Reply to Lock

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Lock's paper begins with a description of current approaches to the use of dissection in English schools. Lock contends that present practice employs the technique to assist students to understand the process of scientific inquiry, and to engage in sophisticated exploration of anatomical structures and their functions. His comments are interesting, but in the absence of supporting evidence (not so much as a curriculum document is cited), they remain anecdotal.

To turn to more substantive matters, Lock refers to data gathered by himself and his colleague employing a sample of English students aged 14 and 15. The original data appear to be reported in an internal research report of the University of Birmingham while other assertions rest upon articles which are either in press or in preparation. Given the inaccessibility of Lock's primary evidence it is difficult to dispute conclusions he has reached based upon that evidence. I shall restrict my response to claims which I believe the cited data fail to support.

Lock claims that teachers in England exhibit "a much wider acceptance of students' rights to opt out of lessons involving dissection." While I would be pleased if this were so, Lock's assertion rests upon the fact that only about half of his sample reported experience with dissection. However, it should be noted that the students were of an age that would place them in grades nine and ten in North America. Certainly, in much of Canada and the United States, initial experience with dissection may begin in the last two years of high school, and I expect that this may well be the case in England.

Lock's data present an interesting paradox. Why do a large majority of students offer clear reasons for doing dissection (in particular, "to learn about function and structure"), while at the same time almost half don't know what they learned or indicate that they learned nothing? Lock proposes that teachers should make the objectives of dissection explicit, yet his own results imply that this is already the case. Students are able to explain why they are using dissection because they have been told. The fact remains, however, that in practice these objectives are not realized and many students are not learning.
I agree with Lock’s proposition that there is a need for more detailed and rigorous research in this area, particularly concerning the relative effectiveness of alternatives. However, I reject his claim that I present no evidence that dissection is contrary to the basic goals of teaching natural science and that it can be easily replaced.

As has been argued elsewhere, there is a logical inconsistency in “the investigation of biological function using dead organisms that no longer function, and structure in cadavers that are in various states of decay or whose structure has been severely modified by fixation” (Shone, 1984, p. 20). Equally important, the principal affective goal of teaching natural science is to foster “a reverence for life” (National Science Teachers Association, 1986), an objective which simply cannot logically be served by cutting up dead animals, a contradiction which Lock fails to address.

The alternatives to dissection are reviewed in my paper, along with some evidence that the most sophisticated techniques are less used than they could be. What evidence, Lock asks, is there that any of these approaches are superior to dissection? I shall cite three examples by way of illustration. Computer simulations, for instance, can be used to permit interactive manipulation and monitoring of physiological variables such as blood pressure and arterial oxygen or carbon dioxide pressure over lengthy periods of time. The development of high quality graphics with text, sound and animation make contemporary software a powerful interactive alternative to dissection (Quentin-Baxter & Dewhurst, 1990). Internal microphotography can be employed to permit students to observe functioning living system “from within,” in very much greater detail than dissection allows. Finally, videotaped demonstrations of dissections conducted by highly skilled experts are superior to the often haphazard, clumsy efforts of students in the school science laboratory.

Lock attempts to defend the assumed effectiveness of dissection as a teaching strategy by appealing to subjective experience: “My gut reaction is that there is no substitute for first hand, personal experience and that this is the key to most effective teaching and learning.” The defense of outmoded, traditional practice in education is replete with statements like this. Of course the science teacher should provide opportunities for children to learn about living things through “hands-on” activities as well as through the use of modern, interactive technology. However, these methods should be consistent with the cognitive and