

RESPECT FOR LIFE, THE FINAL GIFT: A QUALITATIVE
INQUIRY INTO THE EXPERIENCES OF FIRST-YEAR
MEDICAL STUDENTS IN CADAVER DISSECTION

by

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ABSTRACT

Cadaver dissection has been a fundamental part of the education of medical students for hundreds of years. Since the 16th century, dissection has been touted as the premier method for educating doctors in training on human anatomy. Research in the field of medical pedagogy has explored the multifaceted learning experience of dissection. The literature has focused on the emotional impact, utility, and academic merits of dissection. Yet conceptual literature in the field suggests that cadaver dissection offers an even greater learning experience than what is represented in the existing research. The purpose of the current study was to expand on the preexisting research with a more focused and in-depth examination of medical students' experiences in the anatomy lab. The questions guiding this research were: What is the impact of cadaver dissection on medical students, and what do medical students really learn during cadaver dissection? The research was qualitative in nature and based on an interpretivist paradigm. Data were collected from three distinct sources: field observation of a gross anatomy course, in-depth individual interviews with 15 first-year medical students who participated in the gross anatomy course, and a focus group of three students from the same course. The data were analyzed using grounded theory methodology. From the analysis five distinct themes emerged, with one core concept, Balancing Respect as the central theme supported by the remaining four themes: Discovery, The Shock of Medicine, Utility as Motivation/Coping, and Humanity. The results of the research led to the development of a theoretical model of the process in which cadaver dissection aids

medical students in developing a balanced sense of respect for the human body. The act of dissecting evoked two contrasting reactions; a sense of discovery and a sense of shock, and students use the notions of utility and humanity to filter these reactions into a congruent sense of respect. The results of this study have implications for research in the field of medical pedagogy as well as clinical implications for those instructing students through the use of cadaver dissection.

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CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

It is the early part of the 16th century. The Renaissance movement has fully taken hold in Italy and has spread throughout the rest of Europe. There is an explosion of exploration in painting, sculpture, music, and writing. In Padua a young Flemish-born medical educator by the name of Andreas Vesalius will join this wave of exploration and soon change the way the world sees the human body (Gregory & Cole, 2002). As a lecturer he will step down off of the podium and encourage his medical students to use more than their eyes and ears while learning about human anatomy. He will have his students actively participate in the dissection of human cadavers that, up until this point, they had merely watched from a distance.

Nearly five centuries later medical students throughout the world continue to learn human anatomy through dissection. Certain principles have changed over the years, such as the move from the perception of dissection being a punishment for the deceased to a belief that it is a gift from the donor. Nevertheless, one central conviction that the medical community continues to hold is that dissection is a right of passage along the path towards becoming a doctor. However, dissection has never been free of controversy, and that continues to be the case today. Many have asked if dissection is necessary for students to learn gross anatomy (Guttman, Drake, & Trelease, 2004). Others claim that dissection is a rich learning experience for students, which encompasses more than

simply learning anatomy. The central question in the current controversy is, “What do medical students really learn during cadaver dissection?”

The literature in the field surrounding cadaver dissection in the education of medical professionals falls in one of two categories; research and conceptual literature. For the purpose of this study I will review each of the two genres of literature separately. I will begin with a summary of the empirical research that has been published regarding the use of cadavers in medical education. I will then summarize the extant conceptual literature expressing the opinions held by experts on the field of anatomy and medical education.

Research Literature

It is clear that the use of dissection is a fruitful area of research. The use of cadavers in medical education is a nearly universal practice. In 2002 (Drake, Lowrie Jr, & Prewitt) the American Association of Anatomists distributed a survey to 141 allopathic and osteopathic schools in the United States regarding course hour and laboratory activities in gross anatomy, microscopic anatomy, neuroscience, and embryology. A follow-up survey was distributed electronically to these schools in 2009 (Drake, McBride, Lachman, & Pawlina). From the most recent survey, data was collected regarding 65 gross anatomy courses. All 65 of the respondents for gross anatomy reported that some type of cadaver experience was incorporated into the course. When asked what experiences comprised the laboratory component of the gross anatomy course, 49 of the responding schools stated that students participated in a complete dissection, 23 of the schools used a combination of prosection and dissection, and the remaining two schools relied solely on prosection. The primary difference between these

two methods of cadaver use is the level of involvement of the medical students. In dissection, the students are responsible for cutting apart and separating tissues for anatomical study. Whereas with prosection, the students examine cadaver material that has been previously dissected by someone else, usually an instructor or laboratory assistant. The average number of course hours dedicated to gross anatomy was 149, down from 196 in 2002. The total gross anatomy course hours ranged from 56 to 231 hours. The laboratory experience was a significant part of the course, taking up an average of 63% of the course time. Drake noted that there was a difference in the total number of course hours for those using prosected material rather than dissection, but this difference was not statistically significant. These results indicate that gross anatomy instruction, and more specifically cadaver dissection, makes up a substantial portion of the medical school experience for students in their preresidency years.

The research regarding cadaver dissection as a training tool has seen robust movement in recent years. In fact 11 out of the 12 research articles retrieved in the search of the literature were published within the last decade. The country of origin for each research article spanned the globe including North America, Europe, Asia, Africa, the Middle East, and Australia. The focus of this research primarily revolves around three major points; the perception of emotional impact of cadaver dissection, the utility of dissection as an educational tool, and the academic performance of those students utilizing one form of gross anatomy instruction (such as dissection) compared to another method. The research surrounding the first two focal points tends to take the form of student response surveys, while the latter is studied by comparing scores on practical or

national examinations. While a few of the articles focused solely on one area of impact, the majority of the research incorporated two or all three areas of focus.

Emotional Impact of Dissection

One of the more recent areas of exploration in the research has been the study of the emotional impact of cadaver dissection. A number of researchers have acknowledged that there is a psychological and emotional component to the dissection experience. In the late 1980s Horne, Tiller, Eizenber, Tachevska, and Biddle (1990) surveyed 100 first-year medical students about their level of preparation for and reaction to their first encounter with a human cadaver in the dissection lab. Their results indicated that nearly one third of the students experienced adverse psychological effects following the gross anatomy course.

Not surprisingly, these results spurred further research into the emotional impact of cadaver dissection. It was concerning to think that a notable portion of the educational process could cause psychological harm to a significant number of medical students. However, these findings have not been supported in subsequent studies.

Dinsmore, Daugherty, and Zeitz (2001) published a study that spanned a four year period. In that time, medical students entering the Anatomical Science course ($n=24$ per year) in the elective-based science track at Rush Medical College, Chicago, were asked to participate in a survey regarding the delivery of the gross anatomy lab experience and, prior to the experience, the perceived emotional impact they expected from the cadaver dissection. A follow-up survey was administered after the experience for comparison. The results indicated that prior to the experience the majority of students were “eager to begin/excited,” but 10% felt either “fear/anxiety” or “nausea/disgust.” The follow-up

survey indicated that most students viewed their time in the gross anatomy lab as a positive experience.

In 2008, Arráez-Aybar, Castaño-Collado, and Casado-Morales published a study focusing on death anxiety and emotional reactions to cadavers. They administered a survey to 425 first-year medical students from three Spanish universities studying medicine, occupational therapy, or odontology. The study found that the majority of students felt curiosity and interest about the dissection process and that the number of students feeling negative emotions decreased significantly over the study period. The students who had the highest ratings on the Death Anxiety Inventory also maintained the highest negative emotions in the cadaver lab. This seemed to indicate that for the most part the students learned to manage these negative emotions. The authors postulate that this is an important learning tool for future health professionals because it contributed to the students' future ability to confront death in their patients. These results concur with the findings of Dinsmore, Daugherty, and Zeitz (2001) and indicate that the majority of medical students do not have significant adverse negative reactions to cadaver dissection, but there may be a few students where dissection does pose a threat to their emotional well-being.

These results are also supported in the only qualitative study found regarding medical student's experiences with cadaver dissection (Lempp, 2005). This study involved observation of dissection in the gross anatomy lab as well as interviews with 29 1st – 5th year medical students. Many of the students were originally apprehensive about the idea of dissection, but the majority of students moved to feelings of excitement and enthusiasm. Lempp attributed some of this change in the emotional state of the students

to the attitudes and consideration demonstrated by their instructors. Only about ten percent of the students interviewed mentioned negative accounts of the dissection process. One example of a negative experience described the dissection as interesting, but the amount of standing around was boring and the smell of the formaldehyde was “oppressive.” In fact, in each one of the aforementioned articles, the smell of formaldehyde was the most frequently noted negative aspect of dissection.

Utility of Dissection

The utility of cadaver dissection has been another robust area of research in the field. Earlier research by Arráez-Aybar and colleagues (2004) examined both the perceptions of utility as well as the emotional impact that cadaver dissection has on future medical professionals. The authors surveyed 93 anatomists at the 21st Congress of the Spanish Society of Anatomy in Pamplona, Spain. They postulated that future healthcare professionals’ first attitudes towards cadavers may play a part in shaping their relationships with patients, and that students’ attitudes are a product of the behavior they see modeled by the anatomy teachers in the lab. The majority of the respondents believed that dissection is a vital ingredient in training medical professionals and developing professional skills. However, the notion that that role of dissection was to help students develop emotional controls was the least endorsed of the five options given to the participants.

Other research has looked at the students’ perceptions of the utility of cadaver dissection. Azer and Eizenberg (2007) surveyed 475 first and second year medical students at the University of Melbourne regarding their beliefs about the advantages and disadvantages of dissection. They were also asked to rate dissection in comparison to

other educational resources used in teaching anatomy. The study found that first and second-year students had different attitudes regarding dissection ; with the first-year students ranking it as the most useful learning tool, and second-years rating it as the second most useful tool after textbooks. Both groups agreed that dissection “(1) deepened their understanding of anatomy and provided them with a three-dimensional perspective of structures, (2) helped them recall what they learned, (3) provided them with a deep understanding and made learning more interesting, and (4) enhanced their respect towards the human body.” The first-year students were more likely to strongly endorse the aforementioned advantages to dissection. When considering disadvantages, the smell and difficulty in identifying structures were the only two items that were endorsed as areas of concern. It should be noted that the majority of students in both cohorts disagreed or strongly disagreed that dissection should be eliminated, and most disagreed with the statements that dissection should be replaced by computer aided learning (CAL), lectures, or prosection. Both groups of first and second-year students across gender, educational background, and nationality felt that they would be disadvantaged if they did not attend a dissection course.

Similar findings were seen in a study in India. Rajkumari, Das, Sangma, and Singh (2008) developed a survey to examine the views and attitudes of the first-year medical students at the Regional Institute of Medical Sciences in Imphal Manipur India. A total of 80 students took the 18 question survey that asked about their thoughts and emotions regarding their experiences in the cadaver dissection lab, as well as their opinions regarding the utility of dissection. The majority of the students (98.75%) agreed with the statement that cadaver dissection is “considered important and indispensable,”

and 96.25% of the students agreed with the statement “that actual hands on training on cadaver dissection gives better results than demonstration of prosected specimen.” The remainder of the responses to the study were also highly favorable of dissection. Most of the students positively endorsed questions that reflected that dissection was beneficial to their education, that they were prepared for the experience, and that they did not consider dissection a stressful experience.

Dissection and Academic Performance

The early research on cadaver dissection focused primarily on the academic performance of medical students who used dissection over some other form of learning anatomy. The classic research done by Jones, Olafson, and Sutin in 1978 was one of the research projects that focused solely on academic performance. For five consecutive years from 1971-1975, students were randomly assigned to either an experimental group that used multimedia and computer-assisted instruction, or a control group that followed the traditional training methods that included the gross anatomy lab. Both groups had access to cadavers for study and dissection, but dissection was not required for the experimental group. Both groups were tested a number of times throughout the study using four different types of exams (both intramural and extramural). The results of the study indicate that there was no significant difference between the two groups. The students took a total of 70 exams over the 5 year period. There were significant differences between the groups in nine of the exams. For six of them, the experimental group scored significantly higher, in the other three the control group scored higher. The authors stated, “If, however, there is any behavior of knowledge which is gained from the

dissection experience, the conventional evaluation instruments do not demonstrate them, and, in fact, show the opposite trend in this study”.

A similar change in curriculum was studied more recently in the Medical Embryology and Gross Anatomy course at the University of South Carolina School of Medicine by Sargent Jones, Paulman, Thadani, and Terracio (2001). This research examined whether students performed better on their assessment of anatomical knowledge after participating in traditional dissection compared to studying prosection prepared by peers. The students were paired into teams of two to three students with three teams per dissection table. Each team was responsible for six dissections and then required to instruct the other two teams. Half-hour formally scheduled teaching sessions were arranged so that the dissectors could teach the four other students assigned to the table. The dissecting teams were graded during the teaching session on both teaching and the quality of dissection. Following completion of the course, students took the National Board of Medical Examiners (NBME) Gross Anatomy and Embryology Subject Exam. The questions on the exam were coded based on the group that dissected the material the question was based on. This analysis was done for two cohorts of medical students. Students in the later cohort were also assessed using four practical exams throughout the semester, and these were also coded based on the groups responsible for dissection. The results of the study found statistically significant differences between the scores of the dissectors versus the nondissectors on the practical exams, with the dissectors outperforming the nondissectors. However, the study found no significant difference between the groups on the NBME exam.

Further curriculum research has been done in Taiwan (Leung, Lue, Lu, & Huang, 2006). In 1997 the National Taiwan University College of Medicine implemented a two-stage anatomy course split between the third and fifth year of study. During the first stage, students learned through lecture and lab with prosections, models, and images. The second stage in their final year of the program involved a six-week dissection course, mini-lectures, and a “Life and Death” course. At the end of the program, students’ scores on the national licensing exam were compared. There was no significant difference in licensing examination passing rates in those students in the two-stage curriculum compared to previous years. For the most part students had a favorable opinion about the two-stage model. Cadaver dissection was highly favored by the students in learning gross anatomy. The authors note that it is difficult to compare their model to other course designs because of heterogeneity between models and cultural differences, and acknowledge that a well-designed student-centered curriculum could do well without cadaver dissection. They also note that the lack of a control group was a major limiting factor in analyzing the effectiveness of the two-stage model.

A similar area of interest in the research on the use of cadavers is how students actually utilize the tools available to them in the gross anatomy lab. Winkelmann, Hendrix, and Kiessling (2007) surveyed 371 students in three medical schools in Germany about the amount of time they spent actively involved in dissection. The students were also asked about their motivation, general attitude, and emotional and ethical values as they related to dissection. The course time spent was generally split into thirds, with 33% of the time in active dissection, 27% of the time studying prosected material, and 31% of the time on other activities not related to the cadaver. However,

there was a significant individual difference among the students on the allocation of time for active dissection ranging from 0% to 82%. The student's attitude towards dissection was the only positive predictor for involvement in active dissection. The findings suggest that the learning experience in the gross anatomy lab is not a uniform process across students. Even within the same course students varied widely on their use of the different resources available to them.

Winkelmann (2007) also published a literature review of objective studies examining the effect of cadaver dissection on learning outcomes. Winkelmann found 14 studies that compared students using cadaver dissections to other students. These comparison groups differed from the traditional dissection groups by one of many factors including time spent dissecting, the addition of learning tools such as models and CAL programs, and the use of prosection instead of dissection. In all of the studies Winkelmann reviewed, the comparison groups varied on more than one variable. Despite the difficulty in comparing this heterogeneous group, Winkelmann found that there was a slight advantage for traditional dissection. He noted that this result is of interest given that the majority of researchers he reviewed developed their research with the intent of supporting a new course design, in other words, with a bias against dissection. However, Winkelmann was clear in stating that he felt that more sophisticated research needs to be run in order to gain a clearer understanding of best way to teach gross anatomy.

Conceptual Literature

While research articles make up a notable percentage of the literature in the field of anatomical education, one can also find a number of conceptual and theoretical articles, as well as editorial and opinion, articles expressing both the pros and cons of

cadaver dissection. These conceptual articles espousing a view in favor of the use of dissection give a multitude of reasons to support that point of view. Many similar benefits are expressed by multiple authors across these articles.

Positive Views of Dissection

The benefit noted most frequently in the articles supporting the use of cadavers is the notion that cadavers offer students a greater understanding of anatomical variability (Aziz, et al., 2002; Granger, 2004; Korf, et al., 2008; Older, 2004; Pawlina & Lachman, 2004). Human beings display variability across all traits (i.e., physical, emotional, mental), and some postulate that this is an evolutionally adaptive response (Aziz, et al., 2002; Korf, et al., 2008). An understanding of the uniqueness of each human body benefits the medical student in two ways. Firstly, preparing students for bodily variations buffers against misdiagnosis and malpractice due to an unrealistic view of an idealistic “normal” body (Aziz, et al., 2002; Granger, 2004). Granger (2004) quoted one student as saying, “for me, one of the most important lessons I learned in anatomy was that a vast range of structures are considered normal (or at least will never cause dysfunction) .” In addition to the practical aspect of understanding normal human variation, the concept of individuality adds to the humanistic value of medical practice (Korf, et al., 2008; Older, 2004). Each patient deserves to be recognized by her or his physician as a unique individual. These concepts are threatened when student exposure to variability is limited by the use of only idealized models and textbooks or a restricted number of plastinations or prosections (Aziz, et al., 2002; Granger, 2004; Korf, et al., 2008; Older, 2004; Pawlina & Lachman, 2004).

A number of authors indicated that a major benefit of the use of cadaver dissection is the introduction to human mortality (Aziz, et al., 2002; Granger, 2004; Korf, et al., 2008; Older, 2004; Rizzolo, 2002). Aziz and colleagues state that one of the purposes, if not the primary purpose, of medicine is the postponement of death. Therefore, by building the foundation of the doctor-patient relationship with the cadaver, the student is forced to contend with her or his patient's mortality (Aziz, et al., 2002). The emotional responses that students experience as a result of this confrontation with death and dying presents a valuable teaching opportunity (Granger, 2004; Rizzolo, 2002). This experience can introduce future medical practitioners to the notion of humanistic care (Granger, 2004; Korf, et al., 2008). When given a safe environment to explore his or her reaction to this deceased "first patient," the student can learn to balance the notions that the cadaver must be both objectified as an entity to be observed with emotional distance and also personalized as a reflection of a human being to be respected and cared for.

An extension of the "first patient" relationship theory also postulates that full cadaver dissection aids in educating students in professionalism (Pawlina & Lachman, 2004). Because the cadaver is often the first human body that medical students are charged to care for, it introduces them to the physician-patient relationship (Granger, 2004). Aziz and colleagues (2002) referred to this as the "primacy of the patient." In other words, the primary purpose of medical school is learning how to care for the patient, and as a result the patient comes first.

