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Perceptions of veterinary admissions committee members of undergraduate credits earned from community colleges or online compared to traditional 4-year institutions

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Abstract

Veterinary admission committees are asked to create and implement a fair, reliable, and valid system to select the candidates most likely to succeed in veterinary school from a large pool of applicants. Although numerous studies have explored grade point average (GPA) as a predictive value of later academic success, there has been little attention paid to how and where an applicant acquires his/her undergraduate coursework. Quality of academic program is an important component of applicant files, and it is suggested that the source of a candidate's coursework might influence admissions committee decisions, perhaps even outside of the committee's immediate awareness. Options for undergraduate education include taking classes at a traditional four-year institution, a community college, or online. This study provides an overview of the current state of online courses and community colleges in the US as a foundation to explore the views of veterinary admissions committee members pertaining to coursework completed at traditional residential 4-year schools or at community colleges and whether they are delivered on campus or online (at either type of institution). Survey participants reported a pattern of preference for traditional four-year residential coursework compared to online or community college courses. These results are interesting given the exponential growth of students taking online courses and data showing community colleges are providing a successful gateway to obtaining a four-year degree. This also points to the need for admission committees to discuss potential biases since the information about type of school and/or course may not be consistently available for all applicants. Finally, at a time when admitting a diverse class of students is a goal of many programs, it is of special concern that there are potential biases against courses taken online or from community colleges - venues that tend to draw a more diverse population than traditional 4-year universities.

Keywords: Admissions criteria, Community college coursework, Online coursework, Veterinary admissions.

Introduction

Admission committees have the daunting task of creating and implementing a fair, reliable, and valid system to select from a large pool of applicants the students most likely to successfully navigate a rigorous veterinary medical program and ultimately become successful veterinarians (Conlon *et al.*, 2012). As in human medicine, there is much competition for a limited number of seats (Hudson *et al.*, 2013).

It is important that admission committees' values and decisions reflect the needs of their program and university as well as the profession. In addition to a strong academic history and demonstrated intellectual capabilities, both medical and veterinary admissions committees also seek applicants who have demonstrated competency in non-technical skills including critical thinking, problem solving, communication skills, empathy, psychological robustness, integrity and moral and ethical behavior (Nicholson, 2005). In veterinary medicine, these desired characteristics also include

interest, ability and empathy towards animals and related areas (Hudson *et al.*, 2009).

There has been much debate pertaining to what constitutes valid predictive criteria for academic success during veterinary training and professional success after graduation (Roush *et al.*, 2014). The stakes involved are high; veterinary training is an expensive undertaking requiring highly trained staff and faculty as well as sophisticated equipment and facilities (Kunzel and Breit, 2007). Selecting students who are unable to complete their programs, therefore, represents a substantial cost to veterinary programs (Kunzel and Breit, 2007; Muzyamba *et al.*, 2012) as well as to the students themselves (Jones, 2014). Selecting, educating, and graduating students who are ultimately unsuccessful in the veterinary profession represents a broader loss to both the program providing the education and to the profession. It is therefore critically important that the attributes sought by admissions committees are continually examined to

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determine the criteria most helpful in selecting students who will have academic and career success (Hudson *et al.*, 2009; Kogan *et al.*, 2009).

Currently, despite efforts to create common prerequisites and requirements, preadmission criteria for professional veterinary curricula are established independently by each veterinary medical college and often vary from year to year. While some admissions policies attempt to make decisions based on scientific data related to the predictive validity of admission requirements, some look to holistic methods, and other schools rely more on historical precedence and habit (Confer, 1990; Zachary and Schaeffer, 1994; Lloyd *et al.*, 2003; Hardie, 2008; Rhind *et al.*, 2008; Turnwald *et al.*, 2008; Kogan *et al.*, 2009; Danielson *et al.*, 2011; Roush *et al.*, 2014).

Variations of undergraduate and graduate grade point average (GPA) including overall undergraduate GPA, the GPA of required pre-veterinary courses, the GPA of science courses, and the GPA of the last 45 undergraduate credit hours taken are some of the most commonly used criteria for admissions. Numerous studies have found varying levels of association between the pre-veterinary GPA and success in veterinary school (Noeth, 1974; Render and Jackson, 1975; Niedzwiedz and Friedman, 1976; Julius and Kaiser, 1978; Cawunder and Tasker, 1982; Kelman, 1982; Kearney *et al.*, 1985; Confer, 1990; Zachary and Schaeffer, 1994; Kogan *et al.*, 2009). Standardized tests including the Graduate Record Examinations (GRE) (most commonly used), the Veterinary College Admission Test, and the Medical College Admission Test are other commonly used criteria (Confer, 1990; Lafi *et al.*, 1990; Danielson *et al.*, 2011; Roush *et al.*, 2014).

