

Analysis of Studies Comparing the Use of Animals in Science Education to the Use of Humane Educational Methods

Historically—in all levels of science education, from primary to graduate school—animal use has played an integral role in teaching anatomy, physiology, as well as a variety of other disciplines. The pedagogy of such disciplines was not questioned until recent years, when concern for animals used in education has increased. Concurrently, technology has developed to provide students and academics with viable alternatives. Animalearn has compiled a list of studies that compare animal use with humane teaching methods in science education.

Animalearn's list includes over 60 studies—many of which confirm the positive learning outcome, or equivalent effectiveness, of humane teaching methods in imparting knowledge or clinical or surgical skills. Some studies conclude that alternatives also lower costs, decrease the amount of time required to learn, and increase student comfort levels.

Studies in Secondary Education

| Study | Discipline | Teaching Method | Positive | Equivalent | Negative or Undetermined |
|-----------------------------|------------|---------------------|----------|------------|--------------------------|
| Akpan, J. et al 2010 | Biology | Computer Simulation | ○ | | |
| Boothby, C. 2009 | Biology | Virtual Dissection | ○ | | |
| Cross, T.R. et al 2004* | Biology | Virtual Dissection | | | ○ ¹ |
| Fowler, H.S. et al 1968* | Biology | Film | ○ | | |
| Kariuki, P. et al 2001* | Biology | CD-ROM | | | ○ ² |
| Kinzie, M.B. et al 1993* | Biology | Computer Simulation | | ○ | |
| Lalley, J.P. et al 2010 | Biology | Virtual Dissection | ○ | | |
| Lieb, M.J. 1985* | Biology | Lecture | | ○ | |
| Marszalek, C.S. et al 1999* | Biology | Videodisc | | ○ | |
| McCollum, T.L. 1987* | Biology | Lecture | ○ | | |
| Montgomery, L. 2008 | Biology | Virtual Dissection | | ○ | |
| Strauss, R.T. et al 1994* | Biology | Videodisc | | ○ | |
| Velle, S. et al 1999** | Biology | Virtual Dissection | ○ | | |
| Youngblut, C. 2001 | Biology | Virtual Dissection | ○ | | |

Studies in Undergraduate Education

| Study | Discipline | Teaching Method | Positive | Equivalent | Negative or Undetermined |
|----------------------------|-----------------------------|---------------------|----------|------------|--------------------------|
| Clarke, K.A. 1987** | Neurophysiology | Computer Simulation | | ○ | |
| Cohen, P.S. et al 1991* | Psychology | Field Studies | | ○ | |
| DeHoff, M.E. et al 2011 | Physiology | Clay Modeling | | ○ | |
| Dewhurst, D.G. et al 1994* | Physiology | Computer Simulation | | ○ | |
| Dewhurst, D.G. et al 1993* | Physiology and Pharmacology | Computer simulation | | ○ | |
| Dewhurst, D.G. et al 1988 | Physiology | Computer simulation | | ○ | |
| Downie, R. et al 1995* | Biology | Models | | ○ | |
| Guy, J.F. et al 1992* | Anatomy | Videodisc | | ○ | |
| Huang, S.D. et al 1991* | Biology | Videodisc | ○ | | |
| Henman, M.C. et al 1983* | Pharmacology | Biovideograph | ○ | | |
| Hughes, I.E. 2001** | Pharmacology | Computer Simulation | | | ○ ³ |
| Leonard, W.H. 1992* | Biology | Videodisc | | ○ | |
| Matthews, D. 1998* | Biology | CD-ROM | | | ○ ⁴ |
| More, D. et al 1992* | Biology | Virtual Dissection | ○ | | |
| Motoike, H.K. et al 2009 | Physiology | Clay Modeling | ○ | | |
| Phelps, J.L. et al 1992* | Physiology | Videodisc | ○ | | |
| Predavec, E.D. et al 1977* | Biology | Virtual Dissection | ○ | | |
| Prentice, ED et al 1977* | Anatomy | Labeled Slides | | ○ | |
| Taeger, K.R. 2006 | Biology | Virtual Dissection | | ○ | |
| Waters, J.R. et al 2005* | Anatomy | Clay Modeling | ○ | | |
| Waters, J.R. et al 2010 | Anatomy | Clay Modeling | ○ | | |
| Yuza, S. 2010 | Biology | Virtual Dissection | ○ | | |