In addition to improving future relationships with patients, supporters of cadaver dissection also claim that the group work required in the gross anatomy lab encourages learning in peer groups and functioning as part of a team (Granger, 2004). The

collaborative atmosphere in dissection is noticeably different from the competitive environment and didactic teaching style that pervades much of the medical school experience. The social bonding and communication that comes from group learning is beneficial to students (Aziz, et al., 2002; Older, 2004).

The small group environment and active participation also helps students to apply medical terminology that they have gathered through rote memorization (Aziz, et al., 2002). The active use of the basic language of medicine helps to solidify that knowledge. It is assumed that by connecting the concepts to concrete examples students are better able to access this information when called upon in future situations (Granger, 2004; Older, 2004).

Further supportive arguments for the use of cadavers state that dissection can enhance practical skills such as hand-eye coordination and help to develop manual dexterity (Granger, 2004; Older, 2004). Pawlina and Lachman (2004) stated that “dissection defines anatomy and teaches essential skills.” These skills are enhanced by the touch-mediated perception of the body, which allows students to learn through active touch (Aziz, et al., 2002; Granger, 2004; Korf, et al., 2008). By engaging multiple senses, the learning process is enhanced (Pawlina & Lachman, 2004). Korf et al. (2008) praised the benefits of procedural knowledge as reproducible and valuable. They stated that dissection is an “active acquisition of knowledge.” During dissection, the students not only deconstruct the human body, but they must do it in such a way that they can reconstruct it as well.

This constructive learning allows students to actively test hypotheses and learn through deductive reasoning (Korf, et al., 2008; Older, 2004). Pawlina and Lachman

(2004) echoed a similar belief that one of the benefits of cadaver dissection is that it avoids the “normal education model,” thus encouraging students to hone their observational skills, verify what they have learned, and develop working hypotheses.

Another frequently cited benefit of cadaver dissection is that it allows students to develop a multidimensional understanding of the organization of the human body (Granger, 2004). This is important because, in this era of medical imaging, having an in-depth understanding of gross anatomy allows for a better conceptualization of in vivo anatomy (Paalman, 2000). Aziz and colleagues (2002) state that an understanding of anatomy is a prerequisite for the use of diagnostic imaging. A number of authors also noted a current trend in medical education towards a cell-based understanding of disease and care. However, research on the molecular level is wasted without an understanding of how it relates to the human machine.

This leads to a practical point that was supported by many of the authors. Like all areas of higher education, medical schools are faced with political and financial pressures. Financial constraints are often cited as a reason to discontinue the use of cadaver dissection. However, some authors claim that anatomy learned through dissection can actually lead to reduced costs in the long run. Paalman (2000) claims that a base knowledge of anatomy is a cost-saving strategy as it reduces the likelihood of relying on more expensive diagnostic techniques.

Negative and Neutral Views of Dissection

Despite the many benefits that cadaver dissection is believed to offer, there are plenty of drawbacks as well. In the article supporting the use of cadavers, Aziz and colleagues (2002) listed nine reasons given to do away with cadaver dissection. These

are: the amount of time needed for dissection; the labor intensive nature of dissection, complicated by a shortage of anatomists; the requirement of excessive rote memorization; the shortage of cadavers; the misleading nature of cadavers due to postmortem change; the cost to obtain, embalm, store, maintain, and dispose of cadavers; the unaesthetic nature of cadavers; the archaic technology of dissection; and the potential health hazards associated with the use of cadavers.

Only two articles could be found in the literature that stated strong objections to the use of cadavers. Both responded to a debate forum proposed and moderated by the journal *The Anatomical Record*. The debate centered on the question of whether or not dissection of human cadavers is a necessary tool for mapping of the human body or for communicating the map to future medical professionals. The debate consisted of one pro and one con proposition and a rebuttal for each proposition. Each article was written by a different author: Granger, McLachlan, Pawlin and Lachman, and Topp (Guttmann, et al., 2004). The pro propositions put forth by Granger and Pawlin and Lachman were summarized earlier in this literature review and will not be repeated here.

Topp (2004) responded on a point-by-point basis to the positive attributes of dissection noted in Granger's (2004) article. She began by considering the multidimensional understanding of the human body by postulating that it may be easier for students to grasp a three-dimensional understanding of the body structures by beginning with a simplified prosected model rather than the more complex structures in dissection that must be reduced to simple form. She punctuated the argument with the opinion that prosection is much less time consuming for students. For touch-mediated perception, Topp suggested that the prosections may also be used and that, for certain

tissues, embalmed cadavers may give an unrealistic understanding; so unpreserved cadavers should be used, or video when that is not possible. Topp agreed that understanding anatomical variation is important, but felt that prosections may once again provide a greater benefit, as students are likely to miss variation in dissection, but that instructors preparing prosections may be more likely to detect and preserve variation. In regards to learning basic medical language and team building, these can be done just as well with prosection as with dissection. Practical skills (such as the use of some instruments) may not be learned in using prosection, but other skills such as manual palpation can be taught and can be used in both prosection and dissection.

McLachlan's (2004) contribution centered around the benefits of using living anatomy in the education of medical students. McLachlan used the program at the Peninsula Medical School, U.K., as a basis for his claim. At the beginning of the decade, this newly opened medical school decided to rely on living anatomy instead of cadaver dissection. McLachlan points out that this decision was made for a number of reasons, but cost was not one of them. The students are taught in a small group format for 80 sessions, as well as sessions using medical imaging. Forty sessions are dedicated to living anatomy using peer examination and life models. Visualization with the life models is made possible through image projection, "high-verisimilitude body painting," and ultrasound. Plastic and 3D computer models are used in conjunction with these other learning tools. McLachlan addressed the concern that students learn 3D mapping of the body more effectively using dissection. He postulated that extensive use of living models and modern 3D reconstruction and imaging are equivalent if not superior in developing a three dimensional understanding of the body. He reemphasized this point later on, saying

that the color, texture, and smell of a cadaver is nothing like that of a living human being. He disagreed with the belief that cadaver dissection enhances humanistic values and an understanding of death because it may actually traumatize or desensitize some students. McLachlan also countered the notion that cadavers are superior because they offer students an opportunity to appreciate the range of variability in human structures. He ended the piece by acknowledging that they will not be able to make any definitive conclusions about their teaching model until after 2007 when their first students will have finished the program.

Collett, Kirvell, Nakorn, and McLachlan (2009) recently published an ethnographic study of the living anatomy classes McLachlan referred to in his 2004 article. The results of the study indicated that the use of living models when teaching anatomy fosters increased humanitarian thinking. An unexpected benefit was the communication between the life model, students, and tutors. However, the study focused solely on the benefits of using living anatomy for teaching structure, function, and surface anatomy and did not provide a comparison to the use of full cadaver dissection. As a result, McLachlan's statements regarding the weaknesses of cadaver dissection could not be confirmed.

Other opinion articles published regarding the use of cadavers have remained generally neutral or focused on a small aspect of the use of cadavers. One example is the short opinion piece comparing dissection to CAL by Bay Boon Huat (2007). The author is a full professor of anatomy at the National University of Singapore. He repeated many of the supporting and contrary arguments for and against the use of cadavers found in other opinion articles. Huat noted that some of the specific reasons against the use of

cadavers in Asia include a worldwide shortage of qualified anatomists and the low rate of body donation in Asia. Most cadavers used in Asia still come from unclaimed bodies. In a similar piece, published in a less academic medium, Haut incorporated a more personal voice (2007). The tone of that paper implied that Haut's personal experience with dissection made him a supporter of cadaver-based learning. He closes the paper by saying, "... I certainly would not relish the thought that my attending surgeon has learnt his or her human anatomy entirely from a computer!"

Despite the fact that the previous articles were based on opinion and not first hand research, the views expressed should not be taken lightly. These opinions are based on personal experiences of individuals considered experts in the fields of anatomy and medical education. As such, they contain a wealth of knowledge that can be used to inform the direction of future research. The benefits and drawbacks expressed in these articles lay a foundation for future research questions and hypotheses to be explored.

Purpose of This Study

The research noted earlier has added to the general knowledge regarding the emotional impact, utility, and academic benefits of cadaver dissection in medical education. However, when the opinions expressed in the literature are taken into account, the existing research leaves a narrow and stunted view of what experts in the field describe as a rich and complex experience. Very little research has qualitatively examined the experiences of medical students in the cadaver lab. In fact, Lemp's (2005) study was the only qualitative study regarding medical students' understanding and experience of dissection found during the extensive literature review for this research.

Yet it seems reasonable that the best way to understand the learning that occurs during the dissection process is to first understand the meaning that students make of that process. Who better to answer the question “what do students learn” than the students themselves? Lemp (2005) began this process in her research and was able to provide some insight into students’ views on dissection. However, the focus on cadaver dissection was only a cursory part of Lemp’s primary study. The study focused on the entirety of the medical undergraduate experience for 1st-5th year medical students at one British medical school. Focus on cadaver dissection was limited to a single question embedded within the larger interview. Additionally, Lemp’s participant observation was limited to two dissection sessions, and those students that she observed did not participate in the individual interviews.

The purpose of the current study was to expand on the preexisting research with a more focused and in-depth examination of medical students’ experiences in the anatomy lab, thus developing a grounded theory of the learning process for first-year medical students using cadaver dissection. This theory was developed by examining the meaning that students made of their experience of dissection in the gross anatomy lab. The questions guiding this research were: What is the impact of cadaver dissection on medical students, and what do medical students really learn during cadaver dissection?

CHAPTER II

METHOD

I utilized qualitative methodologies as outlined in this chapter in order to explore the research question, “What do medical students really learn during cadaver dissection?” In this chapter I will define the paradigms underpinning my research. This will include the ontology, epistemology, axiology, and rhetorical structure supporting my paradigm of choice. I will then explain the particular methodological approach that will be used in the research. This will be followed by an explanation of my place within the research and how I will approach subjectivity. The chapter will be closed by sections describing the participants, sources of data, and the methods of data analysis.

Paradigm Underpinning the Research

Using an interpretivist paradigm as the foundation for this research, I was able to gain a greater understanding of the learning process that occurs during dissection based. This understanding came from exploring the subjective meanings that medical students made of their experience. This is based on the belief that each person’s experience defines a personal reality that is separate and unique for that individual. As was noted earlier, previous research has indicated that the learning process in the cadaver lab is a multifaceted experience. Even though all students in a particular school participate in the same lab, each student approaches the experience from a unique perspective that acts as a framework for the meaning they make of the experience. These meanings may be

negotiated within the social context of medical school. This research was inductive in nature and was not based on a preexisting theory. The research mentioned previously was taken into account when developing interview questions, but the participants' perceptions of their experiences guided the development of a theory of the learning process.

In order to gain a greater understanding of the worldview of the participants, I attempted to minimize the distance between the dissection process and myself. However, I was also cognizant of the fact that it was my status as an outside observer that originally brought me into the gross anatomy lab. As such I made an effort to maintaining some level of objectivity throughout the research process. This allowed me to maintain a perspective of the events in the lab that was separate from those of the instructors and students. This combination of forced objectivity and a desire for inclusive subjectivity is compatible with qualitative research. The interpretive paradigm allows a researcher to strive for an inclusive understanding of the multiple realities encapsulating a concept, while also remaining aware of her or his beliefs and values (Creswell, 2007; Ponterotto, 2005).

From this standpoint, it is assumed that the values of the researcher exist in tandem with those of the participants (Morrow, 2007). Because the information gleaned from the participants is filtered through the researcher's subjective understanding of reality, full neutrality and objectivity cannot be achieved. Given this understanding, I made every attempt to bracket my preexisting biases, assumptions, and beliefs in order to achieve the purest possible understanding of the participants' point of view. The specific methods for this bracketing will be discussed in greater detail below.

Research Design

This study utilized a grounded theory design in order to build a theoretical understanding of the learning process in the dissection lab as perceived by the medical students. Grounded theory employs a technique of constant comparison between information gathered from the participants and the theory that emerges from those data. In this way, the students themselves can answer the question noted earlier that is plaguing the field of anatomical education, “What do medical students really learn during cadaver dissection?” I believe that the most efficient way to understand the learning experience of medical students using dissection was to build the theory from the ground up. The bulk of the research found in the literature works from theories of learning based on deductive reasoning. Although these certainly have their benefits, I feel that they miss a large swath of valuable information and do not address potentially valuable variables that this in-depth, data rich qualitative study was able to bring to the forefront.

One major concept underpinning grounded theory is the ultimate intention of inductively producing innovative theory that is “grounded” in the data (Fassinger, 2005). The basis behind this intention can be either because there is no theory that explains a particular phenomenon or the theories that do exist only partially capture the phenomenon in question. The latter was the case in the current study. The review of the literature indicated that there is a discrepancy between the current research in the field regarding cadaver dissection in medical education and the opinions expressed in the conceptual literature by experts in the field. Therefore, grounded theory was the most appropriate tool to use to reconcile this discrepancy.

The variables that are often missed in research based in deductive theory are more readily identified when the multiple perspectives of students are taken into account. Many qualitative research designs are emic in nature, incorporating the views of the participants, and grounded theory is no exception. Charmaz (2006) highlighted the importance of learning about the experiences of individuals that are embedded within hidden networks, situations, and relationships. Thus, it was important to take into account the full experience of the anatomy lab as perceived by the student, embedded within the social construct of medical school, allowing me to capture those variables that traditional quantitative methods have missed.

This process lent itself naturally to the use of grounded theory, because the methodologies used in grounded theory are rooted in sociology. Incorporating the meanings that form through the fluid and dynamic processes of interpersonal relationships is a keystone of grounded theory (Fassinger, 2005). Grounded theorists attempt to discover how people define their reality on the basis of their interpersonal interactions by thoroughly exploring the meanings created in those interactions (Cutcliffe, 2000). Likewise, in the current study I was able to explore the meanings created by the medical students in the interactions that occur during the dissection process.

Researcher as Instrument

In qualitative methods, the researcher can take on varying forms of inclusion within the research (Patton, 1990). The level of inclusion falls somewhere on a continuum of no inclusion, as is the goal in positivist research, to full and complete inclusion as is often seen in research based in critical theory. Although it was my goal to

minimize the amount of influence I exerted in the outcome of the research, the interpretivist paradigm from which I was working allows me to acknowledge that I was an active influence in this research. As such, I will continue to exercise the reflexivity that is expected in qualitative research by presenting the context in which I approached this research.

My formal training is in psychology and educational psychology. Although I have some training in theories of learning, my knowledge of pedagogy in medical education was virtually nonexistent before the fall semester of 2008. At that time I was invited to act as a research assistant in the department of Neurobiology and Anatomy at the University of Utah. I was asked to perform an extensive review of the literature concerning the use of cadaver dissection in medical education. Prior to this, my beliefs regarding dissection were based on a conceptual understanding of dissection as presented in popular media. I understood that medical students traditionally participated in the dissection of a human cadaver, but had not considered the implication of that tradition. I held a generally neutral outlook on the procedure but believed that it must be beneficial to the students if it was a requirement in their training. As a result of my involvement in the literature review, my understanding of the history, intent, and theories regarding the teaching of anatomy grew substantially. However, I still possessed no formal training in that area, and that remains the case to the present time.

While conducting the literature review, I was also given the opportunity to spend a number of weeks in the gross anatomy lab with the students. I observed and took extensive field notes regarding the dissection process and the students' interactions with one another, the instructors, and guests; and I made note of my own reactions to the

events that I observed. Although my interaction with the students was limited because of the nature of their work, I did not inhibit any natural interactions that occurred. Thus, I became acquainted with a number of the students.

The theories underpinning qualitative research also allow me to acknowledge my subjectivity. I accept that it is unfeasible for me to maintain complete objectivity in my research, and the current study was no exception. However, this acceptance allowed me to take steps to manage my subjectivity. These steps included keeping a self-reflective journal. I used this journal to express my thoughts and feelings about the research as I moved through the process. I also utilized my peer research team for the same purpose. I met with this team of qualitative researchers every other week throughout the data collection process and approximately every 6 weeks during the data transcription and analysis. In these meetings I was able to discuss my progress, goals, and concerns with my peers and use the feedback they were able to provide in order manage my subjectivity in this research.

Setting

This study was set in the University of Utah School of Medicine. The University of Utah is a level one research university (Carnegie RU/VH) located in Salt Lake City, Utah, a metropolitan area in the Western United States. The School of Medicine is responsible for the predoctoral, graduate, and continuing education of physicians, as well as the graduate and undergraduate training of other health professionals. The mission statement of the School of Medicine states that the size and type of educational programs implemented by the school is guided primarily by the needs of the State of Utah and surrounding states. The average incoming class size utilizing cadaver dissection consists

of 102 first-year medical students and 10 first-year dental students, but varies from year to year.

Observational field notes were taken in the gross anatomy lab. This lab is located in the Health Professionals Education Building, which is located approximately 1 mile from the main hospital. The lab is made up of four interconnected rooms with five to six dissection tables in each room. The gross anatomy lab also includes a small library, museum of preserved anatomical specimens, teaching assistants' office, and an observation lounge overlooking the library and one dissection room. Figure 2.1 illustrates the floor plan of the gross anatomy lab.