Other factors intended to provide a more complete picture of applicants include personal interviews, veterinary related experience, evidence of leadership, personal recommendations, and narrative statements (Funtealba *et al.*, 2011; Roush *et al.*, 2014). These factors are used to estimate non-cognitive skills, including communication; sensitivities to other cultures and people; scientific and professional behavior; desire for knowledge; personal management skills; compassion for animals and people; and personal integrity and ethics. All of these factors have been identified as important in selecting for successful students and future veterinarians (Conlon *et al.*, 2012). In fact, the KPMG LLP report (Pew, 1988) suggested that even though top level scientific and clinical skills are needed to make a successful veterinarian, these other non-technical skills are just as important, and sometimes lacking in graduating seniors (Conlon *et al.*, 2012). Additionally, while knowledge and skills required for success can often be learned, non-technical skills related to personality traits, values, and motivations are much less amenable to training

(Lewis and Klausner, 2003). The KPMG LLP therefore recommended that in addition to academic standards, applicants' non-technical skills are assessed and taken into consideration (Pew, 1988).

Given the importance of the veterinary admissions committee's gatekeeper role in selecting qualified capable students who will succeed in their academics as well as in their professional careers, it is critical to examine factors outside the stated criteria for admissions (e.g. GPA, GRE, etc.) that might impact admissions committee member's decisions. Although numerous studies have explored different calculations of GPA as predictive values of later academic success, there has been little attention paid to how and where an applicant acquires his/her undergraduate coursework. One exception is a study conducted by Confer *et al.* (1995) that found graduation rate to be higher for students acquiring their undergraduate education from four year colleges when compared to students who attended state community colleges.

The quality of one's academic program is an important component of any applicant file, and it is suggested that how and where an applicant acquires his/her academic coursework might influence admissions committee decisions, perhaps even outside of the committee's immediate awareness. Options for earning undergraduate credits include taking classes at a traditional four-year institution, at a community college, or online. It is currently unknown if the course location (four-year versus community college) or delivery type (campus based versus online) impacts perceptions held by veterinary admissions committee members. The fact that course location or delivery type might influence ratings or opinions of applicants is especially concerning given that types of institution or delivery modality may not be readily identifiable on an application. It is only when the institution or specific course is known by an admissions committee member (the title of the institution or course indicates the course was taken online and/or at a community college) that the status would be known. Therefore, it is important to have a better understanding of how admissions committee members feel about online and community college courses. If type of institution and or course delivery type is only randomly identifiable, but when it is identified, it negatively impacts decisions for those applicants, it is important to shed light on the possibility that some applicants might be being evaluated differently and perhaps unfairly, compared to other applicants.

This study provides a brief overview of the current state of online courses and community colleges in the US as a foundation to explore the views of veterinary admissions committee members as they relate to undergraduate coursework completed at traditional 4-year residential schools or at community colleges and

whether they are delivered campus-based or online (in either type of institution).

Online courses

Online course opportunities have expanded exponentially within the last decade, and enrollment in online courses in the US has far outpaced that of traditional in-classroom courses. Between 2002 and 2009, the annual compound rate of growth for online courses was 19%, compared to 2% for campus-based courses (Allen and Seaman, 2010; Redpath, 2012). Clearly, online teaching and learning exert a strong influence on higher education in the United States (Clinefelter and Aslanian, 2014).

Currently, over 80% of public universities and 50% of private colleges offer at least one fully online program (Aldridge *et al.*, 2013; Clinefelter and Aslanian, 2014). Based on the 2012 Department of Education's Integrated Postsecondary Education Data System (IPEDS) survey, 5.5 million US students (26% of all college students) in 2012 took at least one online course and 2.6 million students (13%) studied fully online, with approximately 2 million of the students who studied fully online as undergraduates and 600,000 as graduate students (Clinefelter and Aslanian, 2014). It is estimated that eventually, about one-third of college students will study fully online, one-third will study only on campus, and one-third will do both (Clinefelter and Aslanian, 2014).

