TEACHING ANATOMY AND PHYSIOLOGY BEYOND
THE BOUNDARIES OF THE CLASSROOM

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Teaching Anatomy and Physiology (A&P) courses for Allied Health students is a challenge for faculty across the country. Many students take these courses without the essential foundational concepts in chemistry, physics and biology that facilitate the understanding of physiological mechanisms and structure-function relationships. Educators have to cover a huge amount of material in a short period of time. As a consequence, many instructors do not use pedagogical strategies based on learner-centered instruction because they are afraid of lacking the necessary time to cover the required material. I taught A&P I and II courses to a group of adult students, the majority of whom had returned to the educational system after more than ten years. Many did not have the basic knowledge to understand A&P aspects but had a great desire to succeed in the program, plus extensive personal literacy as a consequence of years of work, parenthood, and life experiences in different countries. Thus, I used all of these pre-existing personal literacies to build up the expected academy literacy regarding A&P, and applied two novel pedagogical approaches to help these students to become engaged and to understand the content. By visiting a museum and by inviting a recognized mountain climber to our class, students could critically assess the course contents and apply them to real world issues. In addition, they could also have social and human perspectives of the content beyond the biological aspects.

BODIES THE EXHIBIT

Thirty students in the A&P I class visited Bodies: The Exhibit once during the Spring 2006 term. It was an exciting way to reinforce student knowledge of the skeletal, muscular, and cardiovascular systems. Students also approached other human systems of organs that were to be covered later on in the course. They had prior knowledge about some organ systems and guided themselves through the exhibit without assistance. Through this learner-centered instruction, they encountered real human bodies and gained a three-dimensional perspective of human organs.
presence of some organs with tumors and some with damage from strokes, and the
sight of organs damaged by the effects of smoking led to a number of serious analytical
discussions; furthermore, we had a conversation about the visit two days later.
Students expressed their opinions of the exhibit even beyond the biological perspective:
the bodies came from China and many students discussed the ethical issues
surrounding the origin of the bodies used for the exhibit.

Following the visit, students were invited to discuss their experiences. In brief,
students had a number of interesting responses to Bodies. Some felt that would-be
medical students would benefit from a visit. Others were fascinated by the sequence
of human embryos starting at two weeks. Most were surprised by how much they had
managed to learn in just one day. Some students, even though they were plagued by
ethical questions and wondered if their bodies would be treated the same way after
they had died, were nevertheless impressed by the opportunity the exhibit gave them
to reflect and reinforce what they had learned. Some pointed out that the exhibit was
like a visual textbook to their own bodies and commented on how the visit raised
their enthusiasm for the course and gave them an opportunity to prepare for future
study. On the whole, students were able to start to understand the difference between
seeing various structures in their textbooks and seeing them in life. Ethical concerns
did keep returning, with some students seemingly disturbed by the juxtaposition
between the exhibits’ former lives and their present condition—some students found
the idea that autonomous adults and helpless children were now nameless exhibits to
be particularly troubling. Some students pointed out that the visit was relatively somber
and that the sight of lungs damaged by cigarette smoke had a powerful impact.

Four students out of forty did not like the exhibit because of ethical issues;
however, some students who had concerns before the visit ended up recognizing how
interesting the trip had been for them. Students reinforced their academy literacy
through this visit, but it was also an opportunity to socialize, to discuss ideas about
women’s rights, ethics, abortion, evolution, smoking and drinking habits. This fall
2006 group obtained better average results in the exams following the visit in comparison
with other groups from different terms that did not attend the exhibition.