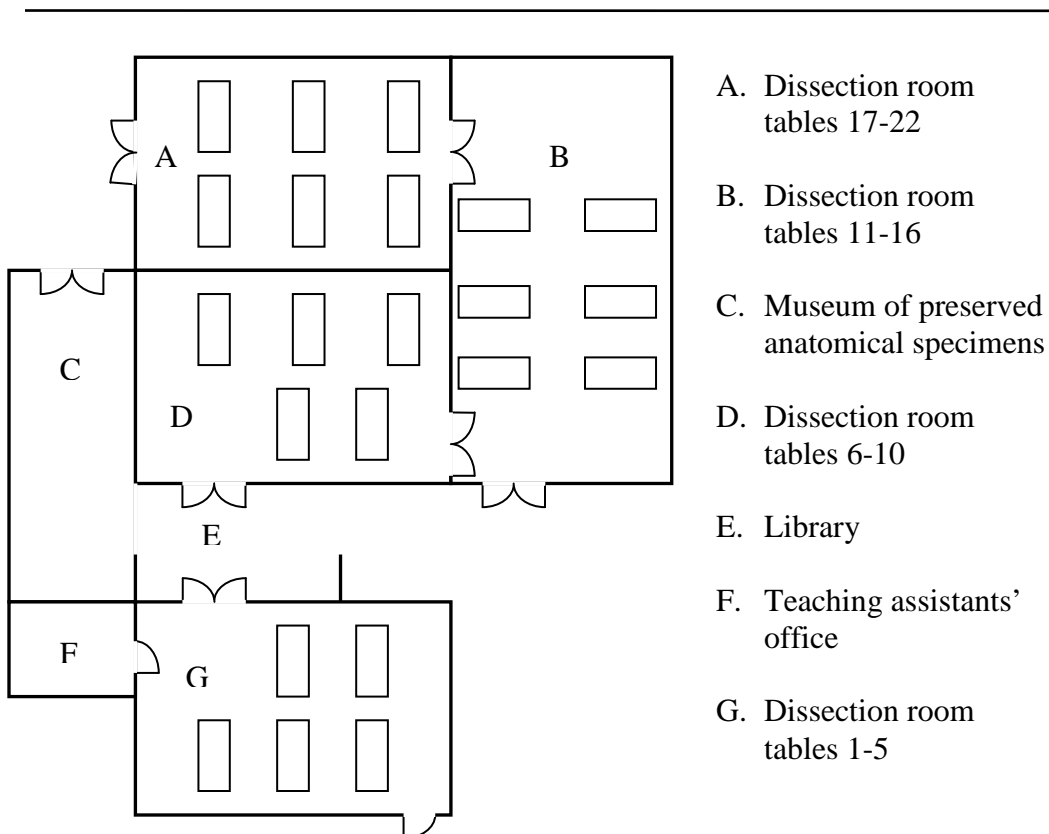


Figure 2.1 Floor plan of the gross anatomy lab including dissection table placement.

The first year of the medical curriculum is broken into three phases, called blocks, for each academic year. The Human Gross Anatomy course occurred during the first 17 week academic block of the first year. The complete course is comprised of lectures, clinical correlations, and the dissection lab. For the purpose of this study only the dissection portion of the course was considered. Before the course began, the students were informed about the body donor program by Kerry D. Peterson, LFP, manager of the program. The students were then introduced to the cadaver they would be working on throughout the academic block. The course is designed so that two teams of two to three students were assigned to one cadaver for the entirety of the block. The teams dissected on alternate laboratory sessions, so there were no more than three students working on a cadaver at any time. The formal dissection lab period was held from one to three times per week throughout the block. However, the medical students had access to the lab 24 hours a day, 7 days a week, so they were able to continue the dissection and study the cadavers outside of the schedule lab periods. The course concluded in the first week of December after 30 lab sessions.

The following May, the students were invited to attend the Body Donor Memorial Service. This is an annual interfaith memorial service honoring the individuals who donated their bodies to advance medical education and science over the previous year. Students, faculty, and friends and family members of the body donors were in attendance for this service, and members of each group spoke at the service. The intent of the service is to honor the individuals who donated their bodies for the medical education and research. In addition, the service provides grief resolution to those close to the body

donors and serves as a source of closure for the students who benefit from the body donors' generosity.

Participants

Participants for this study were drawn from the 102 medical students and 10 dental students who took the Human Gross Anatomy course in the fall semester, 2008. The demographic make-up of this course is slightly disproportionate by sex, race, and ethnicity compared to most medical schools in the United States, with a higher than average percentage of students in the University of Utah School of Medicine being males of non-Hispanic European-American decent (Association of American Medical Colleges, 2008b). The approximate demographics are as follows; 65% of the students are male, 83% identify as White/non-Hispanic, 9% indentify as Asian, 4% identify as Hispanic, 3% indentify as more than one race or ethnicity, and the remaining 1% identify as another race or declined to respond (Association of American Medical Colleges, 2008a). However, because the intent of qualitative research is an elucidation of the particular and specific rather than generalizability, the demographic discrepancy did not negatively impact the study (Pinnegar & Daynes, 2006).

The following is a summary of the demographic information of the participants. The demographic data provided are intentionally limited in order to preserve the anonymity of the participants. Due to the heterogeneous nature of the population of medical students at the University of Utah School of Medicine, students from minorities can be easily identified. As a result the demographics revealed in this study are limited to the gender of the participant. However the culture diversity of the participants in the individual interviews and focus group are reflective of the demographic makeup of the

class as a whole. It should also be noted that the pseudonyms chosen by the participants do not reflect the actual cultural or ethnic identities of the participants. Table 2.1 presents the number of participants for each data source distributed by gender and the pseudonyms chosen the participants. Additional information about the pseudonyms will be presented in the section regarding ethical considerations of the study.

The sample size for this research was gauged by redundancy and saturation of the

Table 2.1

Summary of Demographic Information of Study Participants

Data Source	Number of participants		Pseudonyms	
	Men	Women	Men	Women
Lab observation	82	30	N/A	N/A
Individual interview	8	5	Diego	Amanda
			Jason	Jessica
			José	Laura
			Mark	Sofia
			Phillip	Susan
			Sean	
			Vincent	
			Xavier	
Focus group	1	2	Evan	Latoya
				Susan

data. Redundancy in the data was identified as the point in which additional interviews failed to provide either new themes or disconfirming evidence of existing themes. The final sample size was also determined by the amount of data needed to saturate the categories that emerged from the analysis of the data. In other words, I found as many incidents, events, or statements as possible to provide support for each of the categories (Creswell, 2007). Redundancy and saturation were achieved with 13 individual interviews and 1 focus group in addition to the extensive data gathered through field notes from classroom observations.

Selection Procedures

Qualitative research differs from quantitative research in its process of selecting participants. The purpose of qualitative research is to gain an in-depth understanding of a particular event or phenomenon (Patton, 1990). Participants were recruited with the intent of maximum variation by seeking out participants with a variety of experiences ranging from good, indifferent, and bad. As a result, the selection process was purposeful rather than random. As was noted above, the participants for this research were drawn from the students who participated in the fall semester Human Gross Anatomy course. Thus, the selection procedure was also criterion-based, with the criteria for selection being the participation in the aforementioned course.

Recruitment

Participants were recruited via the e-mail address they provided to the instructor of the Human Gross Anatomy course, David A. Morton, PhD. The e-mail (Appendix A) informed the potential participants that I was investigating students' experiences of cadaver dissection. They were asked to volunteer to share their experience in the gross

anatomy lab in an individual interview that was expected to last approximately one hour, participate in a small-group discussion with other students who were also enrolled in the course, or participate in both the individual interview and group discussion. The potential participants were also informed that the information gathered in this research may be taken into consideration for future curriculum decisions within the School of Medicine. Finally, the e-mail informed the participants that, in order to promote open and honest discussion about this topic, every effort would be made to ensure confidentiality. This included allowing the participants to choose pseudonyms and decline participation at any point in the research if they so wish.

Taking Leave

Guided by the protocols outlined by Marshall and Rossman (2006), I remained respectful of the participants and the relationships that formed between the participants and me. Once participants agreed to be part of the study, I informed them that I expected the project to take approximately four months for the data collection and an additional six months for data analysis and writing the final thesis. During the data collection process contact with the participants was maintained by e-mail, phone, individual interviews, and the small-group discussion. Following the completion of the data collection, contact between me and the participants was limited to e-mail. Each of the participants was informed that I would like to offer them a copy of the final written report of my findings.

Sources of Data

I used triangulation of three of sources of data in order to strengthen the rigor and transferability of this study. Triangulation is the attempt to gain an in-depth understanding of a phenomenon by using multiple methods of data collection (Denzin &

Lincoln, 2008). Through triangulation I was able to illuminate the research question to a greater degree by bringing more than one source of data to bear on a single point (Marshall & Rossman, 2006). These sources of data consisted of the field notes gathered from participant observation, individual interviews, and focus groups.

Participant Observation

Although the data gathered from the individual interviews with participants factored most heavily into the data analysis and subsequent theory construction, the focus of these interviews was guided by information gathered in the observation of the full Human Gross Anatomy course. During the fall semester of 2008, I acted as a participant observer of this course and took copious field notes. The term “participant-observation” encompasses a continuum ranging from greater participation to greater observation (Jorgensen, 1989). I attempted to remain more observer than participant. I did not personally partake in any of the dissection procedures, nor did I handle any of the prosected material. However, I was a noticeable presence in the gross anatomy lab. My position as researcher was not openly announced to the students; and I wore a white lab coat similar to those worn by the instructor and teaching assistants. As a result, a number of students expressed confusion as to my role in the lab and approached me for help in the dissection process. Yet I did not intentionally attempt to deceive the students about my role. When asked, I informed them that I was a researcher working in Educational Psychology and gave them a brief and generic description of the purpose of the research.

The field notes taken during this time consisted primarily of observations of the students performing dissection. These included descriptions of the act of dissections and the students’ observed reactions to dissection. Additionally, I made note of the students’

interactions with each other, the teaching assistants, the instructor, and guests in the lab (e.g., pathology residents). These observations were identified by dissection table rather than individual students. In addition to the observation notes, analytic memos were included. These consisted of my personal thoughts and hypotheses regarding the learning process using cadaver dissection that arose while I was observing the goings on in the lab. Both the observation notes and analytical memos were recorded as hand written notes on paper and then later transferred to an electronic typed document. As this study is based in grounded theory, these notes and memos were analyzed to identify initial themes in the research. These themes were then used to inform the questions asked during the individual interviews and focus group.

Individual Interviews

Because this research is couched in the notion that it is the students' perception of cadaver dissection that is truly valuable, individual interviews with the students played a key role in this research. As such, the interviews were the primary source of data for this study. Individual interviews were beneficial because they quickly provided a large quantity of data (Marshall & Rossman, 2006). Additionally, they allowed me to gain a deeper understanding of the students' experience with dissection and the meaning they made from those experiences.

Individual interviews were conducted with 13 participants (8 men and 5 women) between June and July of 2009, 6 months after the completion of the Human Gross Anatomy course. The interviews were one-on-one and semistructured in nature, and were guided by two overarching research themes. These themes were: (1) what does it mean to dissect a human cadaver? and (2) what is the utility of cadaver dissection in the education

of medical professionals? Each theme was clarified with additional questions, a sample of which is noted below:

- How did you incorporate the experience of dissection into the larger experience of your first year in medical school?
- What emotions did you experience in the dissection lab?
- What did you do with those emotions?
- How did you use dissection in and outside of the lab?
- What if any benefits did you gain from dissection?
- What if anything was detrimental to you about dissection?
- What role do you believe dissection played in your learning human anatomy?

At the beginning of each interview, the participant was simply asked to talk about her or his experience in the cadaver lab. As guidance was needed, I drew interview questions from the research guide listed above, themes that emerge from the participant-observation notes, and themes from previous interviews with other participants. I ended each interview by reminding the participants that one of the target audiences for this research are the deans of the medical school and asked the participants if there was any information that they felt was important for the deans to know about their experience in the gross anatomy lab. I then asked if there were any additional question that I had not asked that they felt would be important to know when considering medical students' experiences with dissection.

The individual interviews lasted between 45 minutes and 1 ½ hours, with most lasting approximately 1 hour. Ideally, interviews for research should take place in a quiet location free of distraction (Creswell, 2007). I was able provide such a location for all

interviews, except for the first interview with Sean. All of the interviews were located in the same building as the gross anatomy lab so as to provide greater context and stimulate more in depth discussion of the topic. The initial interview with Sean was held in the observation lounge overlooking the gross anatomy lab. This lounge is open to all students in the building, and as a result was not free from distraction. Subsequent interviews were held in the teaching assistants' office located within the gross anatomy lab. This is a private office and the secure nature of the office prevented disruption during the interviews. No compensation was offered for participating in the research, but the participants were all thanked for their assistance. All interviews were recorded using a digital voice recorder and fully transcribed into an electronic typed document that was later used for analysis. Immediately following the interview I made note of any non-verbal communication or observations I made during the interview. These observations were recorded and transcribed on the same document as the interview.

Focus Group Interviews

Following the individual interviews, each participant was invited to join one small group discussion about the topic of cadaver dissection in medical education. The purpose of these focus groups was to clarify the themes that emerged from the individual interviews. Questions asked during the focus group were based on these themes, most notably the notion of respect. The focus group was an appropriate source of data because of the interpretivist paradigm underpinning the research (Morgan, 1996). I hold the belief that individuals' attitudes and beliefs about a particular phenomenon do not form in a vacuum. By listening to others' opinions, people are often able to form a more clear understanding of their own opinions and beliefs (Marshall & Rossman, 2006).

Interest in the focus group was limited. Four participants from the individual interviews expressed interest in participating in a group. However, due to scheduling conflicts, Susan was the only participant able to join in both a focus group and individual interview. The result was a single focus group consisting of 3 participants. All of the participants in the group were well acquainted with one another prior to the group meeting. The group was scheduled at a time chosen by the participants and lasted for 1 hour and 15 minutes. Throughout the group meeting, I made every effort to remain aware of power dynamics present within the group and facilitated the discussion so that everyone's voice was heard. My role in the group was primarily to act as a moderator and to introduce topics of discussion. The focus group was held in group meeting room located on the third floor of the Student Services Building on the lower campus of the University of Utah. This room was chosen because it is outfitted with video recording equipment. The group discussion was recorded using a video recorder so that all participants' contributions to the discussion could be easily identified. I also kept handwritten notes of observations and analytic memos that emerge during the discussion. Following the focus group, the video recording of the group was transferred to a digital video file to facilitate ease of analysis.

Data Analysis and Writing

Data Management

The data corpus for this research was comprised of all three data sources noted previously. The field notes from the participant observation were transferred from a hand-written document into a typed electronic document. This document contained the observational notes, analytic memos from the time of the observation, and analytic

memos noted subsequent to the observation. For ease of analysis, these three data forms were color coded in the typed document.

The data from the individual interviews were converted to typed electronic documents transcribed verbatim from the voice recordings. I transcribed the interviews personally with the assistance of voice recognition software, Dragon Naturally Speaking 10 (2008). This facilitated my immersion into the data and allowed me to incorporate analytic memos as I transcribed. Once the interviews were transcribed, I compared each transcription to the voice recording a minimum of two times to check for accuracy and to further enhance my immersion into the data. Additional analytic memos were added during the data checks.

The focus group data were not transcribed in its entirety. In order to immerse myself in these data, I watched the entire video recording of the focus group two times, and watched sections of the video as many as five times. I created an electronic typed document containing excerpts of the group discussion transcribed verbatim that supported previously identified themes and disconfirming evidence.

Data Analysis

Data analysis was based in grounded theory as outlined by Strauss and Corbin (1997) and Fassinger (2005). The guiding principle behind grounded theory is the intent to produce innovative theory that is “grounded” in the data (Fassinger, 2005). Grounded theory is an appropriate method of data analysis when there is no preexisting theory regarding a particular phenomenon or the existing theory does not fully capture the phenomenon in question (Strauss & Corbin, 1997). As was noted previously, the literature surrounding cadaver dissection indicates that there are inconsistencies between

the opinions expressed by experts in the conceptual literature and what the existing research reveals. This leaves us with the question, “What do medical students really learn during cadaver dissection?” Grounded theory was able to allow me to explore that very question by concurrently collecting data from the medical students in question, coding those data, conceptualizing, and theorizing while continually comparing the information I gathered (Fassinger, 2005).

In grounded theory, data analysis occurs in three steps. The first step is open coding. This step is used to identify emerging units of meaning that are referred to as concepts. Each concept is identified and labeled. I labeled the codes that emerged using the language of the participants. The size of the concepts can vary from a few words to entire paragraphs (Morrow & Smith, 2000), as was the case for the data collected for this study. The concepts were compared to each other as they emerge from the data, and related concepts were grouped together into larger categories. Each category was sufficiently abstract in order to encompass all of the variation of the concepts listed in it (Fassinger, 2005).

Axial coding was the second step in analysis. Axial coding occurs when multiple categories are encompassed within a key category (Strauss & Corbin, 1997). Each category’s properties and dimensions were identified in relation to the key category. Fassinger notes that identifying properties and dimensions is “critical in helping the researcher to consider what the categories actually mean in terms of individual participants” (p. 161). I perceive this step in analysis as crucial in creating a multidimensional view of the key concepts. By locating each concept in relation to other

concepts within the key categories I was able to identify the interrelationships that form among these categories.

The ultimate intent of the previous process was to allow me to formulate a substantive theory that fits the experiences described by the participants (Fassinger, 2005). This led to the final step in the data analysis, selective coding. From the information gathered during axial coding, I was able to identify a core concept that encompasses all of the previous key categories.

Although this step-by-step description of the data analysis may give the impression that it was a linear process, the actual procedure was more cyclical in nature. One of the fundamental concepts of grounded theory is the notion of constant comparison. This process was begun by analyzing the field notes collected from the participant observation in the gross anatomy lab. I immersed myself in these notes by reading them multiple times and identifying units of meaning and themes. These emerging themes were then used to inform the questions asked of the participants in the individual interviews. Conversely, the themes that emerge from the interviews were used to inform subsequent interviews with additional participants and were the basis for the topics covered in the focus group. I returned to each source of data multiple times to look for additional evidence supporting identified themes, highlighting new or emerging themes, and looked for disconfirming evidence.

Additionally, I continued to meet with my peer research group throughout the research process. I asked the members of the group to help me identify any themes and categories that I had missed. The intent of these meetings was to help me remain aware of any blind spots in my perceptions of the experiences expressed by the participants.

During the process of gathering and analyzing data, I continued to maintain a self-reflective journal of my thoughts and experiences of the research process. This journal was distinct from the analytic memos added to the data.

Through this extensive data analysis, the ultimate goal was to produce a theoretical model describing the experiences of medical students in cadaver dissection. I was able to meet this goal and construct a theory capturing a specific learning process of medical students participating in cadaver dissection. The hope is that this theory will be used to inform future research in the area of anatomical education of medical professionals.

Ethical Considerations

As my training is in the field of psychology, the ethical codes outlined in the Ethical Principles of Psychologists and Code of Conduct published by the American Psychological Association (2002) guided my work with participants. Throughout the research process I upheld the principals of beneficence and nonmalificence by remaining cognizant that the ultimate beneficiaries of this research should be medical students. I made every attempt to safeguard the well-being of the participants by minimizing the risks of harm that I was able to identify prior to my contact with the participants, and remained vigilant for unforeseen risks as they arose during the research process.

