Comparative Studies of Student Performance

(800)729-2287
info@animalearn.org
www.animalearn.org

The humane alternatives to harmful animal use in teaching have been designed by scientists and educators. Their teaching effectiveness is demonstrated by the fact that almost every study conducted has shown that students trained using humane teaching methods perform at least as well as those trained by harming animals. By 1999 at least 28 scientific studies had confirmed the superior or equivalent effectiveness of humane teaching methods in imparting knowledge or clinical or surgical skills.

Studies Demonstrating Superior Teaching Effectiveness of Humane Teaching Methods

Dewhurst, D.G., J. Hardcastle, P.T. Hardcastle & E. Stuart. 1994. Comparison of a computer simulation program and a traditional laboratory practical class for teaching the principles of intestinal absorption. *American Journal of Physiology* **267 (Advances in Physiology Education 12/1): S95–S104.**
Six undergraduate students working independently with a computer program gained equal knowledge, at one-fifth the cost, as did eight supervised students using freshly killed rats.

Dewhurst, D.G. & L. Jenkinson. 1995. The impact of computer-based alternatives on the use of animals in undergraduate teaching. *ATLA* **23: 521–530.**
Use of computer packages saved teaching staff time, were less expensive, were an effective and enjoyable mode of undergraduate biomedical student learning, and significantly reduced animal use.

Erickson, H.H. & V.L. Clegg. 1993. Active learning in cardiovascular physiology. pp. 107–108 in Modell, H.I., & Michael, J.A. (editors). Promoting Active Learning in the Life Science Classroom. *Annals of the New York Academy of Sciences* **Vol. 701. New York, NY.**
Of fourteen learning methods for basic cardiac teaching and ECG interpretation, computer-based active learning was rated the highest in veterinary student evaluations.

Fawver, A.L., C.E. Branch, L. Trentham, B.T. Robertson & S.D., Beckett. 1990. A comparison of interactive videodisc instruction with live animal laboratories. *American Journal of Physiology* **259 (Advances in Physiology Education 4): S11–S14.**
Use of interactive videodisc simulations yielded equivalent test performance and greater time efficiency in teaching cardiovascular physiology compared with instruction in a live animal laboratory.

Fowler, H.S. & E.J. Brosius. 1968. A research study on the values gained from dissection of animals in secondary school biology. *Science Education* **52(2): 55–57.**
High school students who watched films of animal dissections (earthworm, crayfish, frog, perch) demonstrated greater factual knowledge of these animals than did students who performed dissections on them.

Henman, M.C., & G.D.H. Leach. 1983. An alternative method for pharmacology laboratory class instruction using biovideograph videotape recordings. *British Journal of Pharmacology* **Vol. 80: 591P.**
Undergraduate pharmacology students using biovideograph performed significantly better on post-laboratory tests than those participating in the organ-based laboratories.

Huang, S.D. & J. Aloi. 1991. The impact of using interactive video in teaching general biology. *The American Biology Teacher* **53(5): 281–284.**
Biology undergraduate students using a computer-assisted interactive videodisc system which included dissection simulations performed significantly better than students who had not used the computer-aided instruction.

Johnson, A.L. & J.A. Farmer. 1989. Evaluation of traditional and alternative models in psychomotor laboratories for veterinary surgery. *Journal of Veterinary Medical Education.* 16(1): 11–14.
Inanimate models effectively taught basic psychomotor skills, and had the advantage over live animals that they could be used repeatedly, enhancing the acquisition of motor proficiency.

Leonard, W. H. 1992. A comparison of student performance following instruction by interactive videodisc versus conventional laboratory. *Journal of Research in Science Teaching*, Vol. 29, No. 1, pp. 93–102.
In the use of videodisc or traditional laboratories, no significant difference was found for biology undergraduate students' laboratory grades. However, the videodisc group required one-half the time.

Lilienfield, L.S., & N.C. Broering. 1994. Computers as teachers: learning from animations. American Journal of Physiology 11(1): *Advances in Physiology Education*, pp. S47–S54.
Medical and graduate students who used computer simulation achieved a significantly higher grade in the cardiovascular section of the final exam than their classmates.

McCollum, T.L. 1987. The effect of animal dissections on student acquisition of knowledge of and attitudes toward the animals dissected. Unpublished Doctoral Dissertation, University of Cincinnati.
Approximately 175 high school biology students taught frog structure, function, and adaptation via lecture performed better on a post-test than did approximately 175 high school biology students taught by doing a frog dissection.

More, D. & C.L. Ralph. 1992. A test of effectiveness of courseware in a college biology class. *J. Educational Technology Systems* 21: 79–84.
Biology knowledge of about 92 undergraduate biology students using computer courseware increased more than did that of approximately 92 students using traditional animal-based laboratories.

Phelps, J.L., J.O. Nilsestuen & S. Hosemann 1992. Assessment of effectiveness of videodisc replacement of a live animal physiology laboratory. Distinguished Papers Monograph, American Association for Respiratory Care.
Nursing students who studied using an interactive video program on cardiac output principles performed better on a post-test than did students taught by lecture and live animal physiology laboratory.

Samsel, R.W., G.A. Schmidt, J.B. Hall, L.D.H. Wood, S.G. Shroff & P.T. Schumacker. 1994. Cardiovascular physiology teaching: computer simulations vs. animal demonstrations. *Advances in Physiology Education* 11: S36–S46.
Medical students used both computer demonstrations and animal (dog) demonstrations, and rated the former higher for learning cardiovascular physiology.

