

“I Didn’t Feel Right About Animal Dissection”: Dissection Objectors Share Their Science Class Experiences

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Abstract

This paper highlights the voices and experiences of individuals who objected to animal dissection in their high school science and biology classes. The data were collected via online surveys ($n = 311$), and 8 of these participants took part in more in-depth telephone interviews. Participants were former students from Ontario, Canada, who discussed their experiences with animal dissection in general, and objection to dissection in particular, if applicable. The findings reveal that students who expressed objection to dissection experienced a range of teacher responses, including pressure to participate, the request to join another group of students and watch, the choice to use a dissection alternative, warnings of compromised grades, and other responses. The study points to the importance of choice policies to ensure that dissection alternatives are available in classrooms. In this way, students can select among different options of how they would like to learn, and teachers can be prepared to accommodate those who choose not to dissect.

Keywords

animal dissection, dissection alternatives, objection to dissection, science/biology class, student experiences

When I was growing up, I spent my summers watching the frogs and turtles in a catch basin near our camp. Frogs were like, well, my friends. I couldn't have participated in dissection if my life depended on it.

For me, animal ethics and animal rights are pretty big issues. So you see them wheeling in this big cart of dead pigs, and it just made me think about, “Where are these coming from? What happened to them?” Yeah, I had an issue with it.

My parents have always taught me that you have to be respectful to all of the creatures, not just human beings. We're supposed to be the superior beings. We know better. We can control our actions, whereas animals do it out of the idea of survival.

—excerpts of responses from individuals who objected to animal dissection

There are many reasons why a student might object to picking up a scalpel and cutting into a once-living animal in biology class. Those with an orientation toward animal rights often express ethical concerns about the practice, while others may hold religious, cultural, or environmental reasons for not wanting to participate. Yet other students experience a visceral reaction to dissection that makes them uncomfortable: a fear of blood, for example, or concern about fainting or becoming physically ill. Finally, some might be reticent to participate because dissection simply seems distasteful or “gross” to them (Oakley, 2009; Balcombe, 2000; Barr & Herzog, 2000; Solot & Arluke, 1997).

Given these numerous possibilities, it is not surprising that most science and biology teachers who conduct dissections report having had at least a few students who have objected to the procedure (King, Ross, Stephens, & Rowan, 2004; Almy, Goldsmith, & Patronek, 2001; Moir, 2000). What is less clear, however, is how teachers are responding to student objectors, and what the experiences are of these students. This paper, drawn from a larger doctoral study on animal dissection (Oakley, 2011), highlights the voices and experiences of students who objected to dissection in high school science and biology classes. Since studies show that comparable student learning can be achieved using dissection alternatives (Lalley, Piotrowski, Battaglia, Brophy, & Chugh, 2010; Montgomery, 2008; Maloney, 2005; Kopec, 2002; Youngblut, 2001), I was interested to find out whether or not—and how—student objection is being accommodated.

I approached the research from a humane education and critical pedagogy standpoint. Humane education emphasizes the interconnectedness of all life and the intrinsic value of nature and nonhuman animals, as well as social justice concerns (Humes, 2008; Weil, 2004). To consider dissection from a humane education perspective entails examining its impacts on students, nonhuman animals, and the environment; it also means critically considering the educational value of dissection and what “humane” alternatives exist to it. Humane education can be situated in a broader framework of critical pedagogy, which is grounded in a social and educational vision of justice and equity, and the recognition that education is inherently political (Giroux, 2001; McLaren, 1998). Understanding that schools are institutions where forms of knowledge, values, and social relations are formed, a critical pedagogy approach allows for deeper consideration of the influence teachers have on students’ enactment of curriculum and the choices students have (or do not have) in the science classroom.

Dissection, Objection, and Student Choice

Dissection has not always been practiced in North American schools. It appears to have begun in the 1920s and became a more regular part of science education curricula in the 1960s (Orlans, 1993). As biology lessons involving animals' deaths increased, however, so did opposition to the practice. Antidissection campaigns by humane societies and other animal advocacy organizations began in the 1980s, adopting slogans such as, "Cut the Class, Not the Frog" and "Say No to Dissection" (Orlans, 1993), while organizations such as InterNICHE and the National Anti-Vivisection Society began to promote and make available some of the first alternatives to dissection, including models, computer simulations, films, and videos. As dissection escalated into an ideological debate about the validity of using animals for science class investigations, researchers began to examine student attitudes toward it, and the notion of conscientious objection became popularized (Hepner, 1994; Millett & Lock, 1992; Sieber, 1986).