There are both advantages and disadvantages to online courses when compared to traditional classroom settings. Online courses allow flexibility of access (when and where students learn material), and to a certain degree, the pace at which they can learn the material (Cook, 2007; Johnston, 2008; Rochester and Pradel, 2008). Additionally, offering courses in an online format allows universities to increase course enrollment, expand courses and degree options and reach more nontraditional students (Cook, 2007; Rochester and Pradel, 2008; US News and World Report, 2015). Others have countered benefits with evidence that online courses can also lead to social isolation and might require students to assume a more active role in their own learning (Levett-Jones, 2005; Cook, 2007; Johnston, 2008; Rochester and Pradel, 2008).

Several studies have explored how online courses compare to traditional courses, inducing a meta-analysis conducted by the United States (US) Department of Education (2010) (Means *et al.*, 2010). This report found that most students taking online courses perform moderately better than those learning in a classroom. Other studies examining online courses and learning outcomes have also found that online instruction is at least as effective as traditional classroom teaching (Tallent-Runnels *et al.*, 2006; Porter *et al.*, 2014). Yet, despite substantial research suggesting there is no

significant difference in learning outcomes for students who learn online compared to those who learn in the classroom, online courses are often marginalized and have become synonymous for many with "lower quality" (Kim and Bonk, 2006; Puziffero and Shelton, 2009; Allen and Seaman, 2010).

Community colleges

Community colleges are another avenue many college students take to complete their undergraduate credits. Community colleges are post-secondary, undergraduate educational institutions that typically offer lower-level (freshman and sophomore) classes. Community colleges are seen as major contributors to strengthening the nation's workforce and building a more competitive economy (AACC, 2014).

There is growing concern about the educational and economic competitiveness of the United States (NCPP&HEd, 2008), and community colleges are perceived as a key partner in rectifying America's lagging postsecondary attainment (NCPP&HEd, 2011). There are currently 1,123 community colleges in the US and these institutions awarded 750,399 associate degrees and 459,073 certificates in 2012-2013 (AACC, 2015). They enroll about 40% of the country's undergraduates and typically offer programs that culminate in either vocationally oriented certificates or an Associate's degree (Aud *et al.*, 2010). For 81% of community college students, however, these programs are a stepping-stone towards a higher degree (Horn and Skomsvold, 2012). Students choose community colleges to begin their college career for several reasons, but economics is a major driving force. In-state tuition and fees at a community college average \$2,963 versus \$8,244 for a four year college, and by commuting from home to a community college a student also can avoid the average \$8,549 cost of room and board at a traditional four-year residential college (Monaghan and Attewell, 2015).

As a result, community colleges have also been seen as a way to address the persistent inequitable educational opportunities across race/ethnicity and social class lines (Cabrera *et al.*, 2005; Dowd and Melguizo, 2008; Hagedorn, 2010). The population of students at community colleges is markedly different and more diverse than at four-year institutions. Ethnic and language minority students are more concentrated at community colleges (Leinbach and Bailey, 2006; Aud *et al.*, 2010; Fry, 2011). The ethnic makeup of community college students is 51% white, 19% Hispanic, 14% black, 6% Asian/pacific islander and other (9%). Thirty-six percent of these students are first generation and many have lower incomes compared to students at 4-year institutions (AACC, 2014).

In fact, much of the growth in college enrollment among Hispanics is at community colleges. In 2010, 46% of Hispanics attending college were enrolled at community colleges and 54% were at a four-year college (Liu and

Roohr, 2013). By contrast, among young white college students, 73% were enrolled in a four-year college, as were 78% of young Asian college students and 63% of young black college students (Fry, 2011). Other differences in student demographics between community college students and students at four-year institutions includes the fact that more than half of community college students are enrolled part time, often due to working full time, having families or other obligations (AACC, 2015). The average age of the community college student is 28, with 37% being 21 or younger, 49% between 22-39 and 14% being 40 or older (AACC, 2015). Despite potential benefits of community colleges, what many people (and members of admissions committees) want to know is how they compare to four-year institutions.

One way to compare community colleges with four-year institutions, and perhaps most relevant to this current study, is to examine whether starting at a community college rather than at a four-year college affects the likelihood of an undergraduate completing a bachelor's degree. A challenge to this seemingly simple question, however, is the problem of selection. As stated earlier, the demographics of students who begin at a community college are different from those who start college at a four-year institution in several ways, including socioeconomic factors and level of academic preparation (Monaghan and Attewell, 2015). These differences make it challenging to directly compare the success of students enrolled at a community college in their efforts to earn a bachelor's degree with those initially enrolling at a four-year college without controlling for these extraneous variables (Adelman, 2006; Sandy *et al.*, 2006; Lichtenberger and Dietrich, 2012, 2013).

