

To the Graduate Council:

I am submitting herewith a dissertation written by India Frances Lane entitled “Faculty Perspectives on the Importance and Place of Nontechnical Competencies in Veterinary Medical Education at Five North American Colleges of Veterinary Medicine.” I have examined the final electronic copy of the dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Educational Administration and Policy Studies.

Dr. E. Grady Bogue, Major Professor

We have read this dissertation
and recommend its acceptance:

Dr. Norma Mertz

Dr. Jan Lee

Dr. Ralph Brockett

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

Faculty Perspectives Regarding the Importance and Place
of Nontechnical Competencies in Veterinary Medical Education
at Five North American Colleges of Veterinary Medicine

A Dissertation presented for
the Doctorate in
Education,
The University of Tennessee, Knoxville

India Frances Lane

December 2008

Copyright 2008 by India Lane.

All Rights Reserved.

DEDICATION

This dissertation is dedicated to the memory of my mother, Frances Harbison Lane, who would have been thrilled, and to my friends, Cary, Dianne, Julie and Nancy, who listen to my thoughts and believe in the world of the possible.

ACKNOWLEDGMENTS

I would like to acknowledge the inspiration and support of my professors and newest mentors, Dr. E. Grady Bogue and Dr. Norma Mertz, who continue to challenge me to do the right thing. I would also like to acknowledge the patience, support and expertise of my committee, including Drs. Bogue and Mertz (Department of Educational Leadership and Policy Studies), Dr. Ralph Brockett (Department of Educational Psychology and Counseling), and Dr. Jan Lee (College of Nursing). Dr. Vincent Anfara in the Department of Theory and Practice in Teacher Education also played a key role in my professional development in this new field of ideas, values, terminology and methodology.

I would also like to thank the institutions and individuals who participated in this study and willingly expressed their views, curiosities and interest in the topic. Special thanks go to Ms. Cary Springer for her help in the survey development and statistical analysis. Finally, I would like to acknowledge my colleagues in the College of Veterinary Medicine who supported this effort and believed in its value, including Dr. Nancy Howell, Dr. Michael Sims, Dr. Elizabeth Strand, Dr. Robert DeNovo, Associate Dean James Brace, and former Dean Michael Blackwell.

ABSTRACT

Successful veterinary practice requires a unique combination of medical competence and other professional skills that include empathy, communication skills, business and management skills. Results of two recent national studies have indicated that many veterinarians possess the medical knowledge, but not the ancillary skills, that can determine their economic success. Furthermore, growth in non-practice veterinary careers and changes in food animal production medicine have accentuated the need for veterinarians with exceptional teamwork, management and leadership skills. These nontechnical competencies pose a challenge to veterinary educators, who have traditionally focused on transfer of biomedical knowledge and have had limited involvement in these policy issues. In this study, veterinary faculty from five veterinary colleges were surveyed regarding the importance of nontechnical skills for veterinary graduates, where nontechnical skills should be taught, and their own role and level of preparation in cultivating such skills.

Faculty respondents uniformly agreed that nontechnical competencies are important for veterinary graduates and should be cultivated across the spectrum of preveterinary, veterinary and postgraduate education. The support is greatest for critical thinking and intrapersonal competencies and less for management and business competencies. Basic science, nonveterinarian and junior faculty tend to more strongly appreciate the importance of nontechnical skills. Large animal faculty and midcareer faculty exhibit a more reserved level of support.

Women faculty are more likely to support the development of nontechnical competencies across the continuum of education. Junior faculty, though supportive of the importance of such skills, are less likely than other faculty to view veterinary clinical education as a primary time for their development. Junior faculty are also less likely to perceive a personal role in the cultivation of nontechnical competencies in veterinary students. Faculty members' view of the role and composition of preveterinary and preclinical veterinary education, and their perceptions of personal ability in the cultivation of nontechnical competencies, may be unique to an institution.

Institutional and professional leaders should tailor faculty development and curricular discussions with these disciplinary and career stage differences in mind. Educational leaders should also work toward building integrated methods of training veterinary students in business, management, coaching and leadership skills.

TABLE OF CONTENTS

CHAPTER 1	1
Introduction and Statement of the Problem	1
Introduction.....	1
Statement of the Problem.....	12
Purpose.....	12
Research Questions.....	13
Summary of Method and Procedures.....	13
Significance.....	14
Delimitations.....	15
Limitations.....	16
Definitions of Terms.....	17
Organization of the Study.....	17
CHAPTER 2	19
LITERATURE REVIEW	19
Organization of the Chapter.....	19
Introduction: Art versus Science?.....	20
What can be Taught?	21
Concepts of Intelligence	23
Multiple Intelligences	23
Emotional Intelligence.....	25
Practical Intelligence.....	26
Concepts of Professional Skill Development	27
Competencies and Noncognitive Variables.....	27
Skills, Knowledge, Aptitudes and Attitudes (SKA)	30
Common Threads in Nontechnical Competencies.....	32
The Evidence for Noncognitive Dimensions of Professional Education.....	36
Personality and Psychological Testing in Professional Education	36
Predictive Uses of Noncognitive Variables	37
Predicting Clinical Success.....	41
Implications for Veterinary Medical Education	42
Where Should Nontechnical Skills be Taught?	42
Challenges in Professional Education.....	43
The Needs	49
CHAPTER 3	50
METHOD	50
Purpose of the Study	50
Design of the Study.....	51
Choice of Methodology	52
Setting.....	54
Procedures.....	55
Survey Method.....	55
Development of Survey Questions	55

Sampling Method.....	55
Methods and Timeline for Survey Invitation.....	55
Survey Instrument.....	56
Survey Variables.....	57
Survey Implementation.....	57
Analysis of Data.....	58
Validity and Reliability.....	59
Potential Survey Error.....	61
Researcher's Role.....	63
CHAPTER 4.....	64
RESULTS.....	64
Research Questions.....	64
Organization of the Chapter.....	65
Results of the Study.....	66
Participants and Response Rate.....	66
Associations Among Independent Variables.....	72
Research Question 1.....	78
Which nontechnical competencies do veterinary faculty perceive are important for graduating veterinarians to master?.....	78
Interactions Among Competency Ratings and Independent Factors.....	81
Between Subject Effects.....	99
Research Question 2.....	102
Do veterinary faculty members perceive that nontechnical competencies should be taught in the veterinary curriculum, or acquired elsewhere?.....	102
Which Competencies Should be Taught or Cultivated During each Training Period?	102
What Factors Influence Placement of Competency Development?.....	107
Research Question 3.....	133
Do veterinary faculty members perceive a responsibility to teach or cultivate nontechnical competences in their educational roles?.....	133
Research Question 4.....	159
To what extent do veterinary faculty members feel prepared to teach or cultivate nontechnical competencies?.....	159
Research Question 5.....	181
To what extent do veterinary faculty members feel prepared to evaluate nontechnical competencies?.....	181
Relationships between Importance and Preparation to Teach or Evaluate.....	186
Research Question 6.....	201
Summary of Major Findings: What factors influence veterinary faculty members' perceptions regarding nontechnical competencies in veterinary education?.....	201
Summary of Respondent Comments.....	207
CHAPTER 5.....	208
DISCUSSION.....	208
Summary of Major Findings.....	208

Organization of the Chapter.....	211
Discussion.....	211
A Commitment to Traditional Values.....	212
Communication Skills.....	213
Business and Management Skills.....	215
Views of Leadership	219
Cultural Competence	221
Faculty Characteristics.....	222
A Gender-Neutral View	226
What Should be Learned in Kindergarten?.....	228
The Faculty Life Cycle	230
Limitations	233
Conclusions.....	237
Recommendations for the Field.....	239
LIST OF REFERENCES	241
APPENDIX.....	261
APPENDIX.....	261
VITA.....	278

LIST OF TABLES

Table 2.1	Intelligences, Variables or Competencies Conceptualized for Professional or Personal Success.....	33
Table 4.1	Characteristics of Respondents at Five Colleges or Schools of Veterinary Medicine	69
Table 4.2.	Distribution of Respondents by Gender: Observed and Expected Numbers for Chi-Square Goodness of Fit Model.....	71
Table 4.3.	Measures of Association for Years Teaching Experience of Respondents at Each Institution.....	73
Table 4.4	Measures of Association Between Gender and Academic Rank of Respondents.....	74
Table 4.5.	Measures of Association Between Degree Status and Primary Discipline.....	75
Table 4.6	Respondents' Primary Effort Allocation Within Each Primary Discipline.....	76
Table 4.7	Measures of Association Between Gender of Respondents and Primary Discipline.....	77
Table 4.8	Mean Level of Agreement for 14 Nontechnical Competencies for all Respondents.....	79
Table 4.9	Mean Level of Agreement for 14 Nontechnical Competencies by Institution.....	82
Table 4.10	Mean Level of Agreement for 14 Nontechnical Competencies by Gender of Respondent.....	84
Table 4.11	Mean Level of Agreement for 14 Nontechnical Competencies by Respondent's Primary Effort Allocation.....	85
Table 4.12	Mean Level of Agreement for 14 Nontechnical Competencies by Respondent Primary Discipline.....	86
Table 4.13	Mean Level of Agreement for Nontechnical Competencies by Academic Rank.....	88
Table 4.14	Mean Level of Agreement for 14 Nontechnical Competencies by Degree of Respondent.....	90
Table 4.15	Classification of Groups for Career Stage Information.....	92
Table 4.16	Mean Level of Agreement for 14 Nontechnical Competencies by Respondents' Year of Graduation.....	93
Table 4.17	Mean Level of Agreement for 14 Nontechnical Competencies by Years of Teaching Experience.....	97
Table 4.18	Placement of Nontechnical Competency Development in Veterinary Training.....	103
Table 4.19	Associations Among Institution of Respondent and Placement of Nontechnical Competencies in Veterinary Education.....	108
Table 4.20	Associations Between Gender and Placement of Nontechnical Competencies in Veterinary Education.....	115

Table 4.21	Association Between Respondents' Year of Graduation and Placement of Nontechnical Competencies in Veterinary Education.....	121
Table 4.22	Summary of Associations Between Independent Variables and Placement of Nontechnical Competencies in Veterinary Education....	126
Table 4.23	Self-Reported Responsibility to Teach Nontechnical Competencies for All Respondents.....	134
Table 4.24	Association Between Respondents' Institution and Self-Reported Responsibility to Teach Nontechnical Competencies.....	136
Table 4.25	Association Between Respondent's Gender and Self-Reported Responsibility to Teach Nontechnical Competencies.....	139
Table 4.26	Association Between Respondent's Degree and Self-Reported Responsibility to Teach Nontechnical Competencies.....	142
Table 4.27	Association Between Primary Discipline and Self-Reported Responsibility to Teach Nontechnical Competencies.....	146
Table 4.28	Association Between Respondents' Year of Graduation and Self-Reported Responsibility to Teach Nontechnical Competencies.....	149
Table 4.29	Respondents' Teaching Experience and Self-Reported Responsibility to Teach Nontechnical Competencies.....	152
Table 4.30	Association Between Academic Rank and Respondent's Self-Reported Responsibility to Teach Nontechnical Competencies.....	156
Table 4.31	Mean Level of Preparation to Teach Nontechnical Competencies for All Respondents.....	160
Table 4.32	Respondents' Self-Reported Level of Preparation to Teach Nontechnical Competencies by Institution.....	163
Table 4.33	Respondents' Self-Reported Preparation to Teach Nontechnical Competencies by Gender.....	166
Table 4.34	Respondents' Self-Reported Level of Preparation to Teach Nontechnical Competencies by Academic Degree.....	169
Table 4.35	Respondents' Self-Reported Level of Preparation to Teach Nontechnical Competencies by Primary Discipline.....	173
Table 4.36	Respondents' Self-Reported Level of Preparation to Teach Nontechnical Competencies by Year of Graduation.....	175
Table 4.37	Respondents' Self-Reported Level of Preparation to Teach Nontechnical Competencies by Years of Teaching Experience.....	177
Table 4.38	Respondents' Self-Reported Level of Preparation to Teach Nontechnical Competencies by Academic Rank	179
Table 4.39	Mean Level of Preparation to Evaluate Nontechnical Competencies for All Respondents.....	182
Table 4.40	Respondents' Self-Reported Level of Preparation to Evaluate Nontechnical Competencies by Institution.....	183
Table 4.41	Respondents' Self-Reported Level of Preparation to Evaluate Nontechnical Competencies by Gender.....	187
Table 4.42	Respondents' Self-Reported Level of Preparation to Evaluate Nontechnical Competencies by Academic Degree.....	189

Table 4.43	Respondents' Self-Reported Level of Preparation to Evaluate Nontechnical Competencies by Primary Discipline.....	191
Table 4.44	Respondents' Self-Reported Level of Preparation to Evaluate Nontechnical Competencies by Year of Graduation.....	193
Table 4.45	Respondents' Self-Reported Level of Preparation to Evaluate Nontechnical Competencies by Years of Teaching Experience.....	195
Table 4.46	Respondents' Self-Reported Level of Preparation to Evaluate Nontechnical Competencies by Academic Rank.....	197
Table 4.47	Intercorrelations Among Ratings of Importance, Preparation to Teach, and Preparation to Evaluate Nontechnical Competencies for All Respondents.....	199

LIST OF FIGURES

Figure 4.1.	Mean ratings of the importance of nontechnical competencies for all respondents.	80
Figure 4.2.	Mean ratings of nontechnical competencies by respondent's first terminal degree.....	89
Figure 4.3.	Mean level of agreement in the importance of nontechnical competencies by year of graduation.....	95
Figure 4.4.	Trends in responses regarding the importance of three non-technical competencies by number of years teaching, using three representative examples.	96
Figure 4.5.	Mean level of agreement in the importance of nontechnical competencies by years experience teaching.....	99
Figure 4.6.	Mean level of agreement regarding the importance of non-technical competencies for respondents in five disciplinary areas.....	100
Figure 4.7.	Mean ratings of competencies by gender of respondent.....	101
Figure 4.8.	Schematic representation of respondents support for development of non-technical competencies during the continuum of veterinary education...	104
Figure 4.9.	Schematic representations comparing male and female respondents' support for the development of nontechnical competencies during the continuum of veterinary education.....	119
Figure 4.10.	Perspectives regarding the faculty role in teaching nontechnical competencies.....	135
Figure 4.11.	Mean ratings of preparation to teach (royal blue bars) and preparation to evaluate (teal bars) for all faculty respondents.....	161
Figure 4.12.	Mean level of self-reported preparation to teach or cultivate nontechnical competencies for faculty respondents at five institutions.....	165
Figure 4.13.	Mean level of self-reported preparation to teach or cultivate nontechnical competencies for male and female faculty respondents.....	168
Figure 4.14.	Mean level of self-reported preparation to teach or cultivate nontechnical competencies for DVM and nonveterinarian respondents.....	171
Figure 4.15.	Mean level of self-reported preparation to evaluate nontechnical competencies for faculty respondents at five institutions.....	185

LIST OF ABBREVIATIONS

AAVMC	American Association of Veterinary Medical Colleges
ACT	college admissions test
AVMA	American Veterinary Medical Association
BS	Basic Science faculty
CPI	California Psychological Inventory
CS-DS	Clinical Sciences – Diagnostic Sciences
CS-LA	Clinical Sciences – Large animal
CS-SA	Clinical Sciences – Small animal
CS-O	Clinical Sciences - Other
DVM	Doctor of Veterinary Medicine
EI	Emotional Intelligence
GPA	Grade Point Average
KPMG LLP	United States limited liability partnership affiliated with KPMG International audit, tax and advisory firm
MBA	Masters of Business Administration
NCVEI	National Commission of Veterinary Economics Issues
SAT	Scholastic Aptitude Test
SKA	Skills, knowledge, aptitudes and attitudes
VMD	Veterinary Medical Doctor
NCV	Noncognitive variables
NCV-Q	Noncognitive Variable Questionnaire

CHAPTER 1

Introduction and Statement of the Problem

Introduction

The most enduring image of the veterinarian is the one evoked by James Herriott, the dedicated, resourceful servant to all creatures great and small. In Herriott's day, practical knowledge about common problems and a healthy dose of ingenuity carried the day. Of course, the human element of Herriott's stories was the real hook – the many stories of his life and struggles, the situations, the people, and the lessons learned from so many touching encounters. Although we've come a long way from James Herriott, successful veterinary practice still requires a unique combination of medical competence and other professional skills including empathy, communication skills, teamwork, business and management skills. Veterinarians today are also in demand in non-practice careers, including academia, industry, government and public health, fields that rely on similar and expanded sets of skills. The introductory comments from the 2006 Association of American Veterinary Medical Colleges (AAVMC) Foresight Project (Willis et al., 2007) report underscore the need for veterinarians to remain relevant to evolving societal needs, stating bluntly, "the environment of veterinary medicine is one of profound change" (p. 3).

Results of two national studies focusing on the economic success of the veterinary profession have strongly indicated that many veterinarians possess the medical knowledge, but not the ancillary skills, that determine their economic success (J. P. Brown & Silverman, 1999; Cron, Slocum, Goodnight, & Volk, 2000). The two major

national veterinary professional associations, the American Animal Hospital Association (AAHA) and the American Veterinary Medical Association (AVMA), along with the American Association of Veterinary Medical Colleges, commissioned the 1999 study performed by KPMG LLP Economic Consulting Services in response to lagging incomes for veterinarians in the preceding decade (Brown & Silverman, 1999). Although the study focused on market forces affecting the veterinary profession, the skills and knowledge required for veterinarians were addressed by surveying veterinarians and employers of veterinarians, including practice owners, industry and governmental agencies. Medical and surgical knowledge was obviously desired in practice veterinarians; however, additional training in communications, business and management skills, sales/marketing, computer or research skills were desirable for employees in non-practice types of employment.

At roughly the same time, a study commissioned by the AVMA and performed by Brakke Consulting, Inc. (commonly referred to as the “Brakke study”) analyzed responses to an extensive questionnaire, and correlated responses with income levels, for almost 4,400 practicing veterinarians and practice owners. Above and beyond expected socioeconomic factors (years in practice, number of hours worked, location of practice), their key findings primarily related to business-related factors that either enhanced or impaired income, including application of standard management practices, service orientation, appropriate pricing strategies and the overall financial acumen of the respondent (Cron et al., 2000). However, two personal characteristics, a high level of self-esteem and a reduced fear of negative evaluation, also corresponded to higher income.

Self-esteem and confidence of new graduates is particularly suspect. Employers of new graduates from one North American veterinary college ranked the graduates lower in skills such as time management, financial management, ability to work with others, self-motivation, and ability to function independently than did the graduates themselves (Butler, 2003). In another survey of over 800 Canadian employers of new veterinary graduates, 76% of respondents cited a lack of confidence, competence or both as significant concerns for entering veterinarians (Lofstedt, 2003). While some experienced veterinarians may have difficulty recalling their own level of preparation at that stage, these perceptions support reexamination of veterinary education. It has been suggested that a lack of focused curricula or a mismatch of academic goals versus practicing veterinarians has contributed to the deficiencies in perceived preparation (Lofstedt).

Other surveys support the concept that business and personal skills are important for veterinarians. Students and residents at the University of California School of Veterinary Medicine contributed to the development and ranking of 62 attributes or objectives desired of veterinary graduates (Walsh, Osburn, & Christopher, 2001). In this extensive list of objectives, nontechnical competencies including problem-solving and reasoning skills, communication skills, honesty and ethical practices, respect for others and awareness of own one's limitations were ranked highly as essential for all veterinary graduates. Veterinarians of the California Veterinary Medical Association then reviewed the list of attributes, offered suggestions for additions or deletions, and their impressions of University of California graduates under their employ (Walsh et al.). Business practice knowledge (11%), and essential elements of professionalism (6%) were the most

common further expectations of graduates according to this respondent pool.

Communication skills, practice experience and flexibility were most commonly cited as deficiencies of University of California graduates at that time (Walsh et al.). A desire for communication training, business skills and financial planning skills in veterinary education is commonly expressed by alumni and recent graduates (Bristol, 2002; Hardin & Ainsworth, 2007; Routly, Taylor, Turner, McKernan, & Dobson, 2002).

Over a thousand US small animal practitioners were surveyed regarding frequency of use of various skills, procedures and areas of knowledge (Greenfield, Johnson, & Schaeffer, 2004). The most frequently used skills included complete history and physical examination skills, followed directly by the nontechnical skills of “practice with integrity,” and “have a good attitude.” Other skills including “demonstrate life-long learning skills,” “have good written and oral communication skills,” “well developed interpersonal skills,” and “demonstrate critical thinking skills” were also included in the top 12. In fact, all of the nontechnical skills fell in the top 25 of 64 total items. These frequencies correlated with rankings of expected proficiency in new graduates (Greenfield et al.). In most professions, however, new graduates appear well prepared for the technical aspects of the workplace, but often lack other competencies, particularly communication and teamwork skills (Jones, 2002).

A possible overemphasis on economic success in these studies has been noted (Dorsey, 2004; Whitford, 2004). As Dorsey, a practicing veterinarian, warns, the emphasis on increasing income may endanger the reputation of the profession, “the veterinary profession has pulled itself up by its bootstraps to attain the enviable position

of being among the most trusted and respected professions on earth because of generations of sincere, hard-working, conscientious, practitioners” (p. 1827). Dorsey counters that other nontechnical and noneconomic concepts should be stressed in order to develop successful practices: caring, respecting and empathizing with clients, patients, staff and keeping current with information and reasonable fee structures. A group tasked with further defining the skills, knowledge, aptitudes and attitudes (SKA) of successful veterinarians (Chatterdon, King, & Lloyd, 2001) attempted to reconcile these differences in their discussions:

However, most participants believe that it is plausible and consistent both to be economically successful and to maintain the desirable qualities of compassion and caring while delivering high-quality veterinary services. The participants were concerned that without higher incomes, we will not be able to invest in the profession and reinvest in ourselves, nor to attract the best and the brightest to the profession. A temporary period in which we “hyperfocus” on income may be needed in order to correct our course. (pp. 29 - 30)

In a more recent update regarding the economic viability of the profession, Lloyd (2006) again points to nontechnical SKA as a means for veterinarians to distinguish themselves in the ‘monopolistic competition’ of private veterinary practice. The SKA of the practice veterinarians may well differentiate one clinic from local competitors and help the practice maintain its client base and pricing structure (Lloyd, 2006). Others have stressed the need for practices to place higher value on nontechnical skills when hiring veterinarians and other employees, suggesting that employers seek individuals with

emotional intelligence, interpersonal and relational skills, and a positive attitude in order to best contribute to the healthcare team (Ruby & DeBowes, 2007).

In collaboration with the AAVMC and the National Commission on Veterinary Economic Issues (NCVEI), a consortium of veterinary college administrators and practice management consultants has been developing additional strategies for identifying and addressing these nontechnical competencies in veterinary medical education (the SKA Working Group). Using a working definition of *success* for veterinarians that included “economic success, personal satisfaction, peer acknowledgement, client satisfaction, leadership ability and number of publications” (Lewis & Klausner, 2003, p. 1690) the study identified representatives from several state veterinary associations, alumni associations and veterinary colleges to participate in focus groups of successful veterinarians. From these focus groups, six themes emerged to help redefine *success*: personal fulfillment; pride and fun in work; a helping orientation; a balanced lifestyle; respect and professional recognition; personal goal achievement; and satisfactory economic compensation. The primary competencies leading to the development of success in these individuals were extracted from focus group discussions and interviews (Lewis & Klausner).

The list of key nontechnical competencies includes multiple skills, knowledge, aptitudes or attitudes in five categories: interpersonal, self-management, leadership, business and thinking competencies (Appendix A, Lewis and Klausner, 2003). Recommendations from the 2006 Foresight Project include attention to similar skills: leadership, ethics, business management/law, and communication skills, as well as crisis

management and cultural competency (Willis et al., 2007). Prasse, Heider and Maccabe (2007) illustrate the application of such nontechnical skills across the veterinary profession:

In various sectors of the profession, for example, veterinarians are expected to provide expertise in food safety from production to consumption; leadership in regard to animal husbandry and welfare concerns; executive-level knowledge about economics, business, and personnel management; fundamental client communication and media skills; and ethical and moral guidance in the care and use of animals. Are today's graduates adequately prepared to meet these challenges? (p. 1340)

In all discussions related to implementation of these ideas, it has been recognized that a successful program requires an ongoing, longitudinal approach to achieving these objectives throughout the pre-veterinary and veterinary program. For example, Lloyd and Walsh (2002), in proposing a model curriculum model for nontechnical skills, noted the barriers to successful implementation: "Key constraints identified in implementation of the model curriculum include the need to gain widespread acceptance of the topics' importance (by students, faculty, administrators), frequent limitations in available financial and human resources (i.e., who will teach the material), and uncertain delivery systems" (Lloyd, Klausner, & Lewis, 2002), p.1557). Key comments from a 2003 follow-up meeting confirm the need to "educate and engage faculty on needs, get faculty involved in developing skills, aptitudes, and attitudes in students, and develop tools to

identify faculty as mentors.” (SKA Meeting, Des Moines, IA; August 2003). A successful program must embed skill development in all courses and components of the curriculum.

In a follow-up survey of veterinary colleges conducted in the summer of 2003, Lloyd & King (2004) identified a number of changes underway at veterinary colleges across North America in response to the KPMG results. Short summary responses were obtained from administrators from 23 of 27 veterinary colleges indicating changes implemented or underway, including changes in admissions practices or prerequisites (n=7), orientation practices (n=7), curricular modifications (n=18), co-curricular activities such as club meetings or workshops (n=14), and new programs including management, marketing, Masters of Business Administration (MBA) degree opportunities, mentoring programs, or research projects (n=11). Curriculum changes included revision of courses or creation of courses to include team-building, business management, marketing, professional and interpersonal skills, law/ethics, personal finance, communication, entrepreneurship and life skills. Another college has created a parallel MBA program as well as integrated activities (Kogan, McConnell, & Schoenfeld-Tacher, 2005). College leaders at Washington State University College of Veterinary Medicine responded to the consultants’ reports and their own concerns about veterinary education with a series of leadership and developmental programs embedded in the curriculum (Burns, Ruby, DeBowes, Seaman, & Brannan, 2006). Of note, additional outside participants contributed heavily to these programs, including external practitioners, professional organizations, and psychologists. The authors (Lloyd & King, 2004) summarized, “it is clear that substantial change is...underway within the individual veterinary schools and

colleges” (p. 1924). However, mention of faculty involvement, investment and training is lacking.

In updates several years later, anecdotal reports of ongoing dialogue and continued progress in veterinary academia were described (Lloyd, 2006, 2007). However, in the same time frame, leaders of the AAVMC published a plea to accelerate change in veterinary curricula in order to not just remedy deficiencies, but to prepare for future societal needs (Prasse et al., 2007). The authors comment,

Although we cannot know what societal needs will be in 2050, we can be certain that they will be different from those of today, just as the needs of 1950 were vastly different from those of today.... In today’s work, change occurs at a faster pace and on a global scale. The potential challenges...will require a more rapid response if the profession is to continue to be relevant at the interface of human and animal health. (p. 1340)

To meet new educational goals, costly and time-consuming efforts are required. Veterinary faculty will be the essential link between the conceptualization of nontechnical competency development and effective delivery. These individuals must acknowledge and accept the importance of nontechnical skill development and be willing to sacrifice professional time, energy and content coverage to incorporate additional skill development into crowded veterinary courses and curricula. Faculty members already face high pressure to meet increasingly sophisticated and time-consuming teaching, service and research commitments in disciplinary specialties, and are likely to be wary of any curricular reform that would tax them further. An integrated approach to the training

of technical and nontechnical skills, while minimizing the impact on curricular time, requires collective acceptance of the importance of both sets of skills. In an essay citing common barriers limiting veterinary practice success, Burge (2003) pleaded for the integrated approach:

I believe the schools must now take responsibility for initiating the teaching of these needed life skills, along with the existing medical and surgical training...the goal should be a holistic approach that provides our new graduates the tools and skills necessary for total career success, not just medical success. (pp. 1 - 2)

Change is difficult in any academic setting; dramatic reforms will be met with skepticism and resistance. A change in curricular goals also must be matched by changes in faculty development and faculty reward systems. Faculty “buy in” will be the key to success of any new programs. One report of curricular modifications, including extensive use of a clinical psychologist in wellness, ethics, and professionalism courses as well as teambuilding exercises, noted the new emphases required philosophical shifts in faculty role. The department chair is quoted, “the faculty is cautiously optimistic about it. This constitutes a departure from the traditional approach to veterinary education ” (Kuehn, 2004, p. 1910). Regardless of the specific impact of curricular change on individual faculty members, a lack of trust and support for nontraditional methods is easily perceived by students, and erodes effectiveness of alternative methods or content.

With these points in mind, the voice of faculty members involved in the education of veterinary students has been notably absent from the discussion of nontechnical competencies. Although NCVEI efforts now include efforts to deliver programs and

results to veterinary colleges (Lloyd, 2007), the discussions and reactions of faculty have not been studied. While voices of students, graduates and other stakeholders in the mission of veterinary colleges provide key input for veterinary education, the perspective of faculty members is crucial in defining and implementing educational goals.

Although academic faculty members from a few veterinary colleges were included in the focus groups determining success and competencies related to success for veterinarians (Lewis & Klausner, 2003), as well as in the workshop to develop a template curriculum (Lloyd & Walsh, 2002) their responses were blended with other participants and any components related to faculty alone cannot be determined. Academic faculty members, while involved in initial focus groups of the KPMG study, were not included in the segments surveyed regarding skills and knowledge required by veterinarians (Brown & Silverman, 1999). Academic faculty viewpoints were also blended with many others in the recent Foresight Project (Willis et al., 2007). Most faculty members involved in such projects are those in administrative roles, or carefully selected based on their interest and perspective on educational issues, and may not be representative of faculty members in general. Additionally, in all studies, the focus remained on perceived needs and deficiencies in skills, rather than in how to achieve their educational development. The University of California study sought faculty input regarding key objectives for veterinary graduates, but did not delve into how and where those attributes should be taught (Walsh, 2001).

Thus, veterinary faculty have been only modestly involved in the discussion of nontechnical competencies in veterinary students to date, and their perceptions on their

place in the curriculum are largely unknown. Faculty members already face high pressure to meet increasingly sophisticated and time-consuming teaching, service and research commitments in disciplinary specialties. Faculty needs cannot be addressed until they are identified and understood. Faculty members also must feel involved in the development process and feel that they have adequate knowledge and skills themselves to attack this deficiency appropriately. In order to begin a process of curricular change and create an effective program emphasizing nontechnical SKA, it will be important to understand faculty members' current perspectives regarding this problem.

Statement of the Problem

The viability of the veterinary profession relies on veterinary graduates with the technical and nontechnical skills to meet the unique economic and other challenges facing the profession. However, veterinary faculty educators have been minimally involved in the discussion of nontechnical competencies in veterinary students to date, and their perceptions on the place for addressing these competencies in the curriculum are largely unknown. The roles and responsibilities of faculty in this transformation of veterinary education cannot be addressed until faculty perspectives and needs are identified and understood. In order to begin a process of curricular change and create an effective program emphasizing nontechnical competencies, it will be important to understand faculty members' current perspectives regarding this problem.

Purpose

The purpose of this study was to explore the current perceptions of faculty educators at selected North American veterinary colleges regarding the importance of,

and their role in the development of, identified nontechnical competencies in veterinary graduates.

Research Questions

1. Which nontechnical competencies do veterinary faculty perceive are important for graduating veterinarians to master?
2. Do veterinary faculty members perceive that nontechnical competencies should be taught in the veterinary curriculum, or acquired elsewhere?
3. Do veterinary faculty members perceive a personal responsibility to teach or cultivate nontechnical competences in their educational roles?
4. To what extent do veterinary faculty members feel prepared to teach or cultivate nontechnical competencies?
5. To what extent do veterinary faculty members feel prepared to evaluate nontechnical competencies?
6. What factors influence veterinary faculty members perceptions regarding nontechnical competencies in veterinary medical education?

Summary of Method and Procedures

In this study, a survey design was chosen in order to elicit broad quantitative information from a large population of faculty members. Surveys are most valuable as research instruments when trends in attitudes, opinions, beliefs, practices or needs are of interest to the researcher. This survey was constructed to elicit faculty perspectives on the importance and cultivation of 14 core nontechnical competencies, modified from the work of Lewis and Klausner (2003) and the 2006 Foresight Report (Willis et al, 2007),

and was administered to veterinary faculty at five veterinary colleges. Survey input included participant information including age, gender, terminal degree, primary effort allocation, rank, discipline, years post graduation and years of teaching experience. For each competency, faculty members indicated their level of agreement regarding the importance of the competency for veterinary graduates, then responded to several additional questions for each competency rated as important: where the competency should be taught or cultivated in the course of professional training, whether the respondent teaches this competency in his/her educational roles, and if they feel prepared to teach or evaluate each competency. Analysis of survey results included review of descriptive statistics (means and frequency results) for each question by institution and by categorical variables. Multiple statistical analyses were also employed to detect associations between survey responses and characteristics of the faculty respondents.

Significance

The economic and theoretical advancement of the veterinary profession depends on the ability of veterinary colleges to meet growing and changing demands for highly competent, compassionate veterinarians. Additionally, the high cost of veterinary education to students, states and institutions compels colleges to provide a rigorous, contemporary educational program of value to their graduates. Successful preparation of veterinary graduates, who enter many diverse fields of public and private practice, requires attention to development of nontechnical competencies as well as traditional medical and surgical knowledge. Veterinary college faculty members, while comfortable teaching medical and surgical skills, may not feel able or willing to teach nontechnical

competencies or to provide room in the veterinary curriculum for additional training. An understanding of current faculty attitudes toward nontechnical competencies in veterinary education is essential when devoting extensive time, money and energy developing curricular plans that rely on the faculty for implementation.

This study solicited faculty voices and allowed them to be heard in the policy debate regarding veterinary curricula. The positions of veterinary faculty members, who are entrusted with the majority of preparation of veterinary graduates, are largely unreported and unknown to date, and provide an important starting point for researchers, administrators, policy makers, and faculty leaders involved in curricular and faculty development. Faculty investment in the curriculum and the educational culture is key to developing sustained educational change to better meet the needs of the profession. Uncovering the level of faculty support for the development of nontechnical competencies, and exploring some key factors impacting their perspectives, adds an important missing voice to the knowledge base in this area. An awareness of the faculty perspective will help veterinary educational leaders focus curricular development processes, engage faculty members in the process, and tailor faculty development or recruitment in order to improve delivery of key curricular goals.

Delimitations

This study was delimited to faculty members who are involved in the veterinary professional curriculum (faculty involved in the education of students seeking a professional veterinary degree) at five selected North American veterinary colleges. The outcomes of interest were also delimited to include perceptions of those competencies

clarified as essential to success in one published program of study (Lewis & Klausner, 2003; Lloyd, King, Klausner, & Harris, 2003) and in one prominent report (Willis et al., 2007). Independent variables were limited to those easily reported in survey form and considered most likely to impact perspective.

Limitations

Anticipated limitations of the study were primarily related to the sample selected. Although veterinary colleges were selected to offer a glimpse at a variety of institutions, using a subset of all veterinary schools decreases the generalizability of results. However, contacting a census target population of faculty members at a few veterinary colleges was chosen in order to increase the diversity of the types of faculty members included, to maximize response rate, and to increase manageability of the study. The lack of random sample of faculty may have increased response bias.

Additionally, the list of nontechnical competencies and variables studied were by no means inclusive of either the range of skills important to veterinary education or the range of potential factors influencing faculty perspectives. Key perspectives or concepts may have been missed by the narrow nature of the study.

Other limitations were discovered as survey data were analyzed. By asking respondents further questions about competencies based on their level of agreement and placing responses for competencies, the study missed fully capturing the voices of the faculty who participated, particularly those with less supportive views of nontechnical competencies.

Definitions of Terms

Nontechnical competency: In this study, nontechnical competencies are defined as broad skills, knowledge, attitudes and aptitudes that extend beyond scientific or clinical medical skills. The specific competencies (Appendix A) are based on Lewis and Klausner's (2003) development of skills unique to successful veterinarians and on skills identified as important to future veterinarians by the 2006 Veterinary Foresight Project (Willis et al., 2007).

Professional veterinary curriculum: The professional veterinary curriculum extending from admission to veterinary college and leading to the Doctor of Veterinary Medicine or Veterinary Medical Doctor (DVM/VMD) degree, excluding pre-veterinary and post-graduate experiences.

Veterinary faculty: Faculty members employed by a veterinary college and involved in the training and curriculum leading to the DVM/VMD degree.

Veterinary graduate: A graduate of a DVM/VMD program practicing in any of a variety of veterinary medical careers.

Organization of the Study

In Chapter 2, the evolution of nontechnical and noncognitive competencies is described from origins found in the psychological study of intelligence. This description is followed by a thematic synthesis of the most common noncognitive skills discussed in a variety of models and disciplines within psychological, educational and applied literature. Uses of noncognitive measures in general educational settings, including as admissions criteria and as predictors of academic success, is followed by a review of

similar applications in health professions education and training. Details of the study design, procedures, and methods used for data analysis are provided in Chapter 3. Results of the study are presented in Chapter 4, with survey data organized by research question and by independent variable. A discussion of the major findings, recommendations for the field, and lingering questions for further investigation is presented in Chapter 5.

CHAPTER 2

LITERATURE REVIEW

Organization of the Chapter

Nontechnical competencies identified as essential to veterinarians' professional success include ethical behavior, interpersonal, self-management, leadership, business, and thinking competencies (Appendix A, Lewis & Klausner, 2003). The literature regarding such diverse topics, and the literature regarding "professional success" is extensive and wide-ranging, crossing educational, psychological, business, medical and vocational fields of study. This review is designed to take the reader from its origins in the psychology of human capacity to current perspectives, initiatives and needs in veterinary medical practice.

After an introduction to the tensions inherent in educating veterinarians for both biomedical competency and "cageside manner," the chapter presents a brief overview of the major lines of inquiry into intelligence theory and how theories of multiple intelligences built the foundation for conceptualizing professional and life skills. The discussion then moves from broad concepts of intelligence to more specific workplace skill sets, with an emphasis on professional medical education. This section introduces the research on noncognitive variables in various disciplines, the growing emphasis on competency based education, and the SKA movement in veterinary education.

The next section presents the evidence that nontechnical, noncognitive or humanistic skills influence achievement in academic settings, medical education and clinical performance, as well as the challenges faced when educational priorities must be

made. Finally the argument is built for integrating nontechnical competency development in veterinary medical education in order to craft, foster and nurture these professional skills in the educational process.

Introduction: Art versus Science?

Professional education is challenged with blending basic scientific concepts with applied principles, theoretical knowledge with clinical practice, and technical proficiency with intuition (McGuire, 1993). Educators of professionals have an obligation to produce graduates skilled in the foundations, art and craft of practice. For health professions, this constellation includes a cognitive knowledge base, clinical skills and humanistic qualities that enable successful delivery of health care. Phelan, Obenshain and Galey's (1993) summary of this responsibility could be applied to the education of any health professional; they commented, "when a medical school graduates a student it implies that the individual has the cognitive knowledge, the clinical skills and the noncognitive qualities necessary to function as a competent physician" (p. 799).

The optimal balance between the science and the art of health care delivery has been a source of ongoing tension in health professions education (Harris, 1993; Patel, 1999). Educators are generally more comfortable imparting and assessing the technical realm of practice than the nuances of expert practice. An experiential basis is acknowledged for the development of expertise; as Harris argues, "practical knowledge, know-how, artistry, insight, judgment, and connoisseurship are expressed only in practice and learned only through experience with the practice" (p. 22). Indeed, the art of medicine draws heavily on "tacit" or "implicit" knowledge, that which is grounded in

experience and doing and is difficult to verbalize (Polanyi, 1967). Patel et al.

summarizes the mysterious process of developing tacit knowledge:

Tacit knowledge, by definition, refers to the inarticulate aspects that cannot be taught explicitly and therefore are only acquired via direct experience. This raises the question of what is the nature of the experience that promotes the acquisition of tacit knowledge. (p. 76)

Acknowledging the artistic side of medical practice also has implications for quality of health care. Good doctor-patient interactions, including effective medical interviews, interpersonal interactions, communication ability and attitudes, have been linked to positive health care outcomes. Improvements in diagnosis, informed consent protocols, patient satisfaction, and treatment outcomes can be traced to positive interactions. Conversely, negative doctor-patient interactions have been strongly linked to complaints and litigation. For veterinarians, client satisfaction correlates highly with how the pet owner is treated, rather than with how the pet is treated (Case, 1988).

What can be Taught?

The emphasis on practice has made it difficult to determine “what can be taught” versus what qualities are inherent in personality traits or simply have to be developed by long term practice. A reliance on practice, however, can lead to perpetuation of mistakes or poor habits throughout a student’s education or career. Even in experiential settings such as clinical training, different learning capacities must be drawn upon to learn people skills versus scientific concepts. Kolb postulated that the structure of knowledge in any given discipline directs the learning process, and when the learner’s style preferences (the

person) match the situation (the environment), the individual is more likely to be successful. He pointed to the opposing sets of learning styles needed to learn the medical professions, leading to inherent tension in learners. Most biomedical students are adept as concrete learners, but have to utilize other styles to best acquire the people skills required in the profession (Kolb & Wolfe, 1981).

Schon (1983) conceptualized the various skill sets required by professionals as practical and specialized bodies of knowledge as well as reflective capacity. The professional schools, he charges, have focused too much on a rigorous approach to problems, while ignoring the real world needs of the practice arena. Describing the nuances of professional work, he points out that “these indeterminate zones of practice – uncertainty, uniqueness, and value conflict – escape the canons of technical rationality” (p. 6). In this “rigor versus relevance” dilemma, Schon asserts “what aspiring practitioners need most to learn, professional schools seem least able to teach” (p. 8).

The nuances of real world practice require a different skill set from that utilized in intellectual scientific pursuit. Goleman (2005) echoes Schon as he refers to the impact of intelligence in challenging professions, pointing out that the traditional view of intelligence, measured by IQ scores, is key to dealing with the many “cognitive challenges” faced in a discipline, but “IQ washes out when it comes to predicting who, among a talented pool of candidates within an intellectually demanding profession, will become the strongest leader” (p. xiv). In *A Whole New Mind*, Daniel Pink (2006) delivers a delightful and powerful argument for a different kind of “mindfulness” to lead us into the future. Tongue in cheek, he describes the historical view of right-brain thinking:

This [skeptical] view grudgingly acknowledges the right hemisphere's legitimacy, but believes that emphasizing so-called right-brain thinking risks sabotaging the economic and social progress we've made by applying the force of logic to our lives....What distinguishes us from other animals is our ability to reason analytically. We are humans, hear us calculate. That's what makes us unique. Anything else isn't just different; it's *less*. And paying too much attention to those artsy-fartsy, touchy-feely elements will eventually dumb us down and screw us up. (pp. 16-17)

Separating the crucial content-driven capabilities from the artistry of truly effective ability is an issue that transcends discipline. This conceptual dilemma can be traced to debate over the nature of intelligence.

Concepts of Intelligence

Multiple Intelligences

Classical views of intelligence include the familiar mental abilities measured by standardized IQ tests – namely, the speed, efficiency and scope of physiologic neural processes. Although others began to argue for the existence of separate types or groups of intellectual abilities by the mid-twentieth century, systems theory approaches to intelligence are relatively new (Sternberg, 2004). Howard Gardner (1983) made the argument for “the existence of several *relatively autonomous* human intellectual competences” (p. 8) in the groundbreaking *Frames of Mind: The Theory of Multiple Intelligences*. Gardner notes of the important interactive development of intelligences in a lifetime or in the educational process:

In its strong form, multiple intelligence theory posits a small set of human intellectual potentials, perhaps as few as seven in number, of which all individuals are capable by virtue of their membership in the human species. Owing to heredity, early training, or, in all probability, a constant interaction between these factors, some individuals will develop certain intelligences far more than others; but every normal individual should develop each intelligence to some extent, given but a modest opportunity to do so. (p. 278)

Specifically, seven distinct intelligences are posited: linguistic, logical-mathematical, musical, spatial, bodily-kinesthetic, interpersonal and intrapersonal (Howard Gardner, 1983). In this model, *interpersonal intelligence* is perhaps most relevant to skills required in the professional workplace, including behaviors such as organizing groups, mediating and negotiating solutions, establishing personal connections, and applying social analysis (or empathy for others).

Gardner (2006) recently has proposed another way of looking at the application of intelligences in broad, integrated “minds” that can be cultivated throughout life and work. Included are the *disciplinary*, the *synthesizing*, the *creating*, the *respectful*, and the *ethical* minds. While the disciplinary mind might be considered more cognitive in nature, the concept encapsulated modes of critical thinking that are highly prized in medical education. Adding the other mind “sets” builds the more complete professional and as Gardner posits, the one capable of working in the future workplace and responding to future challenges.

Emotional Intelligence

By expanding the definition of intelligence, Gardner opened the door to new interpretations of what it means to be “bright.” Building on Gardner’s personal intelligences, the conceptualization of *emotional intelligence (EI)* has had the most dramatic and lasting impact on education and workplace development. Although pieces of this model appeared in the literature earlier, such as emotional resilience and a model of psychological well-being (Bar-On, 1988; Felsman & Vaillant, 1987), Salovey and Mayer (Salovey & Mayer, 1990) clarified the model and solidified the terminology in a 1990 publication titled simply, “Emotional intelligence.” Their definition of EI included the major domains of self-awareness (knowing one’s emotions), managing emotions (including anger, stress and depression), using emotions productively (to motivate oneself), having empathy for others (understanding others’ emotions) and handling relations appropriately (including interpersonal communication, social abilities, etc).

Daniel Goleman’s 1995 book *Emotional Intelligence: Why It Can Matter More than IQ* expanded on the potential impact of emotional intelligence (EI) in a variety of settings and life challenges and reached a wide audience (Goleman, 1995). Goleman adopts Mayer and Salovey’s model in behavioral terms, outlining EI as the ability “to motivate oneself and persist in the face of frustrations; to control impulse and delay gratification; to regulate one’s moods...; to empathize and to hope (p. 34).” At both ends of life’s spectrum, Goleman’s message has been applied from early childhood schooling to the workplace and the highest levels of leadership. Bar-On describes multiple, successful efforts to enhance EI in working adults. In at least two programs,

individuals with the lowest initial emotional intelligent quotient measures improved the most following interventions or personal coaching (Bar-On, 2007), suggesting that targeted training for deficient students or veterinarians might be of greatest value (and greatest need!).

In another study of EI in the medical workplace, nurses' assessment of doctors' EI was more predictive of the patient's perception of trust and a quality patient-doctor relationship than was the doctor's self assessment, suggesting the importance of peer or 360 degree assessment of nontechnical competencies. EI measures also increased with age and experience, characteristic of a developmental ability that one can attend to throughout a career or lifetime (Weng, Chen, Chen, Lu, & Hung, 2008).

Many consider EI as the piece that separates the truly successful from the simply bright individuals who lack these emotive skills; indeed Goleman has described EI as the "discriminating competency" (p. xv). Most importantly, he firmly believes EI can be learned, particularly by children "if we bother to teach them" (p. 34).

Practical Intelligence

Again, linking intelligence to successful navigation in life, Robert Sternberg advanced another systems theory approach to intelligence, *successful intelligence*. In defining what may be considered "common sense" or political savvy by some, Sternberg (2004) once summarized successful intelligence as "the ability to adapt to, shape, and select environments so as to accomplish one's goals and those of one's society and culture" (p. 428). His model is organized by a set of three universal *components*: knowledge-acquisition components, performance components, and metacomponent

processes that facilitate planning and monitoring. The intelligence model also encompasses a triarchy of *abilities*: analytical, creative and practical. It is the implementation of these components and balanced interplay of these abilities that contribute to success. At the heart of Sternberg's work is the distinction of this practical intelligence from traditional intelligence. Because of this distinction, Sternberg believes that the successfully intelligent individual develops best (in education or in the workplace) by capitalizing on innate strengths and compensating in some fashion for innate weaknesses (Sternberg, 1996). One can easily view Sternberg's concept as an applied intelligence, leading to successful accomplishment of tasks, decisions and problem-solving. Indeed, *practical intelligence* becomes a preferred term in later work. While employing a task-oriented rather than emotional or relational emphasis, Sternberg's description of the successfully intelligent individual includes shared behaviors such as self-motivation, impulse-control, and perseverance.