One anticipated risk for the students was the potential backlash from the School of Medicine for their participation in the research. It was possible that students would feel conflicted about making negative statements about a program in which they were still enrolled. In order to protect the participants from any backlash, real or perceived, I offered them the opportunity to choose a pseudonym to protect their anonymity. Because

I had access to a list of the names of all students who participated in the Human Gross Anatomy course, I was able to compile a list of alternate names, from which the students could choose a pseudonym. In this way, the information they provide in the individual interviews could not be connected to them. In some cases the participants had given the cadaver with which they worked a name. I offered these participants the option to choose a new pseudonym for the cadaver to further protect their identity. During focus group, I reminded all participants of the importance of creating a safe space for everyone to speak about their experience in the gross anatomy lab. I asked that the participants agree to keep the identities of the individuals in the group confidential. Nevertheless, because I was unable to guarantee that the focus group members would honor confidentiality, the limits of confidentiality were explicit in the Informed Consent (Appendix B). My position as an outsider in the department may have acted as an additional buffer against fears of retribution, as I did not stand to gain or lose anything from the results of the research. I was able convey this fact to the participants and assure them that my interest and investment in the research topic would not change as a result of either negative or positive feedback about their experiences in the program.

Another area of risk for the participants was the possibility of reexperiencing trauma that occurred during the course. There is some quantitative evidence that a small percentage of students find the dissection process upsetting enough to be considered traumatic (Dinsmore, et al., 2001). A number of the participants did recount traumatic or emotionally charged events that occurred during their time in the gross anatomy lab. In order to help protect participants from additional trauma, I began each interview session, both individual and the focus group, by acknowledging that this subject is emotionally

charged and normalizing the fact that each person approaches the experience of dissection in a unique way. Participants were reminded that it is exactly these unique experiences that I was interested in understanding. However, participants were also assured that they would not be forced to talk about any subject that they found too distressing. I checked in with the participants throughout the interview about their level of comfort with the topic being discussed, and reminded them that they were free to discontinue participation at any time. Additionally, each participant was given a list of community mental health resources as part of the informed consent. My training as a mental health provider also assisted me in remaining sensitive to the emotional needs of the participants. However, I was also aware of my role in this process as researcher, and remained cognizant of the fact that I could not act as a therapist for the participants, but only provide references to places where they may seek therapy.

Other common ethical concerns were addressed in the research. These included providing the participants with full informed consent (Appendix B). This was comprised of informing the participants about the purpose of the research, their right to decline to participate at any time, any foreseeable consequence or benefits to participation, and whom to contact if they had questions about the research. Furthermore, I obtained each participant's approval to record the interviews using both voice and video recorders. Finally, I made every effort to be as transparent in the research process as possible. It was not my intent to involve deception in this research in any way. I answered any questions that the research participants had fully and honestly.

CHAPTER III

RESULTS

I feel like anatomy lab lets you go see, really see biology, anatomy, physiology in its true form. We talk about people having a heart, but like me being able to say, “I have seen that there is a heart. I have seen that there is a brain. We call it gray matter, because it's, well, gray” [laughter]. So to me the anatomy lab would be like in a non-literal sense, just experiencing the experience of true life. Experiencing really what biology is, you know, you can actually see it, and that it's there, and you can touch it. (Diego)

In this chapter I will present the various aspects of the experience of cadaver dissection as described by the medical students who participated in this research. The participants provided a wealth of information in response to the two primary questions guiding this research: What is the impact of cadaver dissection on medical students, and what do medical students really learn during cadaver dissection? Whenever possible, I will use the participants' own words to provide depth to the description of each emergent theme. Brackets (i.e., []) indicate changes made to quotes for clarification. Italicized words within the quotes indicate clarifying questions that I asked.

Five interconnected themes emerged from the data. I utilize “in vivo” codes using the participants' own words to identify these themes. They are (a) Discovery, (b) The Shock of Medicine, (c) Utility as Motivation/Coping, (d) Humanity, and (e) Balancing Respect. The final theme, Balancing Respect, emerged from the data as the core concept with each of the other themes playing a specific role within that concept. Table 3.1

Table 3.1

List of Themes and Categories

Core Concept	Themes	Categories
	Discovery	Experiential Learning From Cartoon Medicine to Real Anatomy Holistic Understanding of the Body Variation Peeling the Layers
Balancing Respect	The Shock of Medicine	The Shock of Medicine The First Cut Obstacles
	Utility as Motivation/Coping	Motivation Coping
	Humanity	The Human Connection/Disconnection Sacrifice and Responsibility Unity Reflection on Life and Death

summarizes the core concept, themes, and categories that will be discussed in this chapter. The interactions between these themes will be reviewed thoroughly at the end of this chapter. However, before those interactions can be fully understood, each individual theme will be described in depth.

Discovery

The book is very clean and, you know, basically one example throughout the book, whereas when you get into the cadaver lab you have, you know, 10 plus bodies to look at, and they're all very different anatomies. The colors are different, the texture is different, you know, finding things yourself is very different from opening a page and having it right there in front of you. So the hands-on and the discovery aspect of learning in the lab is very different than if you were just to learn from the book. (Jessica)

This theme was described by each of the participants. Discovery was the concept of obtaining personal knowledge through experiential learning. Many of the remarks made by participants regarding this concept were expressed with a sense of awe and enthusiasm. For example, Juan noted, "There is definitely a lot of excitement as to what you're going to find." Sofia said, "I love medicine. It's visual. It's physical. It's emotional. It's everything. It's just so fun. I love it!" And Jessica exclaimed, "Every day is a discovery in here!" From an observational standpoint, the conversational atmosphere when discussing the topic of Discovery during the interviews and focus group was bright and energetic. Five unique categories were reflective of the theme of discovery: (a) *experiential learning*, (b) *from cartoon medicine to real anatomy*, (c) *holistic understanding of the body*, (d) *variation*, and (e) *peeling the layers*.

Experiential Learning

This category in the greater theme of Discovery reflected the power of information gathered through personal experience. Many participants acknowledged that there were other means for them to learn anatomy including textbooks such as *Gray's Atlas of Anatomy* (Drake & Gray, 2008) and *Netter's Atlas of Human Anatomy* (2006), plastic models, computer image databases, and prosected material, but that the learning that occurred while dissecting held greater value for them. Sofia provided a clear description

I think that a prosection is great for memorizing muscles or where a nerve runs, particularly if it's a delicate nerve or area. But no, I absolutely don't think you get the same experiences with prosections. I think that learning off of prosection... we had great prosections and, but you're just pulling back layers of already dissected muscles and it doesn't give you the feel at all for the human body. It just lets you know where the muscles are and the bones are and the two processes are. It's great, but it's not solidifying like doing it yourself.

Jessica also spoke to this point by saying, "I wouldn't say that I was traditionally a hands-on learner, but with orienting yourself with the body and really learning the true anatomy, as you'll discover it in the operating room, that has to be done through hands-on learning."

The participants also described the benefit in experiential learning for clarifying information that they had learned elsewhere. Xavier stated, "I mean you do learn, so you do learn from doing your own dissection, because you're like, 'Oh, okay that's where that is, you know.'" This same point was echoed by Susan when she described the following experience:

I didn't know how visceral fat compared to subcutaneous fat, and it's all kind of theoretical like you, well, I assumed that one is under the skin and I don't really know any thing about the other. But when you're at the point

where you cut the skin and there's the fat. And then you have this other layer that keeps the organs inside. And then you open that and then inside that there's more fat. You think "Hmmm, so that's what they meant by that" and it seems like it would be intuitive. But I think, like the process of actually touching it and removing it and seeing how it integrates into the organ tissue and how, I don't know, I think it's a different experience than if someone had already done it.

Many of the participants expressed enthusiasm about the discovery process in the lab. The enthusiasm elicited through experiential learning was often evident during my observation of the anatomy lab as well. During their second week of dissection the students were asked to perform a laminectomy on the cadaver in order to expose the spinal cord. During this procedure, the students first had to clear away muscle and fatty tissue from the spinal area, they then had to use a bone saw to remove the lamina (i.e. the top of the spine). The following observations were made of students working on Table 11 in the lab that day. As they were clearing away the area around the spine, one student voiced appreciation of a surgeon's ability to get to that area of the body quickly and effectively through the muscle. As they removed the spinous process and exposed the spinal cord, another student exclaimed, "Oh, that is so ridiculously awesome!" All students at the table then took turns closely examining the removed lamina, turning it, touching it, and pointing out features to others in the group.

From Cartoon Medicine to Real Anatomy

The title for this category came from the following quote from Susan discussing the difficulties of learning anatomy from a textbook.

You know, it's all like cartoon drawings of everything. So you have like two little nerves when it shows the little bubble that has the acetylcholine floating across the bridge, I don't know. It's cartoon medicine compared to like actually thinking about, "Wow, a nerve is really huge and the axon runs all the way from your spinal cord all the way down to the point where it, it's sensing or controlling muscle or whatever," and that is what they're

showing on that long stick on the nerve, and then you can actually hold it in your hand. I don't know, it just made it more real.

It was clear throughout the interviews that the participants felt that the dissection process allowed them to shift their conceptualization about the make-up of the human body from a theoretical and sometimes illusory understanding to a concrete understanding of the “real” anatomy of the human body. This sentiment was echoed by Vincent, “Sometimes a textbook can feel like a fantasy. I mean, when you're reading about these little electrons and all of that kind of stuff, whoever really sees it? So I think it was an opportunity to verify the things that I read and had been taught all of my life.” Mark also expressed a similar statement, “Seeing the, the actual, the real thing instead of just looking at pictures is I think invaluable, personally.”

In addition to these statements, a number of the participants referred to the three-dimensionality of the anatomy lab. They expressed an appreciation for being able to take a two-dimensional image and transfer it to a three-dimensional understanding. This ability to mentally manipulate an object was often associated with having had the opportunity to physically handle and manipulate the object in lab.

The book is not a place to learn it. Reading words is not really a way to learn it, because, from the first anatomy book that I had until now there were very, very few words. It was coloring pictures, it was drawing diagrams. It's looking at Netters, but most importantly, it's coming in to the lab and understanding, holding it, seeing where it's coming from where it's going, looking at it from all of these different angles, and that's, that's how it's learned. (Philip)

Holistic Understanding of the Body

I also think that you need to have a very strong foundational understanding of the flow and the movement and the, you know, the different aspects that come together to create one whole person... I just don't think that there's another way that you learn that; you can't learn it from a book, you can't understand how connected everything is. (Sofia)

A third category that emerged under the umbrella of Discovery was the notion of understanding the holistic nature of the body. The participants expressed an appreciation for being able to understand the connections between the many subsystems within the body. A number of the participants had the opportunity to work with prosected specimens in their undergraduate training. However, the majority of anatomy courses use prosected material as separate individual specimens. In other words, the students are able to study an organ or limb that has been removed from a full cadaver. These students noted that the opportunity to perform a full cadaver dissection allowed them to see the complex connections within the human body that they had not been exposed to before.

Through a holistic understanding of the body, students were able to conceptualize the complexity in a way that was cognitively manageable. Many participants referred to the miraculous nature of the human body. As with the rest of the categories that made up the theme of Discovery, there was a sense of awe associated with many of the statements. However, this sense of awe for the body was not accompanied with the sense of mystery that is often associated with miracles. The participants felt that dissection had allowed them to see the body in a way that engendered a sense of reverence but also a sense of clinical confidence. During the focus group Evan noted that dissection “reinforces the miracle of life because sometimes you get lost in the details.” While a number of the participants expressed this feeling, Susan summarized it poetically in the following quote.

Then, emotionally, I think it's just realizing what an incredible gift, and how amazing the body is. It's just incredible and most the time, it just works just fine and it's such a miracle. And you would never know how it all works and how complex it all is. Then when you look at the slides in histology, and you touch the thing in anatomy, and you realize it's millions of things working together most of the time without any trouble. Like we

make a few adjustments here and there in medicine, but for the most part somehow it just works on its own miraculously.

It should also be noted that the categories making up the larger theme of Discovery were often intertwined. The excitement for experiential learning often blended with the mental shift from cartoon anatomy to real, and the holistic understanding of the body often played a key role in the former. When asked what it meant for her to dissect a human cadaver Laura replied:

Just understanding the pathology of the disease and understanding the notion of how things are connected. I mean, just going back to that 3-D visualization, and having a feel for the size of what should be a healthy artery verses a clogged artery. Actually feel what a clogged artery feels like verses what a healthy one feels like. I mean that was extremely valuable.

In this statement, Laura succinctly expressed what many of the other participants stated throughout the interview. She explained how the holistic understanding of the body allowed her to better appreciate the experiential learning that occurred in the anatomy lab.

Variation

You can see a picture of something in a textbook, right? I guess that's the other method of study if you don't have a human cadaver, just textbooks. If you have a picture you can still see relationships but it's always going to be on paper you don't actually understand that there is variation from person to person, as far as size and even sometimes location, or, you know, densities, things of that nature. When you're in a textbook, I think in Gray's [Anatomy of the Human Body] they say things like, "this can vary" or "that can vary". And I don't think that you really get an idea of how much stuff really varies until you've been around to different cadavers to see. (José)

Each one of the participants noted that one of the major benefits of the anatomy lab was the opportunity to observe the wide range of variability within the human body. The stated purpose of the lab is to give the first year medical students an in-depth understanding of normal human anatomy. However, it quickly becomes evident in the lab

how variable the term “normal” is when it comes to anatomy. The active exploration of the natural variation in the cadavers was evident during my observation of the lab. At the end of the second week of the anatomy lab, the students were able to move into the chest cavity and dissect the lung. The following observations were made during that dissection when two groups stationed next to each other compared the two sets of lungs. One student exclaimed, “Whoa, look at that lung.” The two groups then moved between the two cadavers comparing the texture, color, and size of the two sets of lungs. A student from a third group joined the other two and commented on the size of heart in the body with the lungs that had provoked the earlier exclamation, making a connection between the unhealthy appearance of both and hypothesizing on cause of death. Five minutes later all of the groups in the room were moving between one another and comparing.

A number of the participants also noted the benefit of a dissection lab over using plastic or computer models. One of the top benefits they mentioned was the ability to understand natural variation. Jessica compared her experience with using a computer model to the benefits of being able to look at multiple cadavers:

So, for example, on that module you have one body that they have dissected, and so you can look at the different parts, but it's just one body and that's the same notion of going to an illustration like Netter's [Atlas of Human Anatomy], you're just seeing one example. And although it is real tissue, once you get in, and you see a couple of different ones, you notice how different they change. Shapes and sizes and depth of things change. So you really need to have that broad experience of seeing multiple different bodies, and feeling them yourself, and seeing the dimensions to really kind of put it into perspective.

The participants also noted the practical benefits of understanding variability within anatomy. Sofia noted, “I think that an excellent doctor needs to know their anatomy, and more importantly, they need to know the variations in normal that occur.

And I don't think that can be learned elsewhere.” During the focus group, Susan and Latoya related an experience where they were able to apply the understanding of variability that they had gained in the anatomy lab. When performing screenings for peripheral arterial disease (PAD), they were having trouble finding a pulse in a number of the patients. However, their understanding of the variability in arterial placement allowed them to picture the different places on the lower leg where an artery could lay. Latoya noted, “Everybody is abnormal, and it all still works.” Laura shared a similar experience where she had to use her knowledge of variability in order to find patients’ arteries.

Peeling the Layers

The final category that was encompassed in the theme of Discovery was the notion of peeling back layers in the body. Many of the participants used that exact term when referring to their work with the cadavers. My understanding of this concept grew from the participants’ descriptions of working with the cadavers. During the individual interviews I made notes of any hand motions that the participants made while discussing their experiences. This notion of Peeling the Layers was often accompanied by hand movements that demonstrated the meaning of this statement. The participants would move their hands as if they were turning the pages of a book or carefully unwrapping a package. Sean explained, “You literally peel things out of the way. And then you put them back there as they were in normally.” Prior to these interviews my conceptualization of human anatomy was picturing the body as a vessel that could be opened to view the internal contents. Yet, through the participants’ descriptions and observations in the lab I could see that the human body is not simply separated into exterior and interior, but rather many tightly connected layers. In fact one of the medical

terms most often used in the lab was “lamina.” This is a term that is synonymous with layers. And each of these layers must be pulled back in order to expose the next layer and set of structures. Sofia described the benefits of the process: “And I can't imagine not having been through the experience peeling back the layers of the skin. You know, the layers of connective tissue, and the layers of fat, and the more layers of connective tissue, seeing how the body is held together.” She later returned to the subject stating, “And as you peel it [the layers of tissue] back, it's just amazing to see how strong the body has been made; and it's fragile at the same time.”

The Shock of Medicine

The counterpart to the theme of Discovery was this second theme that revolved around the “shock of medicine.” This theme encompassed the less glamorous areas of medicine and the areas that students can perceive as disturbing. Much of what the medical students were asked to do in the lab was contrary to many social norms. This pattern will continue as they move into the practice of medicine. It appears that doctors in training use the anatomy lab to learn how to deal with their own discomfort with many of the invasive practices in medicine as well as the obstacles they will face in practice, including managing teamwork, time constraints, and the volume of work.

Often times, procedures that physicians are required to do in order to preserve the health of their patients required them to handle their patients' bodies in a way that would be socially unacceptable in any other circumstance. The participants gave numerous examples of the things that they will be asked to do as doctors that may be uncomfortable for them. Examples of these ranged from a routine prostate exam or the violation of the body that occurs with a simple injection to an emergency amputation. In discussing these

possibilities, the participants inferred a personal conflict that they would have to manage between the natural discomfort that could occur and the necessity of the actions for their patients' well-being. This personal conflict was often attached to a sense of shock felt when completing tasks in the dissection lab. This shock came up in topics ranging from making the first cut to the final part of the lab where the bodies were dismembered and bisected. Figure 3.1 illustrates the level of conflict and shock felt by the participants throughout the dissection process.