The documented history of objection to dissection at the high school level dates back to the late 1980s, with the well-publicized case of Jennifer Graham, a California teen who refused to dissect a frog in her biology class. When Graham, an ethical vegetarian, was told she would fail the course if she did not dissect, she and her mother legally challenged the school, taking the matter to a state court with the help of the Humane Society of the United States. Graham's lawyers argued that her ethical beliefs were equivalent to a religion and that the school district was violating her right to freedom of religion. Her case was settled and not fully adjudicated, but it resulted in the amendment of a bill, signed by the governor of California in 1988, which mandated that students have the right to conscientiously object to dissection or other educational projects involving the harmful use of nonhuman animals (Beauchamp, Orlans, Dresser, Morton, & Gluck, 2008; Kramer, 2007).

Graham's case marked an early development in student choice policies in North America. Choice policies, also known as choice legislation, grant students the right to "refuse to participate in classroom activities and demonstrations... that they find objectionable on the basis of personal moral, ethical, or religious convictions... and to have access without penalty to alternative learning methods, models, and approaches" (Cunningham, 2000, p. 192). Currently, choice policies are legislated unevenly in Canada and America. In Canada, five school boards (Vancouver School Board, Burnaby School District #41, Central Okanagan School District #23, Toronto District School Board, and South Shore District School Board) have adopted policies, while 10 American states (Florida, California, Pennsylvania, New York, Rhode Island, Illinois, Virginia, Vermont, Oregon, and New Jersey) have choice legislation

in place. Five American school districts (in Massachusetts, New Mexico, Maine, Maryland, and Louisiana) have also passed resolutions that encourage teachers to provide alternatives to dissection (American Anti-Vivisection Society, 2011; *Frogs Are Cool*, 2011; Duncan, 2008; Kramer, 2007). While these policies represent a victory for students in these jurisdictions, little is known about whether or how they are enforced; further, given that most North American jurisdictions lack policies in the first place, many students remain reliant upon their teacher to offer choice (Kramer, 2007).

It is estimated that in a typical class, 3 to 5% of students will verbally object to dissection, and a higher number will be silently opposed (Balcombe, 2000). For various reasons, there may be a disconnect between how students feel about dissection and whether they verbally object—for example, the power dynamic inherent in the teacher-student relationship may make it difficult for a student to feel entitled to express his or her opinions, and challenging the authority of the teacher or the curriculum can be daunting (Balcombe, 2000; Cunningham, 2000). Further, dissection may be presented as a requirement; some teachers refuse to accommodate students' requests for alternatives and have even reported failing students who refuse to dissect (King et al., 2004). Given these disparate teacher responses, I sought to investigate the classroom experiences from the perspective of former students.

Methods

This research was set in Ontario, Canada, where dissection is part of the grade 10 science and grade 11 biology curricula. Both curricula state that students are to conduct a physical dissection or a computer-simulated dissection to achieve specific learning outcomes regarding the interrelationships between systems and organs (Ontario Ministry of Education, 2008a, 2008b). Teachers can therefore decide whether to offer students a physical dissection, a virtual dissection, or both. As an additional support, the Ontario Ministry of Education has an all-school site license for the virtual dissection software *Froguts*; so assuming that there are adequate computer resources, all schools in the province have access to the software (Ontario Software Acquisition Program Advisory Committee [OSAPAC], 2011).

Participants

The study was conducted over a five-month period in 2010, using a two-phase research design incorporating online surveys ($n = 311$) and subsequent

telephone interviews ($n = 8$). In the first phase, a 25-question survey (see Oakley, 2011) was advertised to potential participants through communications bulletins in Ontario universities, e-mail advertisements, and word of mouth. Individuals aged 18-30 who had completed some or all of their secondary school (grades 9-12) science and biology courses in Ontario were invited to complete a survey that featured demographic (age, gender, province where they attended secondary school), attitudinal, and behavior-related questions about their high school animal dissection experiences.