Concepts of Professional Skill Development

Competencies and Noncognitive Variables

Transferring intelligence to action, a variety of terms appear in literature to describe the specific skills desirable for professional mastery. Originating from a general understanding of the meaning of competence, the term *competency* has been widely applied to both technical and nontechnical abilities. The emphasis on competency development in education can be traced to vocational education and community colleges (Voorhees, 2001) where a strong emphasis is placed on workforce preparation. Goleman

(2005) mentions the difference between *intelligence* and *competence* in the introduction to the tenth anniversary edition of *Emotional Intelligence*:

While our emotional *intelligence* determines our potential for learning the fundamentals of self-mastery and the like, our emotional *competence* shows how much of that potential we have mastered in ways that translate into on-the-job capabilities... But emotional competencies are learned abilities: having social awareness of skill at managing relationships does not guarantee that one has mastered the additional learning required to handle a customer adeptly or to resolve a conflict. One simply has the potential to *become* skilled at these competencies. (p. xv)

Competence in a field can be surprisingly difficult to verbalize, however. As one author (Grant, 1979) put it, “Competence is something all Americans admire, even if, when pressed, they are not quite sure what it means or whether they or society possesses it in adequate amounts” (p. 2). Indeed, competence may be defined by exclusion of all non-competent behaviors or outcomes, leaving a “non-incompetent” definition (Grant). In responding to how criteria for behavioral expectations of medical students were set at one school, one respondent wrote, “...any act that would be grounds for malpractice is regarded as unacceptable!” (Miller, Frank, Franks, & Getto, 1989) (p.43). Because of their subjective nature, noncognitive competencies can be even more challenging to define, leading to less frequent use (Miller *et al.*).

Others have structured the development of competencies more clearly. The Department of Education has defined *competency* as “a combination of skills, abilities

and knowledge needed to perform a specific task.” Similarly, Miller’s pyramid of competency depicts a base of *knows* followed by *knows how*, *shows* and *does* (Miller, 1990). A statement from a German report captures the final nuance of true competence: “Competence can generally be understood as knowledge times experience times power of judgment” (BMBF report cited in Weinert, 2001, p. 45). These definitions illustrate the distinction between general intellectual or underlying abilities and the specialized clusters of these abilities needed for more complex tasks (Weinert). A second distinction can be drawn between the cognitive or skill-oriented competencies and the less content-driven, nontechnical abilities needed to succeed. Sembill (1992) considered performance based, measurable competencies as *objective*, leaving other relevant abilities and skills as *subjective*. Voorhees’ (2001) conceptualization of competence places individual traits and characteristics at the foundation of competency development, leading next to learned skills, abilities and knowledge that form specific competencies which can then be demonstrated.

The term *noncognitive* also has been used to refer to variables or competencies other than the traditional verbal and quantitative aptitudes considered in academia or standardized testing. *Noncognitive variables* or assessments include those related to adjustment, motivational and perceptual variables in individuals (Sedlacek, 2004), whereas noncognitive competencies in professional education refer to those that are outside the technical medical, surgical and scientific competencies required for practice. For veterinarians, Lewis (2002) describes competencies as “descriptions of behaviors systematically associated with achieving results on the job” and distinguishes such

competences from abstract psychological or personality traits. He does, however, suggest that personality features, values or motivations of individuals that may drive desired behavioral competencies can be useful in selecting students for veterinary school. These conceptualizations become problematic, then, by identifying some qualities of competency as inherently vague, as opposed to teachable and measureable.

Skills, Knowledge, Aptitudes and Attitudes (SKA)

Notably, these definitions of competency also fail to specifically mention *attitudes*, a key attribute for successful professionals, or for any individual. The notion of a competent professional working from the basis of core principles is well stated by Stark and Lowther (Stark & Lowther, 1988): “Competent professionals are frequently characterized by their abilities to link technical knowledge with appropriate values and attitudes when making complex judgments within ambiguous contexts” (p.5). These authors see four types of competency for professionals: *conceptual* competence and *technical* competence, encompassing the theoretical foundation of knowledge and skill required for performance, boosted by *integrative* competence (the ability to meld theory and practice) and finally, the skills and knowledge needed by the individual to ensure career marketability (Stark and Lowther). Although applied primarily to pre-professional education, Weinert’s (2001) comprehensive definition of *action competence*, including all the cognitive, motivational and social skills needed for successful action, probably best reflects the skill sets required of truly competent professionals, including physicians and veterinarians. Here, competence was defined as “the ability to meet complex demands successfully or to carry out an activity or task,” with an internal structure of

abilities that may be called upon for effective action: *knowledge, cognitive skills, practical skills, attitudes, emotions, values and ethics, and motivation*. In similar language describing competence as the interplay of knowledge, skills and underlying context, Evers, Rush and Berdrow (Evers, Rush, & Berdrow, 1998) include *values* rather than *attitudes* but note the similarity of the two terms. In their view of competence, values situate actions in context, creating “the context for the use of skills and the application of knowledge” (Evers et al., p. 26). Further, Epstein and Hundert (Epstein & Hundert, 2002) include the value-laden expectation of *beneficence* in their definition of medical competence: “The habitual and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values and reflection in daily practice for the benefit of the individual and the community served” (p. 226).

In veterinary medical literature, comprehensive criteria for success have been framed as “skills, knowledge, attitudes and aptitudes (SKA)” or “nontechnical competencies” (Lewis & Klausner, 2003; Lloyd & King, 2004; Lloyd, King, Klausner, & Harris, 2003). Using extensive focus groups and interviews with successful veterinarians from various disciplines and fields of veterinary medicine, investigators derived a summary set of nontechnical competencies, including interpersonal, self-management, leadership, business, and thinking skills. Collins (1997) provides a parallel viewpoint, by outlining the roles a veterinary graduate must be prepared to fulfill: practitioner, colleague, member of the profession, employee, employer, trainer of staff, vendor of products, educator, taxpayer, citizen in the community, and member of a family.

Common Threads in Nontechnical Competencies

In search of “key” competencies for a given educational or workplace purpose, Weinert (2001) offers the following criterion for inclusion: “context-independent key competencies that are equivalent in their use and effectiveness across different institutions, different tasks, and under varying demand conditions” (p 52). He acknowledges the challenge of determining “key” (or *core*) units at the appropriate level of concreteness and specificity. However, common threads can be seen across models, disciplines and investigators when core nontechnical capabilities are summarized (see Table 2.1). Similar skills are desired from early education to the workplace and professions. The theoretical framework for these similarities can be traced to the influential reframing of intelligence over the latter part of the last century. Most systems theory views of intelligence accommodate a knowledge or cognitive component, an experiential or performance component, and a reflective or metacognitive component, all contributing to ability (Sternberg, 2004). In the noncognitive realm, performance components are usually framed in interpersonal skills, such as organizing, managing, leading, empathizing and communicating with others, and the metacognitive or intrapersonal component appears in various expressions of self-awareness, self-management and self-motivation.

Table 2.1

Intelligences, Variables or Competencies Conceptualized for Professional or Personal Success

Reference/Theorist	Concept or Program	Competencies	Framework or comments
Intelligences			
Gardner (1983)	Interpersonal Intelligence Intrapersonal Intelligence	Knowledge of others Knowledge of self	Multiple intelligences
Sternberg (1996)	Successful Intelligence	Planning and monitoring processes Knowledge-acquisition Analytical thinking Creative thinking Practical thinking	
Salovey and Mayer (1990); Goleman (1995)	Emotional Intelligence	Knowing one's emotions Managing one's emotions Motivating self Recognizing others' emotions (empathy) Handling relationships	Health Success in Work K-12 Educational emphasis
Competencies or Variables			
(Goldberg, 1990, 1992), based on work of (Tupes & Christal, 1961)	The "Big Five" Factors	Extraversion (Surgency) Sociability Agreeableness (Cooperation) Conscientiousness (Motivation, Organization, following rules) Emotional Stability (Adaptability) Intellect/Imagination (Knowledge, planning, analytical skills, communication skills)	Taxonomic model of major psychological traits or descriptors

Table 2.1 *Continued*

Reference/Theorist	Concept or Program	Competencies	Framework or comments
(S. E. Brown & Marengo, 1980); Sedlacek (2004)	Noncognitive Variables	Positive self concept Realistic self appraisal Successfully handling “The System” Preference for long term goals Availability of strong support person Leadership experience Community involvement Knowledge acquired in field	Focused on admissions and development of underrepresented minorities in higher education
(Carnevale, Gainer, & Meltzer, 1990)	Workplace Basics: Skill Groups Desired by Employers	1) Organizational Effectiveness Influence Leadership Adaptability 2) Interpersonal skills Negotiating skills Teamwork 3) Personal Management Motivation, self-esteem, goal setting, careerdevelopment 4) Communication skills 5) Creative Thinking and Problem Solving 6) Reading, Writing, Computational competence 7) Learning Ability	Focused on developing training methods for basic skill sets

Table 2.1 *Continued*

Reference/Theorist	Concept or Program	Competencies	Framework or comments
Evers, Rush & Berdrow (1998)	Competence as Skills for Lifelong Learning and Employability	1) Managing Self Habits, ability to change 2) Communicating Interaction, Information gathering and conveyance 3) Managing People and Tasks Planning, organizing, resource management 4) Mobilizing Innovation and Change	Advocates competency-based education based to match college graduate preparation with employer needs
(Rychen & Tiana, 2004)	Defining and Selecting Key Competencies for Education Project (Organization for Economic Cooperation and Development)	Act autonomously Self assertion/ responsibility Planning Ability to act within “big picture” context Use tools interactively Language, symbols, text Information Technology Function in socially heterogeneous groups Relate to others Cooperation Manage/resolve conflict	Competencies as complex tasks
Lewis and Klausner (2003)	Nontechnical Competencies Essential for Veterinary Career Success	Interpersonal skills Self-management skills Leadership skills Business acumen and skills Thinking Skills	Competence as skills, knowledge, attitudes and aptitudes

The Evidence for Noncognitive Dimensions of Professional Education

Personality and Psychological Testing in Professional Education

Attention to nontechnical competencies in professional education has grown over the last decade. However, the consideration of “nonintellectual” measures to aid selection of college and professional students can be traced back at least 70 years (Tyler, 1931). Investigation of these noncognitive factors initially relied on assessments of personality and psychological tests and centered around indicators of motivation; personality; home, family and school background; and work study habits (Anastasi, Maende, & Schneiders, 1960; Borow, 1945; H. G. Gough, 1953; McQuary, 1953; Rust & Ryan, 1953; Ward, 1958; Weitz & Wilkinson, 1957). Results on such tests as the well-known Rohrschach test (Eron, 1954), Minnesota Multiphasic Personality Inventory (MMPI) (Glaser, 1951; Knehr, 1959; McDonald & Gynther, 1963; Roessler, Lester, Butler, Rankin, & Collins, 1978; Schofield, 1953), and California Psychological Inventory (CPI) (Gough & Hall, 1964; Roessler, Lester, Butler, Rankin, & Collins, 1978) all have been applied in efforts to predict academic achievement in medical education. Gough and Hall (1964) summarized the problems of predicting medical school performance perceived at the time, suggesting that tests, previous achievement and interview ratings, as well as assessments of the “so-called nonintellective domain” (p. 225) had not yielded great results. His application of selective CPI domains in a predictive equation, however, hinted at the promise of such evaluations, leading Gough to characterize the ideal medical student as one who “appears to embody a high degree of personal maturity, concern for

others, and self-confidence, and to be free of any sort of narcissistic achievement drive or compulsive striving” (p. 225).

In veterinary medicine, others have utilized instruments designed to assess vocational interest and fit. Render and Jackson (1975) reported the value of adding personality data to traditional academic predictors of success in veterinary school admissions. Although the sample size was small, the addition of measures of locus of control and self concept scales to specific undergraduate course grades, undergraduate GPA, high school rank and aptitude test scores led to a model highly predictive of first year veterinary school GPA. Another college used an Adjective Checklist to compare its admissions committee’s views of the ideal veterinarian with those of a sample of the local public (Birchard, Frankum, Selby, & Irvin, 1976). The faculty responses were significantly more demanding than the general public in terms of ideal personality traits, including achievement and leadership orientation, high self awareness, and a strong heterosexual orientation. The public respondents described the ideal veterinarian in more personable terms, such as capable, cooperative, dependable, friendly, honest and practical (Birchard et al.).

Predictive Uses of Noncognitive Variables

More recently, inventories of noncognitive variables that suggest applied personality traits and skills have been investigated for their predictive value in higher education. In the late 1990s, concerns about the validity of standardized tests (typically cognitive based aptitude or intelligence tests) drove a shift in attention toward noncognitive and performance based assessments. The Scholastic Aptitude Test (SAT),

the most widely used and criticized test (Lemann, 1999; Sacks, 1999; Sedlacek, 2004), was initially developed to help “level the playing field” in distinguishing between college applicants with varied high school backgrounds. Because of its emphasis on verbal and quantitative cognitive knowledge and skills, the test has been criticized as simply an intelligence test, with limited predictive value, particularly for some groups.

The Personal Qualities Project attempted to shed light on the validity of measures such as the SAT when compared to personal qualities of college students that may affect academic success (Willingham, 1985). Of relevance to professional education, Willingham found that clear goals and career plans were more influential factors in college students’ success in pre-professional (medicine, law) and art students than for most students. In another effort to offset the weaknesses of standardized tests, Sedlacek’s (2004) noncognitive variable questionnaire (NCV-Q), consisting of multiple items reflecting the continuum of behaviors and attitudes in eight domains, has been applied in the admissions process for a variety of college, university and other educational ventures. Sedlacek describes his use of the terminology: “*Noncognitive* is used here to refer to variables relating to adjustment, motivation, and student perceptions, rather than relying solely on the traditional verbal and quantitative (often called cognitive) areas typically measured by standardized tests” (p. 7). Despite early enthusiasm, results have been mixed. In an allied health (physical therapy) program, four non-cognitive domains (those reflecting long range goals, leadership, community ties and academic familiarity) correlated with national licensing examination scores, although the total NCV-Q score was not predictive of outcomes (Guffey, Farris, Aldridge, & Thomas, 2002). Two

domains (understanding racism and realistic self-appraisal) correlated with GPA of nursing students sampled from four different programs (Kornguth, Frisch, Shovein, & Williams, 1994). Although results of NCV-Q factors were reasonably predictive (>70% accuracy) of the risk of academic probation in first year medical students at one school, the NCV-Q scores were slightly less accurate than a risk equation based on GPA and MCAT results (Mavis & Doig, 1998). The additive value of NCV-Q results to the mathematical equation also were slight. The authors questioned the value and sensitivity of Sedlacek's questionnaire for medical students but supported the investigation of additional noncognitive domains and instruments in this academic group (Mavis & Doig).

When various noncognitive assessments are considered, levels of social support and indicators of self-efficacy tend to rise in importance for successful outcomes (Cariaga-Lo, Enarson, Crandall, Zaccaro, & Richards, 1997; Latif, 2005; Mavis & Doig, 1998; Opacic, 2003). For example, factorial and total indices of self-assessed problem solving ability correlated with academic data (ACT and entering GPA) for a small sample of dental hygiene students; the personal control ("the extent to which individuals believe they are in control of their emotions and behavior while solving problems") factor in problem solving was significantly correlated with educational motivation (study habits, seeking help from resources) and outcomes (overall GPA and national board examination scores) in this group (DeAngelis, 2003). Locus of control measures were of minimal value in the prediction of first year grades in another medical school setting (Markert, 1983).

Noncognitive aspects of student development were assessed longitudinally during the first 3 years of medical school in one study, using selected variables assessed by the CPI. Variables reflecting self-realization and achievement through independent means were associated with a decreased risk of attrition or academic difficulty, whereas norm-favoring tendencies were associated with an increased risk (Cariaga-Lo et al., 1997). Indicators of degree of social support, depression and significant life events were found to explain much of the variance in student progress observed in one medical school. Few social supports, moderate depressive symptoms and increased life events correlated with weak academic record and poor overall progress ratings in third year medical students (Blumberg & Flaherty, 1985). Social support measures also entered into predictive models for freshman drop outs in a nursing program (Alichnie, 1981).

In veterinary education, the correlation of personality traits with performance on comprehensive final year exams was examined for students at the University of Pretoria, South Africa (van der Walt & Pickworth, 2007). During the admissions process, students completed a personality factor questionnaire based on the Five Factor Model personality constructs. Personality traits including emotional stability, conscientiousness, self-discipline, and social adaptability were positively correlated with academic scores. This study also provided an opportunity to discover personality traits associated with poor academic performance; these included anxiousness, self-sufficiency (as opposed to group orientation) and surprisingly, imaginativeness and openness. The authors recognized that a tendency to open and imaginative thinking, generally a positive intellectual trait, may

be counterproductive in some scientific courses where highly structured material is presented.

Predicting Clinical Success

One might expect noncognitive variables to have a more significant impact in applied settings, such as clinical education, than in academic measures such as GPA or examination scores. Hojat et al. (1993) found that traditional admissions measures (MCAT) did not significantly predict the clinical ratings of 175 medical students, whereas selected psychosocial measures were predictive of both grades and clinical ratings. Specifically, the authors commented that sociability, fewer stressful life events, and less anxiety, less loneliness, and less externality in locus of control contributed the most to the predictive value (Hojat et al.). Physician assistant students in ten different programs were asked to rank their skills for multiple interpersonal and clinical skills at the time of entering their first clinical clerkship. Self assessments were significantly correlated with subsequent performance assessments in physician assistant students, while grade point average was not (Opacic, 2003).

Attention to noncognitive variables has extended to residency selection and training in medicine. Medical student admission variables, including college GPA and a non-cognitive score, correlated positively with ranking of candidates for residency in internal medicine at another institution (Peskun, Detsky, & Shandling, 2007). A variety of cognitive and noncognitive measures collected at admissions and throughout medical training were examined for correlation with residency performance evaluations in 56 graduates of one medical school (Keck, Arnold, Willoughby, & Calkins, 1979). The final

regression model which optimally predicted post-graduate performance included several noncognitive measures (realistic, artistic and social self directions, and theoretical personality orientation) as well as self evaluations completed during clerkships in the final year of medical school. Single variables also possessing predictive value included selected performance evaluations during the clinical years of medical school completed by instructors and peers (Keck et al.).

Nontechnical skills have been recognized as important needs for anesthesia residents and play a role in selection and training (Fletcher, McGeorge, & R.H., 2002; Matvevskii & Gravenstein, 2008; Reader, Flin, & Lauche, 2006). A surgical department utilized indices of emotional intelligence to track strengths and weaknesses of surgical residents and to tailor educational programs to meet group and individual needs (Jensen et al., 2008). Similar programs or assessments may be in place at some veterinary colleges but have not been reported.

Implications for Veterinary Medical Education

Where Should Nontechnical Skills be Taught?

Despite many studies of the importance of NCV in academic success or professional performance/predictive aspects of NCV, little information regarding the “teaching” of noncognitive skills during professional education is evident. In veterinary medicine, for example, thorough and forward-focused study has identified the core interpersonal, self-management, thinking, leadership and business skills essential to success. However, the heavy lifting of learning when and how to cultivate these qualities and skills in veterinary students remains a challenge for most programs. As in other

fields, nontechnical skills can be developed or selected for prior to veterinary admission, or in specialized experiences found in post-DVM training (Chatterdon et al., 2001).

However, the continuum of professional development that occurs during all phases of education must not be ignored. The need for more attention to personal and professional development programs has been recognized for some time, and was noted in the top five issues related to veterinary medical students by selected North American veterinary educators (Turnwald, 1991). Collins (1997) also noted the dearth of attention paid to personal and professional development of veterinary students in Australian curricula.

Challenges in Professional Education

However, development of nontechnical competencies in medical professional students is usually considered long after, and often in direct competition with, the acquisition of scientific knowledge and training in of applied technical skills. In tracking the trend of increased attention toward education of caring, compassionate physicians in the 1990s, Ludmerer (1999) notes the skepticism that such skills could be taught as well as the perceived competition for curricular time: “some educators began to worry that the growing emphasis on the art of medicine, together with early and more extensive clinical instruction, was coming at the sacrifice of providing a sufficient understanding of medical science” (p. 305). Ludmerer goes on to describe the position of the passionate advocates for scientific fundamentals, to whom a de-emphasis of basic science training “smacked of anti-intellectualism and vocationalism” (p 306). The supremacy of scientific knowledge in the hierarchy of medical education places basic science above applied science above the technical skills of practice. Schon (1987) bluntly describes this

phenomenon, writing, “the greater one’s proximity to basic science, as a rule, the higher one’s academic status. General, theoretical, propositional knowledge enjoys a privileged position” (p.9). This emphasis on scientific content affects not only what is taught, but how it is taught. Schon (1987) again cites the entrenched perspective in professional schools:

The schools’ view of professional knowledge is a traditional view of knowledge as privileged information or expertise. They view teaching as transfer of information; learning, as receiving, storing, and digesting information. “Knowing that” tends to take priority over “knowing how”; and know-how, when it does make its appearance, takes the form of science-based technique. (p. 309)

Schon argued that the skills of artistry (and the phenomena of experiential and reflective learning) should be better studied and that the teaching orientation should move toward a coaching mindset.

The challenges inherent in teaching integrated competencies are not unique to health professions. Evers et al. (1998) listed several barriers to implementing competency-based educational strategies in higher education, including the competitive rather than collaborative culture for students which limits team building, the rigid disciplinary structure of academia which limits integration and interaction, the predominance of lectures which limit discussion, the overwhelming volume of knowledge, and the predominantly quantitative nature of student assessment. Grant (1979) points to the unique faculty adjustments required if competency based programs are considered, including a role shift from a performance orientation toward intensive

observational experiences, increased interdisciplinary collaboration within their institution, and increased openness and accountability with peers. Like Schon, Evers et al. acknowledge a barrier to a new learning paradigm as the “mind-set of educators, with their self-perception as elite experts rather than learning coaches” (p. 146).

Students also may resist efforts to develop other skills while immersed in the rigorous scientific work required in the veterinary curriculum, especially in the first year. Views of success and perception of the value of nontechnical skills also may differ among veterinary students at various stages of the program. Heath, Lynch-Blosse and Lanyon (1996) studied two classes of Australian veterinary students during their first and fifth year of study and following their first post-graduate year of employment. Characteristics rated highest for a successful veterinarian included the ability to handle animals, ability to gain respect and confidence of clients, and the ability to analyze situations and problems logically. Over both time periods, there was a significant increase in the perceived importance of interpersonal skills and in the importance of “a capacity for sustained hard work” (p. 298). Unfortunately there was a decrease over time in the perceived importance of other qualities including honesty, integrity and dedication (Heath, Lynch-Blosse, & Lanyon, 1996). Changes over time in students’ perceptions regarding important nontechnical skills for veterinarians were reflected in students’ attitudes toward the curriculum, where 5th year students felt that the emphasis on noncognitive skills such as communication, self-awareness, self-confidence and understanding of people should be increased (Heath, 2002; Heath et al., 1996).

The importance of professional skills as compared to other technical skills, also increased in fourth year students and graduates of a Canadian veterinary college. Responses from students in this study also hinted at the importance of the appropriate learning environment for exploring professional skills and attitudes, including emotional topics (Tinga, Adams, Bonnett, & Ribble, 2001). Some key opportunities may be missed even in clinical education, while students focus primarily on the medical issues at hand. Indeed, one clinical faculty member places the blame at the student level, responding to critics of the educational process by suggesting that students are largely responsible for grasping the socio-economic issues that are intrinsically woven into teaching hospital activities (Harkin, 2002). In another group of veterinary students at one college, perceptions of the successful veterinarian differed between male and female students across the curriculum. Female students ranked nontechnical skills more highly than males, including effective relationships with clients, staff and other veterinarians, oral and written communication skills, lifelong learning and independent thinking (Kogan, McConnell, & Schoenfeld-Tacher, 2004). Additional attention to gender differences in student and veterinarian attitudes will become more important as the percentage of women graduates continues to increase. Indeed, Lewis & Klausner's (2003) "successful veterinarian" population included an overrepresentation of males which may have impacted their conceptualization of the meaning of "success."

Thus, significant changes in approach and paradigm are required to teach and learn a very different set of skills. Administrators, faculty and students must be prepared to engage in a different kind of training in order to effectively accomplish progress in

professional development. However, changes are already underway in veterinary programs. In 23 veterinary colleges contacted in 2003, most responding schools had implemented curricular or co-curricular measures to strengthen students business or communications skills (Lloyd & King, 2004). Plans or practices included changes in admissions practices or prerequisites (n=7), orientation practices (n=7), curricular modifications (n=18), co-curricular activities such as club meetings or workshops (n=14), and other programs including management, marketing, MBA, mentoring programs or research projects (n=11). Curriculum changes included revision of courses or creation of courses to include “team-building, business management, marketing, professional and interpersonal skills, law/ethics, personal finance, communication, entrepreneurship and life skills” (p.1923). Ongoing efforts, including programmatic changes in 29 of 31 veterinary colleges by 2005, and ongoing dialogue within the veterinary academic community, are cited in an update of this information (Lloyd, 2006).

Many colleges are using external experts to provide such opportunities. One report of curricular modifications, including extensive use of a clinical psychologist in wellness, ethics, and professionalism courses as well as teambuilding exercises noted the new emphases required philosophical shifts in faculty role (Kuehn, 2004). In this news report, the department chair is quoted, “The faculty is cautiously optimistic about it. This constitutes a departure from the traditional approach to veterinary education” (p. 1910). Even when faculty are engaged in teaching nontechnical skills, their background, motivation and approach may limit effectiveness. Veterinary faculty members were found to be comparatively less involved than other business and law professionals in an

online focus group discussion designed to elicit information about the education of veterinary students in practice management (Lloyd & Larsen, 2001). The authors attributed the low participation to a difference in priorities, commenting that practice management “represents a relatively small proportion of these faculty members’ professional responsibilities.... As a consequence, these individuals may be comparatively less passionate about it” (p. 18).

Although some curricular modifications may include faculty involvement, little attention has been given to faculty development in understanding or teaching nontechnical skills. The attitudes and preparation/education of faculty members, who have been trained as medical or scientific experts, is also not seen. Sedlacek (2004) specifically comments on faculty involvement in determining either institutional challenges or students’ developmental needs that may benefit from attention to noncognitive variables:

It appears to be particularly difficult to implement faculty programs at many campuses. A thorough needs analysis should include faculty but they often see themselves as detached from organizational or student issues that they feel don’t affect them or their classes directly. (p. 146)

This gap in faculty buy-in may lead to a compartmentalization of nontechnical skill development in professional schools, with training given by select individuals (often from ancillary fields). While the support and value of experts is progressive and of course warranted, integration of the art and science of professional practice is lost if veterinary faculty do not contribute to a more seamless approach. Additionally, when few faculty, or

only adjunct experts, are engaged in development of nontechnical skills, the possibility of mixed messages becomes great. A message that scientific prowess is prioritized could undermine messages promoting the development of other skills, as opposed to a common message promoting a balanced, holistic approach. A lack of faculty involvement might lead to further fragmentation of education, a battle that already include increasing schisms between discipline/research based faculty and practice based clinical faculty or basic science and clinical faculty (Ludmerer, 1999; Schon, 1987) .

The Needs

The voice of faculty members involved in the education of veterinary students has been notably absent from the discussion of nontechnical competencies. As in other components of veterinary education, the perspective of faculty members is crucial in defining and implementing educational goals. The major studies of veterinary education so far, with limited faculty involvement, have focused on perceived needs and deficiencies in skills, rather than in their educational development: the how and where to teach new skills. Indeed, focus group participants in Lewis & Klausner's were not convinced that such training could occur in the veterinary curriculum due to time limitations and existing levels of student debt (Lewis & Klausner, 2003). Faculty perceptions on the on the place of nontechnical skills in the veterinary curriculum, and their own role in their development, are largely unknown. In order to begin a process of curricular change and create an effective program emphasizing nontechnical SKAs, it will be important to understand faculty members' current perspectives and needs regarding this problem.

CHAPTER 3

METHOD

Purpose of the Study

The purpose of this study was to explore the current perceptions of faculty educators at selected North American veterinary colleges regarding the importance of, and their role in the development of, 14 identified nontechnical competencies in veterinary graduates. The research questions included:

1. Which nontechnical competencies do veterinary faculty perceive are important for graduating veterinarians to master?
2. Do veterinary faculty members perceive that nontechnical competencies should be taught in the veterinary curriculum, or acquired elsewhere?
3. Do veterinary faculty members perceive a personal responsibility to teach or cultivate nontechnical competences in their educational roles?
4. To what extent do veterinary faculty members feel prepared to teach or cultivate nontechnical competencies?
5. To what extent do veterinary faculty members feel prepared to evaluate nontechnical competencies?
6. What factors influence veterinary faculty members' perceptions regarding nontechnical competencies in veterinary education?

This chapter is organized to present the rationale behind the method chosen, the study design and its evolution, strengths and weaknesses. Details of the study setting, survey procedures and methods employed for data analysis follow. The chapter concludes

with a discussion of factors influencing validity and reliability of the study, and measures employed to enhance both.

Design of the Study

The study employed a quantitative survey design in order to maximize feedback from faculty members engaged in veterinary medical education. A two-phase, sequential mixed method design (Creswell, 2003) was initially planned in order to generate both quantitative data with broad generalizability, and qualitative interviews to probe detail and elaborate reasons behind the quantitative results. The quantitative study, however, was considered the dominant method of inquiry (Morse, 1991; Nielsen & Tulinus, 2003; Tashakkori & Teddlie, 1998), and the method best suited to address the first four research questions directly (those investigating “What are faculty perspectives regarding nontechnical competencies?”). The final question, “What factors influence these faculty perspectives?” was also addressed by the survey method, using specific demographic and professional variables as the initial set of factors to explore. The qualitative interview phase, designed to quickly follow the preliminary analysis of survey results, would have allowed elaboration of these and other factors, and would likely have uncovered other issues on participants’ minds regarding this topic. The combined approach also offered the advantage of using complementary methods and the potential for revealing both “convergent and divergent evidence about the phenomenon being studied (Ilgen et al., 2003).

However, the scope of the study was considered too extensive to proceed with both stages at this time, and it was decided to complete and report the quantitative data

prior to embarking on additional research. This more limited approach allowed the researcher to proceed with a more extensive survey and focus on more complex evaluation of the data. By simplifying the design, the major disadvantages of mixed method research were avoided, including the time required to complete two phases of research, the need for the researcher to be competent in the use and reporting of multiple strategies, and the challenge of reporting two different types of data in concise and organized form (Creswell, 2003). Further, full completion, analysis and peer review of the quantitative data prior to qualitative inquiry will enable knowledgeable planning of appropriate and rigorous future research (Morse, 2003).

Choice of Methodology

Quantitative methods are appropriate when the researcher seeks to discern overall trends or tendencies, how trends vary among individuals or groups, or associations or relationships between variables (Creswell, 2003). The quantitative survey method was selected in order to efficiently gather information from a large group of individuals and to best answer the research questions posed by the study. Surveys have been defined as “cross-sectional and longitudinal studies using questionnaires or structured interviews for data collection, with the intent of generalizing from a sample to a population (Babbie, 1990).” The survey provides an economical and quick way to gather broad, generalizable data from large, geographically dispersed populations (Creswell, 2002, 2003; Dillman, 2000, 2007). A short survey design maximizes response rate and satisfies broad research questions (overall attitudes), whereas busy faculty members would be less likely to respond to a long in-depth survey or to provide many replies to open-ended survey

questions. The closed-end questions on the survey will allow ease of data analysis for this phase of the study. Other advantages of the questionnaire strategy include low expense, rapid turnaround, and high perception of anonymity for respondents (Johnson & Turner, 2003). The closed end questions will reflect a snapshot of faculty perspectives at this point in time. Following principles of good survey design, this survey was designed to be short, easily and conveniently completed by respondents, and provide anonymity for responses, with little personal information attached (Dillman, 2000). The data collection method (anonymous submission via internet based survey) also helped minimize investigator bias. Because of the researcher's involvement in veterinary education, perceived or real bias could have influenced telephone, electronic mail or semi-structured interview responses.

The survey approach also was chosen for its appeal to the anticipated audience, notably biomedical faculty and administrators. These individuals typically work from a quantitative orientation, will respond favorably to the confirmatory nature of survey results, and may be skeptical of qualitative methodology. However, because of the applied nature of faculty work while teaching and practicing veterinary medicine, faculty and administrators likely are curious about the meaning behind the quantitative data and appreciate the need for cautious interpretation of data analysis and well-planned qualitative exploration after this phase of research. Finally, pragmatic research approaches should "choose explanations that best produce desired outcome" (Tashakkori & Teddlie, 1998) (p. 23). By offering information about consensus views of veterinary faculty members, as well as some insight into the nature of faculty concerns, this design

was considered ideal for the expected outcomes of this study, especially in providing information valuable to curriculum planning and faculty development.

Setting

Seven North American colleges of veterinary medicine were invited to participate. Invited institutions were chosen to provide colleges that range in geographic location, size of faculty, years of operation, US News and World Report ranking, and degree of engagement in nontechnical competency development (based on publications and involvement of personnel in national educational initiatives). The multi-site target population included a large pool of faculty with a broad range of backgrounds and perspectives in order to increase generalizability. Additionally, using colleges with such varied histories was considered more likely to reveal inter-institutional differences.

The survey was approved by the AAVMC Executive Director (see Appendices F and G). Permission was obtained from each institution using the academic dean or appropriate faculty committee chair as gatekeeper and liaison (see Appendices H and I). Faculty names, ranks and email addresses were obtained from public websites of participating institutions. Individuals were added or deleted as indicated by the institutional contact, based on inquiries from faculty members, and based on multiple returned electronic or regular mail contacts. All procedures underwent a departmental review for human subjects research and were deemed exempt from further institutional review by the University of Tennessee Office of Research.

Procedures

Survey Method

Development of Survey Questions

The basis of the survey was the available literature regarding essential nontechnical skills in the veterinary literature (Lewis & Klausner, 2003; Willis et al., 2007). Descriptions of the skills in the study were modified from the literature in order to collapse the skill sets into a manageable number and to create labels and definitions that would have meaning for the faculty responding to the survey (Appendix A). Independent variables were chosen to include common demographic variables and factors that would distinguish the background and varied educational missions of veterinary academicians (see Appendix B).

Sampling Method

The target population included all faculty members at the selected institutions. This nonrandom, census design was possible in this limited, publicly known and accessible population. An incentive (the chance to win one of several online shopping gift certificates) was offered to encourage participation.

Methods and Timeline for Survey Invitation

Multiple contact modes were employed to encourage response, including mail and electronic mail contacts (Appendices C and D) and contacts from within and outside each institution. The contact strategy was implemented as follows:

Day -3: Electronic mail (e-mail) or postcard pre-notice was distributed to target population.

Day 0: E-mail (1st) invitation to access survey was distributed using listserve containing all target population.

Day 7- 10: Reminder postcard was mailed to study population (with the exception of Canadian site)

Day 10: E-mail reminder (2nd) was distributed using listserve containing all target population.

Day 14- 21: Additional (3rd) e-mail was distributed to nonrespondents in groups by institution. The notice included information about additional gift certificates being offered as incentive to respond.

Day 30: Additional (4th) personal e-mail reminder was distributed to remaining nonrespondents. Pleas were made to institutional contacts to promote the survey locally.

Day 45: Additional (5th) personal e-mail reminders and personally signed reminder postcards (2nd) were distributed to remaining nonrespondents. Notification of a final, added incentive (another gift certificate) for the “last chance” respondents was included.

Day 60: The survey site was inactivated.

Survey Instrument

In this study, a cross-sectional, self-administered questionnaire (Appendix B) was distributed in census mode to all faculty at the selected institutions. The purpose of the research, methods and terms were displayed at the beginning of the survey; respondents indicated their consent by choosing to proceed to the next survey question. Faculty

members not consenting to the survey terms or not involved in the training of DVM students were excluded from study. Participating faculty members also could exit the survey or withdraw their participation from the study at any time prior to data analysis.

Survey Variables

The survey asks respondents to indicate the level of agreement for 1) the importance of 14 competencies for veterinary graduates, and 2) opinions on 3 additional questions for each competency cited as important. Dependent (or outcomes) variables include the responses to the four survey questions for each competency. Independent variables included respondent's institution, sex, age, major discipline, primary effort allocation, years of experience and academic rank.

Survey Implementation

Web delivery (SPSS MrInterview)¹ was chosen as the method for distribution of this study, because the population of faculty members should have access to computers and the internet and be used to working extensively with computers and internet to exchange information. Additionally, email addresses were available for the closed population of study. The use of an internet survey allowed efficient data collection and automated data entry for analysis, although time savings were small over the course of the entire study. Using institutional resources, the internet survey was completed at little cost to the investigator, a savings advantage for large samples (Dillman, 2000; Schonlau, Fricker, & Elliott, 2002).

¹ SPSS DimensionNet version 4.0 and mrInterview version 4.0, © 2002-2006 SPSS Ltd., Chicago, Illinois

Published response rates for mail surveys are higher than e-mail/web surveys, although the better response rates for electronic surveys are seen among groups similar to those reached by this study, such as researchers and college faculty (Schonlau, Fricker, & Elliott, 2002). Today, in the face of widespread adoption of interactive internet technology, these data are likely outdated. Indeed, Dillman (2007) describes a case study in which university faculty received either a mail or electronic mail questionnaire about a curricular topic undergoing review in the institution. Using multiple contacts, a high response rate (58%) was achieved for both methods; responses were received quicker, item nonresponse was lower, and open-ended questions were answered more completely with the e-mail mode. In this study, a follow up mail survey option was originally planned for nonresponders in order to maximize overall response (Dillman, 2000; Schonlau, Fricker, & Elliott, 2002). However, progressive contacts by electronic methods led to an acceptable response rate (approaching 50%); the mail option was not necessary.

Analysis of Data

Statistical analyses were performed using SPSS version 14. Demographic and frequency results were described for the respondents. Chi-square statistic was used to measure association between survey responses (outcome variables) and these independent variables: institution, sex, years of experience, discipline and primary effort allocation. Fischer exact test (and/or Chi square) was used to detect differences in response rate among the participating institutions and differences between the proportions

of males and females responding to the survey versus the gender distribution of the sample. Level of significance for statistical analyses was set at $p \leq .05$.

Mean ratings of agreement for the importance of each competency are presented in descending order to provide the relative ranking of each competency's perceived level of importance. Differences in mean ratings of competencies were determined by General Linear Model Repeated Measures Analysis of Variance and Wilks' Lambda distribution for multivariate probability testing for linearly independent data. Where significant interactions or within subjects differences were observed, differences between groups were identified using the appropriate post hoc tests, most commonly Tukey's Honestly Significant Difference test for multiple pairwise comparisons. Differences among demographic and professional group variables were determined by One-Way Analysis of Variance for multivariate data and Student's *t* test for Independent Samples for bivariate data. Bivariate correlations were performed by Pearson correlation. Measures of association for categorical data were performed by Chi-Square analysis. Levels of significance were set at $p \leq .05$ except when the number of factors examined and number of tests performed necessitated a more conservative level ($p \leq .01$) in order to reduce the likelihood of Type I error.

Validity and Reliability

Concepts of validity and reliability apply to survey investigations just as for other types of research. Validity, or the truthfulness of the results and the conclusions deduced from the results, depends on survey design, response rate and elimination of bias in the survey and responses. Reliability, or the consistency with which results portray the

magnitude or accuracy of findings, can be viewed and measured in various ways. Assessment of stability, consistency over time for measures from the same respondent, is difficult to determine with a one-time, cross sectional survey. Employing multiple administrations of this survey was considered too much of an imposition on respondents' time. On the other hand, self-administered surveys are considered to be highly reliable, since few factors should influence participants during the study (Fowler, 2002). In this setting, validity and reliability go hand in hand: validity is enhanced by ensuring question clarity and quality; reliability is improved by enhancing validity and minimizing measurement errors. Unfortunately, the validity of survey results depends on how truthfully the participants respond. As Fowler points out, all survey research is limited by what people are willing to tell us.

In this study, content validity was assured by using multiple experts, both veterinary and educational, to review the survey design and questions. The survey was also piloted by several faculty members at each institution to ensure clarity of questions and instructional, effectiveness and reliability of the web interface, and accuracy of data captured. The descriptive validity of the data was enhanced by the web interface, in which results are downloaded directly into files for analysis. Because the survey was constructed in the form of 5 measures for each of 14 items (the competencies), interrelationships between dependent variables were also used to confirm reliability. Interrelationships between ratings of importance and ratings of faculty preparation demonstrated internally consistent patterns and provided input equivalent to split half or item correlation measures. Finally, at one institution, preliminary data were presented to

a group of clinical faculty to serve a member-checking function. However, attendance was poor and little feedback was received after the short research presentation.

Potential Survey Error

The major potential errors in survey research include coverage errors, sampling errors, nonresponse errors and measurement errors (Groves, 1989). Coverage and sampling error, including the variance of the sampling frame from the target population, and bias of the sampling frame (Fowler, 2002), were minimized by sampling the entire target population, pursuing aggressive follow-up contacts with nonrespondents, and by using convenient and commonly used electronic mail and internet communication options. Coverage errors were minimized by using faculty directories and departmental listing to obtain the faculty contact information. Newly appointed faculty may have been missed if the public directories were not updated frequently. Additionally, the target population was expected to be relatively large (over 500 faculty members), reducing the effect of sampling error.

Measurement errors (errors affecting the truthfulness of results) were minimized by the internet survey design (avoiding any tendency to provide certain answers in a face to face interview) and by the relatively straightforward nature of the data. The questions were not of a highly personal or sensitive nature, although a few individuals expressed concern over reporting age during the pilot period. The question about the respondent's age was moved to the end of the survey based on this feedback. The survey content was reviewed by multiple members of the author's host institution (including an expert in educational assessment) and at least one individual at each additional participating

institution. Based on feedback from early reviewers, adjustments in language, order and formatting were completed to enhance clarity. Pilot testing of the internet version was completed by individuals at several of the participating institutions in order to ensure clarity of questions and minimize misinterpretation. The clarity and functionality of the internet version also was tested by faculty and staff members at multiple institutions.

Measurement error due to respondent bias is possible. Individuals with strong interest or opinions about the topic may have been more likely to respond to the survey. Again, implementation processes designed to maximize response rate helped minimize this possibility. Survey questions were designed to be short, simple and clear in order to accurately capture the desired information, adequately reflect the research questions, and avoid impressions of researcher bias. Frequent checking of incoming data served as informal wave analysis; no shifts in responses suggesting response bias were observed for either early responders or late responders (Creswell, 2002). Data errors were minimized by relying on the internet survey and associated software, with data directly downloaded into datasets held in the university secure server.

Finally although the survey responses were anonymous and submitted through an internet interface, respondents still may have provided answers that were considered socially acceptable, particularly because of the nature of the survey topic and the introductory comments that validate the position of veterinary leadership on nontechnical competencies. Errors related to social desirability, cultural sensitivity, or other subtle personal interpretations of survey questions are considered less likely in self-administered questionnaires than in face-to-face interviews, however (Dillman, 2007).

Researcher's Role

In all but one of the colleges studied, the researcher was an external, peer investigator. The researcher's interest in the topic of nontechnical competencies and work in curricular and educational programs may have been known to individuals at her host institution, but should have been largely unknown in other institutions. At the University of Tennessee, the researcher remained a non-participant investigator; however, the researcher's affiliation with the College may have led to some bias in faculty colleague's responses or willingness to respond. The quantitative research design maintained objectivity for the researcher in this project. Bias in interpretation was avoided by adherence to rigorous statistical analyses.

CHAPTER 4

RESULTS

The purpose of this study was to explore the current perceptions of faculty educators at selected North American veterinary colleges regarding the importance of, and their role in the development of, 14 identified nontechnical competencies in veterinary graduates. The study involved an internet survey available to faculty members at five North American veterinary colleges over a 60 day period. Demographic (age, gender) and work role variables (institution, academic rank, degree and year of graduation, primary effort allocation, discipline, and number of years teaching) were reported, as were respondent ratings of importance of each competency. For each competency a respondent agreed was important, the respondent answered an additional question about where the competency should be taught or cultivated. For those who agreed that a competency should be taught or cultivated during veterinary school, three additional questions were posed regarding their role and level of preparation in teaching and evaluating those competencies in veterinary students.

Research Questions

1. Which nontechnical competencies do veterinary faculty members perceive are important for graduating veterinarians to master?
2. Do veterinary faculty members perceive that nontechnical competencies should be taught in the veterinary curriculum, or acquired elsewhere?
3. Do veterinary faculty members perceive a responsibility to teach or cultivate nontechnical competences in their educational roles?

4. To what extent do veterinary faculty members feel competent and prepared to teach or cultivate nontechnical competencies?
5. To what extent do veterinary faculty members feel competent and prepared to evaluate nontechnical competencies?
6. What factors influence veterinary faculty members' perceptions regarding nontechnical competencies in veterinary education?

Organization of the Chapter

Survey respondents responded to queries about 14 nontechnical competencies, including a rating of importance for veterinary graduates, a multiple response tally regarding where training in each competency should occur, whether each competency should be taught or cultivated in their own teaching, and their personal level of preparation to teach and evaluate the competencies in veterinary students. After a summary of the response rate, demographics and work role characteristics of respondents, this chapter presents quantitative results organized by research question. For questions 1 through 5, overall descriptive results are presented in tabular form, followed by significant differences among competencies. Research question 6, "What factors influence veterinary faculty members' perceptions regarding nontechnical competencies in veterinary education?" was addressed by investigating differences in responses among respondents based on the identified demographic and work role variables. These between group findings are reported along with the results for each research question 1 – 5.

Where differences were detected, variables are presented in the following order: *institution, gender, DVM status, primary effort allocation, discipline, age, year of graduation, years teaching, and academic rank*. Based on the between group results for overall mean ratings of importance (research question 1), *primary effort allocation* and *age* were deemed unlikely to provide additional value to the interpretation of the study. Therefore, only 7 variables were analyzed for the remaining research questions and are reported in the following order where significant: *institution, gender, DVM status, discipline, year of graduation, years teaching, and academic rank*. At the end of the chapter, the major findings for each dependent variable are summarized for clarity.

Results of the Study

Participants and Response Rate

The academic deans at seven North American veterinary colleges were contacted by mail as an invitation for the college to participate. One dean declined the invitation in an effort to limit survey fatigue of faculty; another did not respond to several inquiries. Both deans who declined were affiliated with large, highly ranked western institutions. Five deans agreed to participate and to support the endeavor with the faculty at their site. The five participating institutions can be characterized as follows:

Institution A: An approximately 35 year-old, midsize and mid-level ranked (2nd quartile of 2007 *U.S. News & World Report* rankings) veterinary college in the southeastern United States, affiliated with a public Comprehensive Doctoral Research (Very High Activity) University. Veterinary college has traditional

curriculum but recently added innovations, including problem-based learning courses, social work and instructional support programs.

Institution B. Relatively small, public veterinary college in Canada, affiliated with Baccalaureate liberal arts university. Veterinary college is approximately 20 years old, with a traditional curriculum and newly implemented communication training emphasis. (Canadian veterinary schools are not ranked by *US News & World Report*)

Institution C. An over 100 year-old, mid-size and mid-level (2nd quartile) ranked veterinary college in the southern United States, affiliated with a public Comprehensive Doctoral Research (Very High Activity) University. Veterinary college employs a traditional curriculum but longstanding attention to student development and student leadership.

Institution D. An over 100 year-old, small veterinary college (age) in northern United States in middle tier (2nd quartile) of rankings, affiliated with a public Comprehensive Doctoral Research (High Activity) University. Veterinary college faculty and administrators are active in the veterinary profession in the areas of nontechnical skill development and veterinary student leadership (based on programs and publications).