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<tr>
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<th>Group attending the exhibition</th>
<th>Groups that did not attend the exhibition</th>
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<tbody>
<tr>
<td>Exam III</td>
<td>74.7</td>
<td>79.3</td>
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<tr>
<td>Exam IV</td>
<td>84.3</td>
<td>61.8</td>
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<tr>
<td>Final Exam</td>
<td>74.2</td>
<td>53</td>
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Student opinions demonstrated how the learning process could also be an enjoyable experience that fosters general skills regardless of their future majors. The visit also reinforced the idea that personal literacy can be used to understand specific course content. Indeed, one student explained how he grasped the skeletal system joint content by using his background as a carpenter.
A MOUNTAIN CLIMBER VISITS OUR CLASS

Javier Huarte, a recognized mountain climber from Navarra, Spain visited an A&P II class during summer 2006. This was the same group of students who had worked with me in A&P I during the Spring of 2006. Huarte has climbed mountains that have 6000 to 8000 meters of altitude and he shared with the students his mental and physical preparations to face these challenges. Students drafted questions about homeostatic mechanisms, and mind and body adaptations; but, interestingly, when the day came, students turned the conversation to the philosophical and personal reasons that made Javier embrace his tremendous and dangerous endeavors.

As I had seen following the class visit to Bodies, student response to Javier Huarte’s visit showed a wide range of concerns. A number of students kept the discussion anchored to class concepts and wondered how Huarte paced his climb to counter decreased oxygen levels, or questioned the changes that the cardiovascular system, the muscular system and all the homeostatic mechanisms adapted to the stress of climbing. Some were even more technically inclined and had specific questions about the negative feedback mechanisms that control the rate of red blood cell formation in low oxygen levels. Many students were able to see the connections between the visit and course materials and commented that the visit made them think about the cardiovascular system, cellular respiration, the muscle system, even the function of adrenaline. Other students tangentially explored ideas of nutrition and speculated about pasta intake and water consumption. Finally, some students were almost overcome with good wishes toward Huarte and were concerned for his safety. One student even mused that since only eight people have ever climbed Everest without bottled oxygen, Huarte must be “crazy”.

Conversations with the students strengthened their knowledge about anatomy and physiology concepts. Students made connections between the different systems of organs. The visit was also an exceptional opportunity to merge aspects regarding the human body and human spirit since they asked the mountain climber: Why do you do this? Why do you spend thousand of dollars doing an activity that can kill you? It was a conversation about challenges, human decisions and actions based on love and beliefs besides the strengthening of the A&P aspects. They could also make connections between A&P I and A&P II content.

DISCUSSION

The two learning experiences described above showed how learner-centered instruction helps students grasp science course content. It is believed that the organization of information in story form is a natural brain process. As instructors, we have to be able to frame coherent learning experiences that allow students use their personal literacies to build up specific academic literacies, and then apply both from the perspective of general education. This approach can also reinforce teaching of both the liberal education requirements and any required discipline-specific skills while at the same time instilling in our students a passion and curiosity for lifelong learning.

Liberally educated people can follow a conversation on any topic, can “read” by searching the World Wide Web, are moved by the great art in museums, can engage
with classic and contemporary works in theaters and cinemas, and are able to recognize the beauty of athletic achievement. Educated people can also solve a variety of puzzles and problems by breaking complicated realities into pieces. Can our students understand that the concept of higher education implies the acquisition of these skills, skills that transcend specific course content? Do they have to be aware of the goals of liberal education, or will they simply realize these ideals on their own after they enter professional life and begin to make the sorts of larger connections that naturally lead to life-long learning? I believe that the implementation of information literacy as a requirement in our syllabi, the creation of assignments that rely on these skills, and the adoption of more learner-centered instruction strategies are the best ways to provide discipline-specific course content and the general skills our students need. Currently, two biology courses in our department have structured information literacy components in their syllabi—in the form of group assignments that require the correct use of library resources and culminate in oral presentations. We look forward to implementing seminars and case-based studies in these courses. These strategies will reinforce the General Education components in our syllabi and complement similar efforts already spearheaded at other colleges of The City University of New York. This ongoing process will ultimately help to foster the growth, and nurture and develop the freedom and the power associated with the knowledge that our students deserve and require to succeed as future professionals.

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ENDNOTES


2 See: http://www.bodiestheexhibition.com/

3 See: http://www.txoin.blogspot.com/

