressing problems remain that the conference could not address. For example, there is a need for research on the development of student attitudes and the extent to which, and manner in which, animal studies affect such attitudes. Perhaps the most pressing need at this point, is for teachers and educational organizations to recognize that animals are sentient beings and that we have a duty to portray them as something other than disposable biological tools, especially when they are being used in the biology classroom.

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Teachable Moments

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The discovery investigations described in this article were conducted with high school students in regular classes and those designed for slow learners. They happened during what I call, "teachable moments," and they grew spontaneously as time and weather permitted. Joy and expectation by students and teacher marked each investigation. Each celebrated a new awareness of the "old" everyday world. Each actively grew in scope and student-teacher involvement. All of our discoveries led to mutual fulfillment. None required costly materials; all yielded priceless learning experiences.

May Day—Play Day

The day is the fifth of May. The sun has warmed the earth deliciously for hours. Dandelions, tulips, daffodils, and dogwood add color to the green of spring. It is a great day to be

alive. With slow shuffling feet, the children file into the red brick building. The sunny landscape is replaced by an artificially lighted interior. A bell rings. School begins. For some few members of this captive audience, the passive routine will be broken; today is a special day. Today the world outside the school beckons. Today offers a "teachable moment."

Students carrying paper, rulers, and pencils joyfully tumble out of the building. Singly or in pairs they stretch and stoop, peer and poke, measure and count. They are gathering data for individual or team studies on plant diversification. Their instructions were minimal: seek as many different types of plants as possible; measure their heights metrically, if possible (approximate for trees); draw a leaf of each plant showing placement, pattern, and venation, and draw each plant's flower indicating structures of sta-

men, pistil, and petal. Exclamations fill the air: "But I never knew grass had flowers!" "Dandelions are plants? I thought they were weeds." "Needles are what?"

Later on a rainy day perhaps, the data will be collated. Bar graphs will be prepared to indicate the numbers of plants within height ranges and petal numbers. Percentages showing the number of flowering plants and the number with netted and parallel veined leaves in the survey will be computed. Forgotten taxonomy will be resurrected—monocot, dicot, angiosperm, and gymnosperm—will come alive in students' minds. Definitions of compound as well as simple flowers, leaf patterns, and vegetative reproduction, will be reinforced.

What better place to study diversification of plants than your own backyard on a glorious day in May. A new crop of plants deserves a fresh look at life.