Institution E. A small, new (< 5 years old) veterinary college in the western United States, affiliated with a private, not-for-profit, special focus institution. College emphases include problem-based curriculum, human-animal bond

orientation, and focus on student development. Not included in *U.S. News & World Report* rankings at this time.

The target sample included 429 faculty members. If the overall population of North American veterinary faculty members is estimated at 3,000 (*Comparative Data Report*, 2005), the sample reflects approximately 15% of the overall population. By closing of the survey, 209 faculty members accessed the survey for a total response return rate of 49%. Thirteen respondents were not directly involved in teaching professional veterinary students; ten additional respondents did not fully complete the survey questions. Data from these 23 respondents were excluded from further analysis, leaving a final completed sample size of 186 faculty members. Characteristics of the completed sample are summarized in Table 4.1.

Response rates (number responding, percentage) varied among institutions, with the highest response rate from Institution A (64 of 106, 60%), followed by Institution E (30 of 52, 58%), Institution C (48 of 90, 53%), Institution B (37 of 77, 48%), and Institution D (34 of 99, 34%). The proportions of faculty members from each institution represented in the completed sample varied significantly, $\chi^2(4, N=186) = 11.34$, $p = .023$, with faculty members at Institution A slightly overrepresented and faculty members at Institution D slightly underrepresented (see Table 4.1).

Of 186 respondents, 95 were male (51%), 84 were female (45%); 7 (4%) declined to report gender. In comparison, the gender distribution of faculty in the participating veterinary colleges is 63% male, 37% female. The gender distribution of respondents was significantly different from the gender distribution of the sample $\chi^2(1, N = 179) = 7.568$,

Table 4.1***Characteristics of Respondents at Five Colleges or Schools of Veterinary Medicine***

Factor	Institution A	Institution B	Institution C	Institution D	Institution E	Total	χ^2	<i>p</i> value ^a
Respondents							1.34	.023*
Respondents/Total	64/106	37/77	48/90	34/99	30/52	186/429		
Response Rate	60%	48%	53%	34%	58%	49%		
Gender							4.36	.358
Male	25 (44%)	18 (56%)	24 (63%)	15 (60%)	13 (48%)	95 (53%)		
Female	32 (56%)	14 (44%)	14 (37%)	10 (40%)	14 (52%)	84 (47%)		
Degree							1.36	.928
DVM	51 (85%)	29 (88%)	36 (90%)	24 (92%)	24 (89%)	164 (88%)		
Non-DVM	9 (15%)	4 (2%)	4 (10%)	2 (8%)	3 (11%)	22 (12%)		
Primary Effort Allocation							15.93	.043†
Teaching	45	20	26	21	24	136		
Research	4	7	10	4	1	26		
Service/Admin	11	6	4	1	2	24		

Table 4.1 Continued

Factor	Institution A	Institution B	Institution C	Institution D	Institution E	Total	χ^2	<i>p</i> value
Primary Discipline							25.22	.193
BS	10	6	16	5	12	49		
CS-SA	22	8	11	5	7	53		
CS-LA	9	10	5	6	3	33		
CS-DS	11	5	7	7	2	32		
CS-O	8	4	1	3	3	19		
Rank							16.93	.152
Instructor	7 (13%)	1 (3%)	1 (3%)	1 (4%)	1 (4%)	11 (6%)		
Assistant	22 (39%)	11 (33%)	6 (15%)	7 (27%)	10 (37%)	56 (31%)		
Associate	14 (25%)	12 (36%)	15 (38%)	9 (35%)	6 (22%)	56 (31%)		
Professor	13 (23%)	9 (27%)	18 (45%)	9 (35%)	10 (37%)	59 (32%)		
Age (<i>Mdn</i>)	48	48	52	49.5	51	48.5		
Yrs Teaching (<i>Mdn</i>)	15.5	18	21.5	19	7.5	17	33.95	.002**
Yr Graduated (<i>Mdn</i>)	1987	1985	1981	1983	1982	1985	nd	

Note. ^aLevel of significance for association between factor and institution. *Significant at a level of $p < .05$. **Significant at a level of $p < .01$.

$p = 0.006$, with women faculty members more likely to respond to the survey than males (see Table 4.2).

Eighty-eight percent (164) of respondents held a veterinary degree. Most respondents ($n = 136$, 73 %) had a primary effort in teaching, whereas 26 (14%) and 24 (13%) reported primary efforts in research and service or administration, respectively. Primary disciplinary focus was identified as Clinical Science-Small Animal (CS-SA) by 53 respondents (29%), Basic Science (BS) by 49 (26%), Clinical Science-Large Animal (CS-LA) by 33 (18%), Clinical Science-Diagnostic Sciences (CS-DS) by 32 (17%), and Clinical Science-Other (CS-O) by 19 respondents (10%).

Median age was 48.5 years ($n = 178$, $M = 49$ years, range 28 - 71); median years teaching veterinary students was 17 years ($n = 186$, $M = 17$, range 1 - 45 years). Year of

Table 4.2.

Distribution of Respondents by Gender: Observed and Expected Numbers for Chi-Square Goodness of Fit Model

	Male	Female	Total
Observed	95**	84**	179
Expected	113	66	179

Note. Expected counts are based on gender distribution of invited participants.
 **Observed counts are significantly different from expected, $\chi^2 (1, N = 179) = 7.568$, $p = .006$

first terminal degree ranged from 1960 to 2006 ($n = 186$, median 1985). Of 182 respondents with available academic rank information (including clinical academic rank appointments), 11 (6%) were categorized as Instructors, 56 (30%) as Assistant Professors, 56 (30%) as Associate Professors, and 59 (32%) as Professors.

Associations Among Independent Variables

Institution was not associated with gender, discipline, or degree status. There was an apparent association between institution and number of years teaching, with those teaching < 9 years overrepresented in Institution E, those teaching for 9 – 17 years overrepresented in Institution A, and those teaching for at least 25 years overrepresented in Institution C; $\chi^2 (12, N = 186) = 31.20, p = .002$ (see Table 4.3). The distribution of faculty experience in this study roughly parallels the respective ages of the institutions. Academic rank was highly associated with gender, but did not differ by institution. Males were overrepresented in the Professor group and underrepresented in the Assistant Professor group, $\chi^2 (3, N = 175) = 11.584, p = 0.009$ (see Table 4.4).

Several variables were associated with primary disciplinary focus, including degree status and gender (see Tables 4.5 and 4.6). As expected, non-veterinarian status was highly associated with Basic Science disciplines; many of these faculty would hold the Ph.D. in a scientific discipline. Basic Science faculty were also more likely to have a primary effort in research, while Clinical Science-SA faculty were more likely to have a primary effort in teaching (which included clinical teaching); however expected numbers in several categories limited data analysis for both of these variables.

Gender also was associated with primary discipline, with males overrepresented in Clinical Science – Large Animal fields and females overrepresented in Clinical Science – Small Animal disciplines, $\chi^2 (3, N = 179) = 11.32, p = 0.023$. This distribution of faculty numbers reflects a traditional predominance of men in large animal practice and study.

Table 4.3.

Measures of Association for Years Teaching Experience of Respondents at Each Institution

Years	Institution					Total
	A	B	C	D	E	
1–8 years	13 (14)	6 (8)	4 (10) ^b	5 (6)	16 (6) ^a	44
9–17 years	22 (16) ^a	9 (9)	11(11)	5 (7)	3 (7) ^b	50
18-24 years	13 (16)	11(9)	11(11)	10 (7)	5 (7)	50
≥ 25 years	12 (14)	7 (7)	14 (9) ^a	6 (6)	3 (6)	42

Note. Results given as observed number with expected number in parentheses. ^aObserved number significantly higher than expected; ^bobserved number significantly lower than expected, $\chi^2 (12, N = 186) = 31.20, p = .002$.

Table 4.4*Measures of Association Between Gender and Academic Rank of Respondents*

		Academic Rank				Total
		Instructor	Assistant Professor	Associate Professor	Professor	
Male	Observed	7	21 ^b	27	40 ^a	95
	Expected	6	29	29	31	95
Female	Observed	4	33 ^a	26	17 ^b	80
	Expected	5	25	24	26	80
Total		11	54	53	57	175

Note. Results given as observed number with expected number in parentheses.
^aObserved count higher than expected; ^bObserved count lower than expected; χ^2 (4, $N = 175$) = 11.58, $p = .009$.

Table 4.5.*Measures of Association Between Degree Status and Primary Discipline*

Degree Status		Discipline				
		BS	CS-Dx	CS-LA	CS-SA	CS-O
DVM	Observed	33 ^b	31	32	52 ^a	16
	Expected	43	28	29	47	17
Other	Observed	16 ^a	1	1	1 ^b	3
	Expected	6	4	4	6	2

Note. ^aObserved count higher than expected; ^bobserved count lower than expected, $\chi^2(4, N = 186) = 30.46, p = <.001$. However, all expected counts do not meet conditions for the Chi-Square test.

Table 4.6*Respondents' Primary Effort Allocation Within Each Primary Discipline*

Degree Status		Discipline				
		BS	CS-Dx	CS-LA	CS-SA	CS-O
Teaching	Observed	29 ^b	24	27	44	12
	Expected	36	23	24	49	14
Research	Observed	18 ^a	0	4	2 ^b	2
	Expected	7	5	5	7	3
Service ^c	Observed	2 ^b	8	2	7	5
	Expected	6	4	4	7	3

Note. ^aObserved count higher than expected; ^bObserved count lower than expected; χ^2 (8, $N = 186$) = 39.88, $p = <.001$. However, all expected counts do not meet conditions for the Chi-Square test. ^cService includes administrative allocations as well as non-teaching clinical service.

Table 4.7*Measures of Association Between Gender of Respondents and Primary Discipline*

		Discipline				
		BS	CS-Dx	CS-LA	CS-SA	CS-O
Male	Observed	28	13	23 ^a	20 ^b	11
	Expected	24	17	17	27	10
Female	Observed	18	18	9 ^b	31 ^a	8
	Expected	22	14	15	24	9

Note. ^aObserved count significantly higher than expected; ^bobserved count significantly lower than expected, $\chi^2(3, N = 179) = 11.32, p = .023$. BS = Basic Science; CS = Clinical Science, with Dx = Diagnostic Sciences, LA = Large Animal, SA = Small Animal, and O = Other.

Research Question 1.

Which nontechnical competencies do veterinary faculty perceive are important for graduating veterinarians to master?

Veterinary faculty members generally perceived nontechnical competencies to be important for veterinary graduates; all mean and median ratings of agreement were well above 4.0, considered the neutral response on the 7-point scale (see Table 4.8 and Figure 4.1). Four isolated responses of “Don’t Know/No Opinion” (representing approximately 2% of the final sample) were recoded with a Likert value of 4, considered neutral, in order to maintain a complete dataset for analysis.

Faculty members responding in this study ($n = 186$) strongly agreed that Ethics/Moral Responsibility, Critical Thinking, Self-Development/Lifelong Learning, Interpersonal Skills, Communication Skills, and Motivation/Persistence were important (all means > 6.5). These ratings were followed (in order) by Self-Management and Flexibility ($M > 6.0$), Creativity, Crisis/Incident Management, Cultural Competence, Coaching Skills ($M > 5.5$), Business Skills, and Leadership Skills.

Mean ratings of individual competencies differed significantly between subjects, $F(13, 173) = 37.28, p < .001$ (see Table 4.8). Although there is some overlap between groups, faculty members again appear to place intrapersonal skills of ethics, thinking and self-development highest in importance, followed by interpersonal and communication skills. Leadership, business and management skill sets are grouped in an important, but relatively lower place of emphasis.

Table 4.8*Mean Level of Agreement for 14 Nontechnical Competencies for all Respondents*

Competency	Mean (<i>n</i> =186)	<i>SD</i>	
Ethics/Moral Responsibility	6.84	.494	a*
Critical Thinking	6.80	.439	a
Self-Development/ Lifelong Learning	6.71	.571	a,b
Interpersonal Skills	6.62	.656	b,c
Communication Skills	6.58	.646	b,c
Motivation/Persistence	6.54	.633	c
Self-Management	6.48	.722	c,d
Flexibility	6.26	.911	d
Creativity	5.97	.876	e
Crisis/Incident Management	5.94	.990	e,f
Cultural Competence	5.68	1.121	f,g
Coaching Skills	5.53	1.096	g
Business Skills	5.47	1.091	g
Leadership Skills	5.45	1.101	g

Note. Ratings differed significantly within subjects $F(13, 173) = 37.28, p < 0.001$.

*Means without letters in common are significantly different.

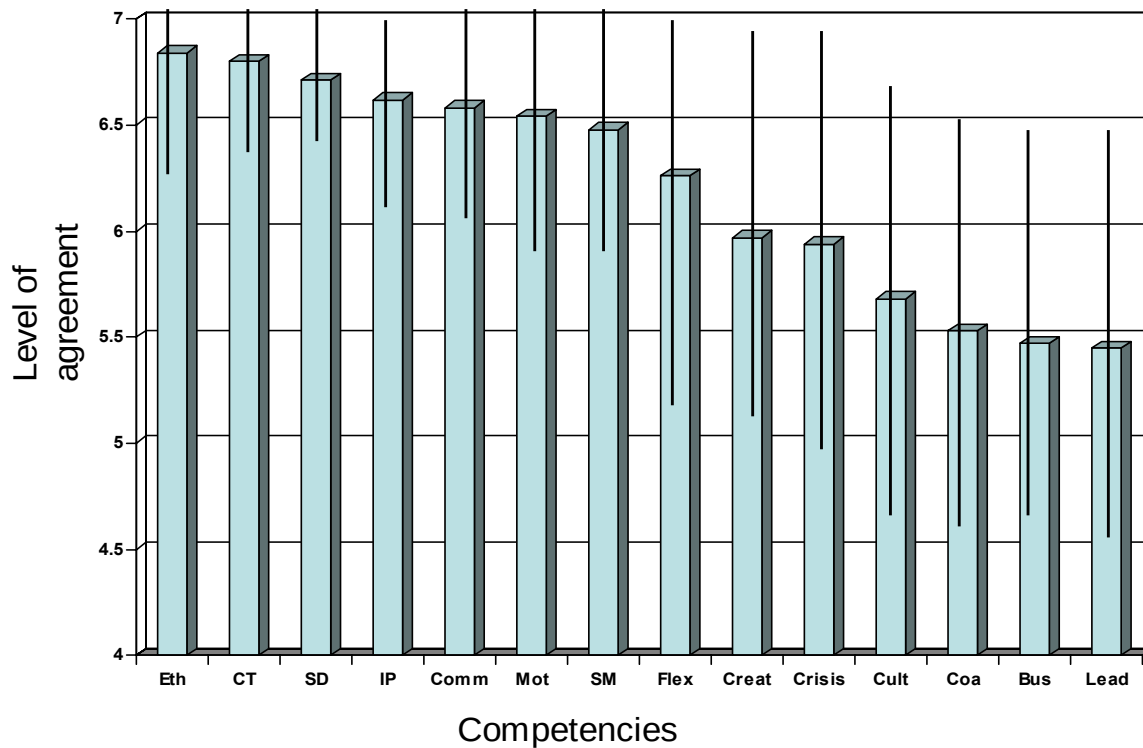


Figure 4.1. Mean ratings of the importance of nontechnical competencies for all respondents. Competencies are presented in descending order of means. Vertical lines indicate SD. Eth =Ethics/Moral Responsibility, CT =Critical Thinking, SD=Self Development/Lifelong Learning, IP=Interpersonal Skills, Comm= Communication Skills, Mot=Motivation/Persistence, SM=Self-Management, Flex=Flexibility, Creat=Creativity, Crisis=Crisis/Incident Management, Cult=Cultural Competence, Coa=Coaching, Bus=Business Skills, Lead=Leadership Skills.

Interactions Among Competency Ratings and Independent Factors

Using repeated measures analysis of variance, mean responses were compared with each independent variable acting as a between subjects factor. In this way, the data were analyzed to detect effects of factors on the pattern of means (within subjects effects) or on a respondent's overall responses regarding the 14 competencies (between subjects effects). Post hoc analyses were completed to isolate significant within subjects effects. There were no effects within competency means attributable to the factors institution, gender, primary effort area, discipline, or academic rank (see Tables 4.9 to 4.13). Significant effects were discovered within competency ratings based on degree status, $F(13, 172) = 2.80, p = .001$, year of graduation, $F(39, 504) = 1.56, p = .019$, and years teaching experience, $F(39, 504) = 1.47 (p = .036)$.

DVM Status. Respondents without a veterinary degree rated selected competencies higher in importance than did those with a DVM or equivalent degree (see Table 4.14 and Figure 4.2). When competencies were examined using Student's *t* test for independent samples for post hoc analysis, non-DVM respondents indicated a higher level of agreement in the importance of Business Skills, $t(184) = -3.59, p < 0.001$, Cultural Competence, $t(184) = -3.18, p = 0.003$, Self-Management, $t(184) = -2.16, p = 0.038$, Ethics/Moral Responsibility, $t(184) = -2.16, p = .035$, and Crisis/Incident Management, $t(184) = -2.18, p = 0.030$ than did DVM respondents (see Table 4.14 and Fig 4.2). Differences in means for Leadership Skills followed a similar pattern, but did not reach statistical significance ($p = .059$).

Table 4.9*Mean Level of Agreement for 14 Nontechnical Competencies by Institution*

Competency	Institution					Total (n=186)
	Inst A (n=60)	Inst B (n=33)	Inst C (n=40)	Inst D (n=26)	Inst E (n=27)	
Ethics/Moral Responsibility	6.80 (.514)	6.85 (.442)	6.85 (.533)	6.81 (.634)	6.93 (.267)	6.84 (.494)
Critical Thinking	6.87 (.415)	6.76 (.561)	6.68 (.526)	6.88 (.326)	7.00 (.000)	6.80 (.439)
Self-Development/ Lifelong Learning	6.67 (.601)	6.58 (.792)	6.73 (.506)	6.77 (.430)	6.89 (.320)	6.71 (.571)
Interpersonal Skills	6.60 (.718)	6.67 (.595)	6.55 (.552)	6.54 (.859)	6.81 (.483)	6.62 (.656)
Communication Skills	6.53 (.623)	6.64 (.549)	6.53 (.716)	6.54 (.761)	6.74 (.594)	6.58 (.646)
Motivation/Persistence	6.47 (.650)	6.36 (.783)	6.60 (.545)	6.69 (.549)	6.70 (.542)	6.54 (.633)
Self-Management	6.37 (.758)	6.33 (.924)	6.60 (.545)	6.46 (.706)	6.89 (.320)	6.48 (.722)
Flexibility	6.18 (.833)	6.06 (1.248)	6.28 (.784)	6.31 (.928)	6.59 (.694)	6.26 (.911)
Creativity	5.82 (.983)	6.03 (.847)	6.00 (.716)	5.96 (.871)	6.19 (.879)	5.97 (.876)

Table 4.9 *Continued*

Competency	Institution					Total (n=186)
	Inst A (n=60)	Inst B (n=33)	Inst C (n=40)	Inst D (n=26)	Inst E (n=27)	
Crisis/Incident Management	5.90 (1.130)	5.76 (1.001)	6.05 (.932)	5.77 (.863)	6.22 (.801)	5.94 (.990)
Cultural Competence	5.65 (1.363)	5.45 (1.003)	5.60 (1.008)	5.69 (.970)	6.11 (.892)	5.68 (1.121)
Coaching Skills	5.43 (1.198)	5.42 (1.062)	5.58 (1.059)	5.38 (1.023)	5.96 (.980)	5.53 (1.096)
Business Skills	5.40 (1.265)	5.55 (1.003)	5.48 (.960)	5.35 (.977)	5.63 (1.115)	5.47 (1.091)
Leadership Skills	5.32 (1.112)	5.55 (1.277)	5.53 (.933)	5.19 (.939)	5.78 (1.188)	5.45 (1.101)

Note. Results are presented as $M (SD)$. There were no significant effects of institution on competency ratings, $F (52, 657) = .73, p = 0.921$, or between subjects effects $F (4,181) = 1.90, p = .112$.

Table 4.10*Mean Level of Agreement for 14 Nontechnical Competencies by Gender of Respondent*

Competency	Gender	
	Male (n=95)	Female(n=84)
Ethics/Moral Responsibility	6.82 (.545)	6.90 (.334)
Critical Thinking	6.77 (.494)	6.87 (.339)
Self-Development/ Lifelong Learning	6.68 (.588)	6.76 (.529)
Interpersonal Skills	6.54 (.712)	6.75 (.557)
Communication Skills	6.54 (.681)	6.65 (.591)
Motivation/Persistence	6.55 (.665)	6.55 (.609)
Self-Management	6.49 (.742)	6.51 (.668)
Flexibility	6.22 (.980)	6.35 (.814)
Creativity	5.93 (.854)	6.06 (.896)
Crisis/Incident Mgmt	5.84 (1.055)	6.04 (.924)
Cultural Competence	5.46 (1.219)	5.95 (.943)
Coaching Skills	5.51 (1.138)	5.63 (.979)
Business Skills	5.44 (1.089)	5.50 (1.114)
Leadership	5.34 (1.163)	5.62 (1.005)

Note. Results are presented as $M (SD)$. There were no significant effects of gender on mean ratings, $F (13, 165) = 1.02, p = .433$. Between-subjects effects did not reach statistical significance, $F (1, 177) = 3.48, p = 0.064$.

Table 4.11

Mean Level of Agreement for 14 Nontechnical Competencies by Respondent's Primary Effort Allocation

Competency	Primary Effort		
	Teaching (n = 136)	Research (n = 26)	Service (n = 24)
Ethics/Moral Responsibility	6.84 (.490)	6.77 (.587)	6.84 (.494)
Critical Thinking	6.82 (.407)	6.69 (.618)	6.83 (.381)
Self-Development/ Lifelong Learning	6.75 (.541)	6.62 (.637)	6.58 (.654)
Interpersonal Skills	6.62 (.656)	6.50 (.812)	6.79 (.415)
Communication Skills	6.57 (.651)	6.58 (.643)	6.62 (.647)
Motivation/Persistence	6.52 (.644)	6.54 (.706)	6.67 (.482)
Self-Management	6.47 (.655)	6.38 (1.023)	6.62 (.711)
Flexibility	6.24 (.905)	6.23 (.951)	6.42 (.929)
Creativity	5.93 (.879)	6.31 (.736)	5.79 (.932)
Crisis/Incident Mgmt	5.86 (1.005)	6.15 (.925)	6.13 (.947)
Cultural Competence	5.67 (1.109)	5.54 (1.208)	5.88 (1.116)
Coaching Skills	5.47 (1.054)	5.50 (1.105)	5.92 (1.283)
Business Skills	5.37 (1.067)	5.81 (.587)	6.92 (.408)
Leadership	5.40 (1.050)	5.54 (1.240)	6.62 (.711)

Note. Results are presented as $M(SD)$. There were no significant effects of effort allocation on competency ratings, $F(26, 342) = 1.34, p = .121$. Between-subjects effects were not significant, $F(2, 183) = .72, p = .487$.

Table 4.12*Mean Level of Agreement for 14 Nontechnical Competencies by Respondent Primary Discipline*

Competency	Basic Science ^a (n=49)	Clinical- Other ^a (n=19)	Clinical- Diagnostic ^{a,b} (n=32)	Clinical- Sm Animal ^{a,b} (n=53)	Clinical- Lg Animal ^b (n=33)
Ethics/Moral Responsibility	6.88 (.389)	6.95 (.229)	6.91 (.296)	6.79 (.495)	6.73 (.801)
Critical Thinking	6.84 (.373)	7.00 (.000)	6.84 (.369)	6.74 (.373)	6.70 (.637)
Self-Development/ Lifelong Learning	6.74 (.569)	6.74 (.562)	6.63 (.609)	6.76 (.515)	6.67 (.645)
Interpersonal Skills	6.61 (.671)	6.84 (.501)	6.78 (.608)	6.62 (.562)	6.36 (.822)
Communication Skills	6.65 (.597)	6.74 (.452)	6.69 (.535)	6.53 (.597)	6.36 (.822)
Motivation/Persistence	6.69 (.548)	6.68 (.671)	6.53 (.567)	6.43 (.605)	6.42 (.792)
Self-Management	6.74 (.531)	6.58 (.692)	6.56 (.564)	6.26 (.763)	6.30 (.918)
Flexibility	6.33 (.801)	6.37 (1.422)	6.44 (.669)	6.19 (.900)	6.03 (.918)
Creativity	6.12 (.881)	6.37 (.761)	5.84 (.884)	5.83 (.881)	5.85 (.151)
Crisis/Incident Mgmt	6.33 (.718)	6.21 (.787)	5.78 (1.039)	5.66 (1.159)	5.79 (.927)

Table 4.12 *Continued*

Competency	Basic Science ^a (n=49)	Clinical- Other ^a (n=19)	Clinical- Diagnostic ^{a,b} (n=32)	Clinical- Sm Animal ^{a,b} (n=53)	Clinical- Lg Animal ^b (n=33)
Cultural Competence	5.92 (.932)	6.05 (.970)	5.63 (1.070)	5.60 (1.192)	5.18 (1.261)
Coaching Skills	5.78 (1.006)	6.00 (1.000)	5.53 (1.164)	5.43 (1.006)	5.06 (.966)
Business Skills	5.63 (1.074)	5.95 (.970)	5.31 (.861)	5.36 (1.074)	5.27 (1.257)
Leadership	5.74 (1.076)	6.00 (1.000)	5.44 (.914)	5.26 (1.076)	5.03 (1.237)

Note. Results are presented as $M (SD)$. There was a significant overall difference among subjects based on primary discipline, $F (4, 181) = 4.35, p = .002$; groups with superscript letters in common are not significantly different. Sm = Small, Lg = Large.

Table 4.13*Mean Level of Agreement for Nontechnical Competencies by Academic Rank*

Competency	Academic Rank			
	Instructor (n=11)	Asst Prof (n=56)	Assoc Prof (n=56)	Prof (n=59)
Ethics/Moral Responsibility	6.91 (.302)	6.82 (.471)	6.79 (.624)	6.88 (.419)
Critical Thinking	6.73 (.467)	6.82 (.386)	6.80 (.483)	6.78 (.457)
Self-Development/ Lifelong Learning	6.82 (.405)	6.71 (.594)	6.73 (.522)	6.69 (.595)
Interpersonal Skills	6.73 (.467)	6.84 (.417)	6.48 (.831)	6.53 (.653)
Communication Skills	6.64 (.674)	6.73 (.556)	6.50 (.763)	6.49 (.598)
Motivation/Persistence	6.73 (.467)	6.50 (.714)	6.52 (.603)	6.58 (.622)
Self-Management	6.64 (.674)	6.48 (.632)	6.43 (.806)	6.46 (.750)
Flexibility	6.18 (.982)	6.14 (1.151)	6.34 (.793)	6.31 (.749)
Creativity	5.82 (1.401)	5.98 (.963)	6.02 (.774)	5.93 (.785)
Crisis/Incident Management	6.27 (.786)	6.14 (.819)	5.80 (1.092)	5.75 (1.092)
Cultural Competence	6.00 (1.265)	5.70 (1.077)	5.75 (1.148)	5.51 (1.135)
Coaching Skills	5.45 (1.635)	5.62 (1.184)	5.29 (.825)	5.66 (1.108)
Business Skills	5.45 (1.508)	5.46 (1.078)	5.43 (1.024)	5.44 (1.087)
Leadership Skills	5.27 (1.348)	5.55 (1.174)	5.23 (1.027)	5.59 (1.036)

Note. Results are presented as $M (SD)$. There were no significant effects of institution on competency ratings, $F (39,492) = 1.36, p = .075$. Between subjects effects were not significant, $F (3, 178) = .40, p = .753$.

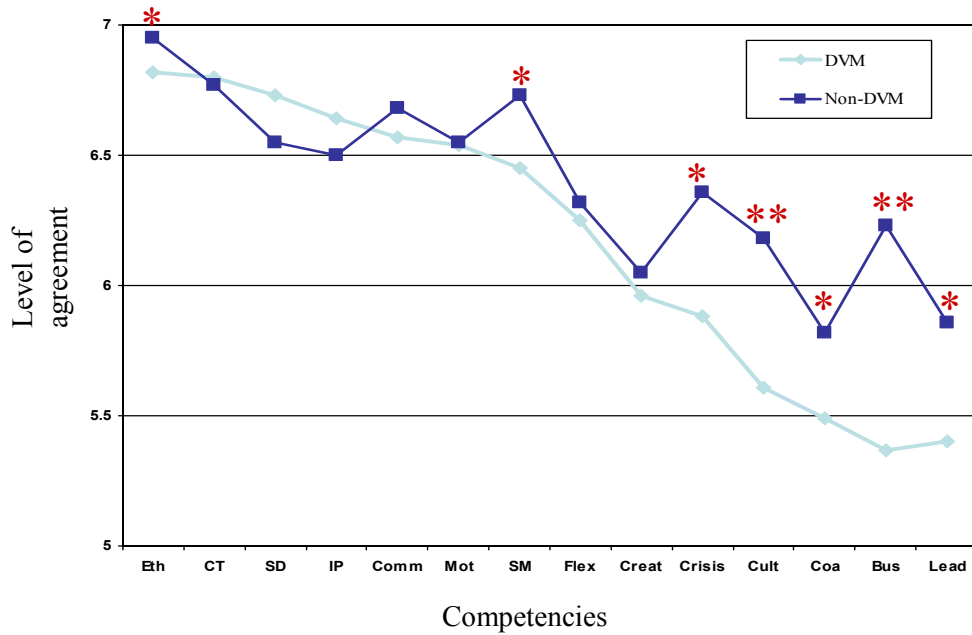


Figure 4.2. Mean ratings of nontechnical competencies by respondent's terminal degree. Single asterisks represent significant difference at the $p \leq 0.05$ level; double asterisks represent significant difference at the $p \leq 0.01$ level.

Table 4.14*Mean Level of Agreement for 14 Nontechnical Competencies by Degree of Respondent*

Competency	Degree		<i>t</i> (184)	<i>p</i>
	DVM (n=164)	Non-DVM (n=22)		
Ethics/Moral Responsibility	6.82 (.519)	6.95 (.213)	-2.16	.035*
Critical Thinking	6.80 (.441)	6.77 (.429)	.32	.748
Self-Development/ Lifelong Learning	6.73 (.532)	6.55 (.800)	1.06	.300
Interpersonal Skills	6.64 (.635)	6.50 (.802)	.94	.348
Communication Skills	6.57 (.657)	6.68 (.568)	-.78	.436
Motivation/Persistence	6.54 (.630)	6.55 (.671)	-.02	.985
Self-Management	6.45 (.737)	6.73 (.550)	-2.16	0.38*
Flexibility	6.25 (.929)	6.32 (.780)	-.33	.743
Creativity	5.96 (.889)	6.05 (.785)	-.44	.659
Crisis/Incident Mgmt	5.88 (.996)	6.36 (.848)	-2.18	.030*
Cultural Competence	5.61 (1.149)	6.18 (.733)	-3.18	.003**
Coaching Skills	5.49 (1.071)	5.82 (1.259)	1.31	.193
Business Skills	5.37 (1.068)	6.23 (.973)	-3.59	<.001**
Leadership	5.40 (1.100)	5.86 (1.037)	-1.97	.059

Note: Results are presented as *M* (*SD*). There was a significant effect of degree on mean ratings, $F(13, 172) = 2.80$, $p = .001$. *Significantly different at $p \leq .05$, ** $p \leq .01$.

Age, Year of Graduation, Years Teaching Experience. Respondents provided information regarding age in years, year of first terminal degree (*Year of Graduation*), and number of years he/she had been involved in teaching veterinary students (*Years Teaching*), including years as a house officer or graduate student, if those positions involved direct contact with professional veterinary students. Using Pearson correlation of raw data, mean ratings were not significantly correlated in a linear fashion with age in years, year of graduation or number of years teaching. The effect of age was examined by preliminary analysis of means by age in quartiles and several test groupings, including groups in five or ten year ranges, and groups by expected career stage. No significant interactions or overall effects for age were found using any grouping method and the variable *age* was eliminated from all further analyses.

However, when years teaching and year of graduation were examined in the same manner, significant interactions arose between ratings and year of graduation in quartiles ($p = .019$), and years teaching when grouped by expected career stage ($p = .026$). For year of graduation, graduates from 1993-2006 comprised the first quartile (Group 1), those from 1985 – 1992 the second quartile (Group 2), those from 1979-1984 the third quartile (Group 3), and those graduating before 1979 the final quartile (Group 4). For number of years teaching, groups defined by expected academic career stages including those teaching veterinary students for less than 9 years (Group 1, expected postgraduate studies and probationary faculty period), those teaching for 9 – 17 years (Group 2, expected advancement to associate professor and fulfillment of associate level tenure), those teaching for 18 – 24 years (Group 3, expected early full professor period), and

those teaching for 25 years or more (Group 4, established and advanced full professor).

For all additional analyses, year of graduation and years teaching will be reported in these groups as summarized in Table 4.15.

Year of graduation. There was a significant effect on mean ratings of competencies among respondents based on the year of first terminal degree, $F(39, 504) = 1.558, p = .019$ (see Table 4.16 and Figure 4.3). When examined in quartiles, significant differences were observed in Interpersonal Skills, $F(3, 182) = 2.838, p = .039$, and Motivation/ Persistence $F(3, 182) = 2.829, p = .04$, where Group 1 (the most recent graduates) ratings were higher than Group 2. Significant differences were also observed in Communication Skills, $F(3, 182) = 3.973, p = .013$, and Crisis/Incident Management, $F(3, 182) = 3.973, p = .009$, where Group 1 was different from both Groups 2 and 3.

Table 4.15

Classification of Groups for Career Stage Information

Group	Year Graduated		Years Teaching	
1	1993-2006	(n=46)	1 – 8 yrs	(n=44)
2	1985-1992	(n=45)	9 – 17 yrs	(n=50)
3	1979-1984	(n=48)	18 - 24 yrs	(n=50)
4	1960- 1978	(n=47)	≥ 25 yrs	(n=42)

Table 4.16*Mean Level of Agreement for 14 Nontechnical Competencies by Respondents' Year of Graduation*

Competency	Year of Graduation				<i>F</i> (3,182)	<i>p</i>
	Group 1 1993-2006 (<i>n</i> =46)	Group 2 1985-1992 (<i>n</i> =45)	Group 3 1979-1984 (<i>n</i> =48)	Group 4 1960-1978 (<i>n</i> =47)		
Ethics/Moral Responsibility	6.85 (.420)	6.82 (.490)	6.79 (.651)	6.89 (.375)	.36	.784
Critical Thinking	6.87 (.415)	6.76 (.561)	6.68 (.526)	6.88 (.326)	.71	.545
Self-Development/ Lifelong Learning	6.78 (.513)	6.60 (.654)	6.69 (.624)	6.77 (.476)	.98	.404
Interpersonal Skills	6.80 (.401) ^a	6.44 (.813)	6.54 (.771)	6.70 (.507)	2.84	.039*
Communication Skills	6.78 (.467) ^{a,b}	6.42 (.657)	6.44 (.848)	6.68 (.471)	3.72	.013
Motivation/Persistence	6.65 (.566) ^a	6.31 (.733)	6.58 (.647)	6.62 (.534)	2.83	.040*
Self-Management	6.54 (.622)	6.29 (.869)	6.65 (.601)	6.43 (.744)	2.14	.097
Flexibility	6.24 (.874)	6.11 (1.172)	6.38 (.761)	6.30 (.805)	.69	.561
Creativity	6.02 (.977)	5.98 (.866)	6.02 (.785)	5.85 (.884)	.39	.758

Table 4.16 *Continued*

Competency	Year of Graduation				<i>F</i> (3,182)	<i>p</i>
	Group 1 1993-2006 (<i>n</i> =46)	Group 2 1985-1992 (<i>n</i> =45)	Group 3 1979-1984 (<i>n</i> =48)	Group 4 1960-1978 (<i>n</i> =47)		
Crisis/Incident Management	6.26 (.828) ^{a,b}	5.71 (1.014)	5.69 (1.151)	6.09 (.830)	3.97	.009**
Cultural Competence	5.93 (.998)	5.58 (1.252)	5.48 (1.185)	5.72 (1.015)	1.46	.226
Coaching Skills	5.80 (1.167)	5.31 (1.145)	5.46 (1.031)	5.55 (1.017)	1.65	.179
Business Skills	5.52 (1.260)	5.40 (.939)	5.33 (1.038)	5.62 (1.114)	.63	.598
Leadership Skills	5.70 (1.152)	5.27 (1.195)	5.35 (1.082)	5.49 (.953)	1.33	.267

Note. There was a significant effect of graduation year on competency ratings, $F(39, 504) = 1.56, p = .019$. ^aGroup mean differs significantly from Group 2. ^bGroup mean differs significantly from Group 3.

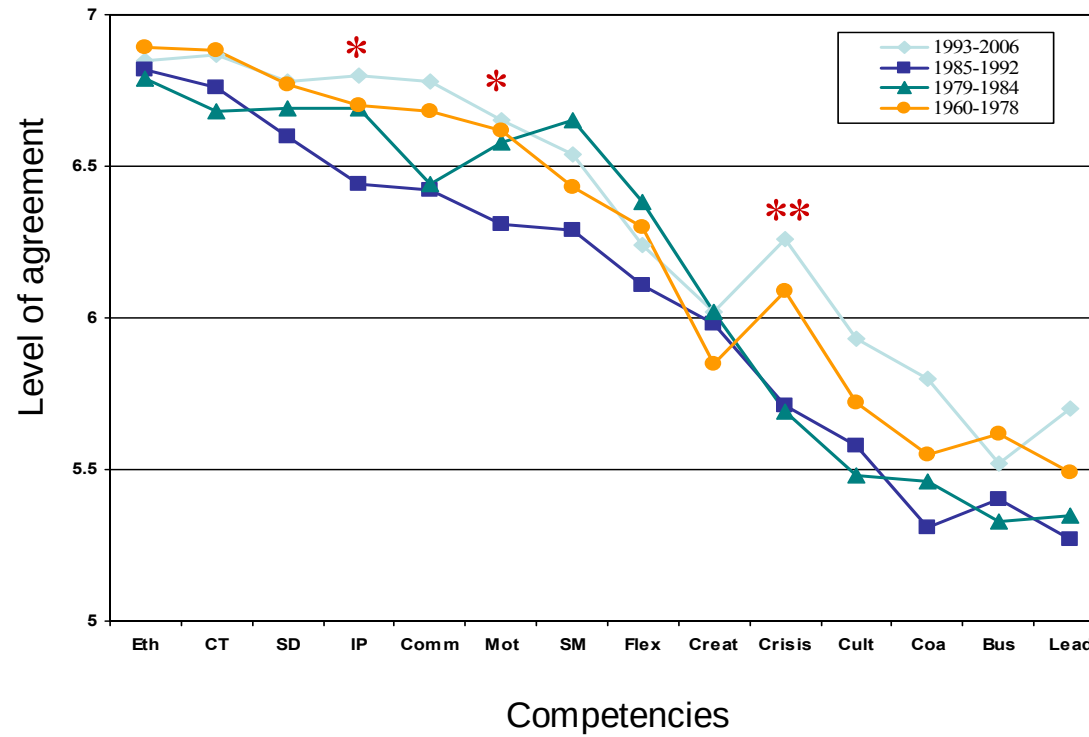


Figure 4.3. Mean level of agreement in the importance of nontechnical competencies by year of graduation, where 1 = strongly disagree and 7 = strongly agree. Single asterisks represent points of significant difference ($p < .05$); double asterisks indicate significant difference at $p < .01$.

Years teaching. There was a trend for mean ratings of importance to be highest in those respondents early in their teaching careers, and to decline from those with the least teaching experience (Group 1) to those with more teaching experience (Group 4), or to decline in groups 2 and 3 but rebound slightly in group 4 (see Table 4.17 and Figures 4.4 and 4.5). There was a significant interaction between mean ratings of competencies and years teaching by career stage group, $F(39, 504) = 1.52$, $p = .026$, where differences were observed in mean ratings of Interpersonal Skills, $F(3, 182) = 2.97$, $p = .033$, and Crisis/Incident Management, $F(3, 182) = 3.25$, $p = .023$. For both competencies, Group 1 mean responses were higher than Group 3 responses.

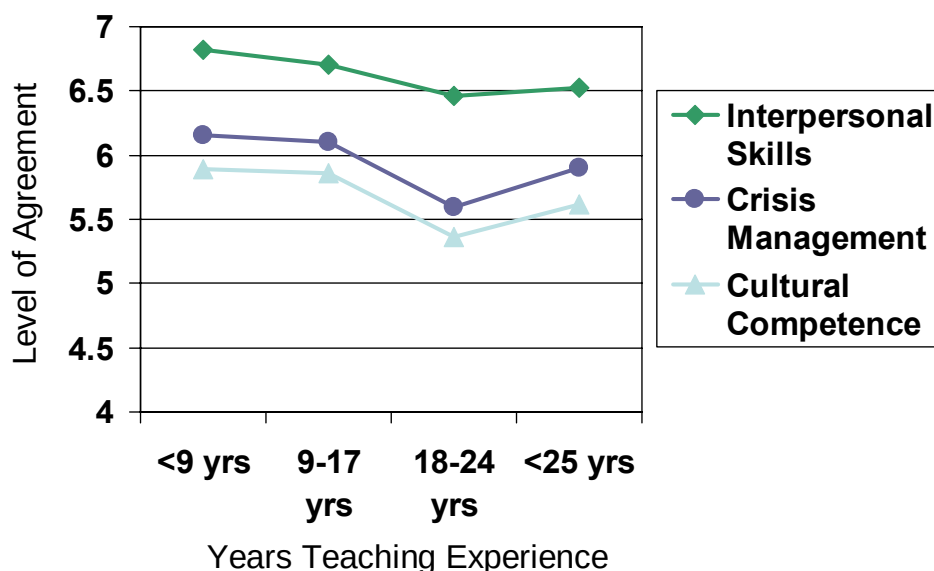


Figure 4.4. Trends in responses regarding the importance of three non-technical competencies by number of years teaching, using three representative examples. See Table 4.17 for data points.

Table 4.17*Mean Level of Agreement for 14 Nontechnical Competencies by Years of Teaching Experience*

Competency	Year s Teaching				<i>F</i> (39,504)	<i>p</i>
	Group 1 1 – 8 yrs (<i>n</i> =44)	Group 2 9 - 17 (<i>n</i> =50)	Group 3 18 – 23 yrs (<i>n</i> =50)	Group 4 ≥ 25 yrs (<i>n</i> =42)		
Ethics/Moral Responsibility	6.84 (.479)	6.82 (.438)	6.88 (.480)	6.81 (.594)	.19	.905
Critical Thinking	6.80 (.408)	6.84 (.422)	6.87 (.405)	6.70 (.507)	1.30	.266
Self-Development/ Lifelong Learning	6.82 (.446)	6.70 (.647)	6.67 (.477)	6.66 (.668)	.80	.498
Interpersonal Skills	6.82 (.446)	6.70 (.544)	6.46 (.838) ^a	6.52 (.671)	2.97	.033*
Communication Skills	6.68 (.639)	6.58 (.609)	6.56 (.675)	6.50 (.672)	.59	.622
Motivation/Persistence	6.64 (.532)	6.56 (.705)	6.46 (.646)	6.52 (.634)	.63	.599
Self-Management	6.59 (.622)	6.54 (.646)	6.42 (.835)	6.36 (.759)	.98	.403
Flexibility	6.14 (1212)	6.22 (.887)	6.38 (.725)	6.29 (.774)	.60	.617
Creativity	6.00 (.988)	6.04 (.856)	5.98 (.769)	5.83 (.908)	.46	.709

Table 4.17 *Continued*

Competency	Years Teaching				<i>F</i> (39,504)	<i>p</i>
	Group 1 1 – 8 yrs (<i>n</i> =44)	Group 2 9 - 17 (<i>n</i> =50)	Group 3 18 – 23 yrs (<i>n</i> =50)	Group 4 ≥ 25 yrs (<i>n</i> =42)		
Crisis/Incident Management	6.16 (.776)	6.10 (.974)	5.60 (1.069) ^a	5.90 (1.031)	3.25	.023*
Cultural Competence	5.89 (1.104)	5.86 (.926)	5.36 (1.156)	5.62 (1.248)	2.38	.072
Coaching Skills	5.80 (1.193)	5.46 (1.092)	5.30 (1.035)	5.62 (1.035)	1.78	.153
Business Skills	5.66 (1.077)	5.46 (1.182)	5.40 (.990)	5.36 (1.122)	.66	.580
Leadership Skills	5.48 (1.267)	5.60 (1.010)	5.26 (1.121)	5.48 (.994)	.82	.484

Note. There was a significant effect of years teaching experience on competency ratings, $F(39, 504) = 1.46, p = .038$.

*Significant difference in groups at $p < 0.05$. ^aGroup mean differs from Group 1 mean.

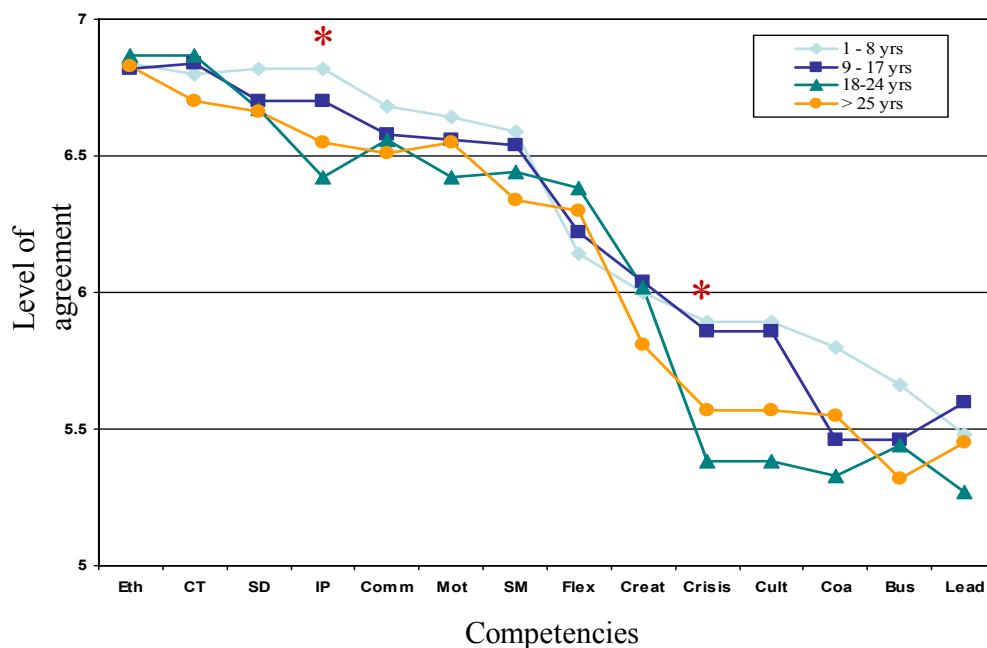


Figure 4.5. Mean level of agreement in the importance of nontechnical competencies by years experience teaching, where 1 = strongly disagree and 7 = strongly agree. Single asterisks represent points of significant difference ($p < .05$).

Between Subject Effects

Discipline. There was an overall effect of primary discipline focus on mean ratings of competencies (see Fig 4.6 and Table 4.12). Means were highest for Clinical Science-Other respondents (grand $M = 6.46$), followed in order by Basic Science (6.35), Clinical Science – Diagnostic Sciences (6.21), Clinical Science- Small Animal Predominant (6.11), and Clinical Science – Large Animal Predominant (5.98). Between subjects, Clinical Science- Large Animal Predominant respondents were significantly different from Clinical Science- Other and Basic Science respondents ($p \leq .05$).