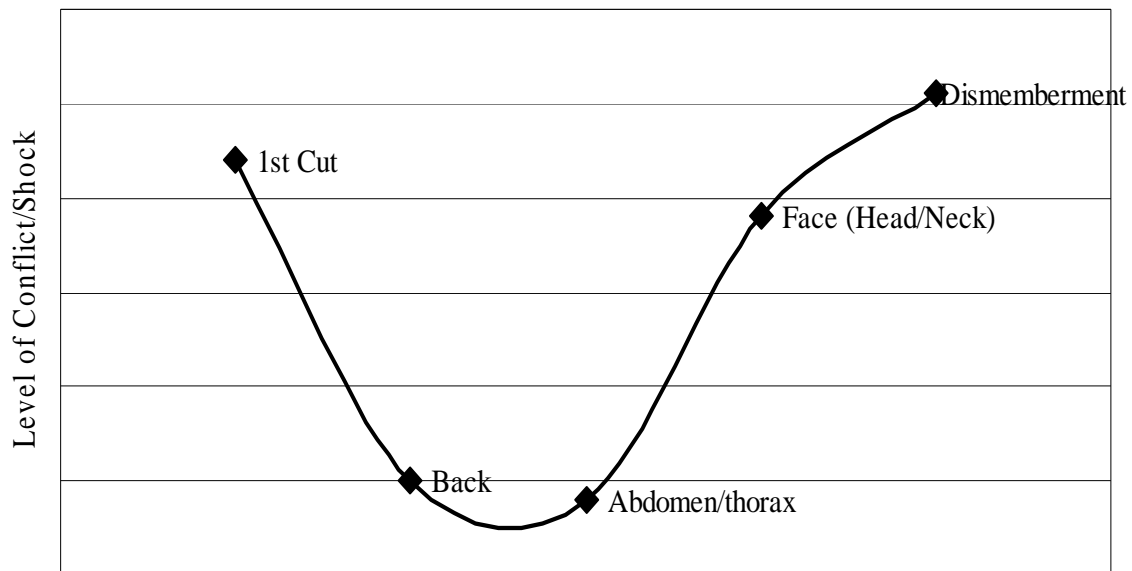


Figure 3.1 Level of conflict and shock across the dissection process

The figure is not quantitative in nature, but rather is based on a qualitative analysis of the number of participants who noted a feeling of shock or conflict, the degree to which they experienced those feelings, and the actions associated with those feelings.

The theme of The Shock of Medicine consisted of three categories: the primary category shares the same title as the theme, (a) *the shock of medicine*, and two secondary subcategories (b) *the first cut* and (c) *obstacles*. Each of these categories will be explored in detail below.

The Shock of Medicine

The title for this category came directly from a statement made by Sean, “I feel like getting over the shock of the medicine is accomplished here. Just because, I mean, it doesn't get much more intimate than, you know, dissecting the bowel or someone's intestines or something.” However, Sean was certainly not the only person to use the term “shock” when referring to some of the more emotionally challenging tasks during the dissection process. Jason noted, “Then the first time we actually had to cut a limb off or something like that. That was a little bit shocking as well. But I think that kind of exposure is important; you don't want to be shocked like that for the first time in the emergency room.” Jason's statement illustrates a position held by a number of the participants, that is, the desire to use the cadaver experience to overcome the shock before they are entrusted with the care of a living patient.

There were five actions that induced the greatest amount of internal conflict within the participants. Jason's previous quote illustrated one, that being the removal of a limb. Another was when they were asked to remove the top of the skull so that they could access the brain. Xavier described his experience:

That [removing the skull cap] was a hardest point for me. I don't know if that was because I did that whole part of that. I don't know, it was just a little weird, but once that was passed it was pretty cool to just learn the brain and the arteries and things like that, and that ended up being my favorite part of any dissection. So that's kind of weird, but, um [laughter], so just getting access was the most memorable as far as being disturbing part. But the actual, like when we got to what we're trying learn about, I really enjoyed that part.

Other participants noted that dissecting the hands or the face was extremely difficult. Many people associated the face and the hands with the person behind the cadaver. Sofia described looking at her cadaver's hands and thinking about the care and work that they had done throughout a lifetime. In the focus group, Evan noted how difficult it was for him the first time he had to make an incision on the cadaver's face, even though they had been dissecting without issue for weeks by that point. He explained that he personalized the experience and cringed inside because he imagined that the facial incision would be painful to experience. His comments prompted the focus group to discuss the difference between the work done on the face and the dissections of the thorax and chest. Susan summarized their conclusion, "cutting into the face is more like skinning whereas the other stuff is dissection."

A fourth difficult process was the removal of the head. A number of participants made note of their experience with either taking the head off of their own cadaver or noticing when other cadavers in the room had their heads removed. When asked about her most difficult day in the lab, Susan recounted:

And the day that we took the head off our cadaver. I think that was inherently a wrong feeling... And we were of course back to our tentative, you know, this is like squarely outside of most people's comfort zone, I think, to cut someone's head off; and the TA's were, like, "Oh, you just have to put some force behind it," and just, and they ended up cutting it off. But it was, that part was kind of unnecessary feeling, too, I would say.

The event that appeared to create the greatest amount of internal conflict for the participants was when they had to bisect the body. During that lab session, a few groups of medical students worked with the teaching assistants to draw the entire body of the cadaver through a band saw in order to compare the right and left halves of the body. Vincent shared with me a very poignant experience he had when his group bisected the body of their cadaver. He was able to describe that day in vivid detail and remembers it as a very emotional experience. “I feel like there was literally something that was taken out of the inside of me when I drug that man's body through a bandsaw.” He compared that moment with his other experiences in the lab:

And I think there's a point where, and maybe I am not to a part in my education, or in my mind, or even within who I am spiritually to be able to reconcile the difference between me being able to cut open the superficial part of a person's body, take out their heart and observe that, admire that, and respect them for donating their body, to pulling their bodies through a bandsaw blade just so I can see the inside of the structure. Do you see what I'm saying? Like I really feel like, like it wasn't something that I expected or anything.

Vincent was not the only person to recount vivid memories of shocking experiences in the lab. Many of these stories consisted of sensory memories in addition to the narrative. Xavier described the sounds and smells:

I mean, the cracking. And another thing with the bone saw when you're cutting is, like, it smells like when the dentist drills into your tooth, so that was weird. Um, [laughter], because I never like that smell. So the smell has something to do with it and then also the, um, that feeling also, like that you're cracking bone [laughter], you know, and the sound, everything to go along with it, yeah.

Susan also remembered the smell, stating, “and the smells like, the saw going through the bones and stuff was really yucky.” Having smell mentioned as a distasteful part of the dissection experience was not unexpected, and a number of participants noted

the distinct and strong odor of formaldehyde in the lab. However, these comments were usually brief and laughed off as an unpleasant but unimportant detail. The smell of the saws, on the other hand, was more shocking in nature and was not as easily dismissed. I even noted during my field observation in the lab, “This process is a very physical endeavor – hammering, sawing, pulling. Noise of saws, hammers, chisels, the crack of bone, the smell of not just the formaldehyde today but also ‘burnt flesh’? – However you would describe the smell of bone that has been heated by the saw.”

The First Cut

In addition to the cuts mentioned above, one of the other shocking experiences described by the participants was the first cut they made on the cadaver. However, the first cut was not shocking in the same sense as those noted previously. The shock of the first cut was more often associated with insecurity, apprehension, and the fear of making a mistake. Jason describes the experience as follows:

The very first time we were really hesitant. The cuts weren't very deep, and it took a long time to go through one layer, because we were trying to be very, very careful. And it was a new experience. And then you get your hands dirty a little bit, you realize that, yeah, it's okay to actually cut through this because you need to do that to get to the next level. Um, so you got a little bit numb, maybe, is the best word

Susan also described her feelings during that first cut. “I had no idea. Obviously I had never cut a person before. So, not knowing how hard you had to push on the scalpel in order to cut through the skin and if it would feel weird or ooze. I didn't have any idea what any of it would feel like.”

However, not everyone experienced trepidation during that first incision. For some of the participants their excitement about the possibility for discovery predominated. But even for them, there was some difficulty with that first cut.

I remember cutting into the skin for the first time. That was kind of, I don't know, I thought it was kind of cool. Maybe that's weird. But, yeah, I remember it being harder than I thought it was going to be.

Harder to cut it?

Harder to find all the structures and harder to figure out what was what... I found that to be difficult, but actually getting the scalpel and cutting, that was easy. (Juan)

The observations I made during the first day in the lab reflect all of these emotions. However, from my perspective as an observer, the words that seemed to best describe the initial incision were "intense concentration." The students were intense in that they were leaning in close to the cadaver, fully focused on their actions with full body engagement, and listening for feedback from their group members and the teaching assistants.

Obstacles

The participants noted a number of obstacles that they had to overcome in order to do the dissection. These revolved around three primary issues. The first was the volume of material that they were required to learn. Sean stated, "If anything, I was dreading coming [to lab] because of the volume of the information that was being thrown at you." Jason reinforced this with his comment, "Just the sheer amount of material that we needed to learn made it difficult to learn everything." Most of the participants acknowledged that the volume of information in the anatomy lab was not significantly greater than the information that they have been required to learn in subsequent academic blocks (i.e., semesters). Yet, because it was one of their very first classes in medical school, the volume of information often seemed overwhelming.

The second issue was the time that the anatomy lab took up. The lab was one of their most time intensive classes of that first block. Vincent summarized the feelings of

many when he said, “We have so many credits that we are taking, and anatomy lab takes up so much time that there were like several days where I just did not want to have to come and pick apart fascia when I could look at the CD that had everything already cleanly dissected for me.” However, when I asked the participants who expressed this feeling if they would rather have already prosected material or more time to dissect (e.g., multiple opportunities to dissect over the first two years of school), every one of them stated that they would like to have more time to dissect. Thus, the participants valued the experience of dissection despite the time pressure that it entailed.

The third obstacle that the participants dealt with was dissecting through the layers of fat and fascia. Xavier summed it up by saying, “I know [for] a lot of people the number one complaint was just how you're just digging through stuff, you know, like fascia and fat layers and that's like, it becomes like you're just cleaning and, I don't know.” A number of participants stated outright that having to go through the fat and fascia was the most difficult part of the anatomy lab for them. This was because it was both time consuming and unpleasant. As Jason said, “Six inches of fat is a lot to cut through, and it's very greasy and slimy and it covers a lot of things up.” For many of these individuals, the fat and fascia was a waste of time because it had no connection with the items they would be tested on during the lab exams. They were simply an obstacle to get past in order to get to the testable items. This lack of utility made it difficult to maintain motivation while dissecting these layers. However, other participants seemed to create a sense of function by incorporating the fat and fascia into the holistic understanding of the body. In addition to being understood as part of the complex whole, a few of the participants noted that they were glad to have been able to see the fat layers

because it was a strong motivation to maintain personal health and a life style that promoted a lean body.

Utility as Motivation/Coping

The medical students interviewed for this research referred to the notion of the utility of the dissection. The theme of utility was future-focused, in that the participants described thinking about how the knowledge they gained through dissection would be useful to them as they progressed through school and into the practice of medicine. This utility served the purpose of filtering some of the stronger emotions and experiences associated with both Discover and The Shock of Medicine. For the positive emotions usually associated with Discovery, participants used Utility as a filter to allow them to remain focused on the task at hand and their ultimate goals. Utility was also used as a coping mechanism for the negative emotions often associated with the Shock of Medicine. Participants' descriptions of the shocking moments in dissection were often buffered by concurrent descriptions of Utility. As such, Utility took two forms, either as (a) *motivation* or as (b) *coping*.

Motivation

The primary purpose for the Utility of Motivation was to answer the question of how the participants would use the dissection experience in the real world. Laura described this event as follows, "I kept thinking ahead, I guess. Thinking, 'How am I going to transfer this to a patient?' I was always trying to put in context what I was doing." This sentiment shared certain attributes with the Holistic Understanding of the Body. However, where that category was focused on the connections and context of the body alone, Motivation was often used to orient the participant to the connections and

context of their experience with that of the larger social context of their goal in becoming a doctor. Sofia described it as such:

As you go through and you look at the different aspects of your patients. I relate that back to, in the small amount of clinical experience that I've had, um. I relate that back to what was my cadaver like, what was her body like, what did she teach me, and so I think that there's, yes, there is, um, I think that it definitely helps to relate what you're learning to the outside world.

Motivation was not used solely to process the positive emotions in the lab.

Participants also describe using Motivation as a way to deal with negative emotions such as anxiety and frustration.

I felt bad because I felt like that [feeling of amazement] got lost along the way for some people and I would be like, "Give yourself a reality check and remember that this is frustrating, yes, and this is challenging, but look at what we get to do. Don't lose sight of, keep the big picture, which is this is awesome." (Amanda)

This sort of mental cheerleading was endorsed by a number of participants. They would use this positive self-talk as a way to ward off apathy or bolster confidence in their future performance. Susan gave a good example of the latter when she stated, "I think there's a lot of fear of screwing up in medicine, and this is sort of an opportunity to get a few free screw ups."

The Utility of Motivation was also used by participants as a way to maintain focus on the work that they were doing in the anatomy lab. When it came to the learning that occurred in the anatomy lab, Jason described it best, "Anybody can give me a list of things to memorize, but I will not remember it unless I have some kind of clear-cut application in my mind about why it's important and why I need to know this." Sean further supported the point when he stated:

I found that when I started to make the conscious effort to remember how things were in relation to each other it became much more fulfilling I guess, much more like, “Oh yes. This is it this is why I need to remember this in the future.” You know, when someone comes in with whatever trauma in the neck or something.

These thoughts of the future utility of dissection also related to feelings of self-efficacy in dealing with the human body. A number of participants noted that their experience with the cadaver dissection increased their confidence in their ability to work with future patients. For example, Diego stated, “I thought about if I could do well the cadaver lab, maybe surgery would be good thing for me....[Dissection] solidified that I can do surgery. Like that I have no problem, you know, using a scalpel and getting into, um, you know, getting right to the meat and bones [laughter] of surgery.”

Coping

In addition to using Utility as a motivational technique, participants also described using it as a way to cope with events in the lab. One way that they relieved some of the discomfort associated with some of the more difficult aspects of dissection was by understanding how they would use the information to help their patients. As was noted in *The Shock of Medicine*, the discomfort they felt was often because of the taboo nature of the actions. Utility was used as a way to reframe this perception:

I think all it took was understanding that this is a necessary part of learning, and that in context it was socially appropriate. It was just a new context, we'd never been exposed to the context of, yes, you cut this cadaver up for a learning process, and that's okay. So it just took realizing that, yes, indeed, this is important and necessary and it's socially acceptable. Even though in other contexts it would be completely unacceptable. (Jason)

Again and again, participants noted that the learning process, and the use they would gain from that learning process, made the more difficult aspects of the lab more

bearable. I observed this process in action about a month into the dissection. At certain points throughout the academic block, a pathologist and pathology residents would come to the anatomy lab and work with the students. On this occasion, a resident working with the students on Table 14 pointed out bruising on the cadaver's sternum. He noted that this was caused from the resuscitation efforts. One student asked with a real look of concern on her face, "Does this always happen?" The pathology resident replied, "It depends on the force." My immediate reaction to this observation was "Wow, what a learning experience." Through dissection, the students were able to see the results of actions they may have to take with their patients some day in order to save a life, but also see that it will have the physical consequence of deep bruising.

However, Coping was not always a successful technique. As Vincent described the trauma he felt during the bisection of the body, he noted that others tried to provide him with a sense of utility as a way to cope with the event. In his own words, he said:

And I had people in my group that were like "Oh, well, you've just got to look at it, like, it's better for us to do this to this guy to look at him and really understand what's going on so that we don't mess up in the thousands of surgeries." You know, and I don't share that perspective. And I think at that point, that point didn't have to happen for me to be able to be a good physician or a good surgeon.

His experience indicates that there are certain events that would be so shocking to an individual, that this common coping technique would not be sufficient to relieve the stress associated with that event. However for the most part, Utility appeared to be an extremely effective filter for the participants.

Humanity

At first, you kind of feel that personal connection, and by the end of it, it's your dissection piece, it's not human anymore. You know, it's not a person. It does. It travels a long way, because you've removed so much.

And they're muscles now, it's not a face. It's the nerves, and the muscles, and the parotid gland and all that sort of stuff. And then you go to this memorial afterwards, and, and it changes, it changes it again. Or at least brings you back to what you first saw; that this is someone's grandma. And it, you know, takes you back, and it says, "All right, yeah, that was a big sacrifice that somebody made to let us have their body and charge us, or entrust us with the charge of care of it." (Philip)

As with Utility, a connection to the humanity associated with dissection played a role in filtering the students' experiences in the lab. The participants often presented their experiences with both Discovery and The Shock of Medicine, couched in a way that connected their actions with a larger picture of humanity. Themes that emerged to form this category included (a) *the human connection/disconnection*, (b) *sacrifice and responsibility*, (c) *reflection on life and death*, and (d) *unity*.

The Human Connection/Disconnection

One of the primary aspects of Humanity was the human connection with the cadaver. For some it was natural to see this connection. "Even though they're dead it's still a human image. You know in your brain; [your brain] knows it's human" (Diego).

For others, finding that connection was slightly unexpected:

At first you, you see it, and she had her nails all done, and looked so nice, and it was, you know, we [pause].... And so, you know, when I noticed that, "Hey, this isn't what I thought we were going to get. We got a little grandma, not a stuffy old man doctor." That, um, a personal connection, maybe. But definitely, you know, it kind of changed our attitudes from the beginning from what I was expecting to have. You know, it made me kind of think. Oh, well, this is, she, she just seems so delicate, you know. She, she, um, had her false teeth in and had her lipstick on, and it was, it was definitely different than anything I had done. (Philip)

For some, that connection was reinforced throughout the dissection process. Two months into the dissection, I observed a discussion at Table 2 about the cadaver's tattoo.

The group was trying to figure out which war it would be associated with based on the

cadaver's age. José described a moment that he had well into the dissection process that reinforced the human connection for him:

The one thing I thought was cool was sort of like a spiritual moment in dissection was when we first opened his head to look at his brain and [I got to] take out his brain and hold it. To me that was like, "Wow! What a cool thing. This is like your command center here. You were a living person. This is what you used. This is the area of your body that holds, you know, love and hate and memories of your children or, you know, smells, your favorite food and color. This is where it is. It's right here. And you've allowed us to hold it and study it."

Many of the participants made a conscious effort to maintain a human connection with the body donor. They expressed a desire to know the person behind the body. However, the information they were given about the donor was limited, so many of them compensated by creating their own story about the donor's life. As Sofia explained:

You kind of assign a personality, whether not that personality really fit, it allows you, I think, mentally, to be able to go through and, you know, learn on the body and things like that. To feel like, at least for me, to feel like they were a person, and to know, you know, to know that they were a person, to feel like there is some connection there instead of, of just, um, "I'm here and here is this limb or I'm here and here's this hand," you know.

For many, the assigned personality included giving the cadaver a name. "We decided we couldn't really cut on him every day if we were not going to have a name for him, and we didn't know anything about him, so we named him Ed the first day" (Susan). Many of the participants described the thought process that they went through in choosing the names that they did. Other times they did not have a specific name for their cadaver but would refer to them in endearing terms such as "our little grandma" or "mister."

For others, it was important to maintain that human connection through gentle touch. Laura stated, "I felt a connection. Sometimes I would even hold his hand as we

were dissecting.” Latoya expressed a similar sentiment during the focus group, “I would try to remember that Carl was a person. I would shake his hand every day before I left.”