Studies Demonstrating Equivalent Teaching Effectiveness of Humane Teaching Methods

Bauer, M.S., N. Glickman, L. Glickman, J.P. Toombs & P. Bill. 1992. Evaluation of the effectiveness of a cadaver laboratory during a fourth-year veterinary surgery rotation. *Journal of Veterinary Medical Education* 19(2): 77–84.
Learning outcomes were similar between two groups of fourth-year veterinary students, one who were taught surgery using a terminal and cadaver laboratory format, the other taught using survival laboratories.

Cohen, P.S. & M. Block, 1991. Replacement of laboratory animals in an introductory psychology laboratory. *Humane Innovations and Alternatives* 5: 221–225.
Undergraduate students who studied feral pigeons in a city park scored equally well on evaluations as did students who studied operant conditioning with rats in a traditional lab.

Dewhurst, D.G. & A.S. Meehan. 1993. Evaluation of the use of computer simulations of experiments in teaching undergraduate students. *British J. Pharm. Proc.* Suppl. 108: 238.
Undergraduate students using computer simulations performed equally well as students using traditional approaches in physiology and pharmacology laboratories.

Downie, R. & J. Meadows. 1995. Experience with a dissection opt-out scheme in university level biology. *Journal of Biological Education* 29(3), 187–194.

Cumulative examination results of 308 undergraduate biology students who studied model rats were the same as those of 2,605 students who performed rat dissections.

Greenfield, C.L., A.L. Johnson, D.J. Shaeffer & L.L. Hungerford. 1995. Comparison of surgical skills of veterinary students trained using models or live animals. *JAVMA* **206(12): 1840–1845.**
Surgical skills of veterinary students were evaluated following training with dogs and cats, or soft tissue organ models; performance of each group was equivalent.

Guy, J.F. & A.J. Frisby. 1992. Using interactive videodiscs to teach gross anatomy to undergraduates at Ohio State University. *Academic Medicine* **67: 132–133.**
Performance of prenursing and premedical students using interactive videodiscs was not significantly different from that of students in traditional cadaver demonstration labs.

Jones, N.A., R.P. Olafson, & J. Sutin. 1978. Evaluation of a gross anatomy program without dissection. *Journal of Medical Education* **53: 198–205.**
Learning performances of freshmen medical students using films, computer-assisted instruction and prosected human cadavers were the same as those of students taught by traditional lecture and dissection.

Kinzie, M.B., R. Strauss & J. Foss. 1993. The effects of an interactive dissection simulation on the performance and achievement of high school biology students. *Journal of Research in Science Teaching* **30(8): 989–1000.**
Findings suggest that an interactive videodisc was at least as effective as actual dissection in promoting high school student learning of frog anatomy and dissection procedures.

Leathard, H.L. & D.G. Dewhurst. 1995. Comparison of the cost effectiveness of a computer-assisted learning program with a tutored demonstration to teach intestinal motility to medical students. *ALT-J* **3(1): 118–125.**
No significant difference was found in the performances of preclinical medical students who used a traditional live animal laboratory and those who used a computer simulation on intestinal motility.

Lieb, M.J. 1985. Dissection: A valuable motivational tool or a trauma to the high school student? Unpublished Thesis, Master of Education, National College of Education, Evanston, Illinois.
Post-test scores were equivalent for high school students who dissected earthworms and those who received a classroom lecture on earthworm anatomy.

Pavletic, M.M., A. Schwartz, J. Berg, & D. Knapp. 1994. An assessment of the outcome of the alternative medical and surgical laboratory program at Tufts University. *JAVMA* **205(1): 97–100.**
No difference was found in surgical confidence or ability of veterinary graduates who had participated in an alternatives course of study versus those who had participated in a conventional course of study.

Prentice, E.D., W.K. Metcalf, T.H. Quinn, J.G. Sharp, R.H. Jensen & E.A. Holyoke. 1977. Stereoscopic anatomy: evaluation of a new teaching system in human gross anatomy. *Journal of Medical Education* **52: 758–763.**
Based on physician-assistant student learning performances, the authors concluded that use of labeled sequential slides of anatomical dissections provided a viable alternative to dissection.

Strauss, R.T. and Kinzie, M.B. 1994. Student achievement and attitudes in a pilot study comparing an interactive videodisc simulation to conventional dissection. *The American Biology Teacher* **56(7): 398–402.**
Two groups of high school students performed equally on a test following either animal dissection or interactive videodisc simulation.

White, K.K., L.G. Wheaton & S.A. Greene. 1992. Curriculum change related to live animal use: a four-year surgical curriculum. *Journal of Veterinary Medical Education* **19: 6–10.**
After hesitancy in their first live tissue surgery, veterinary students from an alternative surgical laboratory program performed on par with students with a standard laboratory experience.

One Study Demonstrating Inferior Teaching Effectiveness of a Humane Teaching Method

Matthews, D. 1998. Comparison of MacPig to Fetal Pig Dissection in College Biology. *The American Biology Teacher*, 60(3): 228–229.

Eight biology undergraduate students who dissected fetal pigs scored significantly higher on an oral test with prosected fetal pigs than did twelve students who studied on a computerized pig (MacPig). However MacPig is considered inadequate for college level biology instruction.

(Source: HSUS)