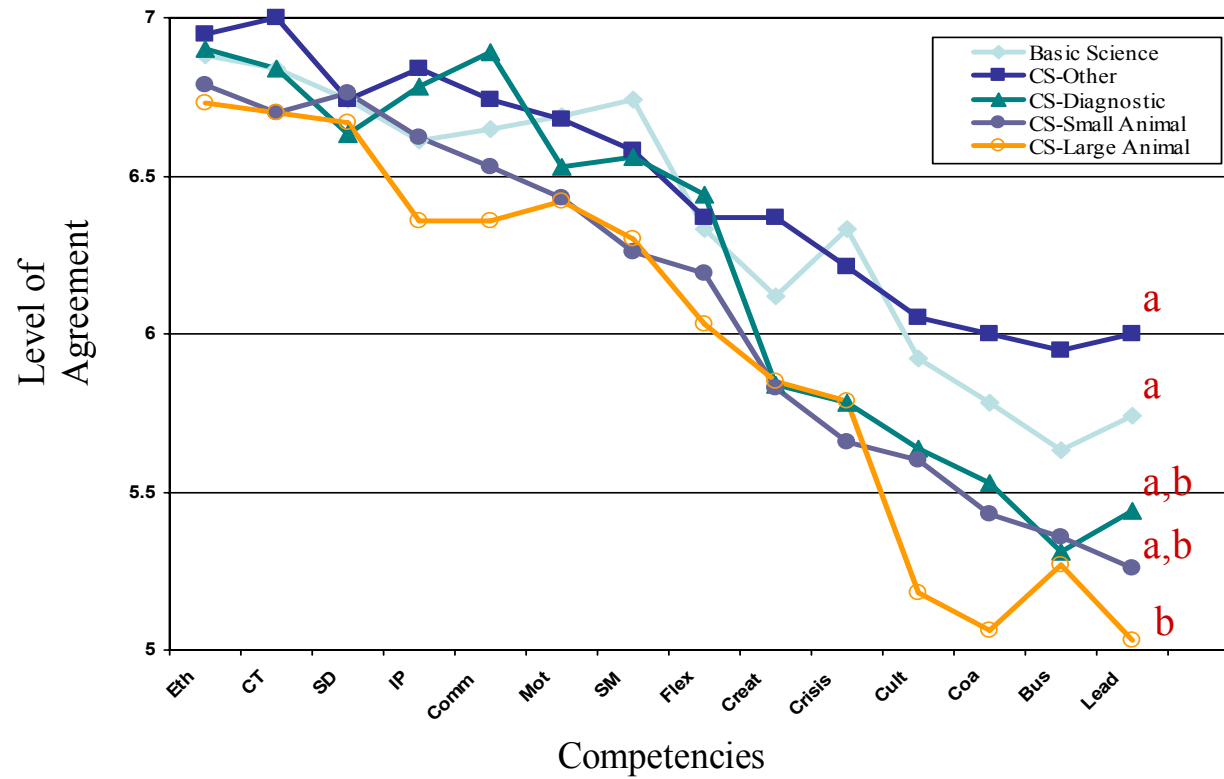


Figure 4.6. Mean level of agreement regarding the importance of non-technical competencies for respondents in five disciplinary areas, where 1 = strongly disagree and 7 = strongly agree. CS= Clinical Science. Series with superscript letters in commons are not significantly different.

Gender. A trend toward an overall effect of gender may be discerned, where ratings of importance of nontechnical competencies were slightly higher for female respondents than male respondents (see Table 4.10 and Figure 4.7). However, neither interaction nor overall effect was statistically significant, $F(1,177) = 3.48, p = .064$.

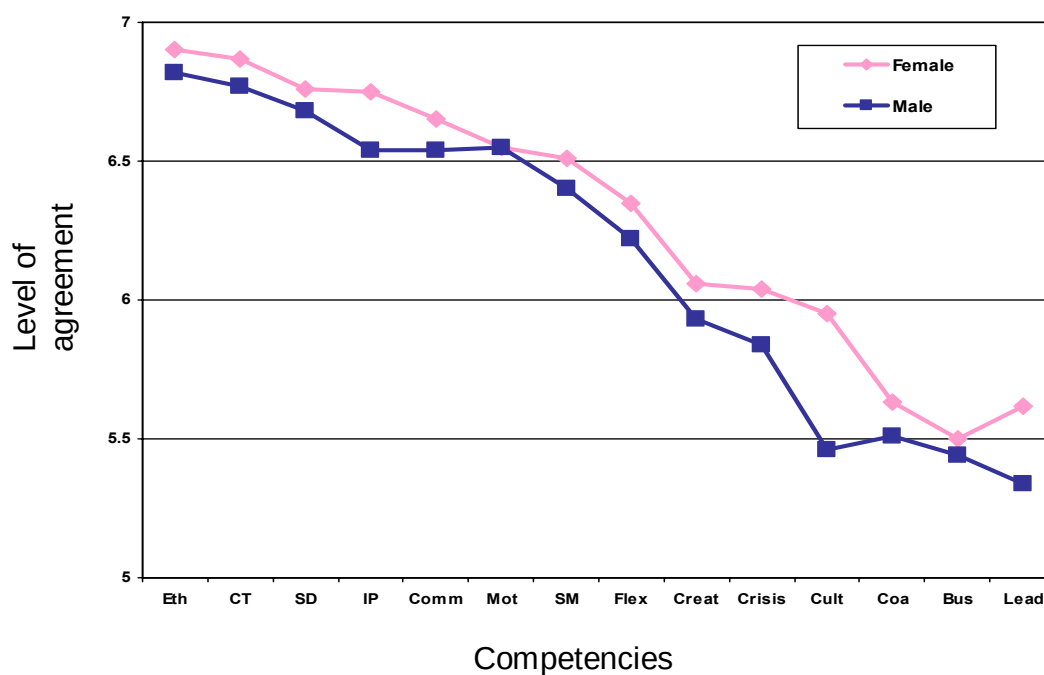


Figure 4.7. Mean ratings of competencies by gender of respondent. There were no significant interactions between gender and the pattern of mean ratings; the overall effect of gender on ratings did not reach statistical significance, $F(1,177) = 3.48, p = .064$.

Research Question 2.

Do veterinary faculty members perceive that nontechnical competencies should be taught in the veterinary curriculum, or acquired elsewhere?

Respondents who rated the importance of a competency above 4 on the 7 point scale were also asked where that competency should be taught or cultivated, with the opportunity to select any or all of four responses: prior to entering professional veterinary education, during preclinical professional veterinary education, during clinical professional veterinary education, and following completion of professional veterinary education. Support is observed for attention to these competencies across this continuum of professional development. Frequency data, including the number and percentage of respondents placing competency development in each phase, are given in Table 4.18. Unfortunately, an undetermined technical error did not appropriately direct some respondents to this question for Communication Skills; the data for placement of this competency includes fewer responses than expected based on ratings of importance.

Which Competencies Should be Taught or Cultivated During each Training Period?

Percentage results. Communication Skills (included by 85% of respondents to this question), Cultural Competence (83%) and Ethics/Moral Responsibility (80%) were the competencies most commonly placed in the *preveterinary* educational period. These competencies were followed by Leadership Skills, Motivation/Persistence and Interpersonal Skills (all above 75%, see Figure 4.8). Faculty respondents less frequently

Table 4.18*Placement of Nontechnical Competency Development in Veterinary Training*

Competency	Total Number of Responses	Prior to veterinary training	During preclinical veterinary training	During clinical veterinary training	Following DVM degree
Ethics and Moral Integrity	184	148 (80%)	144 (78%)	130 (71%)	100 (54%)
Critical Thinking	186	124 (67%)	161 (87%)	158 (85%)	114 (61%)
Self- Development/Lifelong Learning	185	110 (59%)	135 (73%)	142 (77%)	132 (71%)
Interpersonal Skills	183	138 (75%)	128 (70%)	133 (73%)	79 (43%)
Communication Skills	151*	129 (85%)	135 (89%)	131(87%)	99 (66%)
Motivation/Persistence	186	146 (78%)	123 (66%)	124 (67%)	72 (39%)
Self-Management	185	120 (65%)	119 (64%)	140 (76%)	71 (38%)
Flexibility	180	130 (72%)	118 (66%)	141 (78%)	96 (53%)
Creativity	179	126 (70%)	119 (66%)	145 (81%)	110 (61%)
Crisis/Incident Mgmt	173	46 (46%)	98 (57%)	147 (85%)	120 (69%)
Cultural Competence	163	136 (83%)	95 (58%)	110 (75%)	92 (56%)
Coaching Skills	159	94 (59%)	94 (59%)	102 (64%)	97 (61%)
Business Skills	155	59 (38%)	99 (64%)	110 (71%)	110 (71%)
Leadership Skills	152	119 (78%)	100 (66%)	101 (66%)	88 (58%)

Note. Results are given as number of respondents (with percentage of the total number in parentheses) placing competency development in each educational phase. *Numbers of respondents are underrepresented due to technical error.

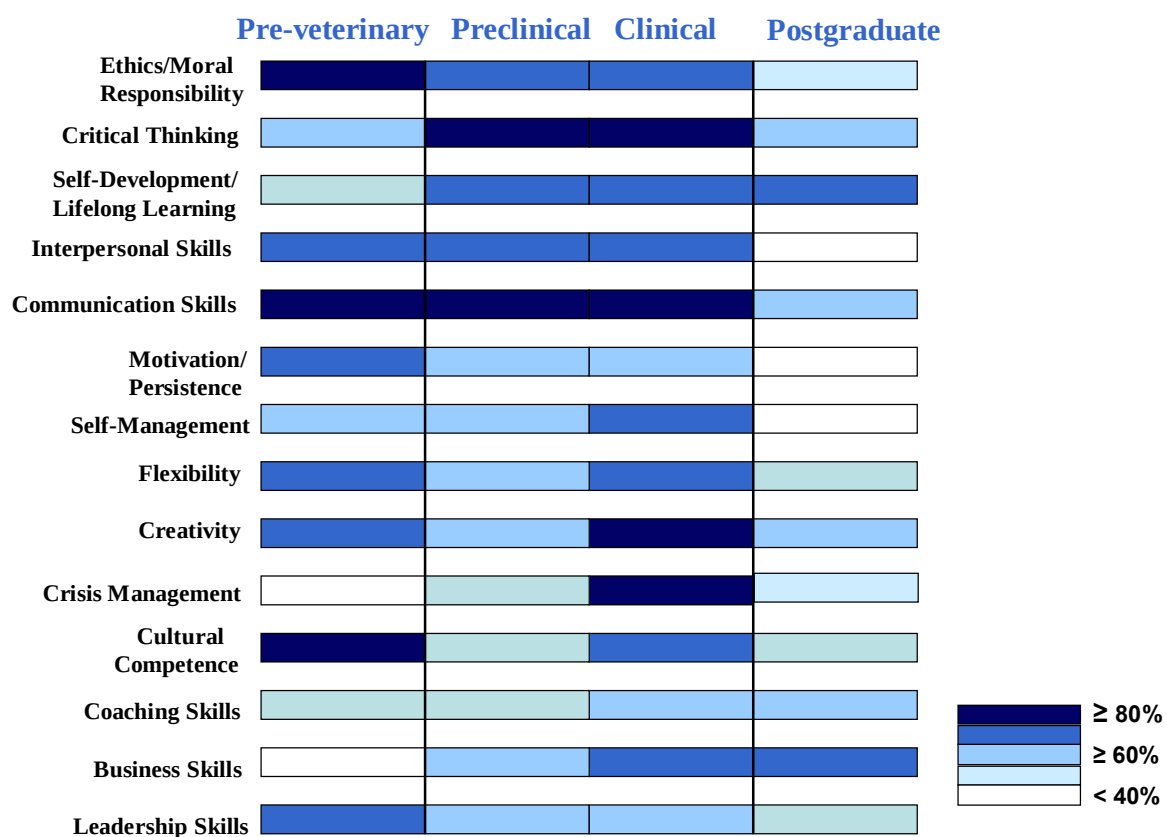


Figure 4.8. Schematic representation of respondents' support for development of non-technical competencies during the continuum of veterinary education. Deepening color shades represent higher percentages of respondents agreeing that a competency should be taught or cultivated in each phase (pre-veterinary, preclinical veterinary, clinical veterinary and postgraduate training). See text for description of educational phases.

cited Crisis/Incident Management (46%) and Business Skills (38%) for development prior to admission.

The majority (>50%) of faculty respondents indicated that attention should be paid to all 14 competencies during the professional veterinary curriculum. During the *preclinical veterinary curriculum*, Communication Skills (89%), Critical Thinking (87%) and Ethics/Moral Responsibility (78%) are cited the most frequently. Crisis/Incident Management, Cultural Competence, and Coaching Skills received the lowest degree of support (< 60% of respondents included these competencies).

As one might expect, support for developing nontechnical competence is highest during the hands-on, clinical portion of veterinary education, including wide support for attention to Communication Skills (87%), Critical Thinking (85%), Crisis/Incident Management (85%), and Creativity (81%). The cultivation of several other competencies was supported largely in the clinical training period as well, including Self-Development/Lifelong Learning, Self-Management, Flexibility, and Business Skills.

Additional development of many of these skills is expected to continue after graduation from veterinary school. In particular, faculty respondents point to the postgraduate period for the refinement of Self-Development/Lifelong Learning Skills and Business Skills (71% of respondents agreed for both competencies). Other strongly supported competencies for postdoctoral development included Crisis/Incident Management (69%) and Communication Skills (66%).

Total Numbers. Since respondents who did not agree that a competency was important were not asked to respond regarding placement of each competency, reviewing

the data by total number of responses, rather than by percentage of respondents, provides additional insight into faculty perspectives. The total number reflects both the relative importance and the placement of the competency in the spectrum of veterinary education. Using total numbers, the highest numbers of faculty respondents agreed that Ethics/Moral Responsibility ($n = 148$), Motivation/Persistence (146), and Interpersonal Skills (138) should be taught or cultivated prior to entering veterinary school. The lowest numbers of respondents agreed that Coaching Skills (94), Business Skills (59) and Crisis/Incident Management (46) should be taught or cultivated *prior to formal veterinary training*.

The highest number of faculty respondents agreed that Critical Thinking ($n = 161$), Ethics/Moral Responsibility (144), Self-Development/Lifelong Learning (135) and Communication Skills (135) should be taught or cultivated during *preclinical veterinary training*. These competencies also are among the five competencies rated highest in overall importance by all respondents. Fewer total respondents indicated support for developing Crisis/Incident Management ($n = 98$), Cultural Competence (95), and Coaching Skills (94) in the preclinical veterinary curriculum.

During *clinical veterinary training*, Critical Thinking ($n = 158$), Crisis/Incident Management (147) and Creativity (145) received the most support. The highest number of faculty respondents agreed that Self-Development/Lifelong Learning (132), Crisis/Incident Management (120), and Critical Thinking (114) should continue to be cultivated following completion of the formal professional veterinary curriculum (*in postgraduate education*).

What Factors Influence Placement of Competency Development?

Overall, there was consensus support for the place of nontechnical competencies during the clinical veterinary curriculum, especially from respondents working in the clinical disciplines. With the exception of career stage indicators, the influence of independent variables, where observed, was most often detected in faculty views of the preveterinary, preclinical veterinary and postgraduate components of a veterinarian's education and development.

Institution. Differences among institutional responses were observed regarding nontechnical competency placement in preveterinary and preclinical veterinary education (see Table 4.19). Institution D faculty viewed the preveterinary period as an important place for nontechnical competency development. There was a trend for these respondents to be more likely than faculty from other institutions to agree that each of the fourteen competencies be cultivated prior to admission; however, only results for Critical Thinking ($p = .032$), Self-Development/Lifelong Learning ($p = .004$), and Flexibility ($p = .011$) reached statistical significance. Faculty from Institution E, which relies heavily on a problem-based curriculum, were more likely than faculty from other institutions to support cultivation of nontechnical competencies during the preclinical (typically classroom or laboratory based) portion of the veterinary professional curriculum; significant differences were observed for Critical Thinking ($p = .038$), Self-Development/Lifelong Learning ($p = .009$), Self-Management ($p = .001$), Motivation/Persistence ($p = .049$), and Crisis Management ($p = .012$). Institution E

Table 4.19*Associations Among Institution of Respondent and Placement of Nontechnical Competencies in Veterinary Education*

Competency		Institution				χ^2	<i>p</i>
		A	B	C	D	E	
Ethics/Moral Responsibility		n = 60	n = 33	n = 39	n = 25	n = 27	
	Preveterinary	45 (60)	25 (26)	28 (31)	24 (20)	24 (22)	7.90 .095
	Preclinical	45 (47)	24 (26)	31 (31)	20 (20)	25 (21)	4.35 .360
	Clinical	41 (43)	22 (24)	28 (28)	18 (18)	22 (19)	1.97 .740
	Postgraduate	32 (33)	18 (18)	18 (21)	14 (14)	18 (18)	2.76 .599
Critical Thinking		n = 60	n = 33	n = 39	n = 26	n = 27	
	Preveterinary	40 (40)	21 (22)	20 (26) ^b	23 (17) ^a	20 (18)	1.056 .032
	Preclinical	48 (52)	26 (29)	34 (34)	25 (22)	27 (23) ^a	10.15 .038
	Clinical	49 (51)	25 (28)	36 (33)	25 (22)	23 (23)	7.03 .134
	Postgraduate	34 (37)	18 (20)	25 (24)	18 (16)	19 (17)	2.93 .569

Table 4.19 *Continued*

Competency	Institution					χ^2	<i>p</i>
	A	B	C	D	E		
Self-Development/ Lifelong Learning	n = 60	n = 32	n = 40	n = 26	n = 27		
Preveterinary	35 (36)	16 (19)	17 (24) ^b	22 (16) ^a	20 (16)	15.21	.004
Preclinical	44 (44)	18 (24) ^b	27 (29)	21 (19)	26 (20) ^a	13.54	.009
Clinical	45 (46)	23 (24)	35 (31)	18 (19)	21 (21)	2.66	.616
Postgraduate	40 (43)	21 (23)	32 (29)	19 (19)	20 (19)	2.75	.599
Interpersonal Skills	n = 59	n = 33	n = 40	n = 24	n = 27		
Preveterinary	45 (44)	23 (25)	27 (30)	2 (18)	19 (20)	5.46	.243
Preclinical	39 (42)	21 (24)	26 (28)	20 (17)	23 (19)	6.57	.160
Clinical	43 (43)	22 (24)	28 (29)	18 (17)	22 (20)	1.86	.761
Postgraduate	25 (25)	10 (14)	15 (17)	15 (10)	13 (12)	6.69	.153
Communication Skills	n = 47	n = 26	n = 35	n = 19	n = 24		
Preveterinary	39 (40)	23 (22)	28 (30)	17 (16)	21 (20)	.147	.832
Preclinical	40 (42)	23 (23)	32 (32)	19 (17)	22 (22)	3.60	.462
Clinical	41 (14)	22 (23)	31 (31)	18 (17)	20 (21)	1.51	.823
Postgraduate	33 (31)	18 (17)	19 (22)	12 (13)	17 (16)	2.92	.571

Table 4.19 *Continued*

Competency		Institution					χ^2	<i>p</i>
		A	B	C	D	E		
Motivation/Persistence		n = 47	n = 26	n = 35	n = 19	n = 24		
	Preveterinary	44 (47)	25 (25)	28 (31)	25 (20)	22 (21)	7.36	.118
	Preclinical	34 (40) ^b	19(22)	28 (27)	20 (17)	23 (18) ^a	9.53	.049
	Clinical	38 (40)	19 (2)	30 (27)	17 (17)	20 (18)	3.46	.484
	Postgraduate	20 (23)	12 (13)	19 (16)	8 (10)	13 (10)	3.81	.432
Self-Management		n = 60	n = 32	n = 40	n = 26	n = 27		
	Preveterinary	43 (39)	22 (21)	20 (26)	20 (17)	16 (18)	7.36	.118
	Preclinical	36 (39)	21 (21)	17 (26) ^b	22 (17) ^a	23 (17) ^a	18.60	.001
	Clinical	43 (45)	20 (24)	32 (30)	20 (20)	25 (20)	8.16	.086
	Postgraduate	22 (23)	11 (12)	13 (15)	10 (10)	14 (10)	2.94	.568
Flexibility		n = 58	n = 31	n = 40	n = 24	n = 27		
	Preveterinary	42 (42)	21 (22)	22 (29) ^b	23 (17) ^a	21 (19)	13.12	.011
	Preclinical	34 (38)	20 (21)	26 (26)	17(16)	22 (18)	4.59	.331
	Clinical	44 (45)	23 (24)	35 (31)	18 (19)	21 (21)	2.66	.616
	Postgraduate	29 (31)	17 (17)	21 (22)	12 913)	18 (15)	2.31	.678

Table 4.19 *Continued*

Competency		Institution					χ^2	<i>p</i>
		A	B	C	D	E		
Creativity		n = 55	n = 32	n = 39	n = 25	n = 27		
	Preveterinary	39 (39)	22 (23)	23 (28)	22 (18)	20 (19)	6.41	.171
	Preclinical	32 (37)	17 (21)	27 (26)	20 (17)	22 (18)	9.14	.058
	Clinical	46 (45)	22 (26)	31 (32)	21 (20)	24 (22)	4.64	.326
	Postgraduate	34 (34)	14 (20)	25 (4)	17 (15)	20 (17)	6.63	.157
Crisis/Incident Mgmt		n = 55	n = 31	n = 35	n = 24	n = 27		
	Preveterinary	14 (14)	5 (8)	7 (9)	11 (6)	8 (7)	7.29	.121
	Preclinical	30 (31)	13 (18)	16 (20)	19 (14) ^a	20 (15) ^a	12.85	.012
	Clinical	46 (47)	26 (26)	29 (30)	21 (20)	24 (23)	.669	.955
	Postgraduate	34 (38)	19 (22)	28 (25)	18 (17)	21 (19)	5.57	.233
Cultural Competence		n = 49	n = 29	n = 34	n = 23	n = 27		
	Preveterinary	40 (41)	25 (24)	26 (29)	21 (19)	24 (23)	3.12	.537
	Preclinical	30 (29)	13 (17)	18 (20)	13 (14)	21 (16)	6.99	.136
	Clinical	33 (33)	16 (20)	24 (23)	15 (15)	21 (18)	3.49	.478
	Postgraduate	30 (28)	16 (17)	19 (19)	10 (13)	17 (15)	2.51	.642

Table 4.19 *Continued*

Competency		Institution					χ^2	<i>p</i>
		A	B	C	D	E		
Coaching Skills		n = 48	n = 26	n = 37	n = 23	n = 25		
	Preveterinary	26 (28)	15 (15)	17 (21)	18 (13)	16 (15)	6.73	.151
	Preclinical	26 (28)	14 (15)	22 (22)	13 (14)	18 (15)	2.53	.639
	Clinical	32 (31)	16 (17)	22 (24)	13 (15)	20 (16)	3.87	.432
	Postgraduate	28 (30)	15 (16)	25 (23)	13 (14)	17 (15)	1.62	.804
Business Skills		n = 48	n = 27	n = 35	n = 21	n = 24		
	Preveterinary	17 (18)	7 (10)	10 (13)	13 (8)	11 (9)	8.87	.064
	Preclinical	35 (31)	14 (17)	18 (22)	16 (13)	16 (15)	7.20	.126
	Clinical	30 (34)	19 (19)	26 (25)	18 (15)	18 (17)	4.29	.368
	Postgraduate	34 (34)	16 (19)	28 (25)	16 (15)	16 (17)	3.67	.452

Table 4.19 *Continued*

Competency	Institution					χ^2	<i>p</i>
	A	B	C	D	E		
Leadership	n = 46	n = 26	n = 35	n = 22	n = 23		
Preveterinary	37 (36)	17 (20)	27 (27)	18 (17)	19 (18)	3.00	.556
Preclinical	28 (30)	15 (17)	22 (23)	16 (15)	19 (15)	4.74	.314
Clinical	29 (31)	18 (17)	21 (23)	15 (15)	18 (15)	2.45	.653
Postgraduate	22 (27)	15 (15)	21 (20)	13 (13)	17 (13)	4.41	.353

Note. Chi-Square analysis for independence results are given as observed number by response, with expected counts given in parentheses. ^aObserved count greater than expected; ^bobserved count less than expected.

faculty were joined in this response pattern by Institution D respondents for the competencies Self-Management and Crisis/Incident Management.

The most divergence in responses based on institutional affiliation was observed regarding placement of several intrapersonal competencies: Critical Thinking, Self-Management, and Self-Development/Lifelong Learning. Institution C respondents were less likely, and Institution D and E respondents were more likely, to agree that Critical Thinking ($p = .032$) be taught in the *preveterinary* period and Self-Management ($p = .001$) be taught or cultivated in the *preclinical* period. For Self-Development/Lifelong Learning, Institution C faculty were less likely, and Institution D faculty were more likely, to agree that the competency be cultivated *prior to veterinary school* ($p = .004$). Institution B (less likely to agree) and Institution E (more likely to agree) faculty respondents differed from the majority regarding the development of this competency in *preclinical veterinary training* ($p = .009$). There were no differences among institutions regarding the cultivation of nontechnical competencies during the clinical or postgraduate training periods.

Gender. Female respondents were more likely than male respondents to agree that nontechnical competencies be cultivated throughout the professional veterinary program, notably in the preclinical years and the years following graduation (see Table 4.20 and Figure 4.9). Female faculty members were more likely to support the development of Critical Thinking ($p = .041$), Self-Development/Lifelong Learning, ($p = .04$), Interpersonal Skills ($p = .048$), Self-Management, ($p = .015$), and Business Skills ($p = .011$), in the *preclinical* years.

Table 4.20***Associations Between Gender and Placement of Nontechnical Competencies in Veterinary Education***

Competency	Gender		χ^2	<i>p</i>
	Male	Female		
Ethics/Moral Responsibility	<i>n</i> = 93	<i>n</i> = 84		
Preveterinary	73 (75)	69 (67)	.370	.543
Preclinical Veterinary	69 (73)	69 (65)	1.62	.203
Clinical Veterinary	67 (66)	58(59)	.12	.662
Postgraduate	48 (50)	48 (46)	.544	.461
Critical Thinking	<i>n</i> = 95	<i>n</i> = 84		
Preveterinary	59 (63)	60 (56)	1.73	.187
Preclinical Veterinary	77 (82)	77 (72)	4.18	.041*
Clinical Veterinary	80 (81)	73 (72)	.26	.610
Postgraduate	52 (58)	57 (51)	3.22	.073
Self-Development/ Lifelong Learning	<i>n</i> = 94	<i>n</i> = 84		
Preveterinary	52 (55)	53 (50)	1.10	.292
Preclinical Veterinary	62 (68)	67 (61)	4.23	.040*
Clinical Veterinary	70 (72)	67 (65)	.70	.402
Postgraduate	61 (67)	65 (59)	3.34	.067
Interpersonal Skills	<i>n</i> = 93	<i>n</i> = 83		
Preveterinary	69 (70)	63 (62)	.07	.794
Preclinical Veterinary	59 (65)	64 (58)	3.89	.048*
Clinical Veterinary	67 (67)	60(60)	.001	.971
Postgraduate	33 (40)	42 (35)	4.09	.043

Table 4.20 Continued

Competency	Male	Female	χ^2	<i>p</i>
Communication Skills	<i>n</i> = 74	<i>n</i> = 70		
Preveterinary	61 (63)	61 (59)	.62	.432
Preclinical Veterinary	66 (67)	64 (63)	.206	.650
Clinical Veterinary	64 (65)	62 (61)	.14	.705
Postgraduate	41 (49)	54 (46)	7.57	.006*
Motivation/Persistence	<i>n</i> = 95	<i>n</i> = 84		
Preveterinary	70 (74)	70 (66)	2.43	.119
Preclinical Veterinary	61 (63)	57 (55)	.26	.607
Clinical Veterinary	65 (63)	53 (55)	.56	.453
Postgraduate	32 (36)	36 (32)	1.59	.207
Self-Management	<i>n</i> = 94	<i>n</i> = 84		
Preveterinary	56 (61)	60 (55)	2.74	.097
Preclinical Veterinary	53 (61)	62 (54)	5.89	.015*
Clinical Veterinary	73 (71)	61 (63)	.61	.436
Postgraduate	30 (35)	36 (31)	2.27	.131
Flexibility	<i>n</i> = 92	<i>n</i> = 82		
Preveterinary	64 (67)	62 (59)	.79	.373
Preclinical Veterinary	58 (60)	56 (54)	.53	.467
Clinical Veterinary	69 (71)	66 (64)	.75	.386
Postgraduate	47 (4)	54 (46)	7.57	.006**

Table 4.20 Continued

Competency	Male	Female	χ^2	<i>p</i>
Creativity	<i>n</i> = 93	<i>n</i> = 80		
Preveterinary	61 (66)	61 (56)	2.35	.125
Preclinical Veterinary	60 (61)	54 (53)	.17	.680
Clinical Veterinary	72 (75)	68 (65)	1.60	.206
Postgraduate	46 (57)	60 (49)	11.82	.001**
Crisis/Incident Mgmt	<i>n</i> = 85	<i>n</i> = 81		
Preveterinary	26 (22)	17 (21)	1.999	.158
Preclinical Veterinary	51 (49)	44 (46)	.55	.460
Clinical Veterinary	70 (72)	70 (68)	.52	.471
Postgraduate	55 (59)	60 (56)	1.71	.191
Cultural Competence	<i>n</i> = 78	<i>n</i> = 79		
Preveterinary	66 (66)	67 (67)	.001	.973
Preclinical Veterinary	44 (45)	47 (46)	.15	.696
Clinical Veterinary	49 (52)	55 (52)	.81	.368
Postgraduate	39 (44)	49 (44)	2.30	.129
Coaching Skills	<i>n</i> = 78	<i>n</i> = 76		
Preveterinary	46 (46)	45 (45)	.001	.976
Preclinical Veterinary	45 (47)	47 (45)	.28	.600
Clinical Veterinary	48 (50)	50 (48)	.30	.584
Postgraduate	38 (48)	56 (46)	10.09	.001**

Table 4.20 Continued

Competency	Male	Female	χ^2	<i>p</i>
Business Skills	<i>n</i> = 82	<i>n</i> = 67		
Preveterinary	30 (31)	26 (25)	.80	.781
Preclinical Veterinary	46 (53)	51 (44)	6.50	.011*
Clinical Veterinary	54 (58)	52 (48)	2.48	.115
Postgraduate	52 (58)	53 (47)	4.36	.037*
Leadership	<i>n</i> = 73	<i>n</i> = 74		
Preveterinary	52 (57)	63 (58)	4.17	.041*
Preclinical Veterinary	47 (48)	50 (49)	.166	.684
Clinical Veterinary	49 (48)	48 (49)	.084	.773
Postgraduate	38 (42)	47 (43)	1.97	.160

Note. Chi-Square analysis for independence results are given as observed number by response, with expected counts given in parentheses. *Observed counts differed between genders.

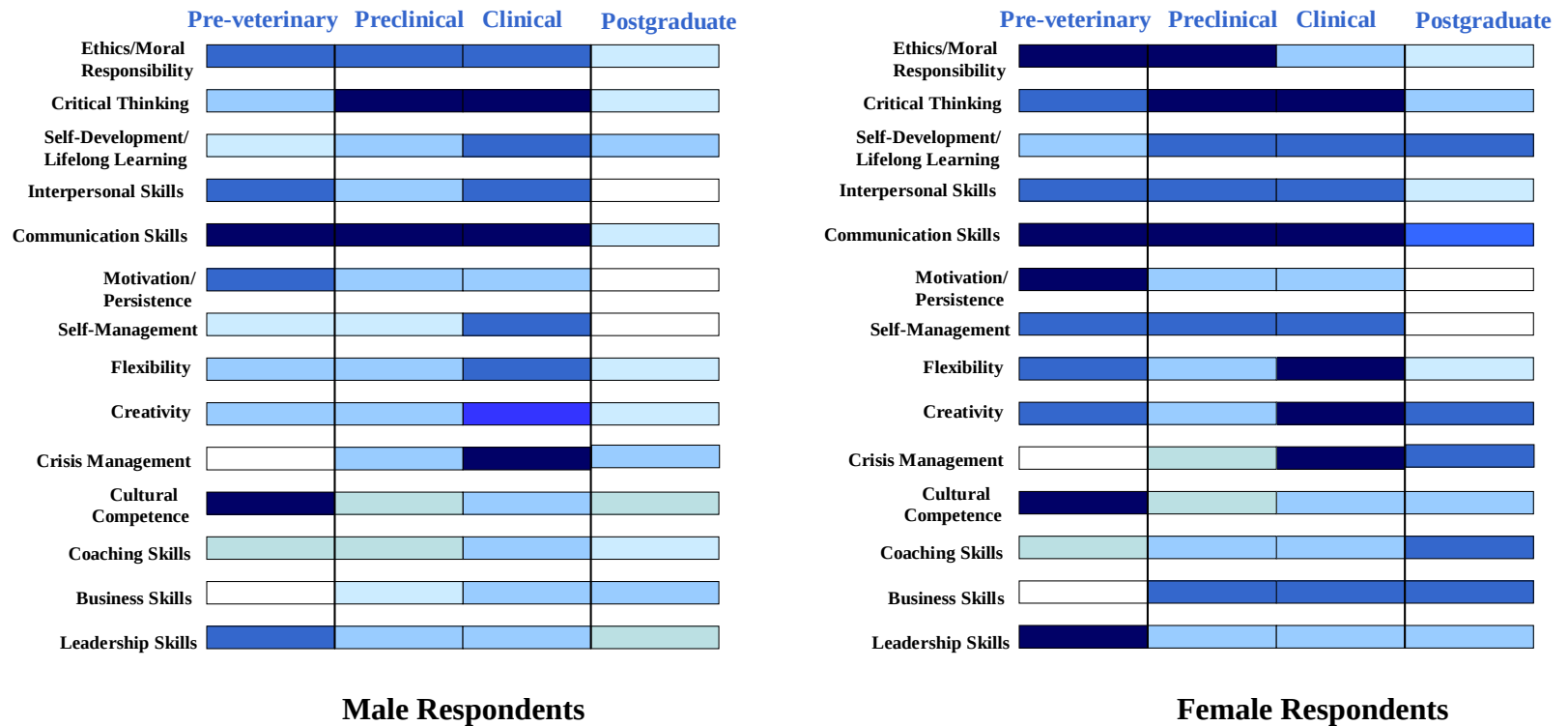


Figure 4.9. Schematic representations comparing male and female respondents' support for the development of nontechnical competencies during the continuum of veterinary education. Deepening color shades represent higher percentages of respondents agreeing that a competency should be taught or cultivated in each phase (pre-veterinary, preclinical veterinary, clinical veterinary, and postgraduate training. See Figure 4.7 for color legend.

Females were also more likely than males to agree that Interpersonal Skills ($p = .043$), Communication Skills ($p = .006$), Creativity ($p = .001$), Coaching Skills ($p = .001$), and Business Skills ($p = .037$), development should be continued in the *postgraduate* years (see Table 4.20 for data points and statistical details).

Year of Graduation. A surprising trend emerged when faculty placement of nontechnical competencies was analyzed by year of respondent's terminal degree. Graduation years were grouped by quartiles, leading to a fairly large range of graduates in Group 1 (degrees from 1993-2006) and Group 4 (degrees from 1960 – 1978). For many nontechnical competencies, the most recent graduates (Group 1) were less likely to include its development in one or more educational phases. For example, Group 1 faculty were significantly less likely than faculty in other groups to indicate that Interpersonal Skills be developed in the *preveterinary* ($p = .045$), or *clinical* veterinary periods ($p = .018$). Other significant findings for Group 1 are summarized as follows (see also Table 4.21 for statistical details): Group 1 respondents were significantly less likely to place cultivation of Self-Management, Motivation/Persistence, Ethics/Moral Responsibility, Self-Development/Lifelong Learning, Flexibility, Leadership Skills, and Business Skills in the clinical phase of veterinary education. These respondents also were significantly less likely to place Creativity in the preclinical veterinary curriculum and to place Self-Development/Lifelong Learning in the postgraduate period.

Table 4.21***Association Between Respondents' Year of Graduation and Placement of Nontechnical Competencies in Veterinary Education***

Competency	Year Graduated				χ^2	<i>p</i>
	1993-2006	1985-1992	1979-1984	1960-1978		
Ethics/Moral Responsibility	<i>n</i> = 46	<i>n</i> = 45	<i>n</i> = 46	<i>n</i> = 47		
Preveterinary	32 (37)	40 (36) ^a	40 (37)	35 (37)	7.61	.055
Preclinical	31 (36)	37 (36)	37 (36)	40 (37)	5.09	.165
Clinical	25 (33) ^b	37 (32)	34 (33)	35 (34)	9.44	.024*
Postgraduate	20 (25)	26 (25)	28 (25)	26 (26)	93.21	.360
Critical Thinking	<i>n</i> = 46	<i>n</i> = 45	<i>n</i> = 48	<i>n</i> = 46		
Preveterinary	26 (31)	34 (30)	35 (32)	29 (31)	4.860	.182
Preclinical	36 (40)	42 (39)	40 (41)	42 (39)	5.79	.122
Clinical	37 (39)	41 (39)	44 (41)	36 (39)	5.48	.140
Postgraduate	27 (28)	29 (28)	34 (30)	24 (28)	3.77	.287
Self-Development/ Lifelong Learning	<i>n</i> = 46	<i>n</i> = 45	<i>n</i> = 47	<i>n</i> = 47		
Preveterinary	28 (27)	30 (27)	31 (28)	21 (28)	6.08	.107
Preclinical	29 (34)	37 (35)	32 (35)	38 (35)	6.35	.096
Clinical	29 (36) ^b	39 (35)	39 (36)	36 (36)	8.45	.037*
Postgraduate	26 (33) ^b	40 (32) ^a	36 (33)	30 (34)	13.65	.003**

Table 4.21 *Continued*

Competency	Year Graduated				χ^2	<i>p</i>
	1993-2006	1985-1992	1979-1984	1960-1978		
Interpersonal Skills	<i>n</i> = 46	<i>n</i> = 43	<i>n</i> = 47	<i>n</i> = 47		
Preveterinary	29 (34) ^b	38 (32) ^a	36 (35)	33 (35)	8.05	.045*
Preclinical	30 (32)	28 (30)	34 (33)	37 (33)	2.82	.420
Clinical	26 (33) ^b	33 (31)	34 (34)	40 (34) ^a	10.06	.018*
Postgraduate	16 (20)	17 (18)	24 (20)	21 (20)	2.77	.428
Communication Skills	<i>n</i> = 32	<i>n</i> = 36	<i>n</i> = 35	<i>n</i> = 33		
Preveterinary	24 (27)	36 (34)	35 (32)	33 (35)	5.37	.146
Preclinical	27 (29)	39 (36)	34 (34)	36 (37)	3.87	.275
Clinical	25 (28)	38 (35)	35 (33)	34 (36)	6.11	.106
Postgraduate	21 (21)	27 (26)	27 (25)	24 (27)	1.47	.689
Motivation/Persistence	<i>n</i> = 46	<i>n</i> = 45	<i>n</i> = 48	<i>n</i> = 47		
Preveterinary	36 (36)	32 (35)	40 (37)	36 (36)	2.02	.568*
Preclinical	26 (31)	32 (30)	33 (32)	33 (31)	2.89	.409
Clinical	22 (31) ^b	34 (30)	36 (32)	32 (31)	10.49	.015*
Postgraduate	14 (18)	15 (17)	24 (19)	19 (18)	4.51	.211
Self-Management	<i>n</i> = 46	<i>n</i> = 44	<i>n</i> = 48	<i>n</i> = 47		
Preveterinary	28 (30)	32 (29)	33 (31)	28 (31)	2.40	.493
Preclinical	27 (29)	29 (28)	34 (31)	27 (30)	1.71	.635
Clinical	26 (35) ^b	35 (33)	39 (36)	40 (36)	12.61	.006**
Postgraduate	11 (17)	15 (17)	24 (18)	20 (18)	7.51	.057

Table 4.21 *Continued*

Competency	Year Graduated				χ^2	<i>p</i>
	1993-2006	1985-1992	1979-1984	1960-1978		
Flexibility	<i>n</i> = 45	<i>n</i> = 42	<i>n</i> = 46	<i>n</i> = 47		
Preveterinary	33 (32)	32 (30)	36 (33)	28 (34)	4.85	.183
Preclinical	23 (30)	32 (28)	32 (30)	32 (31)	6.75	.080
Clinical	29 (35) ^b	37 (33)	38 (36)	37 (37)	7.97	.047*
Postgraduate	17 (24)	26 (23)	27 (25)	27 (25)	6.45	.092
Creativity	<i>n</i> = 42	<i>n</i> = 38	<i>n</i> = 41	<i>n</i> = 41		
Preveterinary	30 (30)	29 (30)	39 (33)	28 (32)	5.22	.156
Preclinical	20 (29) ^b	31 (29)	37 (31) ^a	30 (30)	11.43	.010*
Clinical	24 (27)	26 (27)	34 (29)	26 (28)	3.21	.361
Postgraduate	35 (35)	35 (32)	33 (34)	33 (34)	2.61	.454
Crisis/Incident Mgmt	<i>n</i> = 45	<i>n</i> = 42	<i>n</i> = 46	<i>n</i> = 47		
Preveterinary	12 (12)	10 (11)	6 (11)	17 (12)	5.99	.112
Preclinical	26 (26)	30 (23) ^a	19 (23)	23 (26)	7.82	.050*
Clinical	36 (39)	39 (34)	33 (35)	38 (38)	7.15	.067
Postgraduate	26 (32)	32 (28)	32 (29)	30 (31)	7.35	.062
Cultural Competence	<i>n</i> = 42	<i>n</i> = 38	<i>n</i> = 41	<i>n</i> = 41		
Preveterinary	35 (35)	35 (32)	33 (34)	33 (34)	2.61	.454
Preclinical	18 (25)	24 (22)	28 (24)	25 (24)	6.30	.098
Clinical	21 (28)	28 (26)	30 (28)	30 (28)	7.69	.053
Postgraduate	22 (24)	24 (22)	25 (23)	21 (23)	1.77	.621

Table 4.21 *Continued*

Competency	Year Graduated				χ^2	<i>p</i>
	1993-2006	1985-1992	1979-1984	1960-1978		
Coaching Skills	<i>n</i> = 41	<i>n</i> = 36	<i>n</i> = 41	<i>n</i> = 41		
Preveterinary	28 (24)	21 (21)	23 (24)	20 (24)	3.27	.352
Preclinical	22 (24)	22 (21)	27 (24)	22 (24)	1.80	.614
Clinical	20 (27) ^b	26 (23)	29 (27)	28 (27)	6.331	.097
Postgraduate	23 (25)	25 (22)	29 (25)	21 (25)	4.77	.189
Business Skills	<i>n</i> = 40	<i>n</i> = 35	<i>n</i> = 37	<i>n</i> = 40		
Preveterinary	13 (14)	18 (15)	11 (14)	16 (15)	2.41	.490
Preclinical	23 (24)	26 (25)	25 (24)	25 (26)	.68	.877
Clinical	22 (27) ^b	27 (28)	26 (27)	36 (29) ^a	8.94	.030*
Postgraduate	25 (27)	32 (28)	28 (26)	25 (29)	5.20	.157
Leadership	<i>n</i> = 40	<i>n</i> = 35	<i>n</i> = 37	<i>n</i> = 40		
Preveterinary	36 (31)	26 (27)	28 (29)	28 (31)	5.170	.160
Preclinical	20 (26)	26 (23)	28 (24)	26 (26)	7.17	.067
Clinical	20 (27) ^b	24 (23)	30 (25) ^a	27 (27)	8.49	.037*
Postgraduate	21 (23)	18 (20)	29 (21) ^a	20 (23)	8.46	.037*

Note. Results are given as observed number by response. Expected counts are given in parentheses.

Isolated differences regarding placement of individual competencies were observed when other independent variables were examined. In lieu of separate data tables, significant associations are summarized in Table 4.22.

Years Teaching. Faculty with ≥ 25 years teaching experience were more likely than other groups to include Flexibility in the preveterinary educational process, $\chi^2 (3, N = 183) = 10.04, p = .018$, and to include Interpersonal Skills in the preclinical period, $\chi^2 (3, N = 180) = 8.20, p = .042$. Faculty teaching between 18 – 24 years were more likely, and faculty teaching 9 – 17 years were less likely, to place cultivation of Motivation/Persistence in the preveterinary period, $\chi^2 (3, N = 180) = 8.87, p = .031$.

Degree Status. Respondents without a veterinary degree were more likely to agree that selected relational and management competencies be developed during the *clinical* professional veterinary curriculum, including Cultural Competence, $\chi^2 (1, N = 176) = 3.89, p = .048$, and Coaching Skills, $\chi^2 (1, N = 176) = 3.89, p = .048$. A trend was observed for placement of Leadership Skills into both preclinical and clinical veterinary education by this group as well (*p values* = .052 and .059, respectively).

Non-veterinarian respondents were also more likely than veterinarians to emphasize that development of nontechnical competencies be continued in *postgraduate* development. This was noted for skills highly valued by all participants in this study, including Ethics/Moral Responsibility, $\chi^2 (1, N = 184) = 5.29, p = .021$, Communication Skills, $\chi^2 (1, N = 151) = 6.09, p = .014$, and Coaching Skills, $\chi^2 (1, N = 159) = 3.81, p = .051$. Non-veterinarians were also more likely to support Flexibility in the postgraduate period but the association did not reach statistical significance (*p* = .058).

Table 4.22***Summary of Associations Between Independent Variables and Placement of Nontechnical Competencies in Veterinary Education***

Competency	Phase of Education			
	Preveterinary	Preclinical Veterinary	Clinical Veterinary	Postgraduate
Ethics/Moral Responsibility	Group 1 Graduates (-)		Associate Professors (+) Group 1 Graduates (-) Instructors/ Asst Professors (-)	Non-veterinarians (+)
Critical Thinking	Institution D (+) Associate Professors (+) Institution C (-)	Females (+) Institution E (+)	Associate Professors (+)	
Self-Development/ Lifelong Learning	Institution D (+) Institution C (-)	Females (+) Institution E (+) Institution B (-)	Group 1 Graduates (-)	Group 2 Graduates (+) Associate Professors (+) Group 1 Graduates (-) Instructors/Asst Professors (-)

Table 4.22 *Continued*

Competency	Phase of Education			
	Preveterinary	Preclinical Veterinary	Clinical Veterinary	Postgraduate
Interpersonal Skills	Group 2 Graduates (+)	Females (+)	Group 4 Graduates (-)	Females (+)
	Group 1 Graduates (-)	Teaching $\geq$ 25 yrs (+)	Group 1 Graduates (-)	
Communication Skills				Females (+)
				Non-veterinarians (+)
Motivation/Persistence	Teaching 18-24 yrs (+)	Institution E (+)	Group 1 Graduates (-)	Group 1 Graduates (-)
Self-Management	CS-Small Animal (+)	Females (+)	Group 1 Graduates (-)	Group 1 Graduates (-)
	CS- Large Animal (-)	Institution D (+)	Instructor/Assist Profs (-)	Instructor/Assist Profs (-)
		Institution E (+)		
		Institution C (-)		
Flexibility	Institution D (+)		Group 1 Graduates (-)	Associate Professors (+)
	Teaching $\geq$ 25 yrs (+)			Instructors/Asst Professors (-)

Table 4.22 *Continued*

Competency	Phase of Education			
	Preveterinary	Preclinical Veterinary	Clinical Veterinary	Postgraduate
Creativity		Group 3 Graduates (+)	Group 2 Graduates (+)	Associate Professors (+)
		Group 1 Graduates (-)		Instructor/Asst Professors (-)
Crisis/Incident Mgmt		Institution D (+)	Group 2 Graduates (+)	Group 1 Graduates (-)
		Institution E (+)		Instructor/Asst Professors (-)
		Group 2 Graduates (+)		
Cultural Competence		CS-Other (+)	Non-veterinarians (+)	
			Basic Science (+)	
			CS- Other (+)	
			CS-Small Animal (-)	
			CS- Large Animal (-)	
			Group 1 Graduates (-)	

Table 4.22 *Continued*

Competency	Phase of Education			
	Preveterinary	Preclinical Veterinary	Clinical Veterinary	Postgraduate
Coaching Skills			Non-veterinarians (+)	Females (+) Non-veterinarians (+)
Business Skills		Females (+)	CS - Other (+) Group 4 Graduates (+) Professors (+) CS - Large Animal (-) Group 1 Graduates (-) Instructor/Asst Professors (-)	Females (+)
Leadership		Non-veterinarians (+) Group 1 Graduates (-) Instructor/Asst Professor (-)	Group 3 Graduates (+) Group 1 Graduates (-) Instructor/Asst Professor (-)	Group 3 Graduates (+) Instructor/Asst Professor (-)

Note. Respondents with variables marked (+) were more likely, and those with variables marked (-) were less likely, than other groups to place competency in the indicated phase of veterinary education, $p \leq .05$. CS = Clinical Science; see Table 4.15 for description of Graduate groupings.