Participants' agreement to be interviewed was elicited by a question at the end of the survey that asked whether they would be willing to participate in a follow-up discussion about their experiences. From the 311 surveys collected, 102 individuals offered to be interviewed. From this pool of individuals, those who reported harboring objections to dissection were separated out and stratified by gender. Twelve candidates (6 female and 6 male) were selected to be interviewed, based on diversity in the responses they gave on their surveys regarding why they objected to dissection (e.g., for personal, animal rights, ethical or moral, environmental, religious, and/or cultural reasons). The goal of the interviews was to obtain more in-depth information regarding individual student objectors' experiences. Of the 12 individuals selected, 8 (5 female, 3 male) agreed to be interviewed.

The participant response rate in this study was highly skewed by gender: 80% of survey respondents were female. Three possibilities may explain this gender skew: (1) one of the audiences to which the survey was advertised was a department of education with a higher number of female than male students; (2) females tend to respond to electronic surveys at higher rates than males (Underwood, Kim, & Matier, 2000); and (3) the topic itself may be more interesting to women, as females are more likely than males to object to dissection (Capaldo, 2004; Almy et al., 2001). Research suggests that women express greater concern about animal welfare and are more likely to oppose animal-based research than men (Phillips & McCulloch, 2005; Hagelin, Carlsson, & Hau, 2003; Pifer, 1994), and this too may account for the high female participation rate in this study.

Given that females tend to object to dissection more than males, and 80% of respondents in this study were female, the statistical results are likely skewed against dissection. Further, given the limitations of the sample size and geographic area in which this study was undertaken, the results cannot be generalized to other locations or wider populations. As curricular requirements differ by province in Canada and differ across countries (indeed, dissection is not a global practice), the results of this study are geographically specific to Ontario and represent the experiences of a convenience sample.

Materials

The survey (Oakley, 2011) included 25 questions in total, 23 of which were in closed-ended formats using yes/no questions, checklists, and Likert scales, along with open-ended fields, so that respondents could elaborate upon their answers if they so chose. Two open-ended questions were also included, one at the midpoint and one at the end of the survey, asking respondents to share additional details about their experiences. Questions in the first half of the survey asked participants to reflect on their high school experiences and report on whether or not dissection was part of the curriculum and if so, whether they participated in it; how they felt about their dissection experience(s); whether they received an option from their teacher to opt out of dissection; and whether alternatives were made available to them. Table 1 reports the statistical findings of one of these survey questions.

The second half of the survey inquired into the particular experiences of students who objected to dissection. Participants who reported objecting to dissection ($n = 71$) were asked a series of questions relating to why they objected, how their teacher responded to their objection, and whether they felt supported in their decision not to dissect. Table 2 outlines the statistical findings regarding how objectors reported that their teacher responded to their objection.

The interviews with eight participants who objected to dissection were conducted by telephone, using a semistructured interview guide (see Oakley, 2011). Interviewees were asked to share their experiences of objecting to dissection, including why and how they objected, how their teachers and classmates responded, how they felt about objecting, and what the outcomes were of their objection. The length of interviews ranged from 14 to 26 minutes, with the average being 18.5 minutes. All interviews were recorded and transcribed, and then coded, using line-by-line content analysis techniques. In this paper, quotations were selected from the interview data, along with the open-ended survey data, to illustrate respondents' experiences vis-à-vis objection to dissection.

Results

The vast majority of participants in the study—295 of 311 (94.8%)—reported that dissection was part of the curriculum in one or more of their high school science/biology classes. Participants reported that a great variety of nonhuman animals and animal parts were dissected in class, including (listed by frequency of response) fetal pigs, frogs, worms, rats, cows' eyes, grasshoppers, perch, crayfish, sheeps' brains, dogfish sharks, cats, cows' hearts, mice, and (infrequently) many others. There was also considerable diversity in participants' reported