It is not surprising then, that research examining the relationship between initial community college enrollment and bachelor's completion have shown mixed results, with some studies indicating a clear penalty for community college enrollment and other studies showing no penalty (Lichtenberger and Dietrich, 2013). To create a more equal comparison, some studies have compared rising juniors who directly entered a four-year college with community college students who transferred to a four-year college at a point that would suggest similar junior-level status (Lichtenberger and Dietrich, 2013). When researchers compare these transfer students with native juniors, the results show no penalty for initially enrolling in community college; community college transfer students are just as likely to earn a bachelor's degree as students with similar characteristics who directly enrolled at four-year colleges (Lee *et al.*, 1993; Glass and Harrington, 2002; Melguizo and Dowd, 2009; Melguizo *et al.*, 2011; Lichtenberger and Dietrich, 2013; Monaghan and Attewell, 2015). Additionally, Melguizo *et al.* (2011) found that community college

transfer students, despite "transfer shock", a temporary dip in GPA that some transfer students experience during their first and second semesters at the four-year college (Cejda, 1997; Glass and Harrington, 2002; Townsend, 2007) earn equivalent numbers of non-remedial credits and attain baccalaureate degrees at similar rates as four-year rising juniors. These results suggest that community colleges are a viable option for many students who wish to obtain a higher degree (Lichtenberger and Dietrich (2013).

Current study

This study was designed to assess how veterinary admissions committee members perceive undergraduate courses based on where and how these courses were obtained. Results, potential ramifications and suggestions are discussed.

Materials and Methods

The current study was conducted at Colorado State University with approval from the university IRB as well as approval from the Association of Veterinary Medical Colleges (AAVMC). A survey, modeled after a similar study conducted with medical school admissions committees (Adams, 2009) was distributed via an email from the AAVMC to all associate deans of AAVMC accredited veterinary schools (US and international). It was addressed to Veterinary Admissions Professionals and included an embedded link to a short anonymous survey prepared in Qualtrics. The survey asked recipients to either complete the survey themselves or recruit individuals within their institution who play an active role in their veterinary program admissions process.

The survey was comprised of three different hypothetical scenarios (See Appendix 1) as well as additional questions about participants' views and experiences of online and community college courses. For each of the three scenarios, participants were asked to compare two similar veterinary student applicants given the following assumptions:

- Each applicant has the same: (a) quality and quantity of medically related volunteer experience, (b) excellent academics, (c) good recommendations, and (d) favorable personal qualities.
- Each applicant has earned a degree from an accredited institution in the appropriate field and has completed all prerequisite academic courses.
- As a result of pre-screening the application, neither applicant stands out as the clear choice for the class position. In the above respects, both are equivalent in the qualities that your veterinary school considers desirable.

In the first scenario, Applicant A has a degree awarded by a college or university where 100% of the applicant's courses were completed via traditional residential

classroom and lab instruction at a college or university while Applicant B has the necessary degree with the same grades and the same courses but the degree was awarded by a college or university, where 50% of the applicant's courses were taken online and the other 50% of the applicant's courses were completed via traditional residential classroom and lab instruction at a college or university.

In the second scenario, Applicant A remains the same but Applicant B has transcripts that show the first two years of coursework were successfully completed at a community college. The remaining courses were completed via traditional-residential classroom and lab instruction at a college or university.

In the third scenario, Applicant A completed 50% of his/her courses online and the other 50% via traditional-residential classroom and lab instruction at a college or university while Applicant B completed the first two years of coursework at a community college and the remaining courses at a traditional-residential classroom and lab instruction at a college or university.

Additional questions assessed the potential differences of perceptions of courses (including specifically science and non-science) taken online, at community colleges or residential universities. Lastly, participants were asked to report their own personal experience with online courses, including if they had enrolled, completed, or taught an online course. A place for additional comments was included at the end of the survey to obtain any information participants felt they wanted to share beyond the forced choice responses.

Statistical Analysis

Descriptive statistics and frequency distribution (reported in percentages) were performed using commercially available software (IBM SPSS Statistical software, version 21). Descriptive statistics were used to describe distribution of responses to each of the three scenarios and participants' views and experiences of online and community college courses. Participants' personal experiences with online courses, and the potential relationship between these experiences and their perception of applicants' previous coursework was analyzed through the use of Chi Square (with significance set at 0.05).