Discipline. Respondents from different disciplines viewed the placement of nontechnical competencies in veterinary education in diverse ways, as might be expected basic on clinical and teaching priorities.

The greatest divergence in responses based on disciplinary focus was observed for the competency, Cultural Competence. Recalling that respondents overall placed this competency largely in the preveterinary and clinical educational periods, Clinical Science-Small Animal predominant faculty were somewhat more likely than other groups to think Cultural Competence should be developed *prior to admission* to veterinary college, $\chi^2 (4, N = 185) = 8.87, p = .064$. Statistically significant differences were found when faculty responses in the preclinical and clinical educational period were examined. Clinical Science - Other faculty were more likely than all other faculty groups to agree to the cultivation of Cultural Competence in the *preclinical* curriculum, $\chi^2 (4, N = 162) = 10.60, p = .031$. In the *clinical* setting, Basic Science and Clinical Science-Other faculty were more likely to feel that there was a place for development of cultural awareness than both small animal and large animal clinical faculty, $\chi^2 (4, N = 162) = 15.78, p = .003$. Basic Science faculty were more likely to place another relational competency, Coaching Skills, $\chi^2 (4, N = 159) = 11.60, p = .021$, within the realm of *clinical* veterinary education.

A few differences were detected among faculty in the different clinical disciplines. Clinical Science - Large Animal predominant faculty were less likely than other faculty, and Clinical Science - Small Animal predominant faculty were more likely, to expect development of Self-Management *prior to entering veterinary school*, $\chi^2 (4, N = 185) = 12.52, p = .014$. The large animal oriented respondents were also less likely to

agree that this competency be cultivated in the preclinical years of veterinary education, $\chi^2 (4, N = 185) = 9.86, p = .043$, leaving its development to later in the educational process. Clinical Science – Large Animal Predominant faculty were less likely, and Clinical Science – Other faculty more likely, to agree that Business Skills development be emphasized in *clinical* veterinary education, $\chi^2 (4, N = 155) = 13.62, p = .009$.

Academic Rank. Placement of nontechnical competencies was examined for respondents in the Instructor, Assistant Professor, Associate Professor and Professor ranks. However, the small number of instructors included in the study (and the small number of Instructors in many response cells), limited application of Chi-Square analysis. The Instructor group was then combined with the Assistant Professor group for further analysis.

This group of junior faculty exhibited a unique response pattern to this query, being less likely than respondents at other ranks to place competency development in multiple settings, particularly in the *clinical* setting. The results were significant for Ethics/Moral Responsibility, $\chi^2 (2, N = 180) = 5.94, p = .050$; Business Skills, $\chi^2 (2, N = 151) = 9.21, p = .010$, and Leadership, $\chi^2 (2, N = 149) = 9.21, p = .010$; and neared significance for Self-Management, $\chi^2 (2, N = 181) = 5.89, p = .052$. Respondents holding the rank of Instructor or Assistant Professor were also less likely to see a place for ongoing development of competencies *after graduates leave the veterinary program*, including Self-Management, $\chi^2 (2, N = 181) = 7.45, p = .024$, Self-Development/Lifelong Learning, $\chi^2 (2, N = 181) = 6.59, p = .037$, Flexibility, $\chi^2 (2, N = 176) = 8.73, p = .013$; and Leadership, $\chi^2 (2, N = 149) = 8.74, p = .013$. Responses for Crisis/Incident

Management neared significance as well, $\chi^2 (2, N = 168) = 5.92, p = .052$. Finally, Instructors/Assistant Professors were less likely to place Leadership in the *preclinical educational period* than were respondents of other ranks, $\chi^2 (2, N = 149) = 6.86, p = .032$.

On the other hand, Associate Professors appeared more likely to support development of nontechnical competencies in the latter stages of the training process; they were significantly more likely to place ethical development ($p = .050$), and Critical Thinking, $\chi^2 (2, N = 181) = 5.91, p = .052$, in *clinical education* and more likely to place Self Development/Lifelong Learning, $\chi^2 (2, N = 181) = 6.59, p = .013$, and Flexibility, $\chi^2 (3, N = 180) = 11.21, p = .011$, in the *postgraduate period* than were other faculty. Finally, Associate Professors were more likely to expect development of Critical Thinking skills prior to entering the professional program, $\chi^2 (2, N = 181) = 6.02, p = .049$. The only competency where senior faculty differed from the overall response was Business Skills, with Professors more likely to support the cultivation of these skills in the clinics ($p = .010$).

Research Question 3.

Do veterinary faculty members perceive a responsibility to teach or cultivate nontechnical competences in their educational roles?

For each competency a respondent indicated should be taught or cultivated in the professional veterinary curriculum, he or she was then asked, “Do you think this competency should be taught or cultivated in the courses or educational settings in which you teach?” Response options were simply “yes” or “no.” Overall, faculty were most likely to indicate individual responsibility in teaching Critical Thinking (affirmative answer in 98% of respondents), Communication Skills, Self Development/Lifelong Learning, and Ethics/Moral Responsibility (all > 90%). These were followed in order of percentage by Self-Management, Creativity, Interpersonal Skills, Motivation/Persistence, and Flexibility (all > 80% affirmative). Fewer faculty agreed to a personal role in developing the remaining skills: Coaching Skills, Cultural Competence, Leadership, Crisis/Incident Management and Business Skills (see Table 4.23).

The likelihood of answering “yes” to this question about respondents’ perceived responsibility in cultivating nontechnical competencies was not associated with institution (see Table 4.24), gender (see Table 4.25), degree (see Table 4.26), or years teaching experience of the respondent. Isolated differences in responses were found based on respondent’s primary discipline and year of graduation. Additional differences were observed in the responses of those holding the rank of Assistant Professor.

Table 4.23*Self-Reported Responsibility to Teach Nontechnical Competencies for All Respondents*

Competency	Yes (n, %)	No (n, %)	Total (n)
Critical Thinking	175 (98%)	3 (2%)	178
Self-Development/ Lifelong Learning	149 (93%)	12 (7%)	161
Ethics/Moral Responsibility	139 (90%)	15 (10%)	154
Self-Management	137 (88%)	19 (12%)	156
Communication Skills*	135 (96%)	5 (4%)	139
Creativity	131 (87%)	19 (13%)	150
Interpersonal Skills	130 (87%)	19 (13%)	149
Flexibility	122 (83%)	25 (17%)	147
Motivation/Persistence	118 (84%)	23 (16%)	141
Crisis/Incident Mgmt	100 (64%)	56 (36%)	156
Coaching Skills	88 (76.5%)	27 (23.5%)	115
Cultural Competence	86 (75%)	29 (25%)	115
Leadership	84 (75%)	28 (25%)	112
Business Skills	75 (56%)	58 (44%)	133

Note. Results presented by total number of responses for each competency (with percentage in parentheses), in descending order by number of affirmative responses.

*Note that some respondents agreeing to the importance of this competence were not directed to this follow-up question; its placement in the order of this column may be misrepresented.

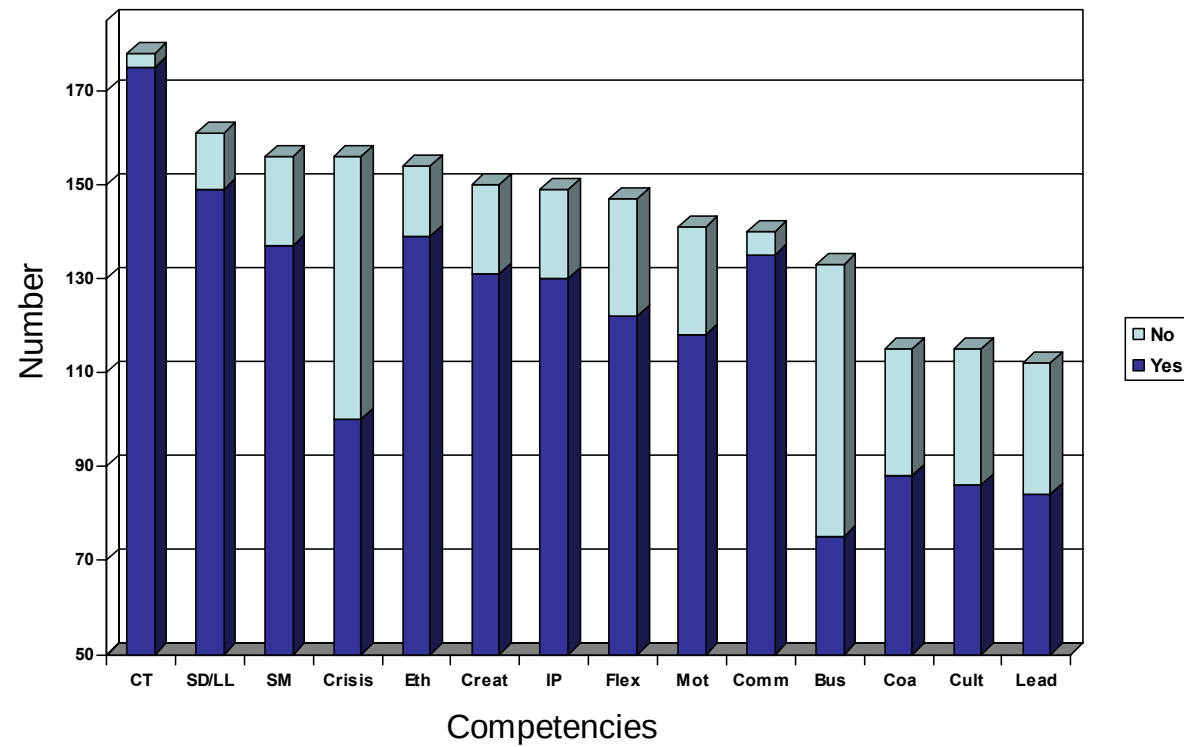


Figure 4.10. Perspectives regarding the faculty role in teaching nontechnical competencies. Height of column represents total number of respondents placing each competency within the veterinary curriculum; royal blue portion represents number of respondents in that group agreeing to a his or her own responsibility to teach or cultivate the competency. See Figure 4.1 for explanation of competency abbreviations.

Table 4.24***Association Between Respondents' Institution and Self-Reported Responsibility to Teach Nontechnical Competencies***

		Institution					χ^2	<i>p</i>
		A	B	C	D	E		
Ethics/Moral Responsibility	Yes	45 (43)	22 (24)	32 (31)	17 (18)	23 (24)	2.90	.573
	No	3 (5)	4 (3)	2 (3)	3 (2)	3 (3)		
Critical Thinking	Yes	57 (57)	29 (28)	38 (38)	24 (25)	27 (26)	1.95	.745
	No	1 (1)	0 (1)	1 (1)	1 (0)	0 (1)		
Self-Development/ Lifelong Learning	Yes	49 (48)	20 (22)	35 (33)	19 (20)	26 (25)	6.07	.193
	No	3 (4)	4 (2)	1 (3)	3 (2)	1 (2)		
Interpersonal Skills	Yes	39 (40)	23 (23)	26 (28)	18 (17)	24 (22)	3.17	.529
	No	7 (6)	3 (3)	6 (4)	2 (3)	1 (3)		
Communication Skills	Yes	40 (41)	22 (22)	33 (33)	18 (18)	22 (21)	1.22	.874
	No	2 (1)	1 (1)	1 (1)	1 (1)	0 (1)		

Table 4.24 Continued

Competency		Institution					χ^2	<i>p</i>
		A	B	C	D	E		
Motivation/Persistence	Yes	32 (35)	17 (18)	30 (28)	16 (17)	23 (19)	7.59	.108
	No	10 (7)	5 (4)	4 (6)	4 (3)	0 (4)		
Self-Management	Yes	40 (42)	23 (23)	27 (29)	21 (20)	26 (24)	3.52	.475
	No	7 (6)	3 (3)	6 (4)	2 (3)	1 (3)		
Flexibility	Yes	37 (37)	17 (20)	31 (30)	15 (15)	22 (20)	4.06	.398
	No	8 (8)	7 (4)	5 (6)	3 (3)	2 (4)		
Creativity	Yes	39 (41)	24 (42)	28 (29)	17 (18)	23 (22)	5.73	.220
	No	8 (6)	0 (3)	5 (4)	4 (3)	2 (3)		
Crisis/Incident Mgmt	Yes	30 (32)	18 (19)	19 (19)	14 (15)	19 (16)	2.08	.720
	No	20 (18)	11 (10)	10 (10)	9 (8)	6 (9)		

Table 4.24 Continued

Competency		Institution					χ^2	<i>p</i>
		A	B	C	D	E		
Cultural Competence	Yes	27 (26)	10 (12)	19 (19)	11 (12)	19 (17)	2.45	.652
	No	8 (9)	6 (4)	6 (6)	5 (4)	4 (6)		
Coaching Skills	Yes	25 (28)	14 (14)	17 (20)	13 (11)	19 (16)	7.17	.127
	No	11 (9)	4 (4)	9 (6)	1 (3)	2 (5)		
Business Skills	Yes	25 (24)	13 (13)	12 (16)	11 (11)	14 (12)	3.17	.529
	No	17 (18)	10 (10)	16 (12)	8 (8)	7 (9)		
Leadership	Yes	23 (24)	13 (14)	18 (18)	11 (12)	19 (16)	3.62	.469
	No	9 (8)	5 (6)	6 (6)	5 (4)	2 (5)		

Note. Results are given as observed number by response. Expected counts are given in parentheses. No significant differences are detected. Note that some cells have expected counts less than five, precluding the validity of the Chi-Square analysis.

Table 4.25***Association Between Respondent's Gender and Self-Reported Responsibility to Teach Nontechnical Competencies***

Competency		Gender		χ^2	<i>p</i>
		Male	Female		
Ethics/Moral Responsibility	Yes	67 (69)	67 (65)	1.75	.185
	No	9 (7)	4 (6)		
Critical Thinking	Yes	89 (89)	80 (80)	.232	.630
	No	2 (2)	1 (1)		
Self-Development/ Lifelong Learning	Yes	73 (73)	69 (69)	.009	.925
	No	6 (6)	6 (6)		
Interpersonal Skills	Yes	62 (65)	64 (61)	2.17	.141
	No	11 (8)	5 (8)		
Communication Skills	Yes	67 (66)	62 (63)	.275	.600
	No	2 (3)	3 (2)		

Table 4.25 Continued

Competency		Gender		χ^2	<i>p</i>
		Male	Female		
Motivation/Persistence	Yes	62 (62)	51 (51)	.044	.834
	No	11 (11)	10 (10)		
Self-Management	Yes	68 (69)	64 (63)	.104	.748
	No	10 (9)	8 (9)		
Flexibility	Yes	64 (60)	52 (56)	3.02	.082
	No	9 (13)	16 (12)		
Creativity	Yes	66 (67)	61 (60)	.081	.776
	No	10 (9)	8 (9)		
Crisis/Incident Mgmt	Yes	51 (49)	46 (48)	.401	.527
	No	25 (27)	28 (26)		

Table 4.25 Continued

Competency		Gender		χ^2	p
		Male	Female		
Cultural Competence	Yes	42 (39)	40 (43)	2.01	.156
	No	10 (13)	18 (15)		
Coaching Skills	Yes	42 (42)	43 (42)	.052	.820
	No	13 (13)	12 (13)		
Business Skills	Yes	39 (38)	34 (35)	.149	.700
	No	28 (29)	28 (27)		
Leadership	Yes	44 (41)	39 (42)	2.22	.136
	No	9 (12)	16 (13)		

Note. Results are given as observed number by response. Expected counts are given in parentheses. No significant differences are detected. Note that some cells have expected counts less than five, precluding the validity of the Chi-Square analysis.

Table 4.26***Association Between Respondent's Degree and Self-Reported Responsibility to Teach Nontechnical Competencies***

Competency		Degree		χ^2	<i>p</i>
		DVM/VMD	Other		
Ethics/Moral Responsibility	Yes	121 (122)	18 (17)	.494	.482
	No	14 (13)	1 (2)		
Critical Thinking	Yes	155 (154)	20 (21)	1.36	.244
	No	2 (3)	1 (0)		
Self-Development/ Lifelong Learning	Yes	132 (132)	17 (17)	.106	.745
	No	11 (11)	1 (1)		
Interpersonal Skills	Yes	113 (113)	17 (17)	.105	.746
	No	16 (16)	3 (3)		
Communication Skills	Yes	117 (117)	18 (18)	.183	.669
	No	4 (4)	1 (1)		

Table 4.26 Continued

Competency		Degree		χ^2	<i>p</i>
		DVM/VMD	Other		
Motivation/Persistence	Yes	103 (102)	15 (16)	.361	.548
	No	19 (20)	4 (3)		
Self-Management	Yes	120 (119)	17 (18)	1.07	.301
	No	15 (16)	4 (3)		
Flexibility	Yes	104 (105)	18 (17)	.805	.370
	No	23 (22)	2 (3)		
Creativity	Yes	113 (113)	18 (18)	.058	.810
	No	16 (16)	3 (3)		
Crisis/Incident Mgmt	Yes	88 (87)	12 (13)	.511	.475
	No	47 (48))	9 (8)		

Table 4.26 Continued

Competency		Degree		χ^2	<i>p</i>
		DVM/VMD	Other		
Cultural Competence	Yes	72 (72)	14 (14)	.015	.904
	No	24 (24)	5 (5)		
Coaching Skills	Yes	73 (74)	15 (15)	.075	.785
	No	23 (22)	4 (4)		
Business Skills	Yes	65 (64)	10 (11)	.127	.721
	No	49 (50)	9 (8)		
Leadership	Yes	70 (71)	14 (13)	.088	.766
	No	24 (23)	4 (5)		

Note. Results are given as observed number by response. Expected counts are given in parentheses. No significant differences are detected. Note that some cells have expected counts less than five, precluding the validity of the Chi-Square analysis.

Discipline. Differences in perceived responsibility to teach were observed for two competencies, Crisis/Incident Management and Business Skills (see Table 4.27). Clinical Science – Small Animal respondents were more likely, while Basic Science respondents were less likely, than respondents of other disciplines to affirm their responsibility in teaching Crisis Management, $\chi^2 (4, N = 156) = 19.73, p = .001$. Clinical Science-Small Animal respondents were also more likely to affirm their responsibility in cultivating Business Skills, while Basic Science and Clinical Science-Diagnostic Sciences faculty were less likely to address those skills, $\chi^2 (4, N = 133) = 24.40, p < .001$.

Year of Graduation. Several differences between groups of faculty were observed based on length of career and teaching experience, but the differences did not portray any consistent pattern (see Tables 4.28 and 4.29). Group 4 (the earliest graduates and most senior faculty) faculty were significantly more likely to mark “yes” regarding their responsibility in cultivating Coaching Skills, while Group 2 respondents were more likely to answer “no” for this competency, $\chi^2 (3, N = 115) = 7.97, p = .047$. Group 1 faculty, the most recent graduates, were less likely to report a perceived responsibility to teach Communication Skills, although statistical significance was not demonstrated ($p = .065$).

Years Teaching. A trend was observed in respondents’ perceptions regarding the competency Cultural Competence (see Table 4.29). The educational and professional focus on cultural awareness and multiculturalism is a relatively recent phenomenon, yet senior faculty appear the most willing to embrace this aspect of veterinary education. Although the differences did not reach statistical significance, the faculty respondents with more teaching experience (Groups 3 and 4) were more likely to assert their personal

Table 4.27***Association Between Primary Discipline and Self-Reported Responsibility to Teach Nontechnical Competencies***

Competency		Primary Discipline					χ^2	<i>p</i>
		BS	CS-Dx	CS-LA	CS-SA	CS-O		
Ethics/Moral Responsibility	Yes	36 (39)	22 (23)	23 (23)	42 (39)	16 (15)	6.09	.192
	No	7 (4)	4 (3)	2 (2)	1 (4)	1 (2)		
Critical Thinking	Yes	45 (45)	32 (31)	31 (31)	49 (49)	18 (18)	1.35	.852
	No	1 (1)	0 (1)	1 (1)	1 (1)	0 (0)		
Self-Development/ Lifelong Learning	Yes	38 (38)	26 (26)	26 (27)	43 (43)	16 (16)	.475	.976
	No	3 (3)	2 (2)	3 (2)	3 (3)	1 (1)		
Interpersonal Skills	Yes	33 (36)	20 (21)	19 (19)	43 (39)	15 (14)	6.58	.159
	No	9 (5)	4 (3)	3 (3)	2 (6)	1 (2)		
Communication Skills	Yes	35 (36)	24 (25)	20 (19)	40 (40)	16 (15)	3.12	.536
	No	2 (1)	2 (1)	0 (1)	1 (1)	0 (1)		

Table 4.27 Continued

Competency		Primary Discipline					χ^2	<i>p</i>
		BS	CS-Dx	CS-LA	CS-SA	CS-O		
Motivation/Persistence	Yes	37 (37)	19 (19)	21 (20)	29 (30)	12 (12)	.581	.965
	No	7 (7)	4 (4)	3 (4)	7 (6)	2 (2)		
Self-Management	Yes	39 (40)	23 (23)	22 (22)	38 (38)	15 (14)	.946	.918
	No	7 (6)	3 (3)	3 (3)	5 (5)	1 (3)		
Flexibility	Yes	33 (33)	20 (23)	16 (30)	38 (35)	15 (13)	6.32	.176
	No	7 (7)	8 (5)	5 (4)	4 (7)	1 (3)		
Creativity	Yes	32 (37)	25 (23)	25 (24)	34 (34)	15 (14)	7.81	.099
	No	8 (6)	0 (3)	5 (4)	4 (3)	2 (3)		
Crisis/Incident Mgmt	Yes	22 (27) ^b	9 (16)	22 (19)	33 (27) ^a	14 (11)	19.73	.001**
	No	21 (15)	16 (9)	7 (10)	9 (8)	3 (6)		

Table 4.27 Continued

Competency		Primary Discipline					χ^2	<i>p</i>
		BS	CS-Dx	CS-LA	CS-SA	CS-O		
Cultural Competence	Yes	26 (29)	12 (13)	12 (10)	22 (22)	14 (12)	5.49	.240
	No	13 (10)	6 (5)	1 (3)	7 (7)	2 (4)		
Coaching Skills	Yes	29 (28)	11 (14)	11 (11)	27 (25)	10 (11)	3.78	.436
	No	8 (9)	7 (4)	3 (3)	5 (7)	4 (3)		
Business Skills	Yes	11 (20)	9 (13)	15 (11)	26 (20)	14 (10)	2.44	.000**
	No	25 (16)	15 (11)	5 (9)	10 (16)	3 (7)		
Leadership	Yes	23 (25)	14 (16)	11 (10)	23 (21)	13 (12)	3.74	.441
	No	10 (8)	8 (6)	2 (3)	5 (7)	3 (4)		

Note. Results are given as observed number by response. Expected counts are given in parentheses. No significant differences are detected. Note that some cells have expected counts less than five, precluding the validity of the Chi-Square analysis.

Table 4.28

Association Between Respondents' Year of Graduation and Self-Reported Responsibility to Teach Nontechnical Competencies

Competency		Year of Graduation				χ^2	<i>p</i>
		Group 1 1993-2006	Group 2 1984-1992	Group 3 1979 -1984	Group 4 1960-1978		
Critical Thinking	Yes	41 (42)	44 (43)	45 (45)	45 (44)	3.87	.275
	No	2 (1)	0 (1)	1 (1)	0 (1)		
Self-Development/ Lifelong Learning	Yes	33 (32)	38 (39)	36 (38)	42 (40)	3.39	.335
	No	2 (3)	4 (3)	5 (3)	1 (3)		
Ethics/Moral Responsibility	Yes	29 (29)	39 (37)	32 (35)	39 (37)	4.41	.220
	No	3 (3)	2 (4)	7 (4)	3 (4)		
Self-Management	Yes	31 (30)	31 (33)	36 (36)	39 (39)	.949	.814
	No	3 (4)	6 (5)	5 (5)	5 (5)		
Communication Skills	Yes	25 (27)	39 (38)	35 (34)	36 (36)	7.20	.066
	No	3 (1)	0 (1)	0 (1)	2 (1)		

Table 4.28 *Continued*

		Year of Graduation				χ^2	<i>p</i>
		Group 1 1993-2006	Group 2 1984-1992	Group 3 1979 -1984	Group 4 1960-1978		
Creativity	Yes	28 (27)	35 (36)	33 (34)	35 (34)	.859	.835
	No	3 (4)	6 (5)	6 (5)	4 (5)		
Interpersonal Skills	Yes	28 (30)	29 (31)	32 (31)	41 (38)	2.81	.420
	No	6 (4) 1	6 (5)	4 (5)	3 (6)		
Flexibility	Yes	24 (26)	31 (31)	30 (32)	37 (34)	2.66	.446
	No	7 (5)	6 (6)	8 (6)	4 (7)		
Motivation/Persistence	Yes	24 (24)	34 (31)	30 (32)	30 (31)	2.65	.448
	No	5 (5)	3 (6)	8 (6)	7 (6)		
Crisis/Incident Mgmt	Yes	27 (26)	23 (26)	20 (23)	30 (25)	4.74	.192
	No	14 (15)	17 (14)	16 (13)	9 (14)		

Table 4.28 *Continued*

Competency		Year of Graduation				χ^2	<i>p</i>
		Group 1 1993-2006	Group 2 1984-1992	Group 3 1979 -1984	Group 4 1960-1978		
Coaching Skills	Yes	20 (19)	16 (21) ^b	24 (25)	28 (24) ^a	7.97	.047*
	No	5 (6)	11 (6)	8 (7)	3 (7)		
Cultural Competence	Yes	15 (16)	20 (22)	22 (24)	29 (24)	5.90	.116
	No	7 (6)	9 (7)	10 (8)	3 (8)		
Leadership	Yes	18 (17)	20 (21)	22 (23)	24 (23)	.462	.927
	No	5 (6)	8 (7)	8 (8)	7 (8)		
Business Skills	Yes	16 (16)	19 (19)	16 (19)	24 (21)	1.94	.585
	No	13 (13)	15 (15)	17 (14)	13 (16)		

Note. Results presented as observed counts with expected counts in parentheses. *Groups are significantly different at $p < .05$.

^aObserved counts are significantly higher than expected; ^bobserved counts are significantly lower than expected.

Table 4.29*Respondents' Teaching Experience and Self-Reported Responsibility to Teach Nontechnical Competencies*

		Years Teaching Experience				χ^2	<i>p</i>
		Group 1 1-8 yrs	Group 2 9-17 yrs	Group 3 18-24 yrs	Group 4 >25 yrs		
Critical Thinking	Yes	40 (40)	46 (46)	50 (49)	39 (39)	1.21	.750
	No	1 (1)	1 (1)	0 (1)	1 (1)		
Self-Development/ Lifelong Learning	Yes	31 (32)	40 (41)	40 (40)	38 (36)	2.23	.505
	No	4 (3)	4 (3)	3 (3)	1 (3)		
Ethics/Moral Responsibility	Yes	33 (33)	37 (37)	37 (37)	32 (32)	.158	.984
	No	3 (4)	4 (4)	4 (4)	4 (4)		
Self-Management	Yes	32 (31)	36 (38)	37 (35)	32 (33)	2.38	.497
	No	3 (4)	7 (5)	3 (5)	6 (5)		
Communication Skills	Yes	26 (27)	39(39)	37 (37)	33 (33)	1.30	.727
	No	2 (1)	1 (1)	1 (1)	1 (1)		

Table 4.29 Continued

		Years Teaching Experience				χ^2	<i>p</i>
		Group 1 1-8 yrs	Group 2 9-17 yrs	Group 3 18-24 yrs	Group 4 >25 yrs		
Creativity	Yes	29 (27)	34 (36)	38 (38)	30 (31)	1.92	.588
	No	2 (4)	7 (5)	5 (5)	5 (4)		
Interpersonal Skills	Yes	30 (30)	31 (34)	32 (31)	37 (35)	3.72	.293
	No	5 (5)	8 (5)	3 (5)	3 (5)		
Flexibility	Yes	23 (24)	32 (34)	32 (32)	35 (32)	3.24	.355
	No	6 (5)	9 (7)	7 (7)	3 (6)		
Motivation/Persistence	Yes	26 (25)	34 (34)	29 (28)	29 (31)	1.40	.705
	No	4 (5)	7 (7)	4 (5)	8 (6)		
Crisis/Incident Mgmt	Yes	26 (26)	23 (28)	26 (24)	25 (22)	4.11	.249
	No	14 (16)	12 (8)	13 (14)	14 (17)		

Table 4.29 Continued

		Years Teaching Experience				χ^2	<i>p</i>
		Group 1 1-8 yrs	Group 2 9-17 yrs	Group 3 18-24 yrs	Group 4 >25 yrs		
Coaching Skills	Yes	22 (21)	18 (21)	23 (24)	25 (21)	5.03	.170
	No	6 (7)	10 (7)	8 (7)	3 (7)		
Cultural Competence	Yes	14 (10)	22 (24)	25 (22)	25 (22)	7.23	.065
	No	10 (6)	10 (8)	5 (8)	4 (7)		
Leadership	Yes	17 (18)	18 (21)	26 (23)	23 (22)	.352	.318
	No	7 (6)	10 (7)	5 (8)	6 (7)		
Business Skills	Yes	17 (18)	15 (19)	22 (21)	21 (17)	4.62	.202
	No	15 (14)	19 (15)	15 (16)	9 (13)		

Note. Results are given as observed number by response. Expected counts are given in parentheses. No significant differences are detected. Note that some cells have expected counts less than five, precluding the validity of the Chi-Square analysis.

responsibility to teach or cultivate Cultural Competence than were faculty in Groups 1 and 2 ($p = .065$).

Academic Rank. When all academic ranks of respondents were considered (Instructor, Assistant Professor, Associate Professor and Professor), Assistant Professors were less likely than faculty of other ranks to agree to a responsibility to teach Self-Development/Life-Long Learning, Cultural Competence, and Coaching Skills; however, low numbers of respondents in the Instructor rank led to expected cell counts less than that required for the Chi-Square test (see Table 4.30). A similar trend was observed for these faculty in the probationary rank of Assistant Professor in responses for other competencies, including Self-Management, Communication Skills, Flexibility, and Business Skills (although not statistically significant).

The analysis was repeated with respondents holding the rank of Instructor combined with Assistant Professors. In this analysis, the Instructor/Assistant Professor rank was again less likely to indicate personal responsibility for cultivating Cultural Competence, $\chi^2(2, N = 112) = 6.45, p = .040$. This group was also less likely to perceive a responsibility to teach Self-Development/Lifelong Learning, $\chi^2(2, N = 158) = 9.39, p = .009$, and Flexibility, $\chi^2(2, N = 144) = 7.44, p = .024$, and showed a similar tendency in responses regarding Communication Skills ($p = .078$), and Coaching Skills ($p = .073$). Associate Professors were more likely to indicate responsibility in cultivating Motivation/Persistence in veterinary students, $\chi^2(2, N = 139) = 6.45, p = .040$. Full Professors were more likely to report a responsibility to cultivate Flexibility.

Table 4.30

Association Between Academic Rank and Respondent's Self-Reported Responsibility to Teach Nontechnical Competencies

Competency		Academic Rank				χ^2	<i>p</i>
		Instructor	Asst Prof	Assoc Prof	Prof		
Critical Thinking	Yes	9 (10)	52 (52)	54 (54)	56 (55)	5.03	.169
	No	1 (0)	1 (1)	1 (1)	0 (1)		
Self-Development/ Lifelong Learning	Yes	8 (7)	38 (43) ^b	51 (48)	49 (47)	12.96	.005†
	No	0 (1)	9 (4)	1 (4)	2 (4)		
Ethics/Moral Responsibility	Yes	6 (5)	39 (40)	45 (43)	45 (46)	2.14	.542
	No	0 (1)	6 (5)	3 (5)	6 (5)		
Self-Management	Yes	5 (5)	38 (41)	45 (42)	46 (46)	3.77	.287
	No	1 (1)	9 (6)	3 (6)	6 (6)		
Communication Skills	Yes	4 (5)	39 (41)	44 (42)	45 (44)	7.21	.065
	No	1(0)	3 (1)	0 (2)	1 (2)		

Table 4.30 *Continued*

		Academic Rank				χ^2	<i>p</i>
		Instructor	Asst Prof	Assoc Prof	Prof		
Creativity	Yes	5 (5)	35 (36)	40 (39)	47 (46)	.844	.839
	No	1 (1)	7 (6)	5 (6)	6 (7)		
Interpersonal Skills	Yes	6 (7)	37 (38)	39 (40)	46 (44)	2.20	.532
	No	2 (1)	6 (5)	6 (5)	4 (6)		
Flexibility	Yes	4 (5)	31 (36)	38 (37)	46 (41)	7.55	.056
	No	2 (1)	12 (7)	7 (8)	4 (9)		
Motivation/Persistence	Yes	6 (7)	32 (33)	41(36)	37 (40)		.087
	No	2 (1)	8 (7)	2 (7)	11 (8)		
Crisis/Incident Mgmt	Yes	6 (5)	28 (33)	31 (29)	32 (30)	3.54	.315
	No	2 (3)	24 (19)	14 (16)	15 (17)		

Table 4.30 *Continued*

		Academic Rank				χ^2	<i>p</i>
		Instructor	Asst Prof	Assoc Prof	Prof		
Coaching Skills	Yes	6 (5)	17 (23) ^b	31 (28)	31 (30)	10.47	.015†
	No	0 (1)	13 (7) ^a	5 (8)	8 (9)		
Cultural Competence	Yes	2 (2)	21 (27) ^b	30 (27)	31 (29)	8.21	.042†
	No	0 (0)	15 (9) ^a	6 (9)	7 (9)		
Leadership	Yes	3 (3)	18 (21)	27 (28)	33 (29)	3.85	.277
	No	1 (1)	10 (7)	11(10)	6 (10)		
Business Skills	Yes	5 (3)	16 (22)	23 (22)	29 (26)	5.86	.119
	No	1(3)	22 (16)	16 (17)	17 (20)		

Note. Results presented as observed counts with expected counts in parentheses. . ^aObserved counts are higher than expected; ^bobserved counts are lower than expected, †Groups are different at $p < .05$; however, expected counts for Instructor rank are not sufficient for conditions of Chi-Square analysis. See text for details of further analysis of this variable.

Research Question 4.

To what extent do veterinary faculty members feel prepared to teach or cultivate nontechnical competencies?

Response options for this question were “well prepared,” “somewhat prepared,” “inadequately prepared,” or “not prepared.” For further analysis, responses were transformed to quantitative ratings, where “well prepared” = 4, “somewhat prepared” = 3, “inadequately prepared” = 2 and “not prepared” = 1. Results are given as mean quantitative scores in the tables in this section. Because of the multiple tests performed to compare groups over 14 outcomes variables, the level of significance for these tests was set at $p \leq .01$ to minimize Type I error.

Overall, faculty members responding to this question were most prepared to teach or cultivate Critical Thinking, Self-Development/ Lifelong Learning, and Communication Skills (all means > 3.25 on the 4 point scoring scale). Other means above 3.0 included those for teaching Ethics/Moral Responsibility and Self-Management. Following these competencies, the mean level of preparation declined in order for Interpersonal Skills, Motivation/Persistence, Flexibility, Creativity, Leadership Skills, Coaching Skills, Crisis/Incident Management, Cultural Competence, and Business Skills (see Table 4.31 and Figure 4.11 for details of data points). At the level of significance required for this analysis ($p \leq .01$), there were no differences in mean level of preparation to teach nontechnical competencies by gender or discipline.

Table 4.31*Mean Level of Preparation to Teach Nontechnical Competencies for All Respondents*

Competency	<i>n</i>	Mean	<i>SD</i>
Critical Thinking	178	3.44	.610
Self-Development/ Lifelong Learning	161	3.35	.664
Communication Skills	140	3.26	.706
Self-Management	156	3.12	.709
Ethics/Moral Responsibility	154	3.12	.723
Interpersonal Skills	149	2.99	.731
Motivation/Persistence	141	2.94	.800
Flexibility	147	2.93	.812
Creativity	150	2.89	.829
Coaching Skills	115	2.74	.828
Leadership Skills	112	2.74	.857
Crisis/Incident Management	156	2.60	1.008
Cultural Competence	115	2.58	.946
Business Skills	133	1.95	.991

Note. Results are given as means of responses from 1 to 4 where 1 = not prepared and 4 = well prepared. *n* = Total number of respondents for each competency.

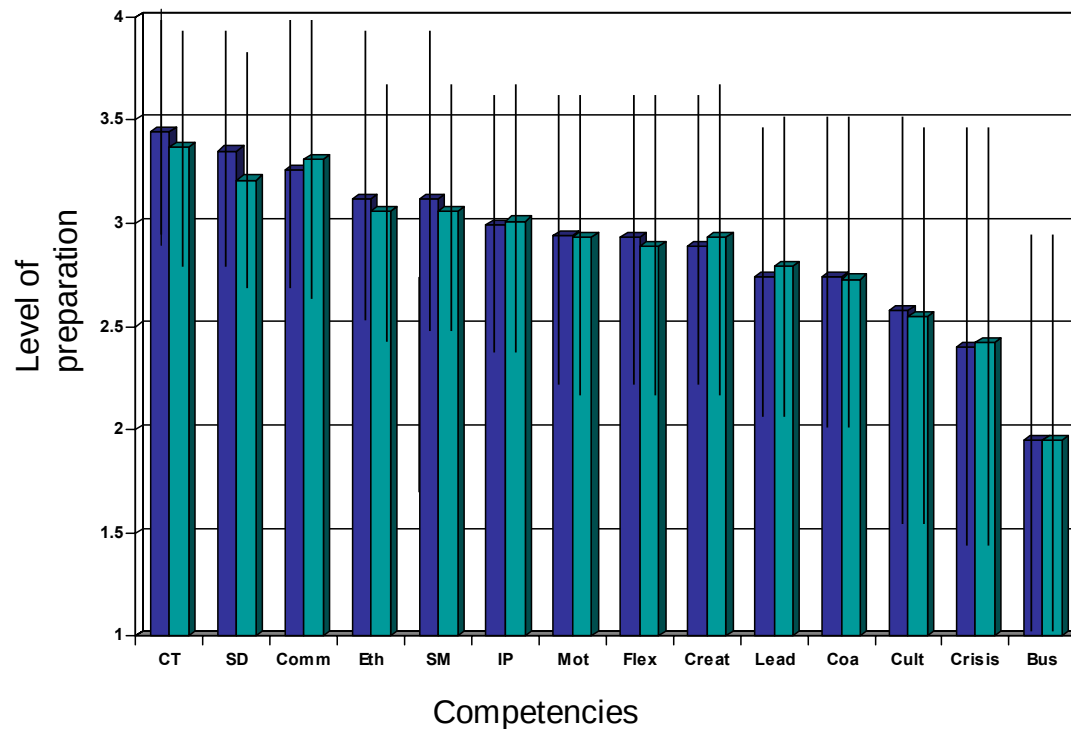


Figure 4.11. Mean ratings of preparation to teach (royal blue bars) and preparation to evaluate (teal bars) for all faculty respondents. Standard deviations are represented by vertical lines. CT =Critical Thinking, SD=Self Development/Lifelong Learning, Comm=Communication Skills, Eth =Ethics/Moral Responsibility, SM=Self-Management, IP=Interpersonal Skills, Mot=Motivation/Persistence, Flex=Flexibility, Creat=Creativity, Lead=Leadership Skills, Coa=Coaching, Cult=Cultural Competence, Crisis=Crisis/Incident Management, Bus=Business Skills.

Institution. There was a slight tendency for respondents of individual institutions to report similarly high or low levels of preparation overall (see Table 4.32 and Figure 4.12) At the $p \leq .05$ level, the trend is most evident for Self-Management ($p = .032$, Ethics and Moral Responsibility ($p = .017$), and Business Skills $p = .039$. However, using the more rigorous requirement of $p < .01$, the only significant difference is for Interpersonal Skills ($p = .004$), where Institution E was different from Institutions A and B. Respondents from Institution E self-reported a higher perceived level of preparation than did respondents from institutions A and B.

Gender. Male faculty members rated their preparation to teach nontechnical competencies slightly higher than female faculty for all competencies except Communication Skills (see Table 4.33 and Figure 4.13). Although mean responses for Motivation/Persistence and Flexibility were different at $p \leq .05$, the gender differences did not reach the required level of statistical significance in this analysis.

Degree Status. There was a trend for Non-DVM respondents to rate their preparation to teach nontechnical competencies higher than respondents with a veterinary degree. Means were slightly higher in the non-DVM group for all competencies except Critical Thinking and Crisis/Incident Management (see Table 4.34 and Figure 4.14). However, the only competency that was statistically different between the two groups was Leadership Skills ($p = .003$).

Table 4.32*Respondents' Self-Reported Level of Preparation to Teach Nontechnical Competencies by Institution*

Competency	Institution					<i>F</i>	<i>p</i>
	A	B	C	D	E		
Ethics/Moral Responsibility	3.21 (.617)	2.73 (.724)	3.26 (.710)	2.95 (.826)	3.27 (.724)	3.12	.017
Critical Thinking	3.40 (.647)	3.31 (.712)	3.41 (.595)	3.60 (.500)	3.59 (.501)	1.28	.279
Self-Development/ Lifelong Learning	3.27 (.630)	3.17 (.761)	3.42 (.604)	3.27 (.703)	3.63 (.629)	2.07	.088
Interpersonal Skills	2.87 (.718)	2.73 (.724)	3.09 (.777)	2.90 (.641)	3.44 (.583) ^a	4.05	.004**
Communication Skills	3.12 (.739)	3.13 (.757)	3.29 (.760)	3.47 (.612)	3.45 (.510)	1.51	.204
Motivation/Persistence	2.93 (.838)	2.59 (.796)	3.12 (.729)	2.90 (.788)	3.09 (.793)	1.71	.151
Self-Management	3.04 (.751)	2.81 (.634)	3.18 (.727)	3.17 (.576)	3.41 (.694)	2.72	.032
Flexibility	2.89 (.859)	2.62 (.824)	3.00 (.828)	3.06 (.725)	3.08 (.717)	1.27	.283
Creativity	2.74 (.820)	2.88 (.612)	3.18 (.808)	2.76 (.889)	2.92 (.954)	1.54	.193
Crisis/Incident Management	2.64 (1.005)	2.79 (1.082)	2.41 (1.018)	2.78 (.951)	2.32 (.945)	1.21	.309

Table 4.32 Continued

Competency	Institution					<i>F</i>	<i>p</i>
	A	B	C	D	E		
Cultural Competence	2.60 (.914)	2.19 (.834)	2.72 (1.100)	2.38 (.957)	2.83 (.834)	1.43	.229
Coaching Skills	2.44 (.809)	2.83 (.618)	2.77 (.951)	2.93 (.730)	3.00 (.837)	1.98	.103
Business Skills	1.76 (.878)	1.61 (.783)	2.25 (1.143)	1.95 (.970)	2.33 (1.065)	2.61	.039
Leadership Skills	2.50 (.842)	2.68 (.671)	2.96 (.908)	2.56 (.964)	3.05 (.805)	1.95	.107

Note. Results are presented as Mean (SD), where 1 = not prepared and 4 = well prepared. Level of significance for ANOVA was set at $p \leq .01$. ^aMean is significantly different from Institution A and Institution B at a level of $p = .004$.

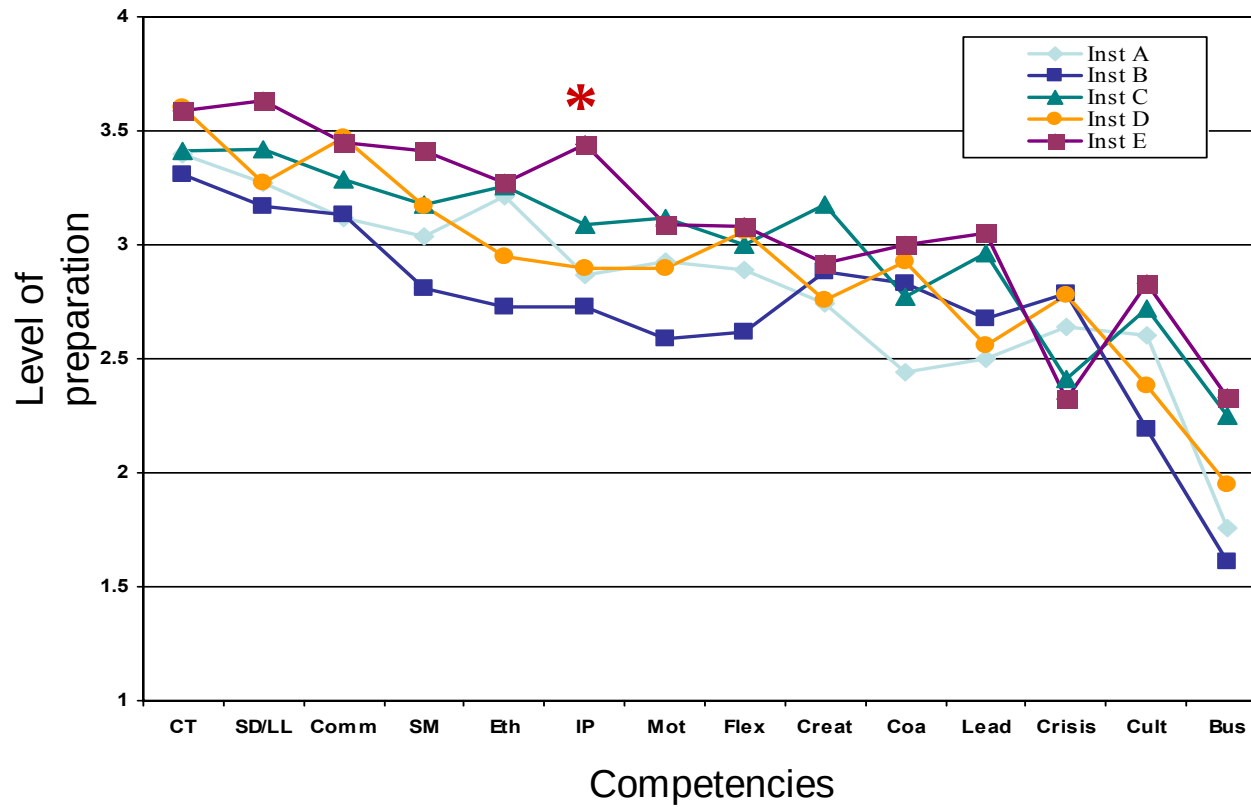


Figure 4.12. Mean level of self-reported preparation to teach or cultivate nontechnical competencies for faculty respondents at five institutions. Respondents reported in categories scored 1 – 4, where 1 = not prepared and 4 = well prepared. *Significant difference detected between groups (see Table 4.31). See Figure 4.1 for abbreviations of competencies.