Table 1. Students' Self-Reported Classroom Animal Dissection Experiences

I willingly participated in an animal dissection(s).	54.0%
I participated in an animal dissection but had mixed feelings about it, due to personal, ethical, cultural, religious, and/or environmental reasons.	34.6%
I did not want to participate in an animal dissection and informed my teacher but was convinced to participate anyways.	7.6%
I did not want to participate in an animal dissection and informed my teacher and was given an alternative mode of learning (e.g., CD-ROM or computer program, 3D anatomical model, video, chart, poster, or overhead).	6.2%
I skipped class on the day(s) of the dissection.	4.2%
I used an alternative (e.g., CD-ROM or computer program 3D anatomical model, video, chart, poster, or overhead) instead of participating in an animal dissection.	3.5%
I did not participate in an animal dissection and was given a failing grade on the assignment.	2.1%

responses to animal dissection; Table 1 demonstrates responses to the survey question, "Which of the following best describes your experience in secondary school classes?" (Note that because participants were asked to select "all that apply," the total responses do not add up to 100%.)

Table 1 demonstrates the diversity in students' classroom experiences: 54% reported willingly participating in a dissection, 34.6% reported having mixed feelings, and some reported participating even though they did not want to—as 7.6% noted, "I did not want to participate in an animal dissection and informed my teacher but was convinced to participate anyways." Further, some reported being granted an alternative, while others were not; finally, some reported skipping class on the day(s) of dissection or failing because they did not participate.

For some students it was not made explicit to them whether they had a choice to opt out of dissection and use an alternative, and this affected whether they objected. In response to one survey question—"Were you ever given an option by your teacher not to participate in (opt out of) a dissection?"—60.8% of respondents reported that they were given an option, while 39.2% said no such option was given. For some individuals, not being given an option by their teacher led them to believe that no option was available to them. One participant commented that she believed she had to participate because there

was no discussion in her classroom about alternatives. Another wrote that when teachers do not give options, it is up to the student to object—and this may be difficult, depending on the teacher:

I remember the different biology teachers in my high school, and there's a couple that I don't think I'd be able to approach and say, "I'm not comfortable with this." . . . If you have a really intimidating teacher, then you're not going to approach them about it, or you're less likely to approach them about it.

That some students do not give voice to their concerns complicates the picture of how many students object. Two survey questions illustrated a discrepancy between participants' feelings of objection and whether they expressed those feelings. One question asked participants, "Did you personally object to animal dissection in your grade 9, grade 10, grade 11, or grade 12 science/biology classes?" and in response, 71 respondents (of the 295 whose curriculum had included dissection) reported "Yes." The follow-up question asked this pool of 71 individuals, "Did you inform your teacher that you did not wish to dissect?" and here, only 54 indicated "Yes." It therefore cannot be assumed that all students will voice their opposition to dissection, especially if no alternatives are offered.

The 71 individuals who reported objecting to dissection cited the following reasons for their objection (the categories overlap, as participants were asked to "check all that apply"): personal (80.3%), animal rights (71.8%), ethical or moral (60.6%), environmental (33.8%), religious (4.2%), and cultural (4.2%). Four participants checked the option "other" in response to the question; two explained that they "dislike blood"/have a "weak stomach" and two simply wrote that they objected because they found it "gross." Balcombe (2000) asserts that most students object to dissection for reasons rooted in their belief systems rather than a desire to avoid work or because they are "grossed out" or "squeamish" about the process; the findings of this study confirm that there are many reasons, beyond a personal negative response, why students object.

Teacher Responses to Objection to Dissection

The individuals who reported expressing objection to dissection experienced diverse teacher reactions. Table 2 outlines the survey responses to the question, "When you informed your teacher that you did not wish to participate in an animal dissection, how did your teacher respond?" (Again, because participants were asked to select "all that apply," the total answers do not add up to 100%.)

Table 2. Student-Reported Teacher Responses to Objection to Animal Dissection

The teacher convinced me to try dissection.	42.6%
The teacher requested that I watch another classmate dissect instead of performing the dissection myself.	35.2%
The teacher provided an alternative for me to use.	33.3%
The teacher told me that not dissecting was not an option.	24.1%
The teacher gave me a failing grade for the dissection assignment.	11.1%
The teacher requested that I find my own alternative.	7.4%

This table highlights that many students who objected to dissection ended up participating in some capacity nonetheless. In the following section I discuss the top five themes emerging from the survey data (as reported in Table 2) and include quotations from the open-ended survey data and the interview data to elucidate each theme.