Results

A total of 38 completed questionnaires were received; 33 from US schools and 5 from schools outside the US. Since the surveys were anonymous, it was not possible to know how many schools responded, and it is likely that at least some schools entered more than one response. No statistically significant differences were found between responses from US and international schools, so all data was combined for analysis.

In the first scenario when Applicant A, who completed all coursework at a residential university, was compared to Applicant B, who completed 50% of

his/her coursework online, there was a clear preference for Applicant A by 24 respondents (63.2%). No one favored Applicant B and 14 participants (26.8%) reported rating the two applicants as equivalent.

In the second scenario when Applicant A, who completed all coursework at a residential university, was compared to Applicant B who completed 50% of coursework at a community college, the majority of respondents (26; 66.7%) reported feeling they were equivalent, 12 respondents (30.8%) reported preferring Applicant A and 1 (2.6%) reported preferring Applicant B.

In the third scenario when Applicant A, who completed 50% of coursework online, was compared to Applicant B, who completed 50% of coursework at a community college, 18 participants (47.4%) reported favoring Applicant B, 15 respondents (39.5%) reported feeling they were equivalent and 5 respondents (13.2%) reporting preferring Applicant A (Table 1).

When participants were asked to indicate how much impact the type of educational institution from which an applicant obtained his/her undergraduate degree (i.e., online university, residential university, residential community college) had on their own selection process, the most common response was "minimal amount" (15; 39.5%), followed by "fair amount" (14, 36.8%) (Table 2). When participants were asked to indicate how much impact a mixture of online vs. residential courses completed by an applicant had on their own selection process, the most common response was "fair amount" (12, 31.6%), followed by "minimal amount" (9, 23.7%) (Table 3).

To assess any differences in perceptions of online courses based on subject matter, participants were asked to compare both science and non-science courses taken online with those taught traditionally. Traditional in-classroom science courses were rated by respondents as better or much better by 33 respondents (86.8%) and equivalent by 5 participants (13.2%). When asked to compare online non-science courses to traditionally taught courses, the traditional courses were rated as equivalent to online courses by 25 respondents (65.8%) and better or much better than online courses by 13 participants (34.2%) No one reported feeling online courses were better for either science or non-science courses (Table 4).

Results followed a similar trend when asked to compare science and non-science courses completed at a community college versus a (four-year) institution. For science courses, residential instruction was viewed as better or much better than community college courses by 24 respondents (63.2%) and equivalent by 13 participants (34.2%). For non-science courses, residential instruction was viewed as equivalent to community colleges by 26 (68.4%) respondents and better or much better than community colleges

Table 1. Applicant scenarios.

Scenario 1- Traditional vs online applicants	Traditional applicant recommended 24 (63.2%)	Online applicant recommended -	Traditional and online applicants viewed as equal 14 (36.8%)
Scenario 2 - Traditional vs Community College applicants	Traditional applicant recommended 12 (30.8%)	Community College applicant recommended 1 (2.6)	Traditional and Community College applicants viewed as equal 26 (66.7%)
Scenario 3 – Community College vs online applicants	Online applicant recommended 5 (13.2%)	Community College applicant recommended 18 (47.4%)	Online and Community College applicants viewed as equal 15 (39.5%)

Table 2. Impact of type of educational institution from which an applicant obtained his/her undergraduate degree.

A great deal	3 (7.9%)
Fair amount	14 (36.8%)
Minimal amount	15 (39.5%)
None	4 (10.5%)
NA	2 (5.3%)

Table 3. Impact of mixture of online and traditional classes completed by an applicant.

A great deal	6 (15.8%)
Fair amount	12 (31.6%)
Minimal amount	9 (23.7%)
None	7 (18.4%)
NA	4 (10.5%)

by 12 (31.7%). No respondents reported feeling community colleges were better for non-science courses and 1 (2.6%) respondent reported feeling science courses offered at community colleges were better than residential (Table 4).

When participants were asked about their own experiences with online courses, 21 respondents (55%) reported enrolling in an online course, while 20 (53%) reported completing an online course and 5 (13%) reported teaching an online course. Using Chi Square, the relationship between enrolling, completing or teaching an online course with choices made in each of the three scenarios was examined. None of these factors were found to have a significant effect on the perception of applicants' history of completing their courses online at a Community College or a residential institution.

Lastly, participants' comments were assessed for any major themes. The common theme can be summarized as a concern and recognition of the inter-group variance among online courses, Community Colleges and residential institutions and the fact that this variance is often viewed as potentially larger than between group variance.