Table 4.33***Respondents' Self-Reported Preparation to Teach Nontechnical Competencies by Gender***

Competency	Gender				<i>t</i>	<i>p</i>
	<i>n</i>	Male Mean (<i>SD</i>)	<i>n</i>	Female Mean (<i>SD</i>)		
Critical Thinking	91	3.45 (.619)	81	3.42 (.610)	.33	.743
Self-Development/ Lifelong Learning	79	3.41 (.689)	75	3.29 (.632)	1.05	.297
Communication Skills	69	3.23 (.710)	65	3.28 (.718)	-.37	.716
Self-Management	78	3.13 (.762)	72	3.08 (.878)	.39	.699
Ethics/Moral Responsibility	76	3.20 (.712)	71	3.03 (.717)	1.45	.153
Interpersonal Skills	73	3.01 (.717)	69	2.94 (.745)	.58	.560
Motivation/Persistence	73	3.08 (.878)	61	2.77 (.643)	2.30	.023
Flexibility	73	3.05 (.797)	68	2.78 (.808)	2.04	.044
Creativity	76	3.00 (.849)	69	2.78 (.783)	1.60	.112

Table 4.33 Continued

Competency	Gender				<i>t</i>	<i>p</i>
	<i>n</i>	Male Mean (<i>SD</i>)	<i>n</i>	Female Mean (<i>SD</i>)		
Coaching Skills	55	2.85 (.780)	55	2.62 (.892)	1.48	.142
Leadership	53	2.91 (.815)	55	2.60 (.894)	1.85	.066
Crisis/Incident Mgmt	76	2.54 (.930)	74	2.26 (1.073)	1.73	.087
Cultural Competence	52	2.65 (.883)	58	2.52 (1.013)	.75	.455
Business Skills	67	2.09 (.965)	62	1.79 (1.010)	1.720 (127)	.088

Note. Results are presented as Mean (SD), where 1 = not prepared and 4 = well prepared. Level of significance for ANOVA was set at $p \leq .01$.

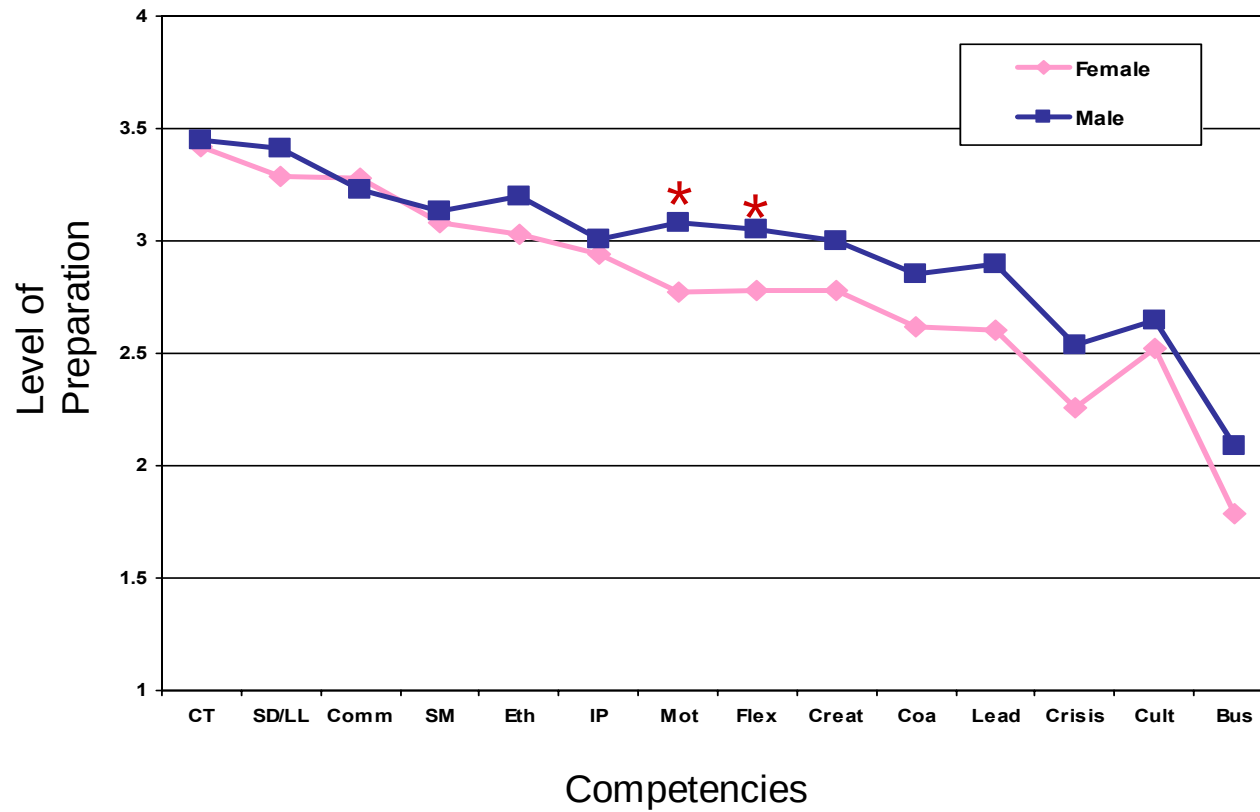


Figure 4.13. Mean level of self-reported preparation to teach or cultivate nontechnical competencies for male and female faculty respondents. Respondents reported in categories scored 1 – 4, where 1 = not prepared, 2 = inadequately prepared, 3 = somewhat prepared and 4 = well prepared. *Results are different at $p < .05$. See Figure 4.1 for abbreviations of competencies.

Table 4.34***Respondents' Self-Reported Level of Preparation to Teach Nontechnical Competencies by Academic Degree***

Competency	Degree				<i>t</i>	<i>p</i>
	<i>n</i>	DVM Mean (<i>SD</i>)	<i>n</i>	Other Mean (<i>SD</i>)		
Critical Thinking	157	3.46 (.594)	21	3.33 (.730)	.88	.379
Self-Development/ Lifelong Learning	143	3.33 (.669)	18	3.50 (.618)	-1.03	.304
Communication Skills	121	3.25 (.699)	19	3.37 (.761)	-.69	.491
Self-Management	135	3.13 (.674)	21	3.14 (.793)	-.19	.849
Ethics/Moral Responsibility	135	3.10 (.721)	19	3.26 (.733)	-.94	.348
Interpersonal Skills	129	3.01 (.655)	20	3.00 (.649)	-1.03	.304
Motivation/Persistence	122	2.92 (.788)	19	3.11 (.875)	-.95	.344
Flexibility	127	2.89 (.809)	20	3.15 (.813)	-1.34	.184
Creativity	129	2.86 (.798)	21	3.10 (.995)	-1.03	.314

Table 4.34 Continued

Competency	Degree				<i>t</i>	<i>p</i>
	<i>n</i>	DVM Mean (<i>SD</i>)	<i>n</i>	Other Mean (<i>SD</i>)		
Coaching Skills	96	2.70 (.822)	19	2.95 (.848)	-1.20	.232
Leadership	94	2.64 (.841)	18	3.28 (.752)	-3.00	.003**
Crisis/Incident Mgmt	135	2.42 (.988)	21	2.29 (1.146)	.58	.565
Cultural Competence	96	2.53 (.917)	19	2.84 (1.068)	-1.31	.192
Business Skills	114	1.90 (.977)	19	2.26 (1.046)	-1.47	.144

Note. Results are presented as Mean (SD), where 1 = not prepared and 4 = well prepared. Level of significance for ANOVA was set at $p \leq .01$. **Significant at $p < .01$.

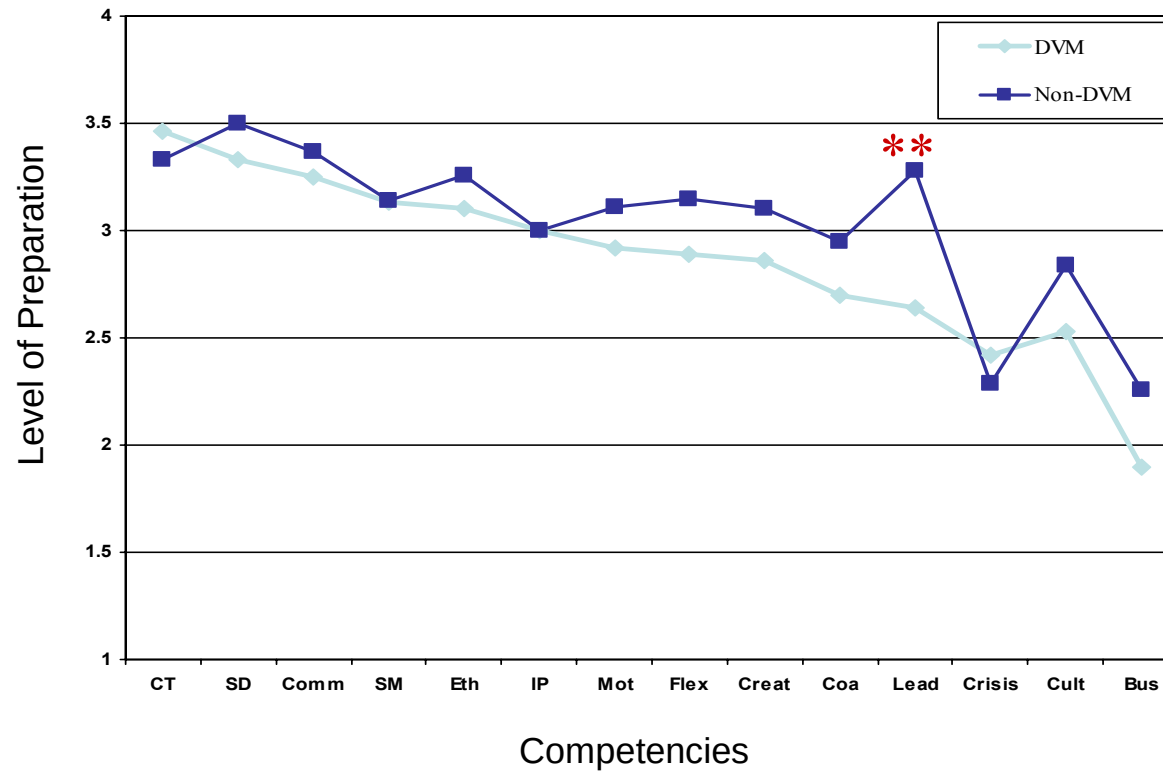


Figure 4.14. Mean level of self-reported preparation to teach or cultivate nontechnical competencies for DVM and nonveterinarian respondents. Respondents reported in categories scored 1 – 4, where 1 = not prepared, 2 = inadequately prepared, 3 = somewhat prepared and 4 = well prepared. **Results are different at $p < .01$. See Figure 4.1 for abbreviations of competencies.

Discipline. At the level of significance required for this analysis, there were no significant differences in preparedness to teach by discipline (see Table 4.35). Trends were observed at the $p < .05$ level for two groups of faculty. Basic Science faculty and Clinical Science – Diagnostic Sciences faculty reported a slightly lower level of preparation to teach Business Skills than did respondents in other disciplines. Clinical Science – Diagnostic Sciences faculty also reported a slightly lower level of preparation for Crisis Management.

Year Graduated. There were no overall trends or patterns for this item based on year of graduation (see Table 4.36). One significant effect was detected for the competency Ethics/Moral Responsibility, with group 1 (most recent graduates) reporting lower levels of preparation to teach this competency than graduates in groups 2 and 4 ($p = .005$).

Years Teaching Experience. There were no overall trends or patterns of responses to this question based on years of teaching experience (see Table 4.37). The only difference based on years of teaching experience that approaches statistical significance ($p = .015$) was in preparation to teach Communication Skills, where faculty in group 3 (those with 18 - 23 years teaching experience) report being more prepared than groups 2 and 4 (those with 9 – 17 and > 24 years experience).

Rank. There were no overall trends or patterns of response to this question based on academic rank of the respondent (see Table 4.38). Instructors rated themselves as significantly more prepared to teach Business Skills than Assistant Professors ($p = .004$).

Table 4.35***Respondents' Self-Reported Level of Preparation to Teach Nontechnical Competencies by Primary Discipline***

Competency	Primary Discipline					<i>F</i>	<i>p</i>
	Basic Science	Clinical-Other	Clinical-Diagnostic	Clinical-Sm Animal	Clinical-Lg Animal		
Critical Thinking	3.33 (.668)	3.61 (.608)	3.47 (.718)	3.42 (.538)	3.53 (.668)	.96	.430
Self-Development/ Lifelong Learning	3.44 (.550)	3.29 (.686)	3.39 (.567)	3.35 (.737)	3.21 (.774)	.57	.682
Communication Skills	3.30 (.702)	3.19 (.544)	3.35 (.797)	3.32 (.722)	3.05 (.686)	.67	.616
Self-Management	3.13 (.806)	2.94 (.854)	3.19 (.694)	3.12 (.662)	3.12 (.526)	.33	.859
Ethics/Moral Responsibility	3.16 (.754)	3.18 (.883)	3.15 (.834)	3.14 (.675)	2.92 (.493)	.55	.694
Interpersonal Skills	3.07 (.838)	3.00 (.730)	2.79 (.833)	3.00 (.640)	3.05 (.575)	.60	.663
Motivation/Persistence	3.07 (.789)	2.64 (.929)	2.91 (.949)	2.94 (.754)	2.92 (.654)	.77	.545
Flexibility	2.85 (.834)	3.25 (.834)	3.00 (.816)	2.86 (.655)	2.86 (.655)	.89	.469
Creativity	2.90 (.983)	2.88 (.885)	3.04 (.662)	2.72 (.793)	3.00 (.734)	.75	.562

Table 4.35 Continued

Competency	Primary Discipline					<i>F</i>	<i>p</i>
	Basic Science	Clinical-Other	Clinical-Diagnostic	Clinical-Sm Animal	Clinical-Lg Animal		
Coaching Skills	2.86 (.887)	2.79 (.699)	2.61 (.850)	2.72 (.851)	2.57 (.756)	.47	.757
Leadership	2.97 (.810)	2.88 (.957)	2.59 (.908)	2.50 (.793)	2.77 (.832)	1.43	.228
Crisis/Incident Mgmt	2.33 (1.017)	2.53 (1.125)	2.00 (1.041)	2.40 (1.014)	2.79 (.774)	2.23	.063
Cultural Competence	2.69 (1.004)	2.56 (1.031)	2.44 (.922)	2.45 (.948)	2.77 (.725)	.49	.741
Business Skills	1.78 (.866)	2.41 (1.064)	1.58 (.929)	2.11 (1.116)	2.05 (.826)	2.40	.053

Note. Results are presented as Mean (SD), where 1 = not prepared and 4 = well prepared. Level of significance for ANOVA was set at $p \leq .01$. Sm = Small, Lg = Large.

Table 4.36*Respondents' Self-Reported Level of Preparation to Teach Nontechnical Competencies by Year of Graduation*

Competency	Year of Graduation				<i>F</i>	<i>p</i>
	Group 1 1993-2006	Group 2 1984-1992	Group 3 1979-1983	Group 4 1960-1978		
Critical Thinking	3.40 (.760)	3.48 (.549)	3.57 (.544)	3.33 (.564)	1.24	.298
Self-Development/ Lifelong Learning	3.34 (.639)	3.26 (.627)	3.41 (.805)	3.37 (.578)	.39	.762
Communication Skills	3.11 (.956)	3.18 (.683)	3.43 (.558)	3.32 (.620)	1.36	.257
Self-Management	3.18 (.797)	3.22 (.630)	3.12 (.748)	2.98 (.664)	.89	.448
Ethics/Moral Responsibility	2.75 (.672) ^a	3.29 (.680)	3.08 (.774)	3.26 (.665)	4.44	.005**
Interpersonal Skills	2.85 (.821)	2.97 (.707)	2.97 (.736)	3.14 (.668)	1.00	.394
Motivation/Persistence	2.90 (.860)	3.03 (.645)	2.82 (.896)	3.03 (.799)	.62	.603
Flexibility	2.87 (.718)	3.03 (.799)	3.00 (.959)	2.80 (.749)	.64	.588
Creativity	3.00 (.856)	2.95 (.805)	2.92 (.870)	2.72 (.793)	.83	.477

Table 4.36 *Continued*

Competency	Year of Graduation				<i>F</i>	<i>p</i>
	Group 1 1993-2006	Group 2 1984-1992	Group 3 1979-1983	Group 4 1960-1978		
Coaching Skills	2.56 (1.003)	2.89 (.892)	2.78 (.832)	2.71 (.588)	.72	.542
Leadership Skills	2.65 (1.071)	2.82 (.863)	2.77 (.858)	2.71 (.693)	.18	.908
Crisis/Incident Management	2.63 (1.067)	2.65 (1.075)	2.61 (1.076)	2.49 (.823)	.21	.890
Cultural Competence	2.64 (1.002)	2.59 (.946)	2.44 (1.076)	2.69 (.780)	.40	.753
Business Skills	1.90 (1.012)	1.88 (.946)	1.79 (.893)	2.22 (1.084)	1.27	.287

Note. Results are presented as Mean (SD), where 1 = not prepared and 4 = well prepared. Level of significance for ANOVA was set at $p \leq .01$. **Groups are significantly different at $p < .01$ ^aMean is significantly different from Groups 2 and 4.

Table 4.37***Respondents' Self-Reported Level of Preparation to Teach Nontechnical Competencies by Years of Teaching Experience***

Competency	Years of Teaching Experience				<i>F</i>	<i>p</i>
	Group 1 1-8 yrs	Group 2 9-17 yrs	Group 3 18-24 yrs	Group 4 ≥ 25 yrs		
Critical Thinking	3.54 (.552)	3.45 (.746)	3.51 (.506)	3.29 (.589)	1.48	.223
Self-Development/ Lifelong Learning	3.37 (.731)	3.30 (.594)	3.33 (.764)	3.40 (.587)	.22	.881
Communication Skills	3.32 (.670)	2.98 (.800)	3.47 (.563)	3.34 (.669)	3.62	.015
Self-Management	3.34 (.725)	3.09(.781)	3.11 (.575)	2.95 (.697)	1.99	.117
Ethics/Moral Responsibility	3.08 (.649)	3.00 (.775)	3.24 (.683)	3.15 (.770)	.79	.504
Interpersonal Skills	3.06 (.802)	2.82 (.790)	3.03 (.657)	3.07 (.661)	1.00	.395
Motivation/Persistence	2.97 (.765)	2.98 (.851)	2.77 (.728)	3.03 (.832)	.62	.603
Flexibility	3.03 (.778)	2.88 (.842)	3.00 (.840)	2.83 (.794)	.50	.687
Creativity	3.06 (.772)	2.88 (.842)	2.92 (.774)	2.74 (.910)	.89	.450

Table 4.37 Continued

Competency	Years of Teaching Experience				<i>F</i>	<i>p</i>
	Group 1 1-8 yrs	Group 2 9-17 yrs	Group 3 18-24 yrs	Group 4 ≥ 25 yrs		
Coaching Skills	2.75 (.928)	2.75 (1.005)	2.79 (.686)	2.68 (.702)	.09	.967
Leadership Skills	2.79 (1.021)	2.64 (.951)	2.89 (.629)	2.66 (.827)	.54	.655
Crisis/Incident Management	2.40 (1.057)	2.36 (1.036)	2.32 (1.007)	2.53 (.951)	.28	.841
Cultural Competence	2.58 (1.060)	2.63 (1.060)	2.59 (.844)	2.53 (.950)	.05	.984
Business Skills	2.16 (1.139)	1.74 (.828)	2.22 (1.128)	2.22 (1.128)	2.36	.075

Note. Results are presented as Mean (*SD*), where 1 = not prepared and 4 = well prepared. Level of significance for ANOVA was set at $p \leq .01$. **Groups are significantly different at $p < .01$

Table 4.38*Respondents' Self-Reported Level of Preparation to Teach Nontechnical Competencies by Academic Rank*

Competency	Academic Rank				<i>F</i>	<i>p</i>
	Instructor	Asst Prof	Assoc Prof	Professor		
Critical Thinking	3.40 (.966)	3.49 (.669)	3.55 (.503)	3.30 (.570)	1.62	.187
Self-Development/ Lifelong Learning	3.50 (.535)	3.23 (.698)	3.29 (.667)	3.51 (.644)	1.75	.160
Communication Skills	2.80 (1.095)	3.17 (.730)	3.27 (.694)	3.41 (.652)	1.66	.178
Self-Management	3.33 (1.211)	3.17(.732)	3.15 (.618)	3.02 (.727)	.61	.607
Ethics/Moral Responsibility	3.33 (.516)	2.98 (.723)	3.15 (.714)	3.18 (.767)	.86	.464
Interpersonal Skills	2.62 (.916)	2.95 (.754)	2.96 (.737)	3.12 (.689)	1.24	.297
Motivation/Persistence	3.12 (1.126)	2.97 (.733)	2.86 (.710)	2.96 (.898)	.31	.819
Flexibility	3.00 (1.265)	2.98 (.771)	2.89 (.714)	2.90 (.909)	.12	.951
Creativity	3.17 (1.169)	3.07 (.778)	2.67 (.769)	2.92 (.874)	2.01	.115
Coaching Skills	3.17 (.983)	2.73 (.907)	2.78 (.832)	2.67 (.772)	.64	.593

Table 4.38 *Continued*

Competency	Academic Rank				<i>F</i>	<i>p</i>
	Instructor	Asst Prof	Assoc Prof	Professor		
Leadership Skills	3.00 (1.414)	2.82 (.983)	2.55 (.724)	2.82 (.854)	.90	.444
Crisis/Incident Management	2.50 (1.195)	2.50 (1.048)	2.53 (.968)	2.30 (.976)	.47	.705
Cultural Competence	3.00 (.000)	2.58 (1.025)	2.61 (.871)	2.61 (.974)	.12	.948
Business Skills	3.00 (.894)	1.58 (.889) ^b	2.03 (.903) ^b	2.07 (1.020)	4.76	.004**

Note. Results are presented as Mean (SD), where 1 = not prepared and 4 = well prepared. Level of significance for ANOVA was set at $p \leq .01$. **Groups are significantly different at $p < .01$. ^bMeans are significantly different from that for Instructors.

Research Question 5.

To what extent do veterinary faculty members feel prepared to evaluate nontechnical competencies?

Response options for this question were formulated and analyzed as for research question 4 above, using a 1 to 4 scoring scale where 1 = “not prepared” and 4 = “well prepared.” The overall means regarding preparation to evaluate nontechnical competencies in veterinary students follow a parallel pattern to the mean responses for preparation to teach such skills (Table 4.39 and Figure 4.11). Overall, respondents reported the highest mean level of preparedness (all $M > 3.0$) for Critical Thinking Skills, Communication Skills, Self-Development/Lifelong Learning and Self-Management. Following these competencies, the mean level of preparation declined in order for Interpersonal Skills, Motivation/Persistence, Creativity, Flexibility, Leadership Skills, Coaching Skills, Cultural Competence, Crisis/Incident Management, and Business Skills.

Institution. Ratings of preparedness to evaluate nontechnical competencies were slightly higher across competencies for Institution E (see Table 4.40 and Figure 4.14). Faculty respondents at Institution B reported a significantly lower mean level of preparation to evaluate Ethics/Moral Responsibility than faculty at Institutions A, C and E, $F(4, 149) = 3.49, p = .009$. These faculty also reported a lower mean level of preparation to evaluate Interpersonal Skills when compared to faculty respondents from Institution E, $F(4, 144) = 4.44, p = .002$.

Table 4.39*Mean Level of Preparation to Evaluate Nontechnical Competencies for All Respondents*

Competency	n	Mean	SD
Critical Thinking	178	3.37	.669
Communication Skills	140	3.31	.679
Self-Development/ Lifelong Learning	161	3.21	.737
Self-Management	156	3.12	.685
Ethics/Moral Responsibility	154	3.06	.743
Interpersonal Skills	149	3.01	.652
Motivation/Persistence	141	2.93	.790
Creativity	150	2.93	.803
Flexibility	147	2.89	.803
Leadership Skills	112	2.79	.821
Coaching Skills	115	2.73	.798
Cultural Competence	115	2.55	.957
Crisis/Incident Management	156	2.42	.983
Business Skills	133	1.95	.952

Note. Respondents reported level of preparation for each competency on a scale of 1 to 4, where 1 = not prepared and 4 = well prepared.

Table 4.40*Respondents' Self-Reported Level of Preparation to Evaluate Nontechnical Competencies by Institution*

Competency	Institution					<i>F</i>	<i>p</i>
	A	B	C	D	E		
Critical Thinking	3.40 (.620)	3.17 (.805)	3.28 (.724)	3.40 (.577)	3.59 (.572)	1.60	.176
Self-Development/ Lifelong Learning	3.25 (.653)	2.79 (1.021)	3.31 (.668)	3.14 (.640)	3.44 (.641)	3.01	.020
Communication Skills	3.31 (.680)	3.04 (.767)	3.32 (.727)	3.42 (.507)	3.50 (.598)	1.46	.217
Self-Management	3.19 (.741)	2.73 (.604)	3.18 (.727)	3.13 (.458)	3.30 (.669)	2.88	.025
Ethics/Moral Responsibility	3.15 (.618) ^a	2.62 (.697)	3.24 (.741) ^a	2.95 (.887)	3.19 (.749) ^a	3.49	.009**
Interpersonal Skills	3.09 (.626) ^a	2.62 (.571)	2.94 (.716)	3.05 (.510)	3.32 (.627) ^a	4.44	.002**
Motivation/Persistence	2.93 (.808)	2.55 (.739)	3.00 (.816)	2.95 (.759)	3.17 (.717)	1.98	.102
Flexibility	2.87 (.842)	2.46 (.721)	3.00 (.828)	2.94 (.639)	3.17 (.761)	2.77	.030
Creativity	2.85 (.807)	2.79 (.658)	3.15 (.755)	2.86 (.727)	2.96 (1.020)	1.75	.152
Coaching Skills	2.53 (.810)	2.72 (.461)	2.73 (.919)	2.86 (.770)	3.00 (.837)	1.28	.282

Table 4.40 *Continued*

Competency	Institution					<i>F</i>	<i>p</i>
	A	B	C	D	E		
Leadership Skills	2.66 (.827)	2.68 (.582)	2.96 (.908)	2.50 (.894)	3.10 (.768)	1.82	.131
Crisis/Incident Management	2.44 (.993)	2.10 (.976)	2.62 (.979)	2.22 (.951)	2.68 (.945)	.29	.830
Cultural Competence	2.60 (.914)	2.06 (.854)	2.72 (1.061)	2.31 (.946)	2.78 (.902)	.36	.783
Business Skills	1.86 (.872)	1.65 (.775)	2.11 (1.100)	1.84 (.834)	2.38 (1.071)	2.05	.091

Note. *Note.* Results are presented as Mean (SD), where 1 = not prepared and 4 = well prepared. Level of significance for ANOVA was set at $p \leq .01$. **Groups are significantly different at $p < .01$. ^aMeans are significantly different than Institution B.

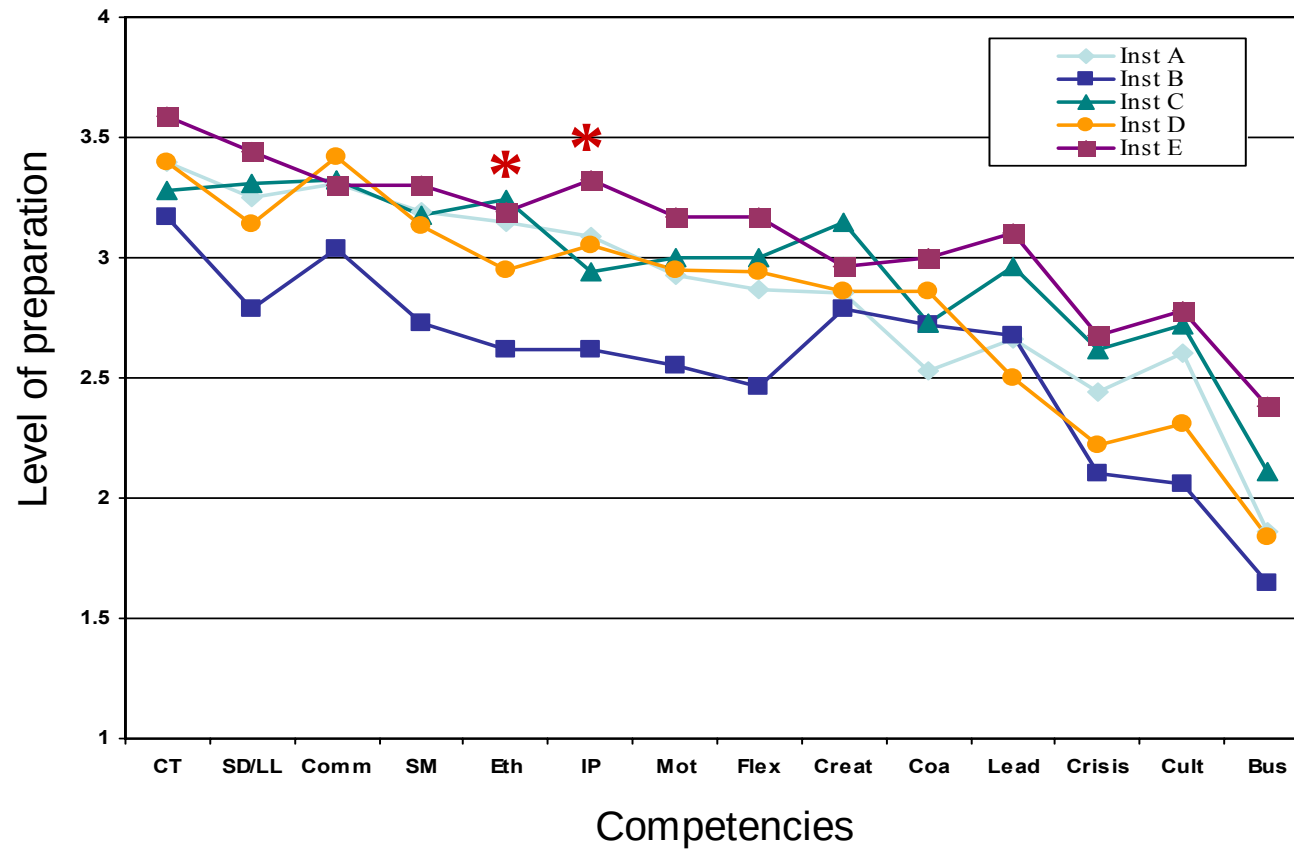


Figure 4.15. Mean level of self-reported preparation to evaluate nontechnical competencies for faculty respondents at five institutions. Respondents reported in categories scored 1 – 4, where 1 = not prepared and 4 = well prepared. *Significant difference detected between groups (see Table 4.31). See Figure 4.1 for abbreviations of competencies.

At the level of significance required for this analysis ($p \leq .01$), there were no significant differences in reported preparation to evaluate nontechnical competencies by gender, degree, discipline, or year of graduation (see Tables 4.41 - 4.44).

Years Teaching and Rank. There was little difference in preparedness to evaluate nontechnical competencies among faculty with varying amounts of teaching experience (see Table 4.45). A significant difference was found between Group 3 faculty (those teaching for 18 – 24 years) and Group 4 faculty (those teaching for ≥ 25 years) for competency Business Skills. The more senior group, Group 4, reported stronger preparation than did Group 3, $F(3, 129) = 4.41, p = .005$ to evaluate this competency in veterinary students. Evaluation of Business Skills was also the sole competency where faculty preparation differed based on academic rank (see Table 4.46). Instructors were significantly more prepared to evaluate Business Skills than were assistant professors and associate professors, $F(3, 125) = 4.35, p = .006$. The instructor mean was also higher than that of full professors, but the difference did not reach statistical significance.

Relationships between Importance and Preparation to Teach or Evaluate

Ratings of importance and preparedness to teach were highly correlated ($p < .01$) for these items: Self Management, Flexibility, Leadership Skills, Coaching Skills, Critical Thinking, Cultural Competence and Crisis Management. Ratings of importance and preparedness to evaluate also were highly correlated for Self-Management, Motivation, Flexibility, Leadership Skills, Coaching Skills, Critical Thinking, Cultural Competence, and Crisis Management. Ratings of preparedness to teach and preparedness to evaluate were highly correlated for all competencies ($p < .01$, see Table 4.47).

Table 4.41*Respondents' Self-Reported Level of Preparation to Evaluate Nontechnical Competencies by Gender*

Competency	Gender				<i>t</i> (<i>df</i>)	<i>p</i>
	<i>n</i>	Male Mean (<i>SD</i>)	<i>n</i>	Female Mean (<i>SD</i>)		
Critical Thinking	73	3.37 (.661)	81	3.35 (.692)	.271 (170)	.787
Communication Skills	69	3.26 (.721)	65	3.35 (.648)	-.784 (132)	.435
Self-Development/ Lifelong Learning	79	3.22 (.762)	75	3.20 (.717)	.127 (152)	.899
Self-Management	78	3.08 (.734)	72	3.17 (.605)	-.813 (148)	.418
Ethics/Moral Responsibility	76	3.11 (.776)	71	3.00 (.697)	.863 (145)	.389
Interpersonal Skills	73	2.97 (.666)	69	3.04 (.605)	-.663 (140)	.509
Motivation/Persistence	73	3.00 (.866)	61	2.85 (.654)	1.095 (132)	.276
Creativity	76	2.97 (.816)	69	2.88 (.777)	.676 (143)	.500
Flexibility	73	2.95 (.780)	68	2.84 (.822)	.793 (139)	.429

Table 4.41 *Continued*

Competency	Gender				<i>t</i> (<i>df</i>)	<i>p</i>
	Male		Female			
	<i>n</i>	Mean (<i>SD</i>)	<i>n</i>	Mean (<i>SD</i>)		
Leadership	53	2.85 (.744)	55	2.75 (.907)	.650 (104)	.517
Coaching Skills	55	2.78 (.809)	55	2.69 (.814)	.587 (108)	.558
Cultural Competence	52	2.56 (.895)	58	2.52 (1.030)	.219 (108)	.827
Crisis/Incident Mgmt	76	2.55 (.900)	74	2.27 (1.051)	1.769 (148)	.079
Business Skills	67	2.07 (.910)	62	1.82 (1.000)	1.499 (127)	.136

Note. Results are presented as Mean (SD), where 1 = not prepared and 4 = well prepared. Level of significance for ANOVA was set at $p \leq .01$.

Table 4.42*Respondents' Self-Reported Level of Preparation to Evaluate Nontechnical Competencies by Academic Degree*

Competency	Degree				<i>t</i> (<i>df</i>)	<i>p</i>
	<i>n</i>	DVM Mean (<i>SD</i>)	<i>n</i>	Other Mean (<i>SD</i>)		
Critical Thinking	157	3.39 (.637)	21	3.19 (.873)	1.276 (176)	.204
Communication Skills	121	3.32 (.661)	19	3.26 (.806)	.352 (138)	.726
Self-Development/ Lifelong Learning	143	3.18 (.747)	18	3.44 (.616)	1.430 (159)	.155
Self-Management	135	3.13 (.674)	21	3.10 (.768)	.190 (154)	.849
Ethics/Moral Responsibility	135	3.04 (.742)	19	3.16 (.765)	-.622 (152)	.535
Interpersonal Skills	129	2.97 (.717)	20	3.15 (.813)	.584 (147)	.560
Motivation/Persistence	122	2.92 (.788)	19	3.00 (.816)	-.420 (139)	.675
Creativity	129	2.91 (.775)	21	3.05 (.973)	-.630 (24.3)	.534
Flexibility	127	2.87 (.810)	20	3.05 (.759)	-.951 (145)	.343

Table 4.42 *Continued*

Competency	Degree				<i>t</i> (<i>df</i>)	<i>p</i>
	<i>n</i>	DVM Mean (<i>SD</i>)	<i>n</i>	Other Mean (<i>SD</i>)		
Leadership	94	2.74 (.825)	18	3.17 (.707)	-2.185 (110)	.031
Coaching Skills	96	2.71 (.794)	19	2.84 (.834)	-.666 (113)	.507
Cultural Competence	96	2.51 (.940)	19	2.74 (1.046)	.750 (113)	.455
Crisis/Incident Mgmt	135	2.44 (.959)	21	2.29 (1.146)	.655 (154)	.514
Business Skills	114	1.91 (.927)	19	2.21 (1.084)	-1.267 (131)	.208

Note. Results are presented as Mean (SD), where 1 = not prepared and 4 = well prepared. Level of significance for ANOVA was set at $p \leq .01$.

Table 4.43*Respondents' Self-Reported Level of Preparation to Evaluate Nontechnical Competencies by Primary Discipline*

Competency	Discipline					<i>F</i>	<i>p</i>
	Basic Science	Clinical-Other	Clinical-Diagnostic	Clinical-Sm Animal	Clinical-Lg Animal		
Critical Thinking	3.26 (.773)	3.61 (.502)	3.41 (.798)	3.32 (.621)	3.41 (.499)	1.005	.407
Communication Skills	3.24 (.723)	3.31 (.479)	3.46 (.761)	3.39 (.628)	3.10 (.718)	1.033	.393
Self-Development/ Lifelong Learning	3.34 (.617)	3.18 (.809)	3.36 (.678)	3.17 (.797)	2.97 (.778)	1.457	.218
Self-Management	3.09 (.784)	2.94 (.680)	3.35 (.629)	3.07 (.669)	3.16 (.554)	1.102	.358
Ethics/Moral Responsibility	3.12 (.731)	2.88 (.993)	3.15 (.925)	3.07 (.669)	2.96 (.455)	.517	.724
Interpersonal Skills	2.95 (.764)	2.94 (.574)	3.04 (.550)	3.09 (.668)	2.95 (.764)	.343	.849
Motivation/Persistence	3.00 (.853)	2.57 (.938)	3.00 (.853)	3.06 (.674)	2.79 (.779)	1.226	.303
Creativity	2.93 (.947)	2.94 (.772)	3.08 (.628)	2.79 (.801)	2.96 (.759)	.497	.738
Flexibility	2.80 (.823)	3.06 (.854)	3.00 (.861)	2.83 (.794)	2.90 (.700)	.488	.784
Leadership	2.94 (.747)	2.94 (.772)	2.77 (.973)	2.50 (.793)	2.85 (.801)	1.306	.272
Coaching Skills	2.86 (.822)	2.50 (.855)	2.67 (.907)	2.78 (.706)	2.57 (.756)	.747	.562
Cultural Competence	2.67 (.982)	2.44 (1.031)	2.56 (.922)	2.34 (1.010)	2.77 (.725)	.696	.596

Table 4.43 *Continued*

Competency	Discipline					<i>F</i>	<i>p</i>
	Basic Science	Clinical-Other	Clinical-Diagnostic	Clinical-Sm Animal	Clinical-Lg Animal		
Crisis/Incident Mgmt	2.35 (.997)	2.65 (1.057)	2.04 (.978)	2.38 (1.035)	2.76 (.739)	2.154	.077
Business Skills	1.72 (.849)	2.35 (.931)	1.67 (.917)	2.11 (1.063)	2.10 (.852)	2.272	.065

Note. Results are presented as Mean (SD), where 1 = not prepared and 4 = well prepared. Level of significance for ANOVA was set at $p \leq .01$. Sm = Small, Lg = Large.

Table 4.44*Respondents' Self-Reported Level of Preparation to Evaluate Nontechnical Competencies by Year of Graduation*

Competency	Year of Graduation				<i>F</i>	<i>p</i>
	Group 1 1993-2006	Group 2 1984-1992	Group 3 1979-1983	Group 4 1960-1978		
Critical Thinking	3.40 (.791)	3.41 (.622)	3.41 (.717)	3.24 (.529)	.655	.581
Self-Development/ Lifelong Learning	3.34 (.591)	3.12 (.861)	3.24 (.799)	3.16 (.652)	.676	.568
Communication Skills	3.29 (.937)	3.31 (.614)	3.40 (.604)	3.26 (.601)	.271	.846
Self-Management	3.24 (.741)	3.16 (.646)	3.17 (.704)	2.95 (.645)	1.307	.274
Ethics/Moral Responsibility	2.84 (.677)	3.20 (.715)	3.03 (.811)	3.12 (.739)	1.485	.221
Interpersonal Skills	3.12 (.641)	3.09 (.702)	2.97 (.696)	2.89 (.579)	1.032	.380
Motivation/Persistence	3.00 (.707)	2.89 (.699)	2.95 (.928)	2.89 (.809)	.137	.938
Flexibility	2.87 (.718)	3.03 (.799)	3.00 (.959)	2.80 (.749)	.959	.414
Creativity	3.06 (.854)	3.05 (.773)	2.92 (.839)	2.69 (.731)	1.752	.159

Table 4.44 *Continued*

Competency	Year of Graduation				<i>F</i>	<i>p</i>
	Group 1 1993-2006	Group 2 1984-1992	Group 3 1979-1983	Group 4 1960-1978		
Coaching Skills	2.72 (.980)	2.81 (.879)	2.69 (.738)	2.71 (.643)	.137	.938
Leadership Skills	2.83 (1.072)	2.93 (.766)	2.80 (.847)	2.61 (.615)	.757	.521
Crisis/Incident Management	2.37 (1.043)	2.35 (1.075)	2.42 (.996)	2.54 (.822)	.293	.830
Cultural Competence	2.64 (.953)	2.55 (.985)	2.41 (1.103)	2.62 (.793)	.359	.783
Business Skills	1.93 (.998)	1.88 (.913)	1.76 (.902)	2.22 (.976)	1.336	.221

Note. Results are presented as Mean (SD), where 1 = not prepared and 4 = well prepared. Level of significance for ANOVA was set at $p \leq .01$.

Table 4.45

Respondents' Self-Reported Level of Preparation to Evaluate Nontechnical Competencies by Years of Teaching Experience

Competency	Years Teaching				<i>F</i>	<i>p</i>
	Group 1 1 – 8 yrs	Group 2 9 – 17 yrs	Group 3 18 – 24 yrs	Group 4 ≥ 25 yrs		
Critical Thinking	3.54 (.636)	3.38 (.768)	3.30 (.678)	3.25 (.543)	1.473	.224
Self-Development/ Lifelong Learning	3.31 (.718)	3.16 (.805)	3.12 (.762)	3.28 (.647)	.656	.580
Communication Skills	3.50 (.577)	3.12 (.791)	3.39 (.595)	3.29 (.676)	1.959	.123
Self-Management	3.31 (.676)	3.14 (.774)	3.05 (.658)	3.00 (.658)	1.4093	.219
Ethics/Moral Responsibility	3.11 (.667)	3.00 (.742)	3.05 (.805)	3.08 (.770)	.158	.924
Interpersonal Skills	3.26 (.701)	2.97 (.707)	2.89 (.583)	2.92 (.572)	2.43	.068
Motivation/Persistence	3.00 (.743)	3.00 (.837)	2.73 (.801)	2.97 (.763)	.946	.420
Flexibility	3.07 (.799)	2.83 (.863)	2.87 (.801)	2.84 (.754)	.604	.613
Creativity	3.13 (.806)	2.93 (.848)	2.93 (.704)	2.74 (.852)	1.273	.286

Table 4.45 *Continued*

Competency	Year of Graduation				<i>F</i>	<i>p</i>
	Group 1 1993-2006	Group 2 1984-1992	Group 3 1979-1983	Group 4 1960-1978		
Coaching Skills	2.86 (.932)	2.68 (.945)	2.65 (.709)	2.75 (.585)	.392	.759
Leadership Skills	3.04 (.955)	2.71 (.897)	2.90 (.597)	2.52 (.785)	2.158	.097
Crisis/Incident Management	2.42 (1.059)	2.36 (1.014)	2.35 (.949)	2.54 (.919)	.286	.835
Cultural Competence	2.62 (1.013)	2.62 (.976)	2.43 (.935)	2.55 (.957)	.359	.783
Business Skills	2.19 (1.148)	1.74 (.751)	1.65 (.716)	2.33 (1.028)	4.410	.005**

Note. Results are presented as Mean (SD), where 1 = not prepared and 4 = well prepared. Level of significance for ANOVA was set at $p \leq .01$. **Groups are significantly different at $p < .01$.

Table 4.46*Respondents' Self-Reported Level of Preparation to Evaluate Nontechnical Competencies by Academic Rank*

Competency	Academic Rank				<i>F</i>	<i>p</i>
	Instructor	Asst Prof	Assoc Prof	Professor		
Critical Thinking	3.30 (1.059)	3.49 (.669)	3.45 (.633)	3.18 (.606)	2.460	.065
Self-Development/ Lifelong Learning	3.38 (.744)	3.26 (.736)	3.13 (.742)	3.25 (.744)	.420	.739
Communication Skills	2.80 (1.095)	3.36 (.692)	3.25 (.651)	3.41 (.652)	1.451	.231
Self-Management	3.33 (1.211)	3.26(.675)	3.04 (.582)	3.06 (.725)	1.138	.336
Ethics/Moral Responsibility	3.33 (.516)	3.00 (.739)	3.04 (.683)	3.12 (.840)	.465	.707
Interpersonal Skills	3.12 (.641)	3.16 (.688)	2.87 (.694)	2.98 (.589)	1.614	.189
Motivation/Persistence	3.25 (1.035)	3.00 (.716)	2.86 (.639)	2.90 (.928)	.674	.569
Flexibility	3.00 (1.265)	2.98 (.801)	2.84 (.706)	2.84 (.866)	.306	.821
Creativity	3.17 (1.169)	3.07 (.808)	2.80 (.757)	2.91 (.815)	.998	.396
Coaching Skills	3.33 (.816)	2.77 (.898)	2.75 (.770)	2.64 (.743)	1.310	.275

Table 4.46 *Continued*

Competency	Academic Rank				<i>F</i>	<i>p</i>
	Instructor	Asst Prof	Assoc Prof	Professor		
Leadership Skills	3.00 (1.414)	2.96 (.962)	2.66 (.669)	2.74 (.818)	.846	.472
Crisis/Incident Management	2.50 (1.195)	2.42 (1.016)	2.47 (.919)	2.34 (.984)	.151	.929
Cultural Competence	3.00 (.000)	2.58 (.996)	2.61 (.934)	2.50 (.980)	.222	.881
Business Skills	3.00 (.894)	1.66 (.909) ^b	1.92 (.807) ^b	2.09 (.985)	4.349	.006*

Note. Results are presented as Mean (SD), where 1 = not prepared and 4 = well prepared. Level of significance for ANOVA was set at $p \leq .01$. **Groups are significantly different at $p < .01$. ^bMeans are significantly lower than the mean for Instructors.

Table 4.47

Intercorrelations Among Ratings of Importance, Preparation to Teach, and Preparation to Evaluate Nontechnical Competencies for All Respondents

Competency	Importance and Preparation to Teach		Importance and Preparation to Evaluate		Preparation to Teach and Preparation to Evaluate	
	r^2	p	r^2	p	r^2	p
Ethics/Moral Responsibility	.08	.342	.05	.555	.77**	< .001
Critical Thinking	.20**	.002	.23**	.002	.83**	< .001
Self-Development/ Lifelong Learning	.13	.090	.07	.395	.756**	< .001
Interpersonal Skills	.03	.704	.09	.296	.61**	< .001
Communication Skills	.09	.277	.16	.055	.80**	< .001
Motivation/Persistence	.17*	.050	.11	.211	.81**	< .001
Self-Management	.17*	.031	.26**	.001	.74**	< .001
Flexibility	.21*	.013	.26**	.002	.90**	< .001

Table 4.47 *Continued*

Competency	Importance and Preparation to Teach		Importance and Preparation to Evaluate		Preparation to Teach and Preparation to Evaluate	
	r^2	p	r^2	p	r^2	p
Creativity	.09	.278	.12	.138	.88**	< .001
Crisis/Incident Management	.24**	.003	.27**	.001	.94**	< .001
Cultural Competence	.30**	.001	.25**	.007	.92**	< .001
Coaching Skills	.34**	< .001	.36**	< .001	.86**	< .001
Business Skills	.15	.840	.166	.056	.945**	< .001
Leadership Skills	.23*	.016	.27**	.004	.855**	< .001

Research Question 6.

Summary of Major Findings: What factors influence veterinary faculty members' perceptions regarding nontechnical competencies in veterinary education?

Institution. Mean ratings of the importance of nontechnical competencies followed institutional patterns; however, there were few significant differences among respondents based on institutional affiliation. When differences were observed, they were primarily detected in faculty members' perceptions regarding placement, teaching and evaluation of nontechnical skills. Institution D faculty viewed the preveterinary period as an important place for nontechnical competency development, particularly Critical Thinking, Self-Development/Lifelong Learning, and Flexibility. Faculty from Institution E were more likely than faculty from other institutions to support cultivation of these three nontechnical competencies during the preclinical veterinary curriculum, with the addition of Self-Management, Motivation/Persistence, and Crisis Management. Institution D faculty were also more likely to place development of Self-Management and Crisis/Incident Management in the preclinical period. On the other hand, Institution C faculty were less likely to agree that the competency Critical Thinking be cultivated prior to veterinary school and that Self-Management be taught or cultivated in the preclinical period.