“I felt pressured into completing the dissection.” The dominant response that objectors reported was that their teacher convinced them to try dissection. Participants spoke of having discussions with their teachers that left them feeling as though their concerns did not warrant alternative learning methods, or that they should try the dissection to see how they felt about it. One participant spoke of her grade 11 classroom experience in which small groups of students were to dissect, collectively, a worm, a frog, a rat, and a fetal pig as part of a unit addressing comparative anatomy. After advising her teacher that she objected to the dissection on ethical grounds, she was told she should try it nonetheless. She recounts how she creatively developed her own alternative in her group:

I had informed my teacher that I refused to participate in the dissection of any animal. I was forced to begin with a worm to “see how I felt” about the situation. Dissecting the worm did not change my feelings about dissection in any way. As the dissection portion of the course progressed, I continued to refuse to dissect and offered to complete all written work for my group, providing I did not have to participate. . . . So, I kind of worked with my group to make an alternative.

Others explained that some teachers pressured them into dissecting by questioning the legitimacy or consistency of their ethical stance. One participant discussed how she felt pressured into dissecting when her teacher questioned her commitment to nonhuman animals:

Basically, our biology teacher told us that we would be participating in a dissection and he would give us a little bit more detail later on about the animal for the dissection. At that time I told him I was uncomfortable with it for moral reasons; animal cruelty; I don't agree with it. And he said, "Well, we can talk closer to the date. Depending on what the animal is, would that change your mind?" I said at the time, no. We found out about two days before that it would be baby pigs [*sic*], and I said to him at that point, "I really object to this. If there's an alternative assignment, I'd like to do that. I don't feel comfortable with this. I don't think it's right." And, instead of saying anything—like agreeing with me, or anything like that, or giving me the alternative—he said, "Well, you're wearing leather shoes. Or you've got a leather belt on. Do you not eat meat?" Sort of playing the defensive there, and saying, "Well, you do this, and you do this, and you do this, but yet you're against the dissection."

In other instances, individuals who commented on this theme said they felt pressured into dissecting because it was discursively framed as an activity that could be important to them in postsecondary education or a later career. One participant shared that although she felt that dissection was, for her, a waste of animal life, her concerns were outweighed by a discussion about how it could be important in the future. She wrote:

I hated the thought of cutting up creatures that were once living just to see their organs. I can see this may have been beneficial had I hoped to become a doctor or a veterinarian, but as it turns out I became a teacher. Looking at pictures on the Internet or even watching willing participants would have been good enough for me.

The data in this category suggests that for many individuals, being pressured to try dissection was not a welcomed pedagogical push; no student who cited opposition to dissection expressed gratitude at being pressured to try it.

"If we didn't want to dissect, we were to join a group and just watch." The second most commonly cited response was that teachers requested that students who did not want to dissect could observe other classmates, rather than performing the dissection themselves. Classroom dissections are often done in pairs or small group of students and because of this, students take on different roles (e.g., as dissector, as person who identifies parts, as person who draws diagrams or takes notes). Among the participants who referenced the setup in their classroom, 11 explained how watching others dissect was presented as an "alternative" to them. One objector commented:

[A]lthough I did not feel comfortable doing this [dissection] as I... don't think dissection is right, I was told I had to be in a group, and even if I didn't do anything (i.e. cutting or touching), then I would still be able to pass the project. I was not impressed, but being young and naive I did what I was told.

Student objectors did not uniformly agree that watching another person dissect was a valid alternative or should be labeled as such. One participant elaborated: "There was not really an alternative. In high school if we did not want to dissect, then we could join a group and just watch. But there were no alternatives like a CD." Another expressed confusion around her classroom experience and the way that watching another student was presented as an alternative:

I didn't really feel like the "alternative" was a viable option since it was just to not participate. I wasn't sure what that even meant. I let my friend, who was very interested in the process, do most of the operation.

Some objectors added that they went along with this option because it allowed them to lessen their direct involvement in the dissection, while others noted explicitly that this was not a satisfactory compromise. The data suggests that for many students, the "alternative" was for them to participate in a more passive way.