These gentle gestures seemed to counteract the harsher actions required for dissection.

However, the dissection itself seemed to destroy the human connection as it progressed. Participants found it harder to hold on to the human identity of the cadaver as the body was taken apart. This process was described by many, but Jason summarized it well:

Those last two or three labs where we finished cutting limbs off. I mean, you started with something that resembled a human being; and you ended with the pile of, of tissue that was hardly even looked like a human. It wasn't even in the same shape or form anymore, and the limbs were gone, the head was gone. It was all just in the pile at that point.

This deconstruction process that took place as the dissection went on appeared to be useful for absorbing some of The Shock of Medicine. For some of the more difficult aspects of dissection, it was useful to compartmentalize the body from the person. Yet, the participants also described using the Body Donor Memorial Service as a way to “put the body back together” and reestablish the human connection. Vincent stated:

Like I feel like that was the final part of the anatomy lab for me, it was going to the service, paying my respects that way. Like I feel that was, I feel like that is when I left the cadaver lab, and not just when I took my final.

I had the privilege of attending this service as well, and it was a touching example of the human face behind the body donor program. During the service faculty, students, and family members of the donors all spoke about the ways that they had been touched by the program. Not all of the students that participated in this research were able to attend that service, but it was clear from the numbers at the service that a large percentage of the class was present. The participants who were able to attend all

described it as a poignant moment for them. As with Vincent, many of them explicitly described the service as the real end of their dissection experience, even though the service was held five months after the final lab.

Sacrifice and Responsibility

It's a huge sacrifice, and I think that was the part that struck me the most everyday. That someone was passionate enough about science and other people and bettering other people's lives that they were willing to step out of a normal comfort zone and, um, make a sacrifice. You know, their family made a sacrifice, they made a sacrifice. You know, whether or not you believe that there's a next life or that there's an unknown. In my mind, I don't care what your religious beliefs are. I still think it's still a sacrifice. (Sofia)

When reflecting on the Body Donor Memorial Service, many of the participants associated it with the sacrifice made by the donors and the resulting sense of responsibility they felt from that sacrifice. “It was a big responsibility. It felt like a big responsibility on your shoulders” (Laura).

In talking about the service Jason said, “It helped me to realize the sacrifices that all people make that donate their bodies to science.” Many participants felt personally touched by the sacrifice that the donors had made. Xavier explained, “I just really appreciate the fact that anybody would actually donate their body, to be, for medical students to learn. Like, that meant more for me than, like, any of the science.”

For some, it was an emotional moment to reflect on the sacrifice that the donors made. Laura described being at the service with her lab group and noticing that all of them had tears in their eyes. She went on to explain the thoughts behind the emotions that she was feeling:

I felt very privileged to have been given the opportunity to do this, and to have been given the trust not only of the body donor but also the body donor's families. I actually thought about that a lot because it is a big deal.

And I don't know necessarily if I were in their places if I would do the same. So yeah, it was immense, it was that blind trust of other people to make you a better person, a better physician, a better medical student, and for that I am extremely grateful, extremely grateful. There are just no price tags, no words that can express the experience of just being entrusted that honor to be with a body for that amount of time and to basically tear it apart. (Laura)

As Susan reflected on her experience in the lab, her voice cracked to a whisper as she said, "I think that it meant someone trusted me enough. They were willing to give of themselves. That's pretty powerful to be trusted like that." She dabbed away the tears that were forming in her eyes and explained, "This is [like] me crying during my final exam, and everyone else is like, 'whoa, exams not going well perhaps,' but really, it's just that I'm completely moved by it, that people would do this."

Unity

The third category in the theme of Humanity was Unity. The participants described forming connections not only with the body donors but also with their peers. I asked the participants about the social aspect of the lab. All of the participants considered the anatomy lab to be an important social experience to some degree or another. Jason explained:

I think it was an important experience socially because you're new in medical school. You don't know each other very well, so to be put into groups of people that you may not know really helps you to get to know a few of your classmates right away. So absolutely, it was a good social experience, because you were involved in this teamwork.

Sean stated that they felt "much more united as a classroom" when they were learning anatomy. Sofia concurred, describing it as a "good bonding experience." For many there was a sense that the bonding that occurred in lab would be long-lasting. A number of the participants noted that the friendships that they made in lab were still

strong six months later. Xavier described being at a social event with one of his lab-mates and having that person say to an acquaintance, “Yeah, we dissected a body together, so we’ll be friends forever.” But the connections were not limited to the one to two other people in their dissection group. Many had made connections with other students in the lab and would study together for the practical exams.

Additionally, nearly every participant made a point to recognize the connection that they felt with the instructor and teaching assistants (TAs) in the lab despite the fact that the lab was primarily self-directed. They emphasized how important it was that Dr. Morton and the teaching assistants got to know them personally. Sofia explained, “I didn’t have whole lot of interaction with them personally. Although, Dr. Morton knew my name. He’s amazing. He knew everybody’s name.” The connection with the instructor and TAs formed a sense of security in the lab. The participants described feeling comfortable working on the cadavers on their own using the dissection guide, but they would turn to the instructor or TAs when they “felt lost” or “needed to be oriented.”

When I broached the subject of the social aspects of the lab, I also inquired about the competitive nature of medical school and how the anatomy lab ranked as far as competitiveness. The participant’s responses surprised me. Only Susan expressed feeling any sort of competition in the lab. She stated, “And then there’s, it shouldn’t be competitive, but it feels like it’s a little competitive.” The rest of the participants stated that they did not feel a significant sense of competition during their first year of medical school. Jason explained, “I really haven’t had that sense of competitiveness in the lab or in class. So much is I feel that I need to do better than student X or student Y.” Rather, they described feeling a sense of trust and cooperation. Sean stated, “It was just the sense

of unity I think that was different. Like the feeling of everybody wanting everybody else to understand more.” Phillip expounded on this by saying, “I guess there is an element of trust, because you have to trust the group on your off days to do it well.”

I observed this cooperation throughout the dissection process. One good example occurred a little over two months into the lab. It was near the end of the lab period, and a group that had finished with dissection was studying a radiograph with one student embellishing his part of the discussion by running his hands over his face and head as he talked about different directions and different points on the images. A student turned to me to ask if I knew what innervates a particular spot. When I responded that I could not help, the two other group members left, and she turned to another table and asked them the same question. They stopped what they were doing, and one student was able to answer her question and took the time to point out the answer in a separate book.

The surprising part was that this cooperation instead of competition was not limited to their experiences in the lab, but generalized out to their experience in medical school in general. I found this curious and was intrigued when Jessica offered the following explanation:

I think that just in general the University of Utah is very different with regards to being competitive as a medical school class. I think the other places I've gone to, to interview and have, I have friends that other medical schools, and it seems to be very competitive, you know, that is sort of the traditional thought, everybody is very competitive. But here, you know, it doesn't really matter what class, or what lab you're in, it's really noncompetitive. It's very much like a community-oriented atmosphere and everybody helping each other learn. There is no looking down on somebody if they have questions. So it's a very different environment, and I don't think it differs between the classes or the labs... my theory is that because 70% of the class is Mormon, and Mormons have this fantastic sense of community, and, you know, sense of importance for family and supporting one another, and I think that this is the reason why this school is so different in the sense that everybody is supportive of one

another, and, you know, everybody wants to see each other succeed, because that is, you know, the sole, I guess, moral belief of 70% of the class. And I think that installs that belief upon everybody else in that class, but it's just a theory, I don't know.

The final unifying aspect of the anatomy experience was the sense that dissection was a rite of passage for the participants. Jason stated, "I think that was an important rite of passage or initiation." I asked what he felt he gained from that rite of passage, and he responded, "It made it easier for us to be open and discuss matters that are normally socially very sensitive." For Susan it "made it feel more like medical school." And Sofia likened it to being "inducted into some club." For Vincent, it had more to do with his future patients than who he was interacting with at the present time. He explained:

Not every medical school now has a cadaver lab. Like tons of them have [done] away with it and they look at images, and they do their CDs stuff. But I think in the general public's mind, I still think that they associate medical school with people's looking at bodies and getting in there and working on them and operating on them, and I think, even if it just helps to provide comfort to your patient when they come to you and you have a Dr. title that they think in their mind that you've been through it.

Reflection on Life and Death

Based on the information gathered in the literature, it was expected that participants would endorse using the anatomy lab as a venue to reflect on life and death.

However, only one participant explicitly made note of this:

I think it led to a lot of reflection on life in general. To the uniqueness and the frailty of human life and how short it is. And I experienced a lot of [pause]. Almost like, I guess I went through a short period of mourning for the time that's already gone by, and just real excitement and passion for the time that is coming. (Sofia)

For other participants, a reflection on life and death appeared to be subtly integrated with all categories, but primarily with the theme of Humanity. These reflections were also often countered by a sense of steeling oneself for the task at hand.

Diego spoke of the somber feeling of death that he was struck with when beginning the dissection, but how he was able to overcome that by looking at it from a medical standpoint instead of a human one. Jessica also acknowledged the presence of death in the dissection lab but explained why it was not a significant factor to her:

It's emotional in the sense that you have a human, somebody who was once alive with a family and experiences. And they're sitting before you dead on a table, you know, and they're your gateway for discovering how the human body is connected. Yes, of course it's emotional in that sense. I think that, for me, dealing with patients in the future is going to be more emotional than in dissecting, although it is a very emotional experience; it's a very sacred opportunity to be able to dissect, but in dealing with patients that are living you're dealing with their emotions and your emotions, and you're dealing with the process of them dying, whether quickly whether slowly, and helping their families deal with that. Whereas here we don't have to worry about all those other emotions. We just have to come to grips with working with a dead body.

So for many of the participants, life and death were considerations within the lab, but not a strong motivating factor.

Balancing Respect

As was noted at the beginning of this chapter, one core category emerged that was related to each of the other themes. This core category was Balancing Respect. Every participant reflected on some aspect of respect for the human body during the dissection process. Their notion of respect was balanced between the Discovery aspect and The Shock of Medicine. The themes of Utility and Humanity were often used as filters in this balancing act. Figure 3.2 presents a visual interpretation of the relationship between the themes. In the following section I will describe these relationships in greater detail.

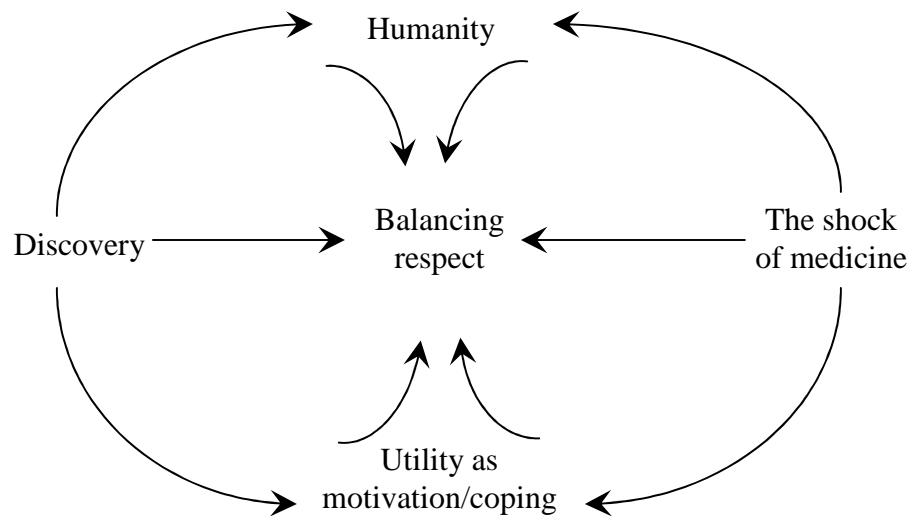


Figure 3.2 Relationship between the core concept and the themes.

When asked what she would take from her experience in the anatomy lab, Susan stated, “I think I’ll just be mostly in awe of the miracle [of how the body works] and how amazing it all is. Like, I am so much more respectful for what a miracle it is.” When reflecting on her experience, Sofia explained:

There is definitely the emotional component where that respect, and that humility that I felt when I initially started on the dissection, definitely comes into play as well as I had to go back and review a lot of the clinical stuff [laughter].

A number of the participants also noted that they felt that it was important to learn as much as they possibly could from the cadaver because that was respecting the body donor’s wishes. When Mark brought up the subject of respect, I asked him what would be considered disrespectful. He indicated that he was offended when people rushed through and did a poor job on the dissection. He explained, “I felt that I wanted to take the time, when I came in, to do a good job and make it, at least, get the use out of it that the person

intended their body to be used for. That people could learn from it.” Laura described a similar feeling:

At least on my part treating him with respect meant doing everything that I could not to diminish the value of his body but just to learn as much as I could, as he had wished, and to help my classmates and my classmates help me to just preserve everything. Not to make jokes, and I think none of that really happened. So yeah, it was just being respectful in the way of following his wishes based on him making the decision to donate his body and following along those lines.

Respect and the Shock of Medicine

The challenge of dissection for the participants was maintaining a sense of personal integrity based on their understanding of respect while simultaneously accessing the body in ways that would be considered unacceptable in any other social context. When recounting the many shocking experiences that happened during the dissection process, ranging from the first cut to dismemberment, Jason stated, “You don't [pause]. You don't do that to a living person and you don't do it to a dead person. Normally, because you want to respect that person.”

Xavier explained the internal process he went through, “You, like, really worry about, super worried about the respect aspect; and you don't really know how to approach it, because it's like you're respecting a body, but then you're, like, cutting into it.” As he went on to describe his experience with removing the skull cap he gave me a glimpse of the thoughts that went on as he tried to maintain this balance of respect: “Yeah, it's like, well, the gut reaction is like, ‘Wow, is this okay, kosher, for me to be doing this,’ you know? It's a weird feeling. So, like, it just felt like it's not something I should be doing almost, you know.”

Vincent was the one participant who spent the most time during our interview discussing this balancing act between respect and desecration. His experience in bisecting the body was extremely troubling for him. In describing the experience he stated:

Like I feel like it was part of my humanity, or part of my respect for life or even the dead was removed. And I think it was because it was graphic, it wasn't what I expected, and there was absolutely no, to me in my mind, there was no respect at that point that was given to the body whatsoever.

As he continued to reflect back on the experience, he illustrated the internal struggle that he felt between maintaining respect while learning from the cadaver and yet dealing with the shock that he experienced:

The first year of medical school, it pushed all of those ideals, it pushed my sacredness and my respect for the human body. It pushed me right up into a wall, where I was, like, okay, do I stick with how I feel and do I fight the feeling of just letting go of a piece of humanity inside of me or do I keep it?

Respect and Utility

Participants described using the notion of utility to balance the respect that they felt for the cadaver with the tasks required of them in the anatomy lab. Xavier offered a description that illustrated these multiple themes coming together:

You definitely developed this level of respect and, um, you're kind of a little nervous at first, I would say. Like the first cut. And then, um, but I would say after, maybe, the first week, um, week or so, you're pretty much, I don't want to say that's gone, like you still have respect, but you have, like, a job to do, you know. So you're not really thinking about that anymore. You kind of thinking about, like, narrowing in on, you know, what, "What's, what's the dissection for today and we have to do" kind of thing?

Jason described a type of compromise that he was able to make within himself. "So to get past the idea that the body is, um, something sacred, I guess. You got to get past that. Yeah. It's something that needs to be respected, but it's also something that

needs to be examined.” Diego echoed this sentiment, “You have to realize the person's dead. You know, you're not hurting them. This is not disrespectful, you know, those are the kind of feelings that happen.”

However, this filter appeared to be ineffective when the individual could not see the utility in her or his actions. I return again to Vincent's experience. He described other members of his group trying to help him cope with the experience by pointing out how it would be useful to him and beneficial to his future patients. However, he retorted:

Like, yeah. I think that what it took from me, the experience, I don't think that what I can give back or, what benefit that way that. Like I don't see me cutting anybody's spine in half in the medical field, [laughter], you know, I just don't.

Respect and Humanity

In some instances the dichotomy between Discovery and The Shock of Medicine did not lend itself to being framed in a sense of Utility. The other filter used by the participants was a connection to the human side of the dissection process. When the participants spoke about the body donor's choice to donate her or his body for the students to study on, it engendered a great deal of respect. Sean talked about the personal relationship he developed with the cadaver: “The relationship I'd say was mostly just a relationship of respect and gratitude. Um, you know, I felt like my education was, was substantially, um, made better because of his decision. I thought that was really neat.” Sofia, who spoke in depth about the power of the discovery process, stated, “I don't remember everything, but I will always carry with me the, um, the deep respect and responsibility that this lab engendered for me.”

I asked the participants where they felt that this sense of respect came from. Some of them considered it a reflection of their religious beliefs. Others felt that it was

associated with their family values. Still others connected it to the example set by the lab instructors. However, most of the participants explained that it was a personal reflection on how they would like to be treated or have a loved one be treated. Susan described it as “just making it a more personal thing.” This view was shared by Evan:

I was thinking about respect because my mom often talks about getting cremated or donating or something and I thought that, if this was someone in my family, I would want whoever it was to treat them with respect and not just be cutting stuff for fun. I mean this is my mom. Respect her. She is giving you a gift. Just translating that that could be someone I know is what helped me to have respect for the cadaver.

Regardless of where they felt that the notion of respect had come from, for each of the participants the general concept was rooted in Humanity as a social construct. They drew in the gifts of discovery and the shocks that they had to endure and embedded those experiences into the human face of dissection resulting in a general concept of respect.

Summary

The participants spoke in depth about their experience with dissection. Through the in depth interviews, focus group discussion, and observation in the lab five unique themes emerged from the data. Of these themes the core concept of Balancing Respect arose as the one theme that was central to all of the other themes. Each participant made note of respect as an influential factor in his or her dissection experience. While the gross anatomy lab was used to learn human anatomy, the participants also used the experience as a venue to enthusiastically explore and grow through discovery, face the shock of some of the difficult tasks of medicine, solidify their knowledge through understanding the utility of the task, and connect to the humanity of medicine through the gift of the donor and connection to their peers in the lab. Yet above all, the participants used the experience of dissection to solidify their respect for the human body.

CHAPTER IV

DISCUSSION

Overview

Qualitative research is used to gain an in-depth understanding of a particular event or phenomenon (Patton, 1990). As such, the results of this study are not intended to be generalizable, but to deeply illuminate the experience of cadaver dissection for the medical students at the University of Utah School of Medicine. Yet, due to the triangulation of the data used in this study the results are rigorous and transferable. The information gained through this current study can be used to inform medical pedagogy.