Discussion

This study asked those involved with veterinary admissions decisions to evaluate candidates who were equal in all regards with the exception of where they completed their prerequisite coursework and whether or not they had taken online or on campus courses. Participants demonstrated a clear pattern of preferring traditional residential coursework over online or community college courses.

The themes that emerged from the open-ended comments section focused on concerns related to the potential variance of online courses in particular and the ability to discern the quality of both online courses and community colleges. These concerns seemed to be higher when the courses under consideration were science courses versus non-science courses. When compared to traditional school settings, non-science courses taken online or at community colleges were viewed as equivalent approximately two-thirds of the time. The number of participants who reported feeling these avenues were equal when asked specifically about science courses was much lower.

It is interesting to note that although the ability to discern quality of a course or an institution is often challenging for residential 4-year schools as well, there were no comments that addressed this issue. It appears that while many admissions decision-makers feel it is possible to obtain similar experiences in non-science courses through alternative avenues, when it comes to science courses, there is a perception that traditional courses are superior. Although this study tried to assess any impact participants' personal experience with online courses might have on their perceptions of online courses, due to the small number of participants and the nature of the data distribution, an analysis for correlation was not possible. It is interesting to note, however, that there appeared to be minimal impact in opinions regarding online courses based on whether someone had enrolled, completed, or taught an online course.

These findings are very similar to a study conducted with medical school admissions committees. In this study, the scenarios were the same with the exception that Adams (2009) did not include an option to find

Table 4. Perceptions of science and non-science courses taken online, at community colleges or at four year institutions.

Science courses				
Online much better	Online better	Same	Traditional better	Traditional much better
---	---	5 (13.2%)	22 (57.9%)	11 (28.9%)
Community much better	Community better	Same	Traditional better	Traditional much better
	1 (2.6%)	13 (34.2%)	18 (47.4%)	6 (15.8%)
Non-Science courses				
Online much better	Online better	Same	Traditional better	Traditional much better
---	---	25 (65.8%)	10 (26.3%)	3 (7.9%)
Community much better	Community better	Same	Traditional better	Traditional much better
---	---	26 (68.4%)	10 (26.4%)	2 (5.3%)

the applicants equivalent. Adams and colleagues found that admissions professionals tend to have a negative view of online courses and community colleges when compared to traditional residential schools. To illustrate, traditional applicants were favored 100% of the time over applicants who completed 50% of their coursework online and 93% of the time when the second applicant completed 50% of their coursework at a community college. Again, similar to the current findings, when forced to choose between participants with community college courses or online courses, 79% choose community colleges (Adams, 2009). These perceptions were not impacted by participants' personal experiences with online courses.

It would appear there are very few differences between the views of medical school admissions committees polled over eight years ago and current veterinary admissions committees. These results are especially interesting given the exponential growth in number of students taking online courses in the last few years and data that indicate community colleges are providing a successful gateway to obtaining a 4-year degree. Even though there have been numerous changes and suggested policy advances in both of these areas, there appears to be an appreciable bias among veterinary admissions professionals for courses completed at traditional residential universities compared to community colleges or taken online.

The present study has several limitations. Not all veterinary schools were represented and the opinions shared by respondents are not necessarily representative of their institution. Further studies investigating the potential impact of how undergraduate courses are obtained and the impact on veterinary school performance (e.g., GPA and class rank) is necessary to gather a more complete picture of this area. It is also recognized that in the current study, the admissions professionals were told where and how the applicants received their undergraduate coursework, and this information is not always apparent on applicants' transcripts.

These factors, however, do not diminish the importance of this topic. In fact, one might argue, they make it even more important to investigate, since this suggests the possibility that all applicants might not be evaluated on the same criteria. For example, if an admissions committee member is familiar with the name of the community college or the online college or course, this might lead to different assessment criteria for this applicant versus applicants who attended colleges in which the status of their coursework is not known.

Despite all the efforts made by admissions committees to determine the best predictors of veterinary student academic success, there appear to be few definitive answers. Results of studies evaluating undergraduate GPA, standardized tests and interviewing suggest that predicting student success is very challenging and despite best efforts, most pre-veterinary data used for performance prediction in veterinary schools is of questionable value (Roush *et al.*, 2014).

Not only are admissions committees tasked with selecting applicants who will be successful in their veterinary programs, they are also asked to select a diverse pool of students who will best serve the changing demographics and needs of the profession. It is perhaps for this reason that it is of special concern that admissions committees are potentially biased in favor of undergraduate coursework obtained from four-year intuitions and biased against courses taken online or from community colleges; two avenues that tend to draw a more diverse population than traditional residential universities.