"If we didn't want to dissect, we could use an alternative." The third most frequently cited response was that teachers provided an alternative (beyond watching others dissect) for student objectors to use. This theme was referenced by respondents who participated in dissection and those who objected to it: among all of the participants in this study, $n = 89$ indicated that they were offered an alternative by their teacher and cited the following alternatives as being offered in their classes: charts, posters, and/or overheads (50%); CD-ROMs or computerized programs (33.3%); videos (16.6%); and 3D anatomical models (5.6%). In response to being asked what alternatives were made available to them, individuals who checked the option "other" listed options including writing an essay, studying a textbook image, using Internet diagrams, conducting library research, and participating in a field trip in lieu of dissection.

Ten individuals who commented on this theme noted positive and respectful teacher-student relationships. That dissection was optional was, for these students, made clear by their teachers: "My teacher never made anyone do it or even be there when it was happening. It was completely voluntary," one individual wrote. Another wrote that: "[The teacher] made it clear that if we weren't comfortable dissecting the animal, we could complete an online dissection lab." Themes of respect, and being given an option of whether to stay in the room during the dissection, were also mentioned. One participant recalled:

I remember my teacher was very respectful to the fact I didn't want to participate. I was in the classroom when they did do it. It was my responsibility to learn the material. My teacher approached me and told me personally that I did not have to participate.

Three other respondents, however, indicated that alternatives were only made available to students in their classrooms who had particular reasons for objecting. This created a classroom environment in which choice was not offered freely but was rather reserved for those who had what were perceived to be legitimate concerns. One person explained: "We were told we didn't have to, but only for religious reasons or if your family were vegetarians or something . . . Not wanting to, or being squeamish wasn't an excuse." Another wrote that in his class, participation was only optional if a student was concerned about becoming physically ill:

I do remember something about, like, if you're not comfortable, or if you feel sick, you don't have to participate or you can leave. But it was definitely not around spiritual or personal beliefs. It was around actually physically getting sick.

That not all teachers use or offer alternatives to students—despite the fact that many high-tech, low-tech, and no-tech options are available—suggests that some teachers either do not see these alternatives as satisfactory teaching aids, or they feel that alternatives should be reserved for students with specific reasons for objecting. What is perceived as a valid reason for objecting, however, may vary from one teacher to the next.

"*We weren't given the option to not participate.*" The fourth most commonly reported experience was that students were not given an option to opt out of dissection. A lack of clear communication about their options left some students assuming that no other option existed and that their participation was mandatory. While teachers may proceed with the assumption that dissenting students will voice their objections, this study found that this is not always the case; even the way a teacher addresses the ethics of dissection can encourage or close down conversation. One objector explained how his classroom experience began with a discussion that served to negate objections before they were even voiced:

I was never offered an alternative but would have taken it. We were told we had to do it. I was disgusted and ethically opposed to it. The teacher gave us a consequentialist argument about the greater good (our learning) outweighing any possible opposition we may have had to it. That was the extent of the discussion.

Confusion around whether or not alternatives were available was expressed by another respondent who explained how he found out *after* participating in a dissection that computerized alternatives were available in his school:

I found out a couple [of months later] that some students were in the computer lab, doing the dissections on the computer . . . I didn't know they had that option for people. They [the teachers] just kind of kept it quiet . . . they wouldn't tell the students ahead of time that that was an option. It would have been nice to have known.

Another commented that the experience of being offered choice in her school differed from one class to the next, depending on the teacher. She noted that in her class, she felt she "had to" dissect:

There wasn't an option. I went and asked my teacher. The thing is, where I was, at least at the time anyway, it was up to the teacher whether or not you could opt out. My sister went to the same school, and she had a different teacher, and they let people opt out, but I had the teacher that I had, and I went and asked, and they said, "No, you have to participate." So everybody in our class had to do it.