The purpose of the research was to explore the meaning that medical students make from their experiences with a full body cadaver dissection. There has been much speculation as to the covert learning that may occur in the anatomy lab (Paalman, 2000). The overt purpose of dissection is to teach normal human anatomy. However, many anatomists and those involved in medical pedagogy have asserted that dissection teaches far more than simple anatomy, but the traditional quantitative assessments used in anatomy labs do not lend themselves to uncovering these covert learning experiences (Lempp, 2005). This has left many asking, “What do students really learn using cadaver dissection?” The current study was designed to allow the students themselves to answer that question.

As is appropriate with qualitative research, this study was designed to preserve the voices of the students who volunteered to take part in this study. Grounded theory is a qualitative research design in which the inquirer generates a general explanation of a process grounded in data from participants who have experienced that process (Creswell, 2007). This study utilized grounded theory methodology in order to draw from the voices of the participants and build a theory explaining the meaning-making process that occurs during cadaver dissection. Through the participants' shared experience a number of unique themes revolving around meaning-making during dissection came to light. Using grounded theory methods as outlined by Strauss and Corbin (1997) and Fassinger (2005), these themes were coded using familial and axial coding. This resulted in one theme, Balancing Respect, arising as the core concept around which the other four themes, Discovery, The Shock of Medicine, Utility as Motivation/Coping, and Humanity, gravitated.

Theory

The process of dissection is a multifaceted experience in which the students must balance multiple and contradictory responses to the process. Above all, the students used the dissection lab as an arena to explore the notion of respect for the human body. This respect for the body was filtered through four unique themes, each serving a particular purpose. The process described in the following pages is depicted in Figure 4.1. Although this study did not identify the root source of the students' concept of respect, it was clear that each student entered the anatomy lab with a preexisting schema for respect. A schema is a mental framework for representing knowledge (Sternberg & Mio, 2006). The students approached dissection from this foundational understanding of the notion of

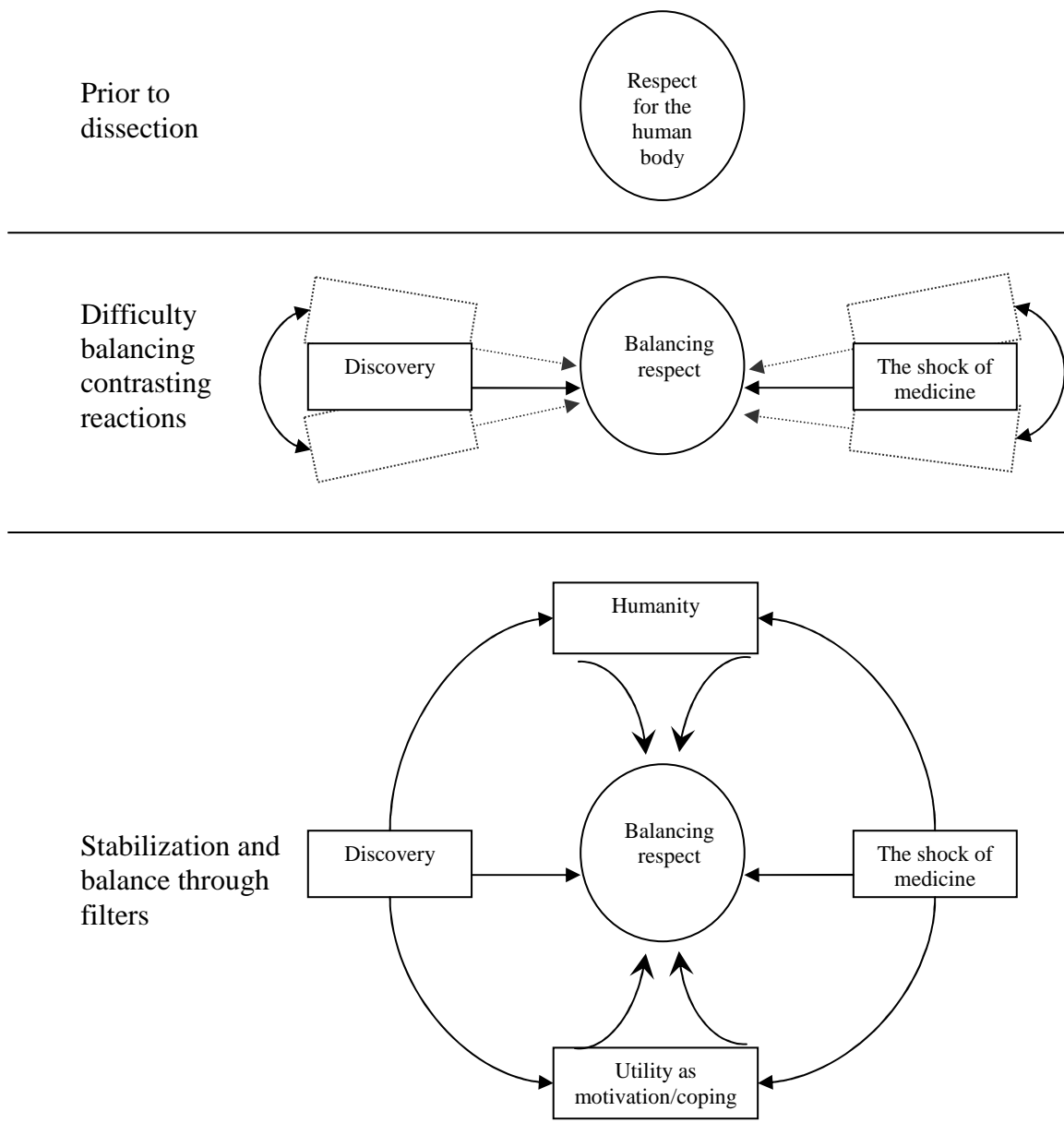


Figure 4.1 The development of the core concept of balancing respect for the human body.

respect. However, the act of dissecting evoked two contrasting reactions; a sense of discovery and a sense of shock. The discovery that occurs during dissection elicits feelings of awe and wonder surrounding the human body. These feelings influence the student's preexisting notion of respect for the human body. Yet the act of dissection also leads to feelings of shock. The actions that must occur in a full body dissection, such as cutting into the cadaver's face and hands, removing the cadaver's head, and dismembering the body, are contrary to socially accepted norms of treating a human body with respect. As a result, the medical students must incorporate these actions into their understanding of respect while maintaining their self-concept as an individual who respects the human body.

Because the feelings of discovery and shock are contrary to one another, students use two additional themes to filter these feelings into the schema of respect. Some students are able to blend the experiences of discovery and shock through a sense of utility. They are able to balance the contrary feelings elicited through dissection by focusing on the functional purpose that dissection serves. By seeing how the process of dissection will benefit them in their medical practice they are able to buffer the shock and focus the enthusiasm they feel for discovery. For other students, the contrary feelings are managed by filtering them through a connection to humanity. They remain aware of the person behind the cadaver by seeking out information about the body donor and remaining cognizant of the fact that the donor was a person with friends, family, and acquaintances. The students also form a personal connection with the cadaver, both by personifying the body and also by considering how they would wish to be treated if the

situation were reversed. In many cases the students use a combination of both filters throughout the dissection process.

When these four themes, Discovery, The Shock of Medicine, Utility as Motivation/Coping, and Humanity, all come together, they provide a platform from which the medical students are able to reevaluate their notion of respect for the human body. This leads to a learning process that is not explicitly outlined as a goal in the gross anatomy lab, yet is vital in the development of future physicians.

Results as Related to the Literature

The themes that emerged from the data in the current study are congruent with a number of findings in previous research. Early research focused on dissection as purely a tool for teaching anatomy (Jones, et al., 1978). However, the research on dissection over the last two decades has focused on it as a multifaceted learning experience (Bouchet, 1996). It is clear from the results of this study that the learning process in dissection is not limited to simply learning anatomy. Previous research has focused on three major points; the perception of emotional impact of cadaver dissection, the utility of dissection as an educational tool, and the academic performance of those students utilizing one form of gross anatomy instruction (such as dissection) compared to another method. The remaining literature has been conceptual in nature. In the following section I will explore how the findings of the current study relate to the existing literature.

Emotional Impact of Dissection

Research in the 1980s began to focus on the emotional impact of cadaver dissection on medical students (Horne, et al., 1990). This early research indicated that a significant percentage of medical students experienced adverse psychological effects due

to the dissection experience. However, replication of these results in subsequent research has been inconsistent (Arráez-Aybar, et al., 2008). For the most part, research exploring the emotional impact of dissection has indicated that the majority of students do not find dissection to be a traumatic experience. These contradictory findings have led to a general consensus in the literature that the majority of medical students do not have significant adverse negative reactions to cadaver dissection, but there may be a few students for whom dissection poses a threat to their emotional well-being.

The results from the current study indicate that negative reactions to cadaver dissection are quite common for students. These emerged as the theme entitled *The Shock of Medicine*. The majority of participants in this study reflected on some aspect of dissection they found to be emotionally disturbing on one level or another. The degree of this shock varied among the participants.

Yet, along with the negative reactions, all of the participants endorsed positive emotions associated with dissection. These positive experiences clustered primarily in the theme of *Discovery*. This sense of enthusiasm and wonder has been described in previous studies (Lempp, 2005). However, the majority of research dichotomizes these two sets of reactions (Azer & Eizenberg, 2007; Dinsmore, et al., 2001). Students are seen as having either a positive or negative dissection experience. In Lempp's (2005) qualitative study, both positive and negative emotions were noted as part of the dissection process, but the duality was still emphasized by the fact that the students were characterized as moving from one end of the continuum of experience to the other. However, because the majority of research exploring the dissection experience is quantitative in nature, the nuance and

complexity of the emotions within that experience are often flattened into the either-or categories of positive or negative.

The results of this study indicate that students experience both positive and negative emotions during their dissection experience. Some of the more intense emotions are filtered by conceptualizing them in a framework of either utility or humanity. The experience of dissection should not be considered as just positive or negative. It is both. Furthermore, it is the interaction of both the positive and negative experiences that act as a catalyst for the growth of the concept of respect for the body.

Utility of Dissection

In the existent literature, the utility of dissection refers to the many uses that dissection has in educating future medical professionals. Researchers have examined the perceived utility of cadaver dissection from the viewpoint of both the medical educators' (Arráez-Aybar, et al., 2004) and the students' perspectives (Azer & Eizenberg, 2007; Rajkumari, et al., 2008).

Utility was also a significant factor in the current study. Students would look for ways in which the experience they gained through dissection would be applicable once they were able to practice medicine. They used this knowledge of the utility of the experience as a motivating factor both to maintain focus and as a coping mechanism for dealing with the difficult aspects of dissection.

Previous research has shown that students feel that dissection is a useful experience, and they feel that they would be disadvantaged if they did not have the opportunity to participate in dissection in medical school (Azer & Eizenberg, 2007; Rajkumari, et al., 2008). This view was echoed by the participants in the current study.

All of the participants agreed that dissection was a valuable experience. I asked a number of the participants if, given the opportunity to learn the anatomical information without dissection, they would forgo the dissection experience. In every case the participants stated that they would still participate in dissection. They saw dissection as a useful exercise with benefits beyond the simple understanding of anatomy.

Dissection and Academic Performance

Previous research focusing on the connection between dissection and academic performance has often compared one form of anatomical instruction over another. Many of these studies have looked at the use of computer-aided learning over traditional dissection, and others have compared the use of prosection to full dissection (Andreas Winkelmann, 2007). The purpose of the current study was not to compare dissection to other forms of teaching anatomy but to examine the experience of dissection. However, valuable data about the learning process that was gathered in the study can be related back to the existent literature on dissection and academic performance.

The flagship study by Jones, Olafson, and Sutin (1978) looking at the use of dissection versus computer-assisted instruction showed no significant difference between the groups, but suggested a benefit in favor of the computer-assisted model. However, the outcome measure that was used to determine the success of one form of instruction over the other was the traditional intramural and extramural exams. This is important to note, because these exams quiz students on identification of anatomical structures. In other words, these instruments are designed to assess only overt learning that occurs in the lab. They are not sensitive to covert learning, such as the experiences identified in the current study. Unfortunately, the concepts of respect, utility, humanity, and discovery are not

likely to be found on the National Board of Medical Examiners (NBME) Gross Anatomy and Embryology Subject Exam. However, participants did note that they felt that the traits associated with these concepts were important in their growth towards becoming competent medical professionals.

The participants also drew their own comparisons between different forms of instruction that they used to learn anatomy, including textbooks, plastic models, computer image databases, and prosected material. As was seen in previous research (Leung, et al., 2006), the students perceived dissection to be the most effective tool for them to learn anatomy. One of the primary benefits noted about dissection versus other methods of instruction was highlighted in the categories within the theme of Discovery. Participants praised the benefits of dissection in allowing them to move from a conceptual understanding of the human body to a concrete understanding gained through experiential learning.

Qualitative Research

The stated purpose of the current study was to expand on the preexisting research with a more focused and in-depth examination of medical students' experiences in the anatomy lab. The majority of the preexisting research is quantitative in nature. There was one qualitative study found in the literature, published by Lempp in 2005, that examines the experience of medical students with cadaver dissection. That study was a subset of a larger study examining the general experience of medical students as they moved through medical school in the United Kingdom. The results of the study were based on responses to a single interview question and participant observation of two lab sessions.

In the study, Lempp identified seven covert learning outcomes: teamwork, respect for the body, familiarization of the body, application of practical skills, integration of theory and practice, preparation for clinical work, and appreciation of the status of dissection within the history of medicine. These seven learning outcomes are congruent with categories identified in the present study. Teamwork was an aspect within Unity in the current study. Respect for the body was noted as a learning outcome by 9 out of 29 of Lempp's participants. Familiarization of the body and integration of theory and practice were defined as a sensory experience in which the students were encouraged to understand the relationship, textures, shapes, and structures of the organs. These learning outcomes share traits with the categories of Experiential Learning and Holistic Understanding of the Body. Appreciation of practical skills and preparation for clinical work were described as motivating factors and thus a reflection a Utility as Motivation. Appreciation of the status of dissection within the history of medicine was a learning outcome that shared traits with Sacrifice and Responsibility and Unity. Although Lempp did not categorize a learning outcome similar to The Shock of Medicine seen in the current study, she did note that a number of her participants mentioned the emotional impact of the dissection. One of her participants is quoted describing dissection as "a psychological preparation so you're not quite as shocked (when you see an accident or go into the operation theatre" (pg 39). Thus the theme The Shock of Medicine was also reflected in Lempp's study.

It is clear that many of the experiences of the medical students interviewed by Lempp are congruent with the experiences of the first-year medical students interviewed for the current study. The benefit of the current study is that the data collected were

triangulated with multiple sources and focused on the specific experience of cadaver dissection rather than the experience of medical school in general. Thus, the data were suitable for vigorous analysis and development of the theory noted previously in this chapter.

Conceptual Literature

The conceptual literature in the field of anatomical education hypothesizes a number of benefits of cadaver dissection that are difficult to assess using traditional quantitative measures. However, in the current study participants noted that many of these benefits were present in their experience with dissection.

Understanding human variation was one of the major benefits of dissection noted by each of the participants in the current study. As a result, Variation formed a category within the greater theme of Discovery. This was also the benefit noted most frequently within the conceptual literature (Aziz, et al., 2002; Granger, 2004; Korf, et al., 2008; Older, 2004; Pawlina & Lachman, 2004). Aziz, et al. (2002) and Granger (2004) postulated that dissection buffers against misdiagnosis and malpractice due to an unrealistic view of an idealistic “normal” body by introducing students to bodily variations. The participants in the current study noted that one of the advantages of working in a gross anatomy lab with multiple cadavers was the ability to compare anatomical structures between the cadavers. Additionally, one of the major concepts within the category entitled From Cartoon Medicine to Real Anatomy was the realization of the variability of structures that cannot be demonstrated in textbooks, models, and diagrams. These concepts were also present in the category of The Human Connection/Disconnection. Through variation, students were reminded of the uniqueness

of each individual. This finding supported the claim in the literature that the concept of individuality adds to the humanistic value of medical practice (Korf, et al., 2008; Older, 2004). That awareness of individuality would be more difficult to obtain if students' only exposure to variability was limited by the use of idealized models and textbooks or a restricted number of plastinations or prosections (Aziz, et al., 2002; Granger, 2004; Korf, et al., 2008; Older, 2004; Pawlina & Lachman, 2004),

Another benefit noted frequently in both the literature and the current study was the multidimensional understanding of the human body. Granger (2004), Paalman (2000), and Aziz and colleagues (2002) have all made strong cases for the educational benefits cadavers have in instructing medical students on the multidimensional nature of the body. The theme of Discovery within the current study was heavily influenced by the participants' discussion of this very benefit of dissection. A number of the participants specifically mentioned using the dissection as a way to move from a two-dimensional understanding to a three-dimensional understanding of the body.

The conceptual literature also identifies dissection as a venue in which medical students are educated on professionalism (Pawlina & Lachman, 2004). The cadaver is seen as the "first patient" and, as such, lends itself to training appropriate physician-patient relations (Aziz & McKenzie, 1999; Granger, 2004). This relationship with the cadaver was noted as a primary characteristic of the respect for the human body, specifically within the category of The Human Connection/Disconnection. Participants identified with the cadaver and noted treating the cadaver as they would a living patient. Additionally, aspects of the education in professionalism could be found in the Utility as Motivation category.

Other benefits of dissection noted in the literature included teamwork and social bonding (Aziz, et al., 2002; Granger, 2004; Older, 2004). This is due to the way in which dissection is traditionally taught with peer groups performing the dissection. These benefits were present in the category of Unity within the current study. The participants reflected the advantages of team building and social connections mentioned in the literature.

Skill acquisition, such as applying medical terminology and practical skills like hand-eye coordination, was another positive outcome of dissection noted in the conceptual literature (Granger, 2004; Korf, et al., 2008; Older, 2004; Pawlina & Lachman, 2004). The application of medical terminology was noted during the observation of the lab. The benefit of gaining practical skills was mentioned by some of the participants as well. For a few of the participants, this was seen as a significant benefit of the dissection experience and fit within the categories of Utility as Motivation and Utility as Coping.

The literature suggests that a primary benefit of dissection is the introduction to human mortality (Aziz, et al., 2002; Granger, 2004; Korf, et al., 2008; Older, 2004; Rizzolo, 2002). Since the issues of death and dying are ever present in the practice of medicine, the gross anatomy lab is assumed to be an ideal educational tool for helping students confront those issues (Aziz, et al., 2002). While issues surrounding mortality were reflected in the data gathered from the participants in the current study, the influence was not to the degree suggested by the literature. The category of Reflections on Life and Death consisted primarily of subtle musings by the participants as apposed to the overt consideration of human mortality suggested by the literature.