Faculty members from Institution E reported a significantly higher degree of preparation to teach Interpersonal Skills than Institutions A and B. For preparation to evaluate Interpersonal Skills, Institution E faculty again reported a higher level of preparation than did faculty from Institution B. Faculty members from Institution B self-

reported lower levels of preparation to evaluate Ethics/ Moral Responsibility than faculty members from several other institutions. Finally, Institution E faculty were more likely to indicate a personal responsibility to teach Motivation/Persistence.

Gender. Although female faculty were overrepresented among respondents, male and female colleagues shared similar views regarding nontechnical competencies. Female faculty rated the importance of nontechnical competencies slightly higher than did male faculty; male faculty reported a slightly higher level of preparation to teach and evaluate nontechnical skills than did female faculty. However, none of these differences reached statistical significance. Significant differences were observed between genders when placement of nontechnical competencies within veterinary education was examined, particularly in the preclinical and postgraduate phases. Female faculty members were more likely to support the development of Critical Thinking, Self-Development/Lifelong Learning, Interpersonal Skills, Self-Management, and Business Skills in the preclinical years. Females were also more likely than males to agree that development of Interpersonal Skills, Communication Skills, Creativity, Coaching Skills, and Business Skills should continue into the postgraduate years.

DVM Status. Respondents without a veterinary degree made up a relatively small group of the sample. However, these non-DVM respondents rated the importance of nontechnical competencies higher than DVM respondents, particularly for the intrapersonal competencies Ethics/Moral Responsibility and Self Management and for many competencies reflecting external relationships, including Business Skills, Cultural Competence, Leadership Skills, Coaching Skills, and Crisis/Incident Management.

Respondents without a veterinary degree were also more likely to agree that selected relational competencies be developed during the clinical curriculum (Cultural Competence and Coaching Skills), and to champion the continued development of core nontechnical competencies through postgraduate training, including Ethics/Moral Responsibility and Communication Skills.

Non-veterinarian respondents also felt slightly more prepared to teach nontechnical competencies than respondents with a veterinary degree, especially Leadership Skills, where the difference was highly significant.

Discipline. Mean ratings of the importance of nontechnical competencies differed by the respondent's primary discipline or expertise. Respondents identified as Clinical Science – Other or Basic Science experts consistently rated overall importance of nontechnical competencies higher than other groups, whereas Clinical Science-Large Animal predominant respondents consistently rated them lower in importance.

Respondents from the different disciplines viewed the placement of nontechnical competencies in veterinary education in diverse ways. Basic Science faculty were more likely to place the relational and management competencies including Cultural Competence and Coaching Skills into the clinical curriculum. Large animal faculty were less likely, and small animal faculty were more likely, to expect development of Self-Management prior to entering veterinary school. Large animal oriented respondents were also less likely to agree that this competency be cultivated in the preclinical years of veterinary education. Clinical Science – Large Animal Predominant faculty were less likely, and Clinical Science – Other faculty more likely, to agree that Business Skills

development be emphasized in clinical veterinary education. The greatest divergence in responses based on primary discipline was observed for the placement of the competency Cultural Competence.

Differences among discipline were also observed in faculty perceptions of personal responsibility to teach nontechnical competences, most likely related to the different types of teaching responsibilities held by these faculty members. Basic Science respondents were less likely to perceive a responsibility to teach Business Skills, Creativity and Crisis Management. Faculty identified as Clinical Science-Diagnostic Sciences experts also were less likely to report responsibility for teaching Business Skills. Clinical Science – Small Animal respondents were more likely than respondents of other disciplines to affirm their responsibility in teaching Interpersonal Skills, Business Skills and Crisis Management. Respondents of all disciplines reported similar levels of preparation for teaching and evaluating nontechnical competencies.

Year graduated. Respondents obtaining their professional or other terminal degree since 1993 tended to rate the importance of nontechnical competencies higher than older graduates. Significant differences were observed in Interpersonal Skills and Motivation/Persistence, where Group 1 (the most recent graduates) ratings were higher than Group 2, and for Communication Skills and Crisis/Incident Management, where Group 1 was different from both Groups 2 and 3. These Group 1 graduates, however, exhibited unique perspectives on the placement of nontechnical competencies, and were less inclined than other faculty to place competencies in the clinical and postgraduate

educational periods. Significantly different Group 1 responses were evident in one or both phases for 10 of the 14 competencies.

Other significant findings related to graduation year were isolated: Group 4 (the earliest graduates) respondents were more likely to answer yes while Group 2 respondents were more likely to answer negatively regarding their responsibility in cultivating Coaching Skills. There were no differences in preparation to teach or evaluate nontechnical skills based on year of graduation.

Years teaching. There was a trend for mean ratings of importance to be highest in those respondents early in their teaching careers, and to decline from those with the least teaching experience (group 1) to those with more teaching experience (group 4), or to decline in groups 2 and 3 but rebound slightly in group 4. This trend was statistically significant for the competencies Interpersonal Skills and Crisis/Incident Management. The only difference in placement of nontechnical competencies based on years teaching experience were observed for Group 4 (senior) faculty, who were more likely to place Flexibility in the preveterinary educational period and to place Interpersonal Skills development in the preclinical curriculum.

There were no differences in perceived responsibility to teach nontechnical competencies, and the only significant difference regarding preparation for teaching was in Communication Skills, where faculty in group 3 (those with 18 - 23 years teaching experience) report being more prepared than groups 2 and 4 (those with 9 – 17 and > 24 years experience). Group 4 faculty felt significantly more prepared than Group 3 faculty to evaluate Business Skills.

Academic Rank. Faculty of all ranks indicated similar views of the relative importance of these nontechnical competencies. However, significant differences were discovered among ranks related to placement of nontechnical competencies and to the personal involvement and preparedness of faculty to cultivate them in the veterinary curriculum. Most differences were observed for faculty of the Instructor/Assistant Professor ranks. Faculty in these ranks were less likely than others to place many competencies in the clinical setting and were less likely to see a place for ongoing development of competencies after graduates leave veterinary school. Associate Professors appeared more likely to support cultivation of nontechnical competencies in the latter stages of the training process; they were significantly more likely to place ethical and Critical Thinking development in clinical education than other faculty, and were more likely to place adaptive skills such as Self Development/Lifelong Learning, Flexibility, and Creativity in the postgraduate period. Professors were more likely than faculty of other ranks to support the cultivation of Business Skills in the clinics.

In this study, Instructors and Assistant Professors were less likely to report personal responsibility for teaching several competencies, including Self-Development/Lifelong Learning, Flexibility and Cultural Competence. Associate Professors were more likely to view cultivating Motivation/ Persistence as part of their role in the education of veterinary students. Instructors also reported better preparation to teach and to evaluate Business Skills than faculty of other ranks.

Summary of Respondent Comments

Respondents were provided an opportunity to comment on the survey structure and content. Comments were captured from 37 (20%) respondents. Respondents offering comments were distributed across institutions, rank and gender. Although there were no specific instructions or open-ended questions for comments, and formal analysis was not completed, certain themes were repeated by multiple respondents. Most frequently respondents reiterated a belief that nontechnical competencies should be developed throughout the educational process and beyond (n=9), with a recognition that many competencies should be acquired at an early age (6) and selected for in the professional school admissions process (5). Others commented on the difficulty in “teaching” such competencies (3) as opposed to demonstrating or cultivating by example and role modeling (5). The value of incorporating nontechnical competencies into existing components of a curriculum, such as problem-based learning opportunities, rather than creating new courses or programs, was specifically noted by three respondents. Others commented that attention to nontechnical skills will require a keen understanding of current and future students and generational differences.

CHAPTER 5

DISCUSSION

The purpose of this study was to explore the perceptions of faculty educators at five diverse North American veterinary colleges regarding the importance, place and teaching of nontechnical competencies. Respondents rated the importance of each of 14 competencies and indicated where these competencies should be taught or cultivated during the training of veterinarians. Respondents also provided feedback on their own role and level of preparation for teaching and for evaluating those competencies in veterinary students. A ranking of importance, as well as trends and association of responses with demographic and professional variables were assessed.

The research questions included: 1) Which nontechnical competencies do veterinary faculty perceive are important for graduating veterinarians to master; 2) Do veterinary faculty members perceive that nontechnical competencies should be taught in the veterinary curriculum, or acquired elsewhere? 3) Do veterinary faculty members perceive a responsibility to teach or cultivate nontechnical competences in their educational roles? and 4) To what extent do veterinary faculty members feel prepared to teach, and 5) evaluate nontechnical competencies? The final research question, what factors influence veterinary faculty members' perceptions regarding nontechnical competencies in veterinary education?, was considered within all of the above questions.

Summary of Major Findings

Response rates from five participating institutions ranged from 34 – 60%, with an overall response rate of 49%. Most respondents were veterinarians and had a primary

effort allocation in teaching. Women were slightly overrepresented in the completed sample. Faculty respondents agreed these nontechnical competencies were important for veterinary graduates. The strongest agreement was observed for the competencies involving ethics, critical thinking, lifelong learning, interpersonal skills and communication skills. The weakest agreement was observed for coaching, business and leadership skills.

There were few significant differences among respondents from different institutions regarding the importance of nontechnical competencies. Minor differences were observed among institutions regarding placement, teaching and evaluation of nontechnical skills. Institution D faculty viewed the preveterinary period as an important place for nontechnical competency development, whereas faculty from Institution E were more likely to support their cultivation during the preclinical veterinary curriculum. Faculty members from Institution E, where the preclinical curriculum is problem-based, also were more prepared to teach and evaluate Interpersonal Skills.

Male and female faculty generally shared similar views regarding the importance and teaching of nontechnical competencies. However, female faculty members were more likely to support the development of nontechnical skills in an ongoing manner throughout the educational process, particularly in the preclinical years and continuing into the postgraduate years.

Responding faculty who did not hold a veterinary degree rated the importance of non-technical competencies higher than did veterinarian respondents, particularly those reflecting intrapersonal attributes and management skills, and were more likely than

others to support their development within clinical and postgraduate training. Non-DVM respondents also were slightly more prepared to teach most competencies than DVM respondents, especially Leadership Skills.

Respondents identified as Clinical Science-Other or Basic Science experts consistently rated overall importance of nontechnical competencies higher than the overall mean; Clinical Science-Large Animal respondents consistently rated them lower in importance. Respondents from different disciplines viewed the placement of nontechnical competencies in veterinary education in diverse ways, as might be expected from their disciplinary background. The greatest divergence in responses by faculty in several disciplines was observed for the placement of the competency Cultural Competence. Differences among discipline were also observed in faculty member's perceptions of personal responsibility to teach nontechnical competences, as expected due to the nature of different types of teaching done by these types of faculty members.

There was a trend for mean ratings of importance to be highest for respondents who were early in their teaching careers, and to decline incrementally for those with more teaching experience, or to decline in midcareer and rebound for more senior faculty. When viewed by academic rank, faculty of all ranks indicated similar views of the relative importance of these nontechnical competencies. However, significant differences were discovered among ranks related to placement, personal responsibility for and preparation for their cultivation in the veterinary curriculum. Junior faculty were surprisingly less likely than others to place nontechnical competency development in the clinical setting and were less likely to see a place for ongoing development of

competencies after graduates leave the veterinary program. Associate Professors appeared more likely to support development of nontechnical competencies in the latter stages of the training process, including the clinical veterinary curriculum and the postgraduate period.

Organization of the Chapter

In this chapter, areas of strongest consensus among respondents are discussed first, followed by a discussion of issues where weaker support and more divergent responses were recorded. The influence of faculty variables on responses is then discussed within the major themes of disciplinary orientation, gender and academic career stage. Summaries of major conclusions, limitations, recommendations for practice and recommendations for further research conclude the chapter.

Discussion

In this study, participating veterinary faculty members supported the overall importance of nontechnical competence in veterinary graduates. The positive level of agreement for all competencies reflects significant progress in academic veterinary medicine, since the focus on nontechnical skills is relatively new. The results of this study affirm other reports that veterinary educators are increasingly working toward improved nontechnical SKAs in their students (Chatterdon, King, & Lloyd, 2001; Lloyd, 2006; Wolf, Lloyd, & Black, 2008). In 2006, Lloyd pointed to numerous initiatives underway and to “ongoing SKA dialogue across the AAVMC and within many colleges and schools of veterinary medicine (p. 273)” as anecdotal evidence of current trends. The voices of faculty members captured here suggest this dialogue has been positive and

constructive. Faculty also seem in agreement that nontechnical SKA are best fostered during multiple points in the continuum of veterinary education, which supports the value of ongoing work in admissions, curriculum development, extracurricular programs and clinical education.

Faculty members' personal engagement and perceived comfort level with teaching and evaluating nontechnical competencies roughly paralleled the perceived importance of each competency. In other words, competencies highly rated in importance are also those that faculty report the highest level of personal responsibility to teach and preparedness to teach or evaluate, whereas competencies rated lower in importance are accompanied by lower perceptions of responsibility and preparation. Most likely, faculty have more experience, more opportunity and more interest in teaching and evaluating that which is important to them. Alternatively, faculty may be reluctant to affirm the relative importance of competencies that he or she is less comfortable weaving into teaching and assessment practices.

A Commitment to Traditional Values

Faculty strongly agree that ethics, critical thinking and self-management are important for veterinary graduates and should be part of professional veterinary education. The Veterinarian's Oath, adopted by the AVMA in 1969, is often the first and last text that veterinary students hear during their professional veterinary training. The Oath reads:

Being admitted to the profession of veterinary medicine, I solemnly swear to use my scientific knowledge and skills for the benefit of society through the

protection of animal health, the relief of animal suffering, the conservation of livestock resources, the promotion of public health and the advancement of medical knowledge. I will practice my profession conscientiously, with dignity and in keeping with the principles of veterinary medical ethics. I accept as a lifelong obligation the continual improvement of my professional knowledge and competence.

In this study, the highest appreciation and most congruent responses were seen for competencies reflected in the Oath, including an ethical orientation, critical thinking skills and a commitment to long-term self-development. These competencies embody the traditional values of the profession and the educational mission of veterinary colleges. It is no surprise that faculty give these skills “top billing” for veterinary graduates, promote their emphasis in both the preclinical and clinical veterinary curriculum, and feel comfortable playing a significant role in their development.

Communication Skills

Lewis and Klausner (2003) grouped ethics, moral responsibility and self-development within a category of self-management skills that also included motivation, flexibility and communication skills. Along with interpersonal skills, these competencies were also highly regarded by veterinary faculty. In particular, veterinary faculty appear to have adopted communication skills as a core competency as promoted by others (Kurtz, 2006). Although communication skills training is usually shepherded by a few individuals at any given institution, the growth in common focus on communication issues in the profession can be easily noted by reviewing conference topics and veterinary

literature over the past 5 years. Theme issues on communication have appeared in the *Journal of Veterinary Medical Education* and *Veterinary Clinics of North America* series. An international conference devoted to communication in veterinary medicine (the International Conference on Communication in Veterinary Medicine) is in its fourth iteration. Communication skills training requirements also were added as an accreditation standard for colleges of veterinary medicine in 2006 ("Accreditation Policies and Procedures of the AVMA Council on Education (COE). 9. Standards", 2008).

Consensus support for the importance of communication skills appeared across institutions and across most faculty variables in this study. As for other competencies, there is a predictable variance in perceptions of faculty from differing disciplinary backgrounds (see Fig 4.5), but the variance is less dramatic than for other relational or leadership skills. Most faculty also accept some responsibility to cultivate communication skills in veterinary students. Likewise, in the issue of *Veterinary Clinics of North America* recently devoted to communication skills, the guest editors point out the diversity of individuals involved in the publication, including faculty from varied disciplines in veterinary medicine and beyond (Cornell, Brandt, & Bonvicini, 2007). However, they also acknowledged the progress needed to bridge the gap between perceived importance and effective action:

Ironically, although veterinarians understand the importance and necessity of communication skills to ensure successful practice, they have long considered learning these skills to be exercises in the “warm and fuzzy” or “touchy feely” category. Assigning such labels to the core skills that comprise effective

communication may reflect the discomfort that we as veterinary professionals experience when examining how our interpersonal skills are perceived by others. Such labels may also create barriers to actively engaging in communication skills training. (p. xv)

In the study reported here, faculty consistently agreed to their personal responsibility to cultivate communication skills and reported solid preparation to teach and evaluate them. Although encouraging, these findings run contrary to published information and experience that highlights the high level of teaching skill, effort and sensitivity required in this area (Kurtz, 2006). Overall, these findings are optimistic and exciting for the profession, but additional investigations regarding faculty ability and structured development of faculty skills in communication training seem warranted. Ultimately, the favorable view and level of engagement in communication training may spill over to weaker areas in veterinary education, since one can argue that effective communication skills are the common thread for developing good interpersonal, leadership, coaching, and business skills, as well as culturally sensitive interactions with others.

Business and Management Skills

Veterinary faculty were less enthusiastic (yet still positive), about the importance of relational skills critical to the management of others, including cultural competence, coaching, business and leadership competencies. Faculty also placed the development of these aptitudes largely outside the purview of the professional school curriculum. Moreover, it was in these relational competencies where greater divergence in responses

was uncovered. Colleges are likely to find small groups of faculty who fight passionately for or against the attention to such abilities in the curriculum.

Colleges have been criticized for an underemphasis on practical management and client relation skills for decades (Kelman & Zellinger, 1979). The disconnect between faculty perspectives and employer/ alumni needs regarding business and leadership skills is striking, as predicted by Lofstedt (2003) and suspected by others (Kieves, Roark, & Sparks, 2007). Business, management, sales and marketing skills are desired by employers of veterinarians across practice and nonpractice fields (Brown & Silverman, 1999; Walsh, Osburn, & Schumacher, 2002). Yet, many teaching faculty do not consider the development of these skills part of their role. These findings parallel previous reports suggesting business skill development has not been a high priority in veterinary education (Lloyd & Larsen, 2001).

Klingborg and Klingborg (2007) summarize the reasons why doctors are not comfortable dealing with or talking about money with clients or patients, which may explain why clinician-educators also avoid the topic. Fundamentally, the notion of money is distasteful to those who see themselves as healers, even more so for veterinarians who are perceived as particularly altruistic, caring and dedicated to the welfare of animals regardless of profitability. Perceived conflicts of interest, limited time, and lack of business skills also impair doctors of many stripes (Klingborg & Klingborg, 2007). Unlike physicians relying on third party payment systems, veterinarians cannot separate concerns for patient care from discussions of cost.

With regard to the importance of business acumen for veterinary graduates, teaching faculty may also be losing touch with veterinary student needs. Students have recognized the problems associated with the economic realities of practice and the growing debt load of veterinary graduates. Independently, they have created programming, events and networks within and among veterinary colleges to shore up training and resources for their classmates (Kieves, Roark, & Sparks, 2007).

Where does the development of business skills fit into veterinary education? In this study, faculty opinion pointed to the clinical and postgraduate educational periods, but a strong consensus was lacking. Even within clinical faculty groups, however, the perceived importance of business skills and leadership, as well as preparation of faculty in these areas, were weaker than all other nontechnical competencies. Furthermore, almost half the respondents who supported business skill training in the veterinary curriculum did not feel a personal responsibility to teach business skills. These findings support the practice of bringing in experts from outside the faculty or providing extracurricular opportunities to enhance business training for students (Lloyd, Frawley, Neer, Merle, & Goebel, 2004; Lloyd & Larsen, 2001). However, colleges may be missing an opportunity to utilize the “village” of the faculty and the teaching hospital to help develop a business orientation in veterinary graduates. Awareness that many faculty do not perceive a responsibility to cultivate business skills in veterinary students may help administrators or consultants target groups or courses for creative integration of core economic concepts. For example, faculty in clinical diagnostic or support services (radiology, diagnostic laboratories) are less likely than others to focus on economic

issues, but such services often act as income-generating engines for the veterinary teaching hospital. Adjustments in clinical teaching could better point out the importance of fee structures, collections and staff management. Knowledgeable awareness of economic trends and factors affecting the economic viability of the profession will forevermore be another essential skill for veterinary students (Lloyd, 2006; Wolf, Lloyd, & Black, 2008).

Weak support was also seen for coaching and leadership skills in veterinary graduates. The emphasis on coaching skills is a relatively “hot” topic in business, management and health care (Palmer, Tubbs, & Whybrow, 2004). The concept has been applied both to coaching of professionals and to coaching of patients to gain desired compliance and outcomes (Ervin, 2005; Krietzer, Sierpina, & Lawson, 2008; Palmer et al., 2004). Obviously coaching becomes extremely important in staff training and mentoring of new graduates in private practices.

Recently the term “coach-consultant” was used to describe a shift in the role of production veterinarians (Noordhuizen et al., 2008). In larger farms or livestock production units, the focus has shifted from the treatment of diseased individual animals to the bigger picture, including population management and preventive health strategies. Given the easy access that all animal owners now have to medical knowledge via the internet, education in facts and figures may become less important for veterinarians over time. Coaching strategies designed to tailor and monitor short and long term care will become more important and could be a distinctive advantage for veterinarians in many practice roles.

Coaching skills can easily be practiced and emphasized in veterinary training. Veterinary academicians have heard and live by the “see one, do one, teach one” maxim for years and have long recognized the depth of understanding required to teach what one has learned to others. Many faculty incorporate student presentations or other activities into courses or clinic rotations, as opportunities for students to demonstrate organization and content of their understanding, practice communication skills and bring information to their classmates. Successful problem-based learning exercises rely heavily on students sharing their learning with each other. Yet, the coaching aspect of teamwork and client education could become a more overt component of veterinary education. For example, low risk peer teaching opportunities in a veterinary anatomy course offered students the opportunity to try their skills in assimilation and communication of the day’s efforts. Participating students felt that the exercise increased their anatomical knowledge, paralleled professional communication practice they would need in the future, enhanced professional skills and improved interactions with their peers (Sprunger & Smith, 2005).

Views of Leadership

In this study, leadership was defined primarily in the context of influencing others (Appendix A) and received the least support from responding faculty. In contrast, recent reports regarding the future of the veterinary profession have uniformly accentuated the need for stronger leadership at all levels. In the words of the AAVMC Veterinary Foresight Report, “Of critical importance to the status of veterinarians is their expression of leadership” (p. 11). More visible leaders are expected to contribute to community human/animal issues, crisis management, ecological health, food safety and public policy

(Willis et al., 2007). From an economic perspective, leadership skills are considered essential tools for ensuring a viable career and viable profession, as they “embody self-awareness, future thinking, team building and teamwork, communication, and the ability to develop others (Lloyd, 2006; Lloyd, King, Mase, & Harris, 2005).” These authors noted opportunities are great for all veterinarians to use leadership tools to maximize practice income.

Within the educational structure, leadership development has received a great deal of attention. Descriptions of leadership enhancement programs are found in the veterinary literature, usually with specific goals (Burns et al., 2006; Fraser & McGregor, 2002; McGregor & Fraser, 2002; Moore & Klingborg, 2006; Moore, Truscott, St. Clair, & Klingborg, 2007; Wagner, 2006). For example, programs have been developed to target future leaders in academia, research or public health, although a general summer leadership program (the Veterinary Leadership Experience) has purposefully worked to spread broad concepts of self-awareness, teamwork, conflict management to students and instructors from across the country. Unfortunately, most leadership training has been delivered as isolated and extracurricular activity for limited numbers of students.

The low rating of leadership skills compared to other nontechnical competencies in this study illustrates a different kind of disconnect, this time between veterinary college faculty and AAVMC leadership. Faculty respondents looked to the pre-veterinary period for development of these skills suggesting that faculty hope to admit students with leadership potential, but may not see a role for themselves and the veterinary curriculum

in cultivating such talents. Without faculty endorsement, the profession cannot present a unified front on the importance of leadership for veterinarians of the future.

Because of these disconnects, colleges need faculty on the front edge of economics, management and leadership theory. Colleges also need curricula that adapt quickly as changes occur. While the use of external or adjunct experts to fill the faculty gaps is a logical and practical solution, the visiting instructors are not part of the college faculty and may perpetuate a perception that business or other nontechnical skills are somehow detached from those of the working veterinary diagnostician and healer. Students may perceive mixed messages if other faculty are not willing or prepared to integrate concepts of business savvy and leadership into their teaching.

Cultural Competence

In this study, cultural competence was defined primarily as the ability to demonstrate awareness and competence in practice related activities and communications. Educating for cultural competence has received much less attention in veterinary medicine than in other health professions. In those fields, the expected multicultural patient population provides the basis for student need. In contrast, the veterinary student population and the pet-owning public remain decidedly white and homogeneous in North America (Greenhill, Nelson, & Elmore, 2007; Lloyd, 2006). It would be naïve, however, to think that the multicultural population shifts will not affect the veterinary client population in due time. Indeed, Lloyd (2006) suggests that veterinarians who reach out to more diverse groups may tap a new pipeline of clients in this economic climate. On a broader level, the cultural awareness of all veterinarians,

who interface daily with clients, young people and potential veterinary students, represent the profession at large and will ultimately be responsible for the diversity (or lack thereof) in the profession.

Within veterinary colleges, cultural sensitivity of the faculty also might impact recruitment, selection, teaching and assessment of students. A recent study of clerkship grades found correlations between the racial or ethnic background of medical students and the grades given to those students by attending physicians (Lee, N., Lau, A., & Jeffe, 2007). Measures of assertiveness or reticence (also commonly associated with cultural differences) also affected clerkship grades. Quiet students and those of minority ethnicity received lower grades than other students. The authors suggested that the entire medical community may require additional training in this area (Lee, N., Lau, A., & Jeffe, 2007).

Faculty in the study reported here were also quite mixed in their views on the place of cultural competence in veterinary education but most often pointed to the preveterinary period for its development. A review of educational and administrative practices at 25 veterinary colleges pointed out the limited training and involvement of faculty in diversity issues so far (Greenhill, Nelson, & Elmore, 2007). Curriculum or program leaders at veterinary colleges can expect a wide variety of faculty perspectives and opinions regarding culturally sensitive training. Additional buy-in may be needed before cultural competency issues are fully integrated into veterinary training.

Faculty Characteristics

The differences observed by respondent characteristics in isolated competencies cannot be explained or dismissed in broad strokes. However, a few themes warrant extra

consideration here. Most dramatically, non-veterinarians and those in nontraditional clinical areas (Clinical Sciences-Other respondents) were more inclined to support the importance and development of nontechnical competences than were clinical faculty “in the trenches” of traditional small or large animal practice. These two groups (non-veterinarians and nontraditional clinical science faculty) were presumed to capture individuals working in educational roles such as social work, public health, business and other roles, although the clinical group could also include veterinarians working with nontraditional species, such as avian, exotics, zoo, wildlife or aquatic animals. However, the largest number of respondents without veterinary degrees identified themselves as Basic Science faculty.

Although the nonveterinarian group was much smaller than other groups, their different viewpoint was striking. Outside the community of faculty trained as veterinarians, the importance of nontechnical skills is clearly appreciated and certainly reflects the consumer’s view of the profession. These individuals probably view veterinary students and the veterinary curriculum differently than faculty members who have completed veterinary school. Academic veterinarians may filter all discussions of veterinary education through the lens of their own experiences, and have more difficulty envisioning new or different approaches. Since the emphasis on nontechnical competencies is fairly recent in medical and veterinary education, individuals with other (nonveterinary) backgrounds may be quicker to see its value.

Although differences among institutions were minor and scattered within the data, two areas merit additional discussion, including the placement of nontechnical

competencies and the preparation of faculty to teach them. It is not possible within this study to comment on why Institution D faculty were more likely to include the preveterinary educational curriculum in competency development, but may result from differing admissions practices or different expectations of entering students. For Institution E, the strong emphasis on nontechnical competency development in the preclinical curriculum might be expected due to the problem-based learning curriculum employed during those years in their curriculum. Likely for the same reason, Institution E faculty reported a better preparation level to teach and evaluate nontechnical skills, especially interpersonal skills. Even though these differences were slight, the trends observed among institutions suggests that institutional culture can impact training in nontechnical competencies.

The role of the respondent also was reflected in significant differences by discipline, reflecting the socialization of disciplines and their perhaps the culture or general value for nontechnical skills. Support for nontechnical competences was quite high for basic science faculty, both with and without veterinary degrees. While one might expect a greater emphasis on factual biomedical knowledge in this group, these faculty may in fact be stronger advocates for the holistic development of veterinary students than clinical faculty. These findings parallel a general trend in medical education, where curricular and student development falls more heavily on basic science faculty.

Significant differences were found in the response patterns of large animal (equine and food animal) faculty. A slightly weaker support for nontechnical

competencies observed in this group was most pointed for interpersonal and relational competencies. These findings probably reflect a cultural difference in large animal practice, where the historical orientation to livestock care made attention to population health management and economic realities of veterinary care the most important tools for success. Communication with livestock owners has typically been perceived as unique, but less nuanced than other clients. The emphasis on nontechnical skills may be viewed as an outgrowth of the rising emphasis on small animal practice, or the rising number of women in veterinary medicine, at the expense of traditional veterinary practice. However, practicing veterinarians continue to press for more adept graduates in the nontechnical realm. In a recent survey of over 800 U.S. equine practitioners regarding the types of medical, surgical and nontechnical skills they perform, results confirm the frequent application of client education and business skills in private practice. In addition, the respondents often added professionalism, communication and personnel management to the list of activities provided by the survey instrument. The investigators recognized that performance of technical tasks comprised only one component of the educational outcomes expected by employers in equine practice (Hubbell, Saville, & Moore, 2008).

Despite the importance of economic issues facing livestock owners and large animal veterinarians, there was low support for development of business skills by large animal veterinarians as well. Perhaps the wording and description of this competency did not imply the ability to deal with the economic pressures faced in rural practice. The role of large animal veterinary practice has been changing, however, with equine and small ruminant (goat or sheep) practice leaning toward a companion animal approach and with

bovine and other food animal practice leaning to a production and population orientation. The gamut of nontechnical skills will be applied in these varied settings, from communication techniques for dealing with a wide variety of pet owners to savvy business, coaching and leadership skills for production and population medicine veterinarians.

Quality of life also has become an issue in large animal practice; the physical and mental demands of the practice often lead veterinarians to shift practice focus after five to ten years. While the physical demands might be inevitable, further development of nontechnical competencies such as interpersonal skills, self-management, communication skills, leadership, coaching and business skills might enable large animal veterinarians to succeed with less stress and personal sacrifice. Articulation of these goals and potential benefits to large animal faculty will be critical to the successful adaptation of nontechnical competency development in veterinary education.

A Gender-Neutral View

Much has been made of the gender shift in the veterinary profession. The introduction of “soft-skills” competencies may be viewed as a feminine movement. Indeed, the majority of individuals working in the arena and training veterinary students in such skills are women. Women faculty did respond to the survey more readily than men, which may indicate more interest in the topic. However, gender played a minor role in the overall results of this study.

Significant gender differences were not discovered in ratings of importance, responsibility for, or preparation for cultivating nontechnical competencies. Gender

differences were seen regarding placement of nontechnical skills in veterinary education, where women faculty were more likely to envision a place for their development in all phases of the educational process. Women faculty appear to appreciate the lifelong and continuous development of professional competencies more than men in the context of this study, and hope the educational process can incorporate holistic training for students at all levels.

There is evidence to support a similar expectation of female veterinary students, who rated the importance of nontechnical skills higher than male students in a study of 428 students at one institution (Kogan et al., 2004). Female students asked to define the successful veterinarian, rated the importance of lifelong learning, client relations, job satisfaction, ethical behavior, and relationships with staff, colleagues and patients significantly higher than did male students. They also rated effective interactions with classmates and with professors significantly higher than males when defining a successful veterinary student. The authors expressed concern that women students maintained higher, perhaps unrealistic expectations of themselves when compared to their male colleagues and might be subject to more self-induced stress (Kogan et al.). However, the results might reveal an opportunity for veterinary educators to tap into the keen interests of female students in becoming strong communicators, colleagues, team players and role models and accelerate efforts to refine these skills. Because the population of students in veterinary colleges is now predominantly female, and more women are filling faculty roles at veterinary colleges, one can certainly argue for the

integration of nontechnical competency development across the curriculum and in continuing education efforts.

Other differences between male and female faculty perspectives may be too subtle to be detected in this study. Perhaps larger numbers of respondents, or qualitative inquiries, would confirm or refute difference in viewpoint by gender.

What Should be Learned in Kindergarten?

Faculty certainly expect veterinary students to come to veterinary training with at least the foundational development of most nontechnical skills, particularly a grounding in ethical and moral integrity; intrapersonal attributes such as motivation, persistence toward goals, and flexibility; and interpersonal skills including communication, cultural competence and leadership skills. Of course, a focus has been on selection for these abilities during the admission process. Gross *et al.* adds a cautionary perspective of assessing moral character in the admission process, suggesting the premedical education drives a superficial notion of its meaning. “The moral education of a physician begins in the premedical years (or perhaps even earlier as middle school and high school students develop strategies for admission to the ‘best’ undergraduate institutions). By the time a student reaches medical school, he or she has already learned how to learn and how to succeed, often by demonstrating character as a shortcut to developing it.” (p.519) In other words, savvy applicants create a façade of moral character using the premedical or preveterinary activities that will reflect well on paper, rather than in actuality.

Burns et al. also acknowledge the role of early development of nontechnical skills, or the expectation thereof:

The responsibility for imparting non-technical competence has historically fallen to the family or significant others rather than to professional schools...In addition, veterinary educators had long presumed that students would somehow acquire non-technical (professional) competence as they struggled to complete the technical aspects of the curriculum...The emphasis across medical curricula on teaching technical skills, to the near exclusion of non-technical offerings, likely reflects yet another incorrect assumption: for years, it was thought that non-technical (professional) competence simply could not be taught. These skills or qualities were deemed to be 'common sense,' inherently or inextricably woven into an individual's personality or psychological makeup; in other words, students either had them or they didn't. (p.302)

These educators became convinced through their research and their experiences that these competencies can be advanced during veterinary school.

Many of the intrapersonal and interpersonal abilities included in this study fall into the larger realm of emotional intelligence. Competencies that prove a bit nebulous in the context of medical education, such as motivation, flexibility, or self-management, might be better defined for faculty in the context of emotional intelligence. Although parenting and schooling are considered the key contributors to emotional intelligence, researchers are encouraged by the success of structured programs designed to enhance measures of emotional intelligence for individuals of many ages and career stages including MBA students, managers, and advanced executives (Boyatzis, Stubbs, & Taylor, 2002; Reuven, 2007). EI measures also tend to increase with age and experience,

characteristic of a developmental ability that one can attend to throughout a career or lifetime (Weng, Chen, Chen, Lu, & Hung, 2008).

Often overlooked, the emotional intelligence of the professionals involved in teaching is also key to effective educational practice (Haskett, 2002). A starting point for faculty development may simply include opportunities for faculty members to explore their own strengths and weaknesses. As an added bonus, emotional intelligence has been correlated with improved academic performance in high school and university students, better physical health, and improved social interactions and personal relationships (Bar-On, 2005).

The Faculty Life Cycle

Distinctions among faculty appeared more related to career stage than to age in the study reported here. Early career faculty, as grouped here by year of graduation, years teaching experience and academic rank, exhibited stronger appreciation for the importance of, but less personal responsibility for teaching nontechnical skills than faculty at other career stages and ranks. It seems likely these more recent graduates had some exposure to nontechnical competencies in their educational experience, since veterinary colleges have implemented programs to address them primarily within the past decade (Lloyd, 2007; Lloyd & King, 2004). Alternatively, early career faculty may be more idealistic in nature, or more attuned to students' needs due to their own current or recent experiences as a new graduate. However, these same faculty members may not yet embrace their own role in teaching and cultivating these abilities in others. Perhaps new faculty members assume that others are filling this role in college's educational mission.

On the surface, the differences in veterinary college experience may also explain the dip in importance of nontechnical competencies seen in the responses of midcareer faculty. These faculty members were unlikely to be exposed to organized efforts or small group activities designed to develop interpersonal, communication or leadership skills in veterinary school. On the other hand, these faculty were socialized into the profession through experience and probably were imprinted by strong role models with good nontechnical attributes and skills. They likely assumed that one learns nontechnical skills by observation and assimilation, rather than by overt instruction.

Alternatively, the lag in support among midcareer faculty seen in this study may simply reflect the usual challenges of academia. In the midcareer years, faculty often become overwhelmed with service commitments, growing research programs and expectations for high profile accomplishments, yet are faced with more responsibilities in mentoring students and junior faculty. Using National Study of Postsecondary Faculty (NSOPF – 99) data, Baldwin et al. found faculty in the middle stages spend more time on administrative duties, consulting and other work outside their institution, and were less satisfied than faculty at other stages regarding their workload, time available for tasks and professional development, and their jobs overall. All this data fails to take into account the mid-life burdens outside of the workplace, including demands from children, aging parents and busy schedules.

However, faculty in the ambiguous and long “mid-career” phase receive less attention than probationary and senior faculty, both in their home institution and in the research literature on faculty needs and development (Baldwin, Lunceford, &

Vanderlinden, 2005). As Baldwin *et al.* recognized, the mid-career faculty segment is the longest and most productive phase of a professor's career. The bulk of faculty teaching in higher education and veterinary schools (and the majority of faculty responding to this survey) fall into the distinction of mid-career, and "deserve the attention of academic leaders, policymakers and higher education researchers (Baldwin *et al.*, 2005)." In this study midcareer faculty can be defined as respondents teaching for 9 – 24 years. This range of teaching experience is very close to the definition used by Baldwin, where faculty teaching 6 – 24 yrs were considered "midlife" faculty and those more than 25 years were considered "late life" faculty in their research.

Midcareer faculty may also have changing, and more realistic, notions of how veterinarians are trained. Their teaching goals may have evolved to focus on the most important concepts or content, without attention to the added dimensions of professional development in veterinary students. The comfort level and draw of routine is strong; yet midlife is complicated by periods of reflection, reexamination and revision. During these times, faculty members could find themselves alternatively optimistic or discouraged about student development. Fortunately these periods of reexamination offer windows of opportunity for faculty members' own professional development.

A positive finding is an upturn in support among the most senior faculty. Senior faculty members can be expected to have a level of comfort with their role and position, and to have the time and experiential basis to reflect on educational issues and the future of the profession. They also have more distance from their own days as a veterinary student, hence less concrete impressions related to how veterinary school should operate.

Life stage also may influence senior faculty members view of students and student development, as they have watched many students, and perhaps their own children, move into professional careers. In higher education, senior faculty interested in teaching are found to be more receptive to new teaching ideas and more open to discussing ideas about teaching from others (Blaisdell & Cox, 2004) Perhaps they “get it” and can step outside the biomedical and show an appreciation for the value of nontechnical skills based on their longer view and experience.

Awareness of the perspectives of faculty at different stages should be most useful to curricular leaders and those planning faculty development. Veterinary colleges should be able to capitalize on the enthusiasm of junior faculty and tap into their enthusiasm by clearly expecting and seeking their input an involvement in curriculum or program planning. Senior faculty perspectives should be utilized to help promote the importance of nontechnical competencies based on longevity and experience. Faculty leaders and college administrators will need to continue to engage junior faculty as they move into mid-career. Finally, mid career faculty will need to be approached differently and carefully; new teaching or coaching efforts that would appear to bring more work or more change are likely to be rejected, but there is an opportunity to seize the interest of those faculty during periods of career reassessment.

Limitations

The primary limitations of this study include those related to the sample and those related to the survey design. Website information was used to prepare the participant database and direct invitations to participate. Inaccurate or outdated website information

may have led to exclusion of some faculty. Despite a good overall response rate, the final completed sample size represents a small percentage of the overall population of veterinary faculty. The number of respondents in certain faculty groups became quite small. The study is also limited by the number and type of schools included. Additional participating colleges would have increased the sample size; inclusion of a large, research-oriented veterinary school would have added to the diversity of perspectives captured. Additionally, the response rate from participating schools was uneven, with respondents from one institution comprising almost a third of the overall completed sample. Similar response rates from other institutions may have enhanced the study results and helped distinguish differences between institution and between groups of faculty.

Response bias certainly was possible, especially since all faculty at participating institutions were invited to participate, rather than randomized samples. Those most interested in the topic might be expected to respond early and in greater numbers. The final response rate of nearly 50% should have largely reduced response bias in this study. Furthermore, the early (week 1) response to the survey was weak. Multiple efforts were required to encourage response during the 60 days of the survey administration. A lag in responses argues against significant response bias from particularly interested faculty.

Although the survey was anonymous, social acceptability of answers still may have played a role in the responses. The survey also relied on self-reporting of perspectives, perceived responsibilities and ability. Respondents might have been inclined to overstate their role and level of preparation to teach and evaluate nontechnical

competencies because the topic has received so much attention in the profession recently. As one pilot participant said, “Most of these competencies are ‘Mom and apple pie’ kind of things; it’d be hard to argue against their importance.” Closed ended questions also offered little flexibility or elaboration of faculty responses. Fortunately the development of scaled response options enabled some discrimination regarding faculty support of individual competencies.

In retrospect, survey construction also limited the interpretation of the final results for some research questions and individual competencies. The tiered approach, where only faculty who agreed to the importance of a competency had an opportunity to weigh in or where it should be cultivated, and only respondents who then selected points of education within the veterinary professional program were asked about their preparation, limits the number of data points available for research questions 2 - 5. Since faculty members who did not think a competency was worthy of attention during veterinary college did not provide viewpoints for these research questions, the results are probably more positive in general than one might find when an entire faculty is weighing in on the issues. That said, the overall ratings of importance, and the consensus viewpoints on placement of nontechnical competence can be extrapolated to larger faculty populations with appropriate caution.

This study design and item nonresponse that ensued also was a problem in analysis of results, eliminating the ability to conduct analyses directly comparing competencies with each other for research questions 3 – 5.

However, because of the very positive responses by most faculty members, only a small group of respondents ended up bypassing question 2 (placement of competencies in veterinary education). Fortunately, almost all respondents agreed to the importance of the top 10 competencies and the aggregate results captured 93 – 100% of the completed sample, and nonagreement only reached 12 – 18% for the lowest rated competencies (Cultural Competence, Coaching Skills, Business Skills and Leadership Skills). For questions 3 – 5, the numbers responding regarding lower rated competencies decrease further. Extrapolating our findings for research questions 3 through 5 to all faculty, would be speculative. The study can be faulted for missing information from the strongest dissenters, but the overriding conclusions remain valid. In retrospect, it would have been ideal to fully complete data collection and analysis from a larger pilot group or from faculty at one institution prior to administering the survey to others. In that case, some of the survey and analytical limitations may have been corrected prior to proceeding with the larger study.

In retrospect, a few other minor limitations in the survey design could be identified. Faculty who did not directly teach veterinary students, and most veterinary administrators, were purposefully excluded from the survey, in order to get an untainted view from the teaching faculty. However, all faculty (and staff) within a college of veterinary medicine have a substantial and personal interest in the educational process and their voices should be heard. Respondents were not asked whether their faculty appointment was tenure track versus nontenure track. An increased use of nontenure track faculty in clinical and research appointments in veterinary colleges makes their

views increasingly relevant to the mission. Finally, faculty were allowed to choose multiple settings for the “placement” of nontechnical competencies in preveterinary, veterinary and postgraduate education, which revealed the views of the spectrum of the education quite nicely. However, it may have been useful to discern the “most important place” for development of each competency in order to aid priority planning. All of these concerns, of course, were weighed against the need to avoid an even longer survey instrument.

Conclusions

The results of this study provide a snapshot of current faculty attitudes regarding an important curricular issue in professional veterinary medical education. Although the sample was drawn from a small number of veterinary colleges, the results should be generalizable to veterinary educators across institutions in this relatively homogenous group. Based on the results of this study, veterinary faculty uniformly agree that nontechnical competencies are important for veterinary graduates and should be cultivated across the spectrum of preveterinary, veterinary and postgraduate education. The support is greatest for critical thinking and intrapersonal competencies and declines somewhat for management and business competencies. Basic science, nonveterinarian and junior faculty groups tend to more strongly appreciate the importance of but are less inclined to perceive their own responsibilities to teach nontechnical competencies.

There are some disconnects in the perceptions of the veterinary faculty members and those outside the profession or outside academia, as evidenced by the literature and by the responses obtained from non-veterinarians in this study.

Veterinary faculty members expect students to come to veterinary school as highly motivated individuals with fundamental competence in ethics and intrapersonal skills. The veterinary curriculum is viewed as a key place for further cultivating these skills as well as critical thinking and communication skills. Additional competencies, including crisis management, creativity and business skills may be best suited for the clinical portion of veterinary education.

Institutional affiliation does not make great differences in importance but can make a difference in faculty training or faculty perceptions of their own abilities in the cultivation of nontechnical competencies. Also, faculty members' view of the role and composition of preveterinary and preclinical veterinary education in cultivating nontechnical competence may be unique to an institution.

Women faculty do not rate the importance of nontechnical competencies significantly higher or lower than male faculty; however, women faculty are more likely to support their development across the continuum of education.

Faculty perceptions may vary with time or by career stage. The most senior and experienced faculty members indicated a high appreciation and comfort level for developing a well-rounded skill set for veterinarians. Junior faculty members appear to highly appreciate the value of nontechnical competencies but may not view themselves responsible for their development in veterinary students. Mid-career faculty maintain a slightly reserved view of the importance of nontechnical skills and of their own ability to enhance these skills in veterinary students, and warrant further study.

Recommendations for the Field

This research has added a new perspective and voice to the knowledge base in this area and should better inform veterinarians, accrediting agencies, and college administrators of faculty perspectives and needs. Specific recommendations include:

1. Veterinary college administrators and faculty involved in faculty hiring, faculty development and curricular planning should be particularly aware of disciplinary and career stage differences in perception of nontechnical competencies when addressing those groups. Young faculty are likely to be supportive, but may need encouragement to engage in, nontechnical competency development. Gender differences may be slight, but administrators can expect women faculty to support integrated development of competencies across the curriculum.

2. Although institutional variation is mild, administrators and curriculum committees should gain feedback from their own faculty about placement of nontechnical competency development, especially in planning preveterinary requirements and the preclinical curriculum.

3. Leaders of academic veterinary medicine, as well as instructors in veterinary colleges, should work toward building integrated methods of training veterinary students in business, management, coaching and leadership skills, in order to provide a unified message and to tap into underutilized faculty and resources within the college to enhance this training.

4. Senior faculty and faculty members who are not veterinarians can be advocates and leaders for curricular and other educational programs that promote or develop nontechnical skills in veterinary students.

5. Exposure of faculty to curricular programs and small group formats that encourage development of nontechnical competencies may increase their support and comfort level with cultivating them in the curriculum.

6. Since faculty members' perceived importance appears to be directly correlated with their self-assessment of ability, providing faculty development in teaching and evaluating such skills may enhance their view of their importance and willingness to participate in initiatives.

Recommendations for Further Research

Additional research will be valuable in order to expand on the findings of this study. Implementing a modified survey at additional veterinary colleges, or conducting a national study, would increase the numbers in all faculty groups and further affirm the disciplinary and other differences seen here. Qualitative inquiries will be critical to further explore the differences seen among faculty in different disciplines and at different career and life stages, and to learn the perspectives of nonveterinarians teaching in veterinary colleges. Qualitative studies using purposeful and snowball sampling methods also will help researchers learn more from dissenting voices. Finally, further investigation into how nontechnical competencies are developed over a veterinary career will bring even more insight into best educational practices.