"My marks would suffer if I did not dissect." The fifth most commonly cited response was that teachers either implied or stated explicitly that students' grades would suffer if they did not participate in a dissection, or that they might fail some or all of the assessment activities associated with dissection (such as a follow-up exam or bell-ringer test, in which students move from station to station, identifying parts of a prosected animal). One individual commented, "He [the teacher] told me I would lose 15% of my mark for not participating," while another wrote, "My teacher made it known that it would be harder for me to receive a good grade if I chose the alternative." Another explained that she participated in a dissection reluctantly because she was told the alternative would not adequately prepare her for the final exam: "I was informed that if I did the alternative CD-ROM version, that my knowledge of the material would not be as thorough, and I would likely fail the exam. I felt pressured into completing [it]." This demonstrates that marks can be inextricably linked with the theme of feeling pressured to participate, although not all individuals in this study opted to participate, even with warnings of compromised grades.

The theme of "dissect or fail" was commented upon by nine individuals, including one who wrote: "Our school forced us to participate in animal dissection. If we refused, we were given a failing grade," and another who explained that she participated unwillingly because it was important to her to not fail: "I did not want to participate in animal dissection but was told that I would be given a 0 for not participating. Therefore, I unwillingly participated

because my grades were important to me, and there was no alternative assignment offered.” Another student outlined her response to the choice she was given: “I asked for alternative software to complete the assignment and was told no other option. Either participate or fail. I received a failing grade.”

Finally, one person shared her story of contesting the fact that marks were associated with dissection. She explained her attempt to find a compromise with her teacher and how her school principal, parents, and even the guidance counselor became involved:

It [*sic*] was [first] taken down to the principal because I was so strongly against this [dissection], and I told him my position, and the teacher told the principal his position, and what came out of it was an agreement that I had to be in the classroom, but I didn't have to actually participate. And unfortunately, because I didn't actually participate, it did hinder my mark... I failed the assignment, and I wasn't offered any other ways to bring up my mark. I did ask for an alternative assignment afterwards, after receiving the failing grade, and was told, “No, that was the assignment. There's nothing else to do for that.” I then brought that home to my parents—they knew the situation already, that it had escalated to the principal—and he [the principal] did say that, you know, “This was the situation. There was an agreement saying that she would be in the classroom but didn't have to participate, however, I guess marks weren't discussed.” He said that it would be resolved. I ended up passing the class with a 52. Because... it was never resolved. We had taken it down to the guidance counselor, and they said unfortunately, what's done is done, and I can take it at a summer school to bring up my mark, or I can just... leave it. It was on my transcript; it was there for good.

Other responses. Beyond the themes outlined above, a small percentage of student objectors shared other responses. These included being asked by their teacher to find their own alternative and deciding to skip class on the day(s) of dissection. Finally, and perhaps most extremely, three students reported expressing their objection to dissection by dropping the class, and two others indicated that they investigated course outlines in advance to determine whether dissection alternatives would be made available to them. “When I found out that grade 12 biology consisted of dissecting a rat, I did not enroll myself into the course,” one wrote. This response, along with the others outlined above, demonstrate that dissection can be a highly contentious issue and one that students may go to great lengths to avoid if choice is not proactively granted.

Discussion

Most students do not object to dissection, as previous research (e.g., Almy et al., 2001; Barr & Herzog, 2000) and the present study confirm. However, the number of students who do object, or partially object, may be underestimated

in studies based on teacher estimates. Some students will go along with dissection even if they are against it because of classroom dynamics or because a choice is not offered; as a result, teachers may have a skewed picture of the true number of student objectors. The number of objectors in my convenience sample was 71 out of 295 students whose curriculum included dissection.

This research points to a clear need for students to be proactively and non-coercively given a choice between dissecting and completing a comparable learning activity. Of the individuals in this study who reported objecting to dissection, only a third (33.3%) said that their teacher responded by providing an alternative for them to use (see Table 2). The other two-thirds experienced less accommodating teacher reactions, highlighting the reality that teachers do not uniformly offer students choice. These findings point to the importance of choice policies to ensure that all students who do not want to dissect have access to alternative ways of learning.

There are several benefits (beyond the obvious ones, for student objectors) that can accompany the implementation of choice-in-dissection policies. For teachers, having a policy in place can help ensure that they are prepared to accommodate students who object, while simultaneously creating an opening for a class discussion on the ethics of dissection and the various thought positions surrounding the use of nonhuman animals in science. This in turn can help to promote critical thinking and informed decision making among students and can also alleviate issues of peer pressure by helping students understand why others might make different choices than they have. As Jukes and Chiuia (2003) write, student objectors are often conscientious people who are thinking critically and challenging the status quo—hallmarks of a good scientist—and choice policies welcome, rather than diminish or alienate, their perspectives.