The notion that four-year institutions provide a more rigorous college education than community colleges has been challenged by several studies. While some studies indicate that attending a community college as the first postsecondary institution reduces students' chances of eventually completing a baccalaureate degree (Alfonso, 2006; Long and Kurlaender, 2009), other studies indicate little or no negative consequence associated with attending a community college (Bahr *et al.*, 2013). It has been suggested that to assess the

potential differences between community colleges and four-year institutions, one must account for student self-selection into community colleges versus four-year institutions (Townsend, 2007).

Studies that did not control for extraneous student variables report that community college transfer students are significantly weaker than those from four-year colleges, yet, when controlling for extraneous variables, several studies have found that community college transfer students are just as likely to complete a bachelor's degree as juniors starting at four-year colleges (Bahr *et al.*, 2013; Lichtenberger and Dietrich, 2013; Liu and Roohr, 2013). It is suggested that academic standards and outcomes are more dependent on pedagogy than they are on mode of delivery (Arbaugh and Benbunan-Fich, 2006). For example, Blaich and Wise (2011) found that over the last 10 years students across all types of institutions have made consistent improvements in critical thinking. While there are differences in courses delivered online with those offered in community colleges and four-year institutions, it can be argued that no one avenue is better or worse than another; they all have their own potential strengths.

Several studies have demonstrated that online and community college courses can be equivalent to courses completed at four-year institutions. The authors would like to suggest that there are actually possible advantages to selecting students who have obtained some of their coursework through these educational avenues. For example, it has been suggested that by nature of the course structure, online courses create a need for students to take more control of and responsibility for their education. Collaboration is often viewed as a shared task between students and teachers, and the instructor's role is often more facilitative than directive (Garrison *et al.*, 2000; Arbaugh and Benbunan-Fich, 2006; Arbaugh, 2010; Ke, 2010). As a result, online courses encourage more participation, and collaboration. Additionally, through the need for written communication, online students have more opportunities to think and reflect on their learning (Heckman and Annabi, 2005; Connolly *et al.*, 2007; Sautter, 2007; Hansen, 2008; Arbaugh, 2010). Hence, certain learning outcomes, such as application and transfer of learning and effective group decision making, may be more evident in virtual learning environments (Heckman and Annabi, 2005; Iverson *et al.*, 2005; Hansen, 2008) compared to traditional classroom settings.

Conclusions

In conclusion, our survey results indicated a pattern of preference for traditional four-year residential coursework compared to online or community college courses by individuals involved in the veterinary school admissions process. It is therefore recommended that

veterinary admissions committees discuss any potential biases they might harbor towards alternative educational avenues and decide as a committee how they want to use this type of information, currently only apparent on some applicant files and transcripts, in a way that is fair to all students and at the same time, accurately reflects the values and mission of their admissions committee and veterinary program.

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APPENDIX 1

VETERINARY APPLICANTS AND EDUCATIONAL BACKGROUND

Admissions Professional:

The following brief survey includes three hypothetical veterinary applicant scenarios and questions about their educational backgrounds. We are interested in assessing veterinary admissions professionals' views regarding veterinary applicants based on their educational backgrounds. This survey was designed to gauge admissions professionals' OPINIONS about candidate qualifications, even in situations where there are no established policies. If your school's policies would not differentiate between the two candidates, please respond using your own judgment/views"

This voluntary, anonymous survey takes less than 10 minutes to complete. The aggregated data from this survey may be used for research purposes and results of this survey will be shared with all participating veterinary schools. We are not aware of any risks or benefits associated with taking this survey.

Your contribution to this study is greatly appreciated. Please complete the survey by May 30, 2104. For any questions or comments about the survey, please contact Lori Kogan, (Lori.Kogan@colostate.edu or phone: (970) 491-7984). Any questions about participant's rights related to this survey can be directed to Janell Barker, CSU IRB coordinator (janell.barker@colostate.edu) or 970 491-1655.

DIRECTIONS

Listed below are three different hypothetical scenarios. In each, pre-veterinary students have applied for positions in your upcoming veterinary school class. Please assume that in each of these situations you will be the person who makes the final recommendation as to which of the applicants should be accepted.