LIST OF REFERENCES

References

- Accreditation Policies and Procedures of the AVMA Council on Education (COE). 9. Standards. (2008). Retrieved September 4, 2008, from http://www.avma.org/education/cvea/coe_standard.asp
- Alichnie, M. C. B., J. T. (1981). Prediction of freshman students' success in a baccalaureate nursing program. *1981*, 30(1), 49-53.
- Anastasi, A. M., Maende, M. J., & Schneiders, A. A. (1960). *The validation of a biographical inventory as a predictor of college success*. New York: College Entrance Examination Board.
- Babbie, E. (1990). *Survey research methods* (2nd ed.). Belmont, CA: Wadsworth.
- Baldwin, R. G., Lunceford, C. J., & Vanderlinden, K. E. (2005). Faculty in the middle years: illuminating an overlooked phase of academic life. *Review of Higher Education*, 29(1), 97-118.
- Bar-On, R. (1988). The development of a concept of psychological well-being: Rhodes University, South Africa.
- Bar-On, R. (2005). The impact of emotional-social intelligence on subjective well-being. *Perspectives in Education*, 23(2), 1-22.
- Bar-On, R. (2007). How important is it to educate people to be emotionally intelligent, and can it be done? In B. Reuven, J. G. Maree & M. J. Elias (Eds.), *Educating people to be emotionally intelligent* (pp. 1-14). Westport, Connecticut: Praeger.

- Birchard, S. J., Frankum, W. M., Selby, L. A., & Irvin, J. A. (1976). Ideal personality characteristics for veterinary medical students. *Journal of Veterinary Medical Education*, 3(1), 32-38.
- Blaisdell, M. L., & Cox, M. D. (2004). Midcareer and senior faculty learning communities: learning throughout faculty careers. *New Directions for Teaching and Learning*, 97, 137-148.
- Blumberg, P., & Flaherty, J. A. (1985). The influence of noncognitive variables in student performance. *Journal of Medical Education*, 60(9), 721-723.
- Borow, H. T. (1945). *A psychometric study of nonintellectual factors in college achievement*. Unpublished doctoral dissertation, Pennsylvania State College.
- Boyatzis, R. E., Stubbs, E. C., & Taylor, S. N. (2002). Learning cognitive and emotional intelligence competencies through graduate management education. *Academy of Management Journal on Learning and Education*, 1(2), 150-162.
- Bristol, D. G. (2002). Using alumni research to assess a veterinary curriculum and alumni employment and reward patterns. *Journal of Veterinary Medical Education*, 29(1), 20-27.
- Brown, J. P., & Silverman, J. D. (1999). The current and future market for veterinarians and veterinary medical services in the United States. *Journal of the American Veterinary Medical Association*, 215, 161-183.
- Brown, S. E., & Marengo, E., Jr. (1980). *Law school admissions study*. San Francisco: Mexican American legal Defense and Educational Fund.

- Burge, G. D. (2003). Six barriers to veterinary career success. *Journal of Veterinary Medical Education*, 30(1), 1-4.
- Burns, G. A., Ruby, K. L., DeBowes, R. M., Seaman, S. J., & Brannan, J. K. (2006). Teaching non-technical (professional) competence in a veterinary school curriculum. *Journal of Veterinary Medical Education*, 33(2), 301-308.
- Butler, D. G. (2003). Employer and new graduate satisfaction with new graduate performance in the workplace within the first year following convocation from the Ontario Veterinary College. *Can Vet J*, 44(5), 380-391.
- Cariaga-Lo, L. D., Enarson, C. E., Crandall, S. J., Zaccaro, D. J., & Richards, B. F. (1997). Cognitive and noncognitive predictors of academic difficulty and attrition. *Academic Medicine*, 72(10 Suppl 1), S69-71.
- Carnevale, A. P., Gainer, L. J., & Meltzer, A. S. (1990). *Workplace basics*. San Francisco: Jossey-Bass.
- Case, D. B. (1988). Survey of expectations among clients of three small animal clinics. *Journal of the American Veterinary Medical Association*, 192(4), 498-502.
- Chatterdon, L. M., King, L. J., & Lloyd, J. W. (2001). The skills, knowledge, aptitudes, and attitudes of successful veterinarians: a summary of presentations to the NCVEI Subgroup (Brook Lodge, Augusta, Michigan, December 4 – 6, 2000).
- Collins, H. (1997). *Shedding the blinkers: A perspective on veterinary education*. Sydney, Australia: University of Sydney.
- Comparative Data Report*. (2005). Washington, D.C.: American Association of Veterinary Medical Colleges.

- Cornell, K. K., Brandt, J. C., & Bonvicini, K. A. (Eds.). (2007). *Effective communication in veterinary practice* (Vol. 37 (1)). Philadelphia: W. B. Saunders.
- Creswell, J. W. (2002). *Educational research; planning, conducting and evaluating quantitative and qualitative research*. Upper Saddle River, NJ: Merrill Prentice Hall.
- Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed method approaches* (2nd ed.). Thousand Oaks, CA: Sage.
- Cron, W. L., Slocum, J. V., Goodnight, D. B., & Volk, J. O. (2000). Executive summary of the Brakke management and behavior study. *Journal of the American Veterinary Medical Association*, 217(3), 332-338.
- DeAngelis, S. (2003). Noncognitive predictors of academic performance. Going beyond the traditional measures. *Journal of Allied Health*, 32(1), 52-57.
- Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method* (2nd ed.). New York: John Wiley & Sons.
- Dillman, D. A. (2007). *Mail and internet surveys: The tailored design method, 2007 update with new internet, visual, and mixed-mode guide* (2nd ed.). Hoboken, NJ: John Wiley & Sons.
- Dorsey, W. A. (2004). Concerns about our profession. *Journal of the American Veterinary Medical Association*, 225(12), 1827-1828.
- Epstein, R., & Hundert, E. (2002). Defining and assessing professional competence. *Journal of the American Medical Association*, 287(2), 226-235.

- Eron, L. D. (1954). Use of the Rohrschach method in medical student selection. *Journal of Medical Education*, 29, 35-39.
- Ervin, N. (2005). Clinical coaching: a strategy for enhancing evidence-based nursing practice. *Clin Nurse Spec*, 19(6), 296-301.
- Evers, F. T., Rush, J. C., & Berdrow, I. (1998). *The bases of competence: skills for lifelong learning and employability*. San Francisco: Jossey-Bass.
- Felsman, J. K., & Vaillant, G. E. (1987). Resilient children as adults: A 40-year study. In E. J. Anderson & B. J. Cohler (Eds.), *The invulnerable child*. New York: Guilford Press.
- Fletcher, G. C., McGeorge, P., & R.H., F. (2002). The role of non-technical skills in anesthesia: a review of current literature. *British Journal of Anaesthesiology*, 88, 418-429.
- Fowler, F. J., Jr. (2002). *Survey research methods* (3rd ed. Vol. 1). Thousand Oaks, CA: Sage Publications.
- Fraser, D. R., & McGregor, D. D. (2002). An exercise in leadership training for veterinary students aiming for careers in biomedical research. *Journal of Veterinary Medical Education*, 29, 162-166.
- Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.
- Gardner, H. (2006). *Five minds for the future*. Boston: Harvard Business School Press.
- Glaser, R. (1951). Predicting achievement in medical school. *Journal of Applied Psychology*, 35, 272-274.

- Goldberg, L. R. (1990). An alternative "Description of personality": the Big-Five factor structure. *Journal of Personality and Social Psychology*, 59, 1216-1229.
- Goldberg, L. R. (1992). The development of markers for the Big-Five factor structure. *Psychological Assessment*, 4(1), 26-42.
- Goleman, D. (1995). *Emotional intelligence: Why it can matter more than IQ*. New York: Bantam.
- Goleman, D. (2005). Introduction. . In *Emotional intelligence: Why it can matter more than IQ. Tenth anniversary edition*. (pp. i-xviii). New York: Bantam.
- Gough, H. G. (1953). The construction of a personality scale to predict scholastic achievement. *Journal of Applied Psychology*, 37, 361-366.
- Gough, H. G., Hall W. B. (1964). Prediction of performance in medical school from the California Psychological Inventory. *Journal of Applied Psychology*, 48(4), 218-226.
- Grant, G. (1979). Implications for competence-based education. In G. E. Grant, P.; Ewens T.; Gamson, Z.; Kohli, W.; Neumann, W.; Olesen, V.; & Riesman, D. (Ed.), *On competence: a critical analysis of competence-based reforms in higher education*. San Francisco: Jossey-Bass.
- Greenfield, C. L., Johnson, A. L., & Schaeffer, D. J. (2004). Frequency of use of various procedures, skills, and areas of knowledge among veterinarians in private small animal exclusive or predominant practice and proficiency expected of new veterinary school graduates. *Journal of the American Veterinary Medical Association*, 224(11), 1780-1787.

- Greenhill, L. M., Nelson, P. D., & Elmore, R. G. (2007). Racial, cultural and ethnic diversity within US veterinary colleges. *Journal of Veterinary Medical Education*, 34(2), 74-78.
- Groves, R. (1989). *Survey errors and survey costs*. New York: John Wiley & Sons.
- Guffey, J. S., Farris, J. W., Aldridge, R., & Thomas, T. (2002). An evaluation of the usefulness of noncognitive variables as predictors of scores on the national physical therapy licensing examination. *Journal of Allied Health*, 31(2), 78-86.
- Hardin, L. E., & Ainsworth, J. A. (2007). An alumni survey to assess self-reported career preparation attained at a US veterinary school. *Journal of Veterinary Medical Education*, 34(5), 683-688.
- Harkin, K. R. (2002). Who is responsible? *Journal of Veterinary Medical Education*, 29(1), 5.
- Harris, I. B. (1993). New expectations for professional competence. In L. Curry (Ed.), *Educating professionals* (pp. 17-52). San Francisco: Jossey-Bass.
- Haskett, R. A. (2002). Emotional intelligence and teaching success in higher education.: Indiana University.
- Heath, T. J. (2002). Longitudinal study of veterinarians from entry to the veterinary course to 10 years after graduation: attitudes to work, career and profession. *Australian Veterinary Journal* 80(8), 474-478.
- Heath, T. J., Lanyon, A., & Lynch-Blosse, M. (1996). A longitudinal study of veterinary students and recent graduates 3. Perceptions of veterinary education. *Australian Veterinary Journal*, 74(4), 301-304.

- Heath, T. J., Lynch-Blosse, M., & Lanyon, A. (1996). A longitudinal study of veterinary students and recent graduates 2. Views of the veterinary profession. *Australian Veterinary Journal*, 74(4), 297-300.
- Hojat, M., Robeson, M., Damjanov, I., Veloski, J. J., Glaser, K., & Gonnella, J. S. (1993). Students' psychosocial characteristics as predictors of academic performance in medical school. *Academic Medicine*, 68(8), 635-637.
- Hubbell, J. A. E., Saville, W. J. A., & Moore, R. M. (2008). Frequency of activities and procedures performed in private equine practice and proficiency expected of new veterinary school graduates. *Journal of the American Veterinary Medical Association*, 232(1), 42-46.
- Ilgen, D. R., Lloyd, J. W., Morgeson, F. P., Johnson, M. D., Meyer, C. J., & Marrinan, M. (2003). Personal characteristics, knowledge of the veterinary profession, and influences on career choice among students in the veterinary school applicant pool. *Journal of the American Veterinary Medical Association*, 223(11), 1587-1594.
- Jensen, A. R., Wright, A. S., Lance, A. R., K.C., O. B., Pratt, C. D., Anastakis, D. J., et al. (2008). The emotional intelligence of surgical residents: a descriptive study. *American Journal of Surgery*, 195(1), 5-10.
- Johnson, B., & Turner, L. A. (2003). Data collection strategies in mixed methods research. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 297-319). Thousand Oaks, California: Sage.

- Jones, E. A. (2002). *Transforming the curriculum: Preparing students for a changing world*. San Francisco: Jossey-Bass.
- Keck, J. W., Arnold, L., Willoughby, L., & Calkins, V. (1979). Efficacy of cognitive/noncognitive measures in predicting resident-physician performance. *Journal of Medical Education*, 54(10), 759-765.
- Kelman, E. G., & Zellinger, M. S. (1979). Veterinarians review their professional school education. *Journal of Veterinary Medical Education*, 6(2).
- Kieves, N. R., Roark, A. W., & Sparks, T. K. (2007). Business education in veterinary schools: the potential role of the Veterinary Business Management Association. *Journal of Veterinary Medical Education*, 34(5), 678-682.
- Klingborg, D. J., & Klingborg, J. (2007). Talking with veterinary clients about money. *Veterinary Clinics of North America; Small Animal Practice*, 37(1), 79-93.
- Knehr, C. A., Kohl, R. N. (1959). MMPI screening of entering medical students. *Journal of Psychology*, 47, 297-304.
- Kogan, L. R., McConnell, S. L., & Schoenfeld-Tacher, R. (2004). Gender differences and the definition of success: male and female veterinary students' career and work performance expectations. *Journal of Veterinary Medical Education*, 31(2), 154-160.
- Kogan, L. R., McConnell, S. L., & Schoenfeld-Tacher, R. (2005). Response of a veterinary college to career development needs identified in the KPMG LLP study and the executive summary of the Brakke study: a combined MBA/DVM

- program, business certificate program, and curricular modifications. *Journal of the American Veterinary Medical Association*, 226(7), 1070-1076.
- Kolb, D. A., & Wolfe, D. (1981). *Professional Education and Career Development: A Cross-Sectional Study of Adaptative Competencies*. Cleveland, Ohio: Case Western Reserve University.
- Kornguth, M., Frisch, N., Shovein, J., & Williams, R. (1994). Noncognitive factors that put students at academic risk in nursing programs. *Nurse Educ*, 19(5), 24-27.
- Krietzer, M. J., Sierpina, V. S., & Lawson, K. (2008). Health coaching: innovative education and clinical programs emerging. *Explore*, 4(2), 154-155.
- Kuehn, B. M. (2004). Raising emotional IQ. *Journal of the American Veterinary Medical Association*, 224(12), 1909-1910.
- Kurtz, S. (2006). Teaching and learning communication in veterinary medicine. *Journal of Veterinary Medical Education*, 33(1), 11-19.
- Latif, D. A. (2005). Including the assessment of nontraditional factors in pharmacy school admissions. *Annals Pharmacotherapy*, 39(4), 721-726.
- Lee, K. B., N., V. S., Lau, S. K., A., A. D., & Jeffe, D. B. (2007). "Making the grade:" noncognitive predictors of medical students' clinical clerkship grades. *Journal of the National Medical Association*, 99(10), 1138-1150.
- Lemann, N. (1999). *The big test: The secret history of American meritocracy*. New York: Farrar, Straus, and Giroux.

- Lewis, R. E., & Klausner, J. S. (2003). Nontechnical competencies underlying career success as a veterinarian. *Journal of the American Veterinary Medical Association*, 222(12), 1690-1696.
- Lloyd, J. W. (2006). Current economic trends affecting the veterinary medical profession. *Veterinary Clinics of North America; Small Animal Practice*, 36, 267-279.
- Lloyd, J. W. (2007). Enhancing nontechnical skills, knowledge, aptitudes, and attitudes in the veterinary profession through the work of the National Commission on Veterinary Economic Issues. *Journal of the American Veterinary Medical Association*, 230(1), 1646-1652.
- Lloyd, J. W., Frawley, S. L., Neer, C. A., Merle, C., & Goebel, R. (2004). The Zodiac workshop: an innovative model for teaching financial management through partnership with industry. *Journal of Veterinary Medical Education*, 31(2), 175-178.
- Lloyd, J. W., & King, L. J. (2004). What are the veterinary schools and colleges doing to improve the nontechnical skills, knowledge, aptitudes, and attitudes of veterinary students? *Journal of the American Veterinary Medical Association*, 224(12), 1923-1924.
- Lloyd, J. W., King, L. J., Klausner, J. S., & Harris, D. (2003). National workshop on core competencies for success in the veterinary profession. *Journal of Veterinary Medical Education*, 30(3), 280-284.

- Lloyd, J. W., King, L. J., Mase, C. A., & Harris, D. L. (2005). Leadership in veterinary medicine: future needs and recommendations. *Journal of the American Veterinary Medical Association*, 226(7), 1060-1067.
- Lloyd, J. W., Klausner, J. S., & Lewis, R. E. (2002). Update on improving the skills, knowledge, aptitudes, and attitudes of veterinarians. *Journal of the American Veterinary Medical Association*, 221(11), 1556-1557.
- Lloyd, J. W., & Larsen, E. R. (2001). Veterinary practice management: Teaching needs as viewed by consultants and teachers. *Journal of Veterinary Medical Education*, 28(1), 15-18.
- Lloyd, J. W., & Walsh, D. A. (2002). Template for a recommended curriculum in "Veterinary Professional Development and Career Success". *Journal of Veterinary Medical Education*, 29(2), 84-93.
- Lofstedt, J. (2003). Confidence and competence of recent veterinary graduates--is there a problem? *Canadian Veterinary Journal*, 44(5), 359-360.
- Ludmerer, K. M. (1999). *Time to heal: American medical education from the turn of the century to the era of managed care*. Oxford: Oxford University Press.
- Markert, R. J. (1983). Incremental validity of noncognitive tests for medical school academic achievement. *Medical Education*, 17(3), 172-174.
- Matvevskii, A. S., & Gravenstein, N. (2008). Role of simulators, educational programs, and nontechnical skills in anesthesia resident selection, education, and competency assessment. *Journal of Critical Care*, 23(2), 167-172.

- Mavis, B., & Doig, K. (1998). The value of noncognitive factors in predicting students' first-year academic probation. *Academic Medicine*, 73(2), 201-203.
- McDonald, R. L., & Gynther, M. D. (1963). Nonintellectual Factors Associated with Performance in Medical School. *J Genet Psychol*, 103, 185-194.
- McGregor, D. D., & Fraser, D. R. (2002). The Cornell Leadership Program for veterinary students. *Journal of Veterinary Medical Education*, 29, 157-161.
- McGuire, C. H. (1993). Sociocultural changes affecting professions and professionals. In L. Curry (Ed.), *Educating professionals* (pp. 3-16). San Francisco: Jossey-Bass.
- McQuary, J. P. (1953). Some relationships between non-intellective characteristics and academic achievement. *Journal of Educational Psychology*, 44, 215-228.
- Miller, G. D. (1990). The assessment of clinical skills, competence, performance. *Academic Medicine*, 65(9), S63-S67.
- Miller, G. D., Frank, D., Franks, R. D., & Getto, C. J. (1989). Noncognitive criteria for assessing students in North American medical schools. *Academic Medicine*, 64(1), 42-45.
- Moore, D. A., & Klingborg, D. J. (2006). The University of California Veterinary Student Leadership Program: Comparison of a five-day course with a three-day course. *Journal of Veterinary Medical Education*, 33, 284-293.
- Moore, D. A., Truscott, M. L., St. Clair, L., & Klingborg, D. J. (2007). Effects of a veterinary student leadership program on measures of stress and academic performance. *Journal of Veterinary Medical Education*, 34, 112-121.

- Morse, J. M. (1991). Approaches to qualitative-quantitative methodological triangulation. *Nursing Research*, 40(1), 120-123.
- Morse, J. M. (2003). Principles of mixed methods and multimethod research design. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 189-208). Thousand Oaks, CA: Sage Publications.
- Nielsen, B., & Tulinius, C. (2003). [Physicians in training in general practice want mentors]. *Ugeskr Laeger*, 165(36), 3418-3423.
- Noordhuizen, J. P., van Egmond, M. J., Jorritsma, R., H., H., van Werven, T., Vos, P. L., et al. (2008). Veterinary advice for entrepreneurial dutch dairy farmers: form curative practice to coach-consultant: what needs to be changed? *Tijdschr Diergeneeskde*, 133(1), 4-8.
- Opacic, D. A. (2003). The relationship between self-efficacy and student physician assistant clinical performance. *Journal of Allied Health*, 32(3), 158-166.
- Palmer, S., Tubbs, I., & Whybrow, A. (2004). Health coaching to facilitate the promotion of healthy behavior and achievement of health-related goals. *International Journal of Health Promotion Education*, 41(3), 91-93.
- Patel, V. L., Arocha, J. F., Kaufman, D. R. (1999). Expertise and tacit knowledge in medicine. In R. Sternberg, J. A. Horvath & D. R. Kaufman (Eds.), *Tacit knowledge in professional practice: researcher and practitioner perspectives*. Mahwah, NJ: Lawrence Erlbaum Associates Publishing.

- Peskun, C., Detsky, A., & Shandling, M. (2007). Effectiveness of medical school admissions criteria in predicting residency ranking four years later. *Medical Education, 41*, 57-64.
- Phelan, S., Obenshain, S. S., & Galey, W. R. (1993). Evaluation of the noncognitive professional traits of medical students. *Academic Medicine, 68*(10), 799-803.
- Pink, D. H. (2006). *A Whole New Mind: Why Right-Brainers Will Rule the Future*. New York: Penguin Group.
- Polanyi, M. (1967). *The tacit dimension*. New York: Doubleday.
- Prasse, K. W., Heider, L. E., & Maccabe, A. T. (2007). Envisioning the future of veterinary medicine: the imperative for change in veterinary medical education. *Journal of the American Veterinary Medical Association, 231*(9), 1340-1341.
- Reader, T., Flin, R., & Lauche, K. (2006). Non-technical skills in the intensive care unit. *British Journal of Anaesthesiology, 96*, 551-559.
- Render, G. F., & Jackson, H. D. (1975). Preveterinary performance, admissions criteria and personality variables as predictors of success in veterinary school. *Journal of Veterinary Medical Education, 2*, 3-6.
- Reuven, B. (2007). How important is it to educate people to be emotionally intelligent, and can it be done? In B. Reuven, J. G. Maree & M. J. Elias (Eds.), *Educating people to be emotionally intelligent* (pp. 1-14). Westport, Connecticut: Praeger.
- Roessler, R., Lester, J. W., Butler, W. T., Rankin, B., & Collins, F. (1978). Cognitive and noncognitive variables in the prediction of preclinical performance. *Journal of Medical Education, 53*(8), 678-680.

- Routly, J. E., Taylor, I. R., Turner, R., McKernan, E. J., & Dobson, H. (2002). Support needs of veterinary surgeons during the first few years of practice: perceptions of recent graduates and senior partners. *Veterinary Record*, 150, 167-171.
- Ruby, K. L., & DeBowes, R. M. (2007). The veterinary health care team: going from good to great. *Veterinary Clinics of North America; Small Animal Practice*, 37(1), 19-35.
- Rust, R. M., & Ryan, F. J. (1953). The relationship of some Rorschach variables to academic behavior. *Journal of Personality*, 21, 441-456.
- Rychen, D. S., & Tiana, A. (2004). *Developing key competencies in education: some lessons from international and national experience*. Paris: United Nations Educational, Scientific and Cultural Organization (UNESCO).
- Sacks, P. (1999). *Standardized minds*. Cambridge, Massachusetts: Perseus Publishing.
- Salovey, P., & Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition, and Personality*, 9, 185-211.
- Schofield, W. (1953). A study of medical students with the MMPI: III. Personality and academic success. *Journal of Applied Psychology*, 37, 47-52.
- Schon, D. A. (1983). *The reflective practitioner: How professionals think in action*: Basic Books, Inc.
- Schon, D. A. (1987). *Educating the reflective practitioner: toward a new design for teaching and learning in the professions*. San Francisco: Jossey-Bass.
- Schonlau, M., Fricker, R. D., Jr., & Elliott, M. N. (2002). *Conducting research surveys via e-mail and the web*. Santa Monica, CA: RAND.

- Sedlacek, W. E. (2004). *Beyond the big test: noncognitive assessment in higher education*. San Francisco: Jossey-Bass.
- Sembill, D. (1992). *Problemlosefähigkeit, Handlungskompetenz und Emotionale Befindlichkeit*. Gottingen: Hogrefe.
- Sprunger, L., K., & Smith, T. L. (2005). Reorganizing small animal gross anatomy: improving the faculty and student experience and incorporating non-technical competency development. *Journal of Veterinary Medical Education*, 32, 255-263.
- Stark, J. S., & Lowther, M. A. (1988). *Strengthening the ties that bind: Integrating undergraduate liberal and professional study. Report of the professional preparation network*. Ann Arbor: University of Michigan.
- Sternberg, R. J. (1996). *Successful intelligence: How practical and creative intelligence determine success in life*. New York: Simon and Schuster.
- Sternberg, R. J. (2004). North American approaches to intelligence. In R. J. Sternberg (Ed.), *International handbook of intelligence*. Cambridge: Cambridge University Press.
- Tashakkori, A., & Teddlie, C. (1998). *Mixed methodology: Combining qualitative and quantitative approaches* (Vol. 46). Thousand Oaks, CA: Sage Publications.
- Tinga, C., Adams, C. L., Bonnett, B. N., & Ribble, C. S. (2001). Survey of veterinary technical and professional skills in students and recent graduates of a veterinary college. *Journal of the American Medical Association*, 219(7), 924-931.

- Tupes, E. C., & Christal, R. E. (1961). *Recurrent personality factors based on trait ratings* (Technical Report No. ASD-TR-61 97). Lackland Air Force Base, TX: U.S. Air Force.
- Tyler, H. T. (1931). *Bearing of certain personality factors other than intelligence on academic success: a study of tests made at Teachers' College, Columbia University* (No. 468). New York: Columbia University.
- van der Walt, H. S., & Pickworth, G. (2007). Personality and academic performance of three cohorts of veterinary students in South Africa. *Journal of Veterinary Medical Education*, 34(3), 356-365.
- Voorhees, R. A. (2001). Competency-based learning models: a necessary future. In R. A. Voorhees (Ed.), *Measuring what matters: competency based learning models in higher education* (Vol. 110, pp. 5-13).
- Wagner, G. G. (2006). Texas A & M University's College of Veterinary Medicine and Biomedical Sciences: Global Veterinary Leadership Program. *Journal of Veterinary Medical Education*, 33, 299-300.
- Walsh, D. A., Osburn, B. I., & Christopher, M. M. (2001). Defining the attributes expected of graduating veterinary medical students. *Journal of the American Veterinary Medical Association*, 219(10), 1358-1365.
- Walsh, D. A., Osburn, B. I., & Schumacher, R. L. (2002). Defining the attributes expected of graduating veterinary medical students, Part 2: External evaluation and outcomes assessment. *Journal of Veterinary Medical Education*, 29(1), 36-42.

- Ward, A. (1958). *Development of an inventory of noncognitive predictors of academic success*. Unpublished doctoral dissertation, The University of Tennessee.
- Weinert, F. E. (2001). Concept of competence: a conceptual clarification. In D. S. Rychen & L. H. Salganik (Eds.), *Defining and selecting key competencies* (pp. 45-65). Seattle: Hogrefe & Huber.
- Weitz, H., & Wilkinson, J. (1957). The relationships between certain nonintellectual factors and academic success in college. *Journal of Counseling Psychology*, 4, 54-60.
- Weng, H. C., Chen, H. C., Chen, H. J., Lu, K., & Hung, S. Y. (2008). Doctors' emotional intelligence and the patient-doctor relationship. *Medical Education*, 42(7), 703-711.
- Whitford, R. E. (2004). Future prosperity depends on consumer trust. *Journal of the American Veterinary Medical Association* 225(12), 1824-1825.
- Willingham, W. W. (1985). *Success in college: the role of personal qualities and academic ability*. New York: College Entrance Examination Board.
- Willis, N. G., Monroe, F. A., Potworowski, J. A., Halbert, G., Evans, B. R., Smith, J. E., et al. (2007). Envisioning the future of veterinary medical education: The Association of American Veterinary Medical Colleges Foresight Project, final report. *Journal of Veterinary Medical Education*, 34(1), 3-42.
- Wolf, C. A., Lloyd, J. W., & Black, J. R. (2008). An examination of US consumer pet-related and veterinary service expenditures, 1980-2005. *Journal of the American Veterinary Medical Association*, 233(3), 404-413.

APPENDIX

Appendix A

Description of Nontechnical Competencies as Presented to Study Participants

1. *Interpersonal skills.* Builds relationships and trust with others by demonstrating interest in their concerns, valuing their perspectives and treating them with respect
2. *Self-Management.* Acts autonomously and confidently in decision-making and can work independently
3. *Motivation and Persistence.* Drives for results with focused goals, persistence and in the face of multiple tasks
4. *Ethics and Moral Integrity.* Demonstrates integrity, in consistency with the principles of the profession and one's own convictions
5. *Self-development and lifelong learning.* Pursues continuing development in one's own skills and knowledge base in order to meet changing needs or challenges
6. *Flexibility.* Demonstrates adaptability and resilience by staying optimistic and using a range of skills to handle challenges
7. *Communication skills.* Communicates effectively in written and spoken methods, including listening to others effectively and making effective formal presentations
8. *Leadership skills.* Motivates and influences others, including energizing, mobilizing and empowering others to achieve important goals
9. *Coaching skills.* Coaches and develops others, building skills, addressing their needs and providing effective feedback

10. *Business skills*. Is business oriented and understands resource management in meeting organizational goals
11. *Critical thinking*. Uses sound judgment, making decisions on the basis of logic, evidence, experience and accepted practice, seeking information when needed
12. *Creativity*. Thinks innovatively to create or try new approaches to challenges
13. *Cultural competence*. Demonstrates awareness of cultural sensitivity and cultural competency in public and private practice communications and settings
14. *Crisis/Incident management*. Is knowledgeable and able to apply principles of crisis management relevant to veterinary and public health practice

Appendix B. Survey Questions

Faculty Perspectives on Nontechnical Competencies in Veterinary Education

Instructions

Nontechnical competencies include such skills, knowledge, attitudes, and aptitudes above and beyond biomedical content knowledge that contribute to effective achievement in veterinary and related professional fields. A broad set of specific nontechnical competencies has been identified as critical to success for veterinary graduates. A consortium of agencies, including members of AAVMC, AVMA, AAHA and industry partners, has been investigating the implications of these competencies on veterinary education. Veterinary faculty input has been limited at this stage.

This study is interested in the opinions of veterinary faculty members on the importance of these competencies for veterinary graduates and their place in pre-veterinary, veterinary and postgraduate education. This short survey is being distributed to faculty at selected veterinary colleges in North America. Participation is voluntary; however, your response will help ensure an accurate representation of the variety of faculty voices in our profession. Information about your perspectives will aid policy making, planning of curricula and faculty development in veterinary medicine.

We expect this online survey to take 10-15 minutes. By completing the survey, you will be giving us permission to use your anonymous responses in written and oral reports, which may be published. This study has been approved by (or is exempt from) Institutional Review Board, University of Tennessee and by the IRB of your institution. If you do not wish to respond to the survey, please click on the link below to decline:

Screening Question

1. In your role as a faculty member, are you directly involved in the education of professional veterinary students (those seeking the DVM degree)?

Yes ☐

No ☐

Participant Consent

2. By proceeding with the survey, I agree to have my results reported in aggregate form. I understand that my results will be completely anonymous to the investigator.

I agree ☐ I do not agree ☐

Participants responding “No” to either of the above questions were directed to an exit page and thanked for accessing the survey. All others were directed to the body of the survey.

What year did you receive your primary terminal degree (DVM, Ph.D. or other)?

How many years have you been teaching professional DVM students in a veterinary college (years in residency may be included in the total if direct student teaching was involved) ? _____

In your role as a veterinary educator, what is your primary discipline?

Basic Science ☐

Clinical Science-Large Animal Predominant, ☐

Clinical Science-Small Animal Predominant, ☐

Clinical Science-Other ☐

As a veterinary college faculty member, what is your primary effort allocation (reflecting the largest percentage or greatest actual time commitment)?

Teaching (including clinical service with students) ☐

Research ☐

Service or Administrative ☐

Survey Instrument. Part 2.

The following is a list of 14 competencies described as critical for the success of veterinarians (modified from Lewis & Klausner, 2003; Willis et al., 2007). Please indicate your level of agreement regarding the importance of these skills in veterinarians (graduates of professional DVM programs). [7 = Strongly Agree to 1 = Strongly Disagree in 7 point Likert scale]

The internet survey then routed the respondent to answer additional questions regarding only the competencies they indicated were important (by selecting options 5-7 on the 7 point Likert scale).

Example: You agreed that the following competency was important for veterinary graduates:

1. Builds relationships with others by demonstrating interest in their concerns, valuing their perspectives and making them feel comfortable

Where should this competency be taught or cultivated in the training of veterinarians? (Select all that apply)

Prior to professional veterinary education/curriculum ☐

During professional veterinary education (preclinical) ☐

During professional veterinary education (clinical) ☐

Following professional veterinary education ☐

Respondents who chose either “During professional veterinary education (preclinical)” or “During professional veterinary education (clinical)” were directed to three additional questions about the competency.

Do you think this competency should be taught or cultivated in the courses or educational settings in which you teach?

Yes ☐

No ☐

If asked to do so, how prepared do you feel to teach or cultivate this competency in veterinary students?

Well prepared ☐

Somewhat prepared ☐

Inadequately prepared ☐

Not prepared ☐

If asked to do so, how prepared do you feel to evaluate this competency in veterinary students?

Well prepared ☐

Somewhat prepared ☐

Inadequately prepared ☐

Not prepared ☐

Final demographic questions (Optional for all respondents)

What is your age (years)? _____

What is your sex _____

Male ☐

Female ☐

Appendix C.

Initial Electronic Mail Invitation

Dear Faculty Member,

We are requesting your assistance in a survey of faculty at selected North American veterinary colleges regarding the importance, placement and teaching of nontechnical competencies in veterinary education.

You have received this email because you are listed as a faculty member at one of several participating institutions. Your input will be very valuable in determining faculty perspectives and needs in this area. We expect the online survey to take about 10-15 minutes at most.

By completing the survey, you will be giving us permission to use your anonymous responses in written or oral reports of the aggregated results, which may be published. The study protocol has been approved by departmental review and deemed exempt from further review by the Institutional Review Board for Human Subject Research, The University of Tennessee and the college or university IRB or REB of your institution. If you have questions about the institutional review of this study or about your rights as a participant, you may contact the Office of Research at the University of Tennessee Knoxville at 865-974-3466.

Your individual **access code** is the **user name** that appears before the @ sign in the email address by which you received this survey.

For example, if you received this email via the address johndoe@university.edu then your access code would be "johndoe" (without quotation marks).

To take the survey, click on the link below:

<http://survey.utk.edu/mrIWeb/mrIWeb.dll?I.Project=VETFACULTYSURVEY>

If you have any difficulties entering the survey, please email me at ilane@utk.edu for help resolving the problem. Thank you very much in advance for your participation,

India Lane, DVM, MS
Department of Small Animal Clinical Sciences and Office of Educational Enhancement
E. Grady Bogue, Ph.D.
Department of Educational Psychology and Counseling
The University of Tennessee

Appendix D.

Postcard Reminders

February 2008



Dear Colleague,

In a few days you will receive an electronic mail invitation to participate in an internet survey of veterinary faculty. Your name was selected because you are listed as a faculty member at one of several participating institutions.

The survey is designed to collect input from a large number of faculty members about the development of non-technical competencies in veterinary students and veterinarians. We hope this survey will inform the profession of the view from the heart of veterinary education, the teaching faculty. The results will help veterinary colleges in planning curricula and in developing faculty skills to meet our students' needs. In order to maximize response, we are offering as an incentive a chance to win one of two \$50 Amazon gift certificates.

Thank you for your time and participation. Your generous help will ensure that this research is successful and valuable.

India Lane, DVM, MS
Associate Professor and Director
Office of Educational Enhancement
College of Veterinary Medicine
University of Tennessee

E. Grady Bogue, Ph.D.
Professor
Educational Leadership and Policy Studies
College of Education, Health and
Human Sciences
University of Tennessee

February 2008



Dear Colleague,

You recently received an electronic mail invitation to participate in an internet survey of veterinary faculty. Your name was selected because you are listed as a faculty member at one of several participating institutions. If you have already responded to the survey, please disregard this notice.

The survey is designed to collect input from a large number of faculty members about the development of non-technical competencies in veterinary students and veterinarians. We hope this survey will inform the profession of the view from the heart of veterinary education, the teaching faculty. The results will help veterinary colleges in planning curricula and in developing faculty skills to meet our students' needs. In order to maximize response, we are offering as an incentive a chance to win one of two \$50 Amazon gift certificates.

Thank you for your time and participation. Your generous help will ensure that this research is successful and valuable.

India Lane, DVM, MS
Associate Professor and Director
Office of Educational Enhancement
College of Veterinary Medicine
University of Tennessee

E. Grady Bogue, Ph.D.
Professor
Educational Leadership and Policy Studies
College of Education, Health and
Human Sciences
University of Tennessee

Appendix E

Sample Reminder Electronic Mail Message to Nonrespondents

Dear Dr.:

Last week we sent you an email requesting your assistance with a survey of faculty at selected veterinary colleges regarding the importance and teaching of nontechnical competencies in veterinary education. To the best of our knowledge you have not yet responded to our invitation. If our records are incorrect and you have responded, thank you! If you have not yet responded, we would greatly appreciate your participation in this short survey.

Your individual log-in information is as follows:

Username:

Password:

To take the survey, click on the link below:

If you do not wish to respond to the survey please click on the link below to decline:

India Lane
Office of Educational Enhancement
The University of Tennessee College of Veterinary Medicine
c/o C247 VTH
2407 River Drive
Knoxville TN 37996-4544
865-974-8387
ilane@utk.edu

Thank you very much in advance for your participation,

India Lane, Department of Small Animal Clinical Sciences and Office of Educational Enhancement
E. Grady Bogue, Department of Educational Psychology and Counseling
The University of Tennessee

Appendix F.

Cover Letter (American Association of Veterinary Medical Colleges Invitation and Request for Consent from Survey Committee)

September 26, 2007

Dr. Larry Heider
Executive Director
American Association of Veterinary Medical Colleges
1101 Vermont Av NW
Suite 301
Washington, DC 20005

Dear Dr. Heider:

As you know, the importance of nontechnical competencies in the development of successful veterinary graduates has been cited in major studies of the profession over the last decade, including the 1999 KPMG study, the 2000 Brakke study and the AAMVC sponsored 2006 Foresight Report. The development of nontechnical competencies in veterinary medical education has also been a focus of the work of the National Commission on Veterinary Economic Issues and a frequent topic in the veterinary educational literature over the last five or six years, and provides curricular and educational challenges for all veterinary colleges. During this time, veterinary faculty members have been only modestly and sporadically involved in policy discussions. However, veterinary faculty will be the essential link between conceptualization of nontechnical competency development and their effective delivery in the veterinary curricula.

We have developed a study designed to elicit perspectives of a larger number of faculty regarding the importance and place of these competencies in the professional veterinary curriculum. The study will be conducted at six veterinary colleges chosen to reflect variety in age, size and geographic location

[REDACTED]

The chief academic dean will be contacted each at participating college for institutional consent and to facilitate any specific institutional review requirements at the site. Alternate colleges will be selected on an ad hoc basis if any of the invited colleges decline to participate.

Veterinary faculty at participating institutions will be invited to respond to a short internet survey. The survey includes questions about the perceived importance and ideal

placing of 14 nontechnical competencies in veterinary education (see Appendix). All survey respondents will be anonymous to the researchers, and the confidentiality of institutions will be maintained throughout the study and in any published or presented reports. The study protocol has undergone a departmental review and been deemed exempt from additional review by the University of Tennessee Institutional Review Board (see attached documentation).

The AAVMC and participating institutions will receive a report of the overall survey data, as well as an institutional profile. The summary results will also be prepared for publication in a national or international veterinary publication. It is anticipated that the results will help to inform colleges, administrators and faculty in planning individual programs, curricular modifications, and faculty development in these areas. I hope that you will indicate the AAVMC approval for this study by returning the enclosed consent form by October 5, 2007 (FAX number 865-974-5554). We would like to launch the web survey and complete data collection later this fall. Please feel free to contact Dr. Lane at 865-974-8387 or ilane@utk.edu if you would like to view the test survey or if you have any additional questions regarding the study.

Sincerely,

India F. Lane, DVM, MS
Associate Professor and Director, Educational Enhancement
The University of Tennessee College of Veterinary Medicine
Doctoral Candidate in the Department of Educational Psychology and Counseling
The University of Tennessee

E. Grady Bogue, Ph.D
Professor
Department of Educational Psychology and Counseling

Appendix G.

Consent Form: American Association of Veterinary Medical Colleges

Purpose: The purpose of this study is to explore the current perceptions of faculty educators at five veterinary colleges regarding the importance of, and their role in the development of, selected nontechnical competencies in veterinary graduates. This mixed methods study will include quantitative analysis of a survey open to all faculty at six North American colleges of veterinary medicine and qualitative analysis of interviews with approximately 4 faculty volunteers from each of the selected institutions.

Risks & Benefits: There are no foreseeable risks involved in the participation in this project. Participation will provide the profession with the benefit of data regarding faculty perspectives on this important issue, and how they may compare to other institutions. We hope that the study results will inform the AAVMC, and faculty and administrators at veterinary colleges, in planning programs, curricula and faculty development.

Information & Confidentiality: Identification of institutions and interview participants will be kept confidential through the use of codes blinded to the investigator. The survey administrator will be the only individual who has access to emails of participating faculty. Survey data will be housed in the secure server by the survey administrator. Only I will have access to interview transcripts and consent forms, which will be kept in a locked file cabinet. No identifying information about interview participants will be included in oral or written reports.

Participation: Institutional and individual participation in this study is voluntary; you may decline to participate without penalty. Interview participants will be able to withdraw from the study at any time, and their data will be destroyed.

Contact: If you have questions at any time about the study or procedures, you may contact me at 865-974-8387 or at ilane@utk.edu. If you have questions about the institutional review of this study or about the rights of participants, you may contact the Office of Research at the University of Tennessee, Knoxville at (865) 974-3466.

Consent: I have read the above information and agree to participate in this study. I have received a copy of this form.

Authorizing individual (print name) _____

Participant's signature _____
American Association of Veterinary Medical Colleges

Date _____

Appendix H.
Cover Letter (Institutional Invitation)

November 10, 2007

Dr. [REDACTED]
Office of the Dean

Dear Dr. [REDACTED]:

As you know, the importance of nontechnical competencies in the development of successful veterinary graduates has been cited in major studies of the profession over the last decade, including the 1999 KPMG study, the 2000 Brakke study and the 2006 Foresight Report. The development of nontechnical competencies in veterinary medical education has also been a focus of the veterinary educational literature over the last five or six years, and provides curricular and educational challenges for all veterinary colleges. During this time, veterinary faculty members have been minimally and sporadically involved in policy discussions occurring at national levels. However, veterinary faculty will be the essential link between conceptualization of nontechnical competency development and effective delivery in the veterinary curricula.

We would like to invite your institution and faculty to be involved in a study designed to elicit perspectives of a larger number of faculty regarding the importance and place of these competencies in the professional veterinary curriculum. The study will be conducted at six veterinary colleges chosen to reflect variety in age, size and geographic location. Veterinary faculty at participating institutions will be invited to respond to a short internet survey. The survey includes questions about the perceived importance and ideal placing of 14 nontechnical competencies in veterinary education. All survey respondents will be anonymous to the researchers, and the confidentiality of institutions and survey respondents will be maintained throughout the study and in any published or presented reports.

The study protocol has undergone departmental review and has been deemed exempt from further review by the University of Tennessee Institutional Review Board. The survey and study has also been approved by the AAVMC. We would be happy to provide these documents or satisfy any additional requirements for your individual institutional review process.

Participating institutions will receive a report of the overall survey data, as well as an institutional profile. It is anticipated that the results will help to inform colleges, administrators and faculty in planning individual programs, curricular modifications, and faculty development in these areas. I hope that you will indicate your agreement to participate in this study by returning the enclosed consent form as soon as possible. We would like to launch the web survey later this fall or in January 2008. Please feel free to contact Dr. Lane at 865-974-8387 or ilane@utk.edu if you have any additional questions regarding the study.

Sincerely,

India F. Lane, DVM, MS
Associate Professor and Director, Educational Enhancement
The University of Tennessee College of Veterinary Medicine

Doctoral Candidate in the Department of Educational Psychology and Counseling
The University of Tennessee

E. Grady Bogue, Ph.D.
Professor
Department of Educational Psychology and Counseling

Appendix I. Informed Consent (Institution)

Faculty Perspectives Regarding the Importance and Place of Nontechnical Competencies in Veterinary Medical Education at Six North American Colleges of Veterinary Medicine

Informed Consent (Institution)

Purpose: The purpose of this study is to explore the current perceptions of faculty educators at five veterinary colleges regarding the importance of, and their role in the development of, selected nontechnical competencies in veterinary graduates. These results will be combined with data from five other colleges of veterinary medicine.

Risks & Benefits: There are no foreseeable risks involved in the participation in this project. Participation will provide you with the benefit of data regarding faculty perspectives in your institution, and how they may compare to other institutions. We hope that the study results will inform faculty and administrators in planning programs, curricula and faculty development.

Information & Confidentiality: Identification of institutions and survey respondents will be kept confidential through the use of coding. The survey administrator will be the only individual who has access to emails of participating faculty. Survey data will be housed in the secure server by the survey administrator. Institutions will not be specifically identified in verbal or published reports; however, institutions may be described in broad terms such as approximate age and size.

Participation: Your institution's participation in this study is voluntary; you may decline to participate without penalty. Interview participants will be able to withdraw from the study at any time, and their data will be destroyed.

Contact: If you have questions at any time about the study or procedures (or if your institution experiences any adverse events as a result of participation), you may contact me at 865-974-8387 or ilane@utk.edu. If you have questions about the institutional review of this study or about your rights as a participant, you may contact the Office of Research at the University of Tennessee, Knoxville at (865) 974-3466.

Consent: I have read the above information and agree to participate in this study. I have received a copy of this form and a copy of the Informed Consent Form for Interview participants.

Institutional Representative Name and Title: _____

Institution: _____

Representative's Signature _____

Date _____

PLEASE RETURN THIS COPY

***Faculty Perspectives Regarding the Importance and Place of
Nontechnical Competencies in Veterinary Medical Education at Six
North American Colleges of Veterinary Medicine***

Informed Consent (Institution)

Purpose: The purpose of this study is to explore the current perceptions of faculty educators at five veterinary colleges regarding the importance of, and their role in the development of, selected nontechnical competencies in veterinary graduates. These results will be combined with data from five other colleges of veterinary medicine.

Risks & Benefits: There are no foreseeable risks involved in the participation in this project. Participation will provide you with the benefit of data regarding faculty perspectives in your institution, and how they may compare to other institutions. We hope that the study results will inform faculty and administrators in planning programs, curricula and faculty development.

Information & Confidentiality: Identification of institutions and survey respondents will be kept confidential through the use of coding. The survey administrator will be the only individual who has access to emails of participating faculty. Survey data will be housed in the secure server by the survey administrator. Institutions will not be specifically identified in verbal or published reports; however, institutions may be described in broad terms such as approximate age and size.

Participation: Your institution's participation in this study is voluntary; you may decline to participate without penalty. Interview participants will be able to withdraw from the study at any time, and their data will be destroyed.

Contact: If you have questions at any time about the study or procedures (or if your institution experiences any adverse events as a result of participation), you may contact me at 865-974-8387 or ilane@utk.edu. If you have questions about the institutional review of this study or about your rights as a participant, you may contact the Office of Research at the University of Tennessee, Knoxville at (865) 974-3466.

Consent: I have read the above information and agree to participate in this study. I have received a copy of this form and a copy of the Informed Consent Form for Interview participants.

Institutional Representative Name and Title: _____

Institution: _____

Representative's Signature _____

Date _____

PLEASE RETAIN THIS COPY FOR YOUR RECORDS

VITA

India Frances Lane was born and raised in Atlanta, Georgia and attended the University of Georgia in Athens, Georgia where she earned a Doctor of Veterinary Medicine degree in 1988. She then completed an internship at Texas A & M University, College Station, Texas in 1989 and a residency in small animal internal medicine at Colorado State University, Fort Collins, Colorado in 1992. At that time, she also received the Masters of Science degree in Clinical Sciences and achieved Diplomate status in the American College of Veterinary Internal Medicine. India then accepted a faculty position at the Atlantic Veterinary College in Prince Edward Island, Canada, followed by a similar position as an Assistant Professor of Medicine at the University of Tennessee, moving back to the southeast in 1997. Dr. Lane became interested in pursuing studies in higher education in 2002 and received the Doctor of Education degree in Educational Leadership and Policy Studies, with a Higher Education concentration, in 2008. Dr. Lane currently serves as an Associate Professor of Medicine and the Director of Educational Enhancement in the University of Tennessee College of Veterinary Medicine, Knoxville, Tennessee.

12/08