Thoughtfully worded choice policies can also help to create equitable classroom environments where those who object are not positioned as a fringe minority. At present, the ways in which dissection is discursively positioned as a dominant or “normal” practice is evidenced by the language used: students who do not want to dissect must “opt out” and ask for an “alternative” way of learning. A more reasonable solution might entail having students “opt in” to dissection following a class discussion, or for them to pick from two (or more) “equal choices” in learning (T. Battle, Alberta SPCA, personal communication, May 11, 2010). These small linguistic shifts, in concert with choice policies, could help to prevent the marginalization of students who choose not to dissect.

From a critical humane education perspective, the act of offering students choice might also result in a decline in the number of animals dissected. Given this study’s finding that some students would have used alternatives had they

been offered, it is possible that choice policies could result in fewer dissections being performed. With an estimated 10-12 million animals killed each year for American classroom dissections (Rosenberger, 1998), and widespread suffering involved in the ways the animals are procured, confined, transported, handled, and killed (Sapontzis, 1995), a decline in dissection would be welcome news to humane educators. A decline could also connect to an improved environmental and ecological footprint, given that some dissected animals, such as frogs, are wild-caught and removed from ecosystems, and some specimens are still preserved in formaldehyde-based solutions that present both health and environmental risks (Occupational Safety and Health Administration [OSHA], 2011; Balcombe, 2000). Choice policies can thus represent a progressive step from both an ethical and environmental point of view.

Choice legislation also supports the development and use of humane alternatives, including virtual dissection programs and other options such as 3D anatomical models, films, charts, diagrams, or creative alternatives such as asking students to build models out of clay. To date, most research has sought to measure student learning with virtual dissection software against a traditional dissection, with several studies concluding that learning with virtual alternatives can be comparable, and in some cases superior, to learning with actual animals (e.g., Lalley et al., 2010; Montgomery, 2008; Maloney, 2005; Kopec, 2002; Youngblut, 2001). Two meta-reviews of research measuring student learning with conventional dissection versus alternatives also conclude that most learning objectives can be met with alternatives, that knowledge gain is equivalent, that costs are less, and that alternatives provide better support for weaker students (Humane Society of the United States [HSUS], 2008; Balcombe, 2003).

And yet, despite encouraging findings about the validity of virtual dissection software, many teachers continue to privilege traditional dissection and see it as the “best” way students can learn (King et al., 2004; Almy et al., 2001). Given this study’s finding that many objectors were not offered an alternative by their teacher, it is evident that concurrent with the implementation of choice policies is the need for improved teacher education. Teachers may be unaware of the validity of alternatives or may perceive them as pedagogically inferior to “hands-on learning.” Hence, a related recommendation growing out of this study is for enhanced teacher education programs and opportunities for teachers to learn about available alternatives and the organizations, databases, and journals that provide reviews of them (e.g., InterNICHE, NORINA, and *The American Biology Teacher*). Having opportunities in teacher education programs to gain exposure to alternatives and to discuss the debate surrounding dissection is an important step toward progressive

humane science practices. Further research exploring teachers' perspectives is also needed; while this paper addressed the experiences of former students, hearing from teachers is equally important to gain insight into the state of dissection and choice in schools today.

Ultimately, the disparate experiences reported by student objectors in this study point to a continued need for humane educators and animal advocates to lobby for choice in dissection policies. At present these policies are legislated unevenly across North America, and while it is unknown how they are monitored or enforced, having the policies in place is a necessary first step to ensure that students have the right to say no to dissection. The reality that a considerable number of students object to dissection, that comparable learning can be achieved via humane alternatives, and that classroom practices vary from one teacher to the next, indicates the need for choice policies to be adopted by all schools to ensure that classroom environments are comfortable, equitable spaces for all students. For, as one objector in this study astutely noted: "I didn't feel right about animal dissection . . . [and] feeling uncomfortable is not a healthy learning environment."

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