Studies in Veterinary School

| Study | Discipline | Teaching Method | Positive | Equivalent | Negative or Undetermined |
|-------------------------------|-----------------|--|----------|------------|--------------------------|
| Abutarbush, S.M. et al 2006** | Clinical Skills | Computer Simulation | ○ | | |
| Baillie, S. et al 2005 | Clinical Skills | Computer Simulation | ○ | | |
| Bauer, M.S. et al 1992* | Surgery | Survival Lab | | ○ | |
| Carpenter, L.G. et al 1991** | Surgery | Cadaver | | ○ | |
| Erickson, H.H. et al 1993* | Physiology | Computer Simulation | ○ | | |
| Fawver, A.L. et al 1990* | Physiology | Computer Simulation | | ○ | |
| Greenfield, C.L. et al 1995* | Surgery | Model | | ○ | |
| Griffon, D.G. et al 2000* | Surgery | Model | ○ | | |
| Johnson, A.L. et al 1989* | Surgery | Model | ○ | | |
| Linton, A. et al 2005 | Anatomy | Computer Simulation | | ○ | |
| Olsen, D. et al 1996* | Surgery | Model | | ○ | |
| Pavletic, M.M. et al 1994* | Surgery | Cadavers and Models The Alternative Tufts Program | | ○ | |
| Smeak, D.D. et al 1994** | Surgery | Simulator | | | ○ ⁵ |
| Theoret, C.L. et al 2007 | Anatomy | Film | | | ○ ⁶ |
| White, K.K. et al 1992* | Surgery | Alternative Surgical Program | | ○ | |

Studies in Medical School

| Study | Discipline | Teaching Method | Positive | Equivalent | Negative or Undetermined |
|------------------------------|-----------------------------|-----------------|----------|------------|--------------------------|
| Bowyer, M.W. et al 2005 | Clinical Skills | | ○ | | |
| Granger, N.A. et al 2007 | Anatomy | | | | ○ ⁷ |
| Jacomides, L. et al 2004 | Clinical Skills | | | ○ | |
| Jones, N.A. et al 1978* | Anatomy | | | ○ | |
| Leathard, H.L. et al 1995* | Physiology and Pharmacology | | | ○ | |
| Lilienfeld, L.S. et al 1994* | Physiology | | ○ | | |
| Ramshaw, B.J. et al 2001 | Surgery | | ○ | | |
| Samsel, R. W. et al 1994* | Physiology | | ○ | | |

Clarification of Negative or Undetermined Results

- 1 Negative: BioLab Frog was used in this study. The first year of the study, both study groups were tested using real frogs. The second year of the study, the groups were tested using the simulation and the real frog. Students dissecting real frogs performed better on the lab test.
- 2 Negative
- 3 Undetermined: Performance of students using computer simulation was higher than those who used the wet labs. However, when assessing details of the wet lab, the computer simulation group did not perform as well.
- 4 Negative: This study had a small sample size of 8 students dissecting fetal pigs and 12 using MacPig. The 8 that used the real fetal pigs scored significantly higher on an oral test using a prosected fetal pig.
- 5 Negative: Simulator was suitable for teaching overall gastrotomy technique but could not simulate live tissue.
- 6 Negative
- 7 Negative

* Humane Society of the United States. 2005. Source of study and resulting data.

** Knight, A., Balcombe, J. & DeBoo, J. 2008. Comparative studies of student performance: humane teaching methods demonstrate educational efficacy when compared to harmful animal use in biomedical education. Source of study and resulting data.

Learn more about the benefits of humane science education at
[Animalearn.org/Hello](https://animalearn.org>Hello)