Likewise, the utility of cadavers for honing observational skills (Pawlina & Lachman, 2004) and hypothesis building through deductive reasoning (Korf, et al., 2008; Older, 2004) were not strongly reflected in the interview data collected for this research. This does not mean that these things did not occur in the gross anatomy lab. Some of the data collected during the observation of the lab is indicative of these processes. Yet it was insufficient to include as a factor in the analysis of the data as a whole.

As a whole, the findings of the current study supported many of the claims put forth in the conceptual literature. In some areas, such as variability and a multidimensional understanding of the body, the data from the current study strongly supported the hypotheses put forth in literature. In other areas, the data were less conclusive. Overall, this study adds to the existing literature by providing concrete support for claims made in the conceptual literature as well as adding to the preexisting research data.

Clinical Implications

The results of this research indicate that cadaver dissection provides a unique and beneficial learning experience for medical students that can not be duplicated with alternative methods of teaching gross anatomy. Dissection labs are expensive to maintain and are often scrutinized for the benefits they provide over the cost to maintain them (Aziz, et al., 2002). Yet, for the most part, the only benefit that is typically factored into this equation is how well students using cadaver dissection are able to learn human anatomy (Elizondo-Omana, Guzman-Lopez, & Garcia-Rodriguez, 2005). Although anatomical education is indeed the foremost benefit provided by dissection, this research indicates that it is far from the only benefit.

The qualitative nature of this study allowed for the illumination of the subjective process of meaning-making within dissection. One of the primary foci for meaning making was the personal reflection on the concept of respect for the human body. Considering the ultimate goal of medicine is to care for the human body, it is vital that physicians in training develop a deep understanding of their relationship with the human body. Thus, the process of balancing respect for the body through their experience in the gross anatomy lab is an essential part of medical students' training.

This is an important point for medical schools that are considering replacing traditional dissection courses with computer-aided models or other alternative forms of instruction. By some calculations it may appear that these alternative means of instruction would be cost-effective. However, when one considers the multiple covert learning processes noted by the participants in this research, it is clear that there are many forms of learning that occur during dissection that would be lost with any other form of instruction.

Instructors of dissection labs should also take note of the results of this research. The findings of this research may not be surprising to individuals who spend the majority of their time working with dissection. There is an intuitive element to understanding that the dissection process allows medical students to learn how to balance their respect for the human body with the procedures that they must perform in order to preserve the health of the human body. However, the specific process outline in the theory developed from these data can be a useful tool for those teaching gross anatomy to medical students.

Historically, dissection has been recognized as a vehicle to train doctors to maintain an objective detachment towards patients in order to be able to perform the

procedures necessary to benefit the patient's health (Arráez-Aybar, et al., 2004). In other words, doctors needed to be able to absorb the shock of medicine and still be able to function as a physician. Yet, the field of medicine is also embracing a movement towards humanistic care in which the physician is required to maintain a human connection with his or her patients (Collett, et al., 2009).

The results of this study illustrate how medical students use cadaver dissection to meld these two concepts. Medical educators should take note of this process so that they are able to recognize it in their students. Anatomy instructors and dissection teaching assistants can help students learn to balance respect for the human body by guiding them through the filters of utility and humanity. A number of the participants in the study noted that it was helpful for them when the course instructor or teaching assistants pointed out how the information they were learning would be useful for them in the field. Instructors can highlight immediate utility (e.g., “these structures will be on the practical exam,” or “in order to understand the muscles of the back you must first understand the layers of fascia that keep those muscles in place”) and they can also provide motivation through future utility (e.g., “bisecting the skull is important because it will allow you to have a clear picture of the lateral nasal wall when you're working with a patient with chronic sinusitis”). Greater understanding of both present and future utility will promote increased self-efficacy in students when dealing with patients.

Additionally, by understanding which aspects of dissection students do and do not find useful, instructors can minimize the obstacles and some areas of shock for the students. For example, due to the findings of the current study, the Department of Neurobiology and Anatomy at the University of Utah has adjusted the curriculum for the

Human Gross Anatomy course so that the medical students are no longer required to perform the abdominal bisection. This decision was based on the shock experienced by students performing this task combined with the understanding that students will never use the tools used for bisection in their medical profession nor will they need to bisect a pelvis or spine as medical professionals.

Connection to the humanity of the experience was maintained during the actual dissection process by communication with the director of the body donor program, conversation with their peers, and personalization of the cadaver. Participants also noted that the departmentally sponsored Body Donor Memorial Service played a major role in their connection to the humanity of the dissection experience as a whole. Course instructors and teaching assistants can further promote the use of humanity as a filter in balancing respect for the body. This can be done by helping the students identify with the body donor by providing information that is available about the donor, acknowledging personalized connections that the students have made on their own, and, most importantly, modeling a standard of personalized respect when working with the cadavers.

It should be noted that there are times when a student is unable to maintain the balance of respect on his or her own, as was the case with Vincent's difficult experience when bisecting the cadaver. Even though his lab mates attempted to highlight the utility of the process, it was not sufficient to counteract the shock of the experience; and the result was that Vincent's sense of respect for the body was thrown off balance. In cases such as these, the course instructor can provide support by working with the student to identify aspects of each of the four factors that play a role in balancing respect. The

instructor should acknowledge the shock of the event and allow the student to identify the discovery aspects involved, the use she or he will get out of it, and the human connections involved. The instructor can help the student by supplementing each area as needed. Being aware that each of these areas plays a role in the student's learning in the lab will allow instructors to not only handle difficult situations like the one noted previously, but also help them to promote learning in general in the gross anatomy lab.

Limitations and Implications for Future Research

The intent of the current study was to examine the learning process of first-year medical students using cadaver dissection. The research met this overall goal. However, there are some areas in which the scope of the study is limited and further research is necessary.

While it was not the intent of this study to compare one form of anatomical instruction to another, the opportunity to make a comparison between the use of prosection versus dissection was available due to the fact that the majority of the participants had experienced prosection in their undergraduate anatomy courses. Some participants volunteered comparisons of the two experiences, but this was limited. For the most part, participants were not asked to explore how their experience learning anatomy through prosection differed from the dissection experience. Had this opportunity been utilized, it may have resulted in richer data surrounding the unique learning that occurs with a full body dissection. While a qualitative study could not determine which of the two methods was more effective in teaching anatomy, it could examine which of the two methods the students perceive to be more effective.

Additional research is also needed in order to better understand of the origins of the concept of respect in general and how that translates to respect for the human body. The data gathered in the current study clearly illustrate how the concept of respect for the human body is developed and managed within the gross anatomy lab. Yet, the students entered the lab with a root schema of respect. This concept was only explored in the final few interviews and was not explored in depth. Had this line of questioning been explored in greater detail with all of the participants, it is likely it would have contributed to a more robust understanding of the general schema of respect. By having a better grasp of the schema of respect, the way in which dissection changes that concept could be better understood.

This study did not examine a number of cultural factors, such as race and ethnicity, gender, and religion, and the relationship between these factors and the experience of dissection. Mortality is a universal human factor, yet one's culture plays a role in how an individual approaches issues of death, dying, and respect for the human body. Of the aforementioned cultural factors, gender and religion were mentioned by a handful of participants. However, with the exception of the statement made by Jessica regarding the lack of competition within the lab (see Chapter III, p. 72), these were not a primary topic of conversation during the interviews. Given the opportunity to repeat the interviews, I feel that it would be very beneficial to further explore the relationship between culture and the experience of dissection.

As has been noted previously, the themes identified in this study do not easily lend themselves to identification through traditional quantitative measures. However, now that the concept of balancing respect has been identified as a central theme within

the dissection experience, it will be easier to develop a quantitative measure to further explore the concept with a broader population and generalize the findings. Such research can examine the roles that the supporting themes of Discovery, The Shock of Medicine, Utility as Motivation/Coping, and Humanity play in the dissection process.

Further research should survey the extent to which the concept of respect is promoted within gross anatomy labs. Students who are dealing with the process of balancing respect for the human body will be influenced by the way in which respect is presented in their labs. Research is needed to understand how respect for the human body is taught or not taught as an extension of the dissection process. This could lead to longitudinal studies investigating the correlational relationship between a student's ability to effectively balance respect for the body through the dissection process and his or her future aptitude for dispensing medical care congruent with a humanistic approach to medicine.

Additional research is needed to fully understand the process students go through in choosing the filters of utility and humanity. Likewise, a student's predilection towards a particular filter may be indicative of his or her approach towards patient care. Longitudinal or cross-sectional research exploring this connection, if it exists, would be beneficial to medical schools when developing protocols for gross anatomy education.

The educational process and benefits of cadaver dissection have been fruitful areas of research. This study has added to the existent research, but there is still much left to be discovered. Future research exploring dissection as an educational tool for medical students can utilize the findings of this study.

Conclusion

In conclusion, this study offers a unique insight into the process that students go through when participating in a full body cadaver dissection. The results of the study illuminate a previously unidentified learning process that occurs through dissection. This process focuses around learning to balance respect for the human body while assuming the responsibilities required of a physician. The results of this study support findings previously reported in the literature, as well as benefits of dissection hypothesized in the conceptual literature. The results of this study should also inform future research examining dissection as an educational tool for medical students. There are also significant clinical implications, and the findings of this study should be utilized by individuals designing medical training using cadaver dissection.

APPENDIX A

RECRUITMENT EMAIL

Dear Medical Students,

In an attempt to continually improve the gross anatomy course the Departments of Neurobiology and Anatomy and Educational Psychology are jointly studying the cadaver laboratory experience by first year medical students.

The questions guiding this research project are:

- What is the impact of cadaver dissection on medical students?
- What do medical students really learn during cadaver dissection?

Therefore, we would like to hear from you about your experience including thoughts, feelings, and concerns about cadaver dissection. We are interested in hearing from people who think of their experience in the dissection lab as good, bad, and anywhere in-between.

There are two ways in which you can participate in this study (you can choose to take part in one or both options and participation is completely voluntary):

(1) An in-person interview (1 – 2 hours)

and/or

(2) A group discussion with 3-5 of your classmates (1 ½ - 3 hours)

Your confidentiality is very important, and as such I will not know who has chosen to participate. To ensure confidentiality, all contact will go through the primary researcher, Miki Skinner. Miki is a graduate student in the Department of Educational Psychology, and is not associated with the School of Medicine. Some of you may remember Miki from the cadaver lab this past fall 2008. Miki will be the one conducting the interviews.

If you are interested in participating in this study please contact Miki Skinner directly at:

E-mail: mikidskinner@gmail.com

Phone: (208) 703-9404

Thank you very much for considering participation in this project. Your experiences will help us understand the value of cadaver dissection to the learning process of medical students.

I wish you all the best in the coming weeks of final exams.

Sincerely,

David A. Morton, Ph.D.

Gross Anatomy Course Director

Department of Neurobiology and Anatomy

University of Utah School of Medicine

401 MREB 20 N 1900 E

Salt Lake City, UT 84132

Tel: 801-581-3385

david.morton@hsc.utah.edu

APPENDIX B

INFORMED CONSENT FORM

Consent and Authorization Document

The Experiences of First-year Medical Students in Cadaver Dissection

THANK YOU for considering taking part in our study on the experiences of first-year medical students in cadaver dissection.

BACKGROUND

You are being asked to take part in a research study on the experiences of first-year medical students in cadaver dissection. Before you decide, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with friends and relatives if you wish. Ask the researcher if there is anything that is not clear or if you would like more information. Take time to decide whether or not to volunteer to take part in this research study.

The purpose of the study is to look at the learning process for first-year medical students using cadaver dissection. This is done by examining the meaning that first-year medical students make of their experience of dissection in the gross anatomy lab. The questions guiding this research are:

- What is the impact of cadaver dissection on medical students?
- What do medical students really learn during cadaver dissection?

You are being asked to participate in this study because you were enrolled in the Human Gross Anatomy course in the fall semester of 2008. The researcher would like you to talk about your experience with dissection in the Human Gross Anatomy course. The details of how this study will be conducted can be found in the Study Procedures section of this consent form.

The primary researcher for this study is Miki D. Skinner, a graduate student in the Department of Educational Psychology at the University of Utah. The research will be overseen by three faculty members at the University of Utah: 2 from the Department of Educational Psychology and 1 from the Department of Neurobiology and Anatomy.

STUDY PROCEDURES

There are two ways that you can participate in this study. Your participation in this study will take no more than 5 ½ hours maximum and will likely not exceed 3 hours. You can choose to take part in one or both of the following types of interviews:

Individual interview	Discussion group
<ul style="list-style-type: none"> • You will be asked about your thoughts, feelings, and concerns regarding your experience with dissection in the Human Gross Anatomy Lab • Expected time: 1 – 2 hours • The interview will be audiotaped • You may be asked for a follow-up interview up to 30 minutes, which will also be audiotaped 	<ul style="list-style-type: none"> • You will be asked to take part in a discussion group with 3 – 5 other medical students to further explore the dissection experience. • Expected time: 1 ½ – 3 hours • So that the researcher will know who was talking in the group, the group will be videotaped • However, you may sit with your back to the camera if you are uncomfortable being videotaped.

If you choose to participate in both the individual interview and the discussion group, you will be invited to participate in the discussion group within 1 month following your individual interview.

RISKS

The risks of taking part in this study are considered minimal. It is possible that you may feel upset thinking about or talking about the dissection experience. These risks are similar to those you experience when discussing personal information with others. All participants will be given a list of resources available to help if they feel upset from this experience. If you participate in the discussion group or discussion forum, there is no way for the researcher to guarantee that the information you share will be kept private by other members. Participation in the study may also involve risks that are currently unforeseeable. If the researcher becomes aware of additional risks from taking part in the study, she will tell you as soon as possible.

BENEFITS

I cannot promise any direct benefit for taking part in this study. However, my experience is that having the opportunity to talk about these kinds of issues may result in increased self-awareness and positive feelings about sharing your thoughts and feelings with other people and the possibility of sharing information that will help others. It may also result in greater clarity about your own experience with dissection. Following the completion of the study, the results of the research will be made available to you.

CONFIDENTIALITY

The information you share will be kept confidential. Tapes and transcripts will be stored in a locked filing cabinet or on a password protected computer located in the researcher's work space. Only the researcher and members of her study team will have access to this information. You will be asked to choose a code name from a list of names not associated with the Human Gross Anatomy

course. This code name will be used with all information you provide for this study including the individual interview and discussion group. In publications, only your code name will be used, and every effort will be made to protect your identity by removing identifying information from quotes, etc., that are used in publication.

Although the researcher can guarantee that she will keep all information you share confidential, it is possible that participants in the optional discussion group might share information about you to others. I will discuss this with all participants in the effort to assure confidentiality. The only other exception to our guarantee of confidentiality is if you share information indicating that you may be at risk of harming yourself or others.

PERSON TO CONTACT

If you have questions, complaints, or concerns about this study, or if you feel you have been harmed by taking part in the research, you can leave a message with the Department of Educational Psychology for the primary researcher, Miki Skinner at 801-581-7148. Miki will return your call as soon as possible. You may also contact her by e-mail at miki.skinner@utah.edu; however, you should be aware that e-mail is not a confidential form of communication.

If you do not wish to contact the primary researcher, you can contact her supervisor, Sue Morrow, at 801-581-3400. Sue can normally be reached during normal working hours; however, if she is unavailable when you call, you may leave a message on her confidential voice mail. She will return your call as soon as possible. You may also contact her by e-mail at sue.morrow@utah.edu; however, you should be aware that e-mail is not a confidential form of communication.

If you think you may have been emotionally harmed from being in this study, please call the Director of Student Counseling, Len Haas at 801-587-3657. Dr. Haas can be reached at this number during normal business hours. You may also contact Dr. Haas by e-mail at leonard.haas@hsc.utah.edu; however, you should be aware that e-mail is not a confidential form of communication.

Institutional Review Board: Contact the Institutional Review Board (IRB) if you have questions regarding your rights as a research participant. Also, contact the IRB if you have questions, complaints or concerns which you do not feel you can discuss with the investigator. The University of Utah IRB may be reached by phone at (801) 581-3655 or by e-mail at irb@hsc.utah.edu.

Research Participant Advocate: You may also contact the Research Participant Advocate (RPA) by phone at (801) 581-3803 or by email at participant.advocate@hsc.utah.edu.

RESEARCH-RELATED INJURY

If you are injured from being in this study, medical care is available to you at the University Hospital, as it is to all sick or injured people. The University of Utah does not have a program to pay you if you are hurt or have other bad results from being in the study. The costs for any treatment or hospital care would be charged to you or your insurance company (if you have insurance), or other third party (if applicable), to the extent those parties are responsible for paying for medical care you receive. Since this is a research study, some health insurance plans may not pay for the costs.

The University of Utah is a part of the government. If you are injured in this study, and want to sue the University or the doctors, nurses, students, or other people who work for the University, special laws may apply. The Utah Governmental Immunity Act is a law that controls when a person needs to bring a claim against the government, and limits the amount of money a person may recover. See Section 63G -7-101 to -904 of the Utah Code.

VOLUNTARY PARTICIPATION

It is entirely up to you to decide whether to take part in this study. If you decide not to take part, or if you withdraw from the study after starting, there will be no penalty or loss of benefits of any kind, nor will it affect your relationship with the researcher or faculty and staff in the School of Medicine. If you decide to stop after you have agreed to participate, just inform the researcher. She will destroy your interview tape and any transcripts she has made. If you withdraw after taking part in the discussion group, the tape will not be destroyed, but all of your participation will be erased from the transcript of the group.

COSTS AND COMPENSATION TO PARTICIPANTS

There should typically not be any costs to you for participating in this study. If you incur any costs (such as transportation, long-distance phone calls, etc.), you will be reimbursed. There will also not be any payment for your participation in this study.

NUMBER OF PARTICIPANTS

This study will be conducted solely at the University of Utah. The number of participants in this study will not exceed the number of students who were enrolled in the Human Gross Anatomy course in the fall semester, 2008.

CONSENT

By signing this consent form, I confirm I have read the information in this consent form and have had the opportunity to ask questions. I will be given a signed copy of this consent form. I voluntarily agree to take part in this study.

Participant's Name

Participant's Signature

Date

Name of Person Obtaining Authorization and Consent

Signature of Person Obtaining Authorization and Consent

Date

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