Please also assume the following:

- Each applicant has the same: (a) quality and quantity of medically related volunteer experience, (b) excellent academics, (c) good recommendations, and (d) favorable personal qualities.
- Each applicant has earned a degree from an accredited institution in the appropriate field and has completed all prerequisite academic courses.
- As a result of pre-screening the application, neither applicant stands out as the clear choice for the class position. In the above respects, both are equivalent in the qualities that your veterinary school considers desirable.

SELECTING THE MOST QUALIFIED APPLICANT

For each of the hypothetical situations below, please select which one of the two applicants you would most likely recommend for admission:

Hypothetical Scenario One:

Applicant A has the necessary degree with the same grades and the same courses. The degree was awarded by a college or university where 100% of the applicant's courses were completed via traditional-residential classroom and lab instruction at a college or university.

Applicant B has the necessary degree with the same grades and the same courses. The degree was awarded by a college or university, where 50% of the applicant's courses were taken online over the Internet and the other 50% of the applicant's courses were completed via traditional-residential classroom and lab instruction at a college or university.

- I would most likely recommend Applicant A.
- I would most likely recommend Applicant B.
- I would consider these applicants to be academically equivalent.

Hypothetical Scenario Two:

Applicant A has the necessary degree with the same grades and the same courses. The degree was awarded by a college or university where 100% of the applicant's courses were completed via traditional-residential classroom and lab instruction at a college or university.

Applicant B has the necessary degree with the same grades and the same courses. The degree transcript shows the first two years of coursework were successfully completed at a community college. The remaining courses were completed via traditional-residential classroom and lab instruction at a college or university.

- I would most likely recommend Applicant A.
- I would most likely recommend Applicant B.
- I would consider these applicants to be academically equivalent.

Hypothetical Scenario Three:

Applicant A has the necessary degree with the same grades and the same courses. The degree was awarded by a college or university, where 50% of the applicant's courses were taken online over the Internet and the other 50% of the applicant's courses completed via traditional-residential classroom and lab instruction at a college or university.

Applicant B has the necessary degree with the same grades and the same courses. The degree transcript shows the first two years of coursework were successfully completed at a community college. The remaining courses were completed via traditional-residential classroom and lab instruction at a college or university.

- I would most likely recommend Applicant A.
- I would most likely recommend Applicant B.
- I would consider these applicants to be academically equivalent.

For each of the statements below, please indicate your opinion.

How much impact does the type of educational institution (*online university, residential university, residential community college*) from which an applicant obtained his/her undergraduate degree have on your selection process?

- A great deal
- A fair amount
- A minimal amount
- None
- NA (please explain):

How much impact does the mix of *online vs. residential courses* taken by the applicant to complete an undergraduate degree have on your selection process?

- A great deal
- A fair amount
- A minimal amount
- None
- NA (please explain):

When comparing science courses (e.g., biology, chemistry, physics) offered by known online institutions (e.g., University of Phoenix) to courses taken in primarily residential teaching institutions

(e.g., state universities, etc.), please indicate your perception:

- Online much better
- Online better
- Online and residential the same
- Residential better
- Residential much better

When comparing non-science courses (e.g., humanities) offered by known online institutions (e.g., University of Phoenix) to courses taken in primarily residential teaching institutions (e.g., state universities, etc.), please indicate your perception:

- Online much better
- Online better
- Online and residential the same
- Residential better
- Residential much better

When comparing science courses (e.g., biology, chemistry, physics) offered by residential colleges/universities to courses taken in residential community colleges, please indicate your perception:

- Colleges/universities much better
- Colleges/universities better
- Colleges/universities and community colleges the same
- Community colleges better
- Community colleges much better

When comparing non-science courses (e.g., humanities) offered by residential colleges/universities to courses taken in residential community colleges, please indicate your perception:

- Colleges/universities much better
- Colleges/universities better
- Colleges/universities and community colleges the same
- Community colleges better
- Community colleges much better

Have you ever enrolled in an online course?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have you ever completed an online course?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have you ever taught an online course?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Please indicate the age group that you belong to	<input type="checkbox"/>	25 – 34
	<input type="checkbox"/>	35 – 44
	<input type="checkbox"/>	45 – 54
	<input type="checkbox"/>	55 +

ADDITIONAL COMMENTS:

THANK YOU VERY MUCH.

We deeply appreciate the time and effort that you have taken to provide us with information concerning your views of these important educational issues. Please return the completed questionnaire in the self-addressed and stamped envelope provided.

Please feel free to contact us if you have any questions, or if you wish to offer us additional comments.

Lori Kogan's email = lori.kogan@colostate.edu

Please include your mail/email address here if you would like to receive an executive summary of preliminary findings.