

# Comparison of Student Self-Assessment with Faculty Assessment of Clinical Competence

Margaret V. Root Kustritz ■ Laura K. Molgaard ■ Aaron Rendahl

## ABSTRACT

At the University of Minnesota, fourth-year veterinary students assessed their clinical competence after completion of a small-animal, internal-medicine clinical rotation using the same rotation assessment form used by supervising faculty. Grades were compared between the two groups. Students identified by faculty as low-performing were more likely to overestimate their competence in the areas of knowledge, clinical skill, and professionalism than were students identified by faculty as higher performing. This finding mirrors research results in human health professional training. Self-assessment should not be used as the primary or sole measure of clinical competence in veterinary medical training without the introduction of measures to ensure the accuracy of student self-assessment, measures that include active faculty mentoring of student self-assessment, student goal-setting and reflection, and availability of subsequent opportunities to practice additional self-assessment.

**Key words:** accreditation, evaluation, assessment, clinical, competency

## INTRODUCTION

The American Veterinary Medical Association Council on Education (COE), the accrediting body for all North American and some foreign veterinary schools, mandates the demonstration of new graduates' clinical competence as follows:

The specific clinical competencies expected of entry-level practitioners are comprehensive patient diagnosis (problem solving), appropriate use of clinical laboratory testing, and record management; comprehensive treatment planning including patient referral when indicated; anesthesia and pain management, patient welfare; basic surgery skills, experience, and case management; basic medicine skills, experience, and case management; emergency and intensive care management; health promotion, disease prevention/biosecurity, zoonosis, and food safety; client communications and ethical conduct; and strong appreciation for the role of research in furthering the practice of veterinary medicine.<sup>1</sup>

Competency-based education is a growing trend in human and veterinary health professional training. The general goals of competency assessment are that the student first demonstrates knowledge of clinical medicine and also demonstrates the abilities to integrate knowledge from several sources (history, physical examination, records review, laboratory testing), to make sound decisions, and to relay those decisions to clients. The COE does not dictate how schools demonstrate their students' mastery of competencies. The creation of appropriate assessment tools must take into account the ability of those tools to meet these specific learning objectives and must expose health students to a broad sampling of cases to ensure that clinical competence assessment is reliable across the breadth of the discipline.<sup>2</sup> Many modalities have been created to try to assess competency in health students, in-

cluding objective structured clinical examinations (OSCEs) in which the student interacts with a standardized patient or client; case logs or portfolios that may or may not contain descriptive and reflective elements; clinical competency examinations that can be completed either on paper, online, or as practical examinations; assessments by faculty and practitioners as students move through a variety of clinical rotations and externships; skills lists; and students' self-assessments.<sup>3-18</sup>

Self-assessment can be used for formative or summative evaluation. Formative evaluation is constructive review for the sole purpose of improving subsequent performance. Summative evaluation also includes some aspect of grading. Self-assessment for educational purposes is a natural offshoot of human behavior in other contexts. As social life has evolved, the need for social comparison—that is, the need to compare one's own attributes to those of others—has done so as well.<sup>19</sup> High-performing students, including veterinary students, have been proven to spend a considerable amount of mental energy evaluating and comparing themselves to others.<sup>20</sup> This self-evaluation can be channeled to good use for learning and, in an educational setting, it also has non-cognitive benefits including increased student motivation and increased communication between students and teachers as students strive to understand how they can best achieve mastery.<sup>21</sup>

The primary concern with using self-assessment for learning is that human beings are not naturally good at self-evaluation. The ability to assess one's own competence requires many of the same skills that are required to perform other tasks well. As a result, it is difficult for low-performing individuals to judge their own performance accurately. Low-performing individuals might at times overestimate their abilities because of the ambiguity involved in the process.<sup>19</sup> Almost any individual, for example, if asked to rate him or herself as a companion,

can find some aspect of the large skill set that makes up companionship at which he or she excels. Accuracy of self-assessment also varies with knowledge of external factors, the type of ability being rated, and the context in which the self-assessment occurs.<sup>5,22,23</sup> High-performing individuals tend to underestimate their skills, perhaps because of social norms against bragging, unrealistically high personal goals, or unrealistic beliefs about others' comparative skills.<sup>9,24</sup> Finally, one might underestimate or overestimate one's skills based on confidence, which has been defined as the willingness to undertake an activity.<sup>23</sup> Many facets of human health professional training have demonstrated that low-performing students overestimate their abilities when they self-assess.<sup>5-9,11-13,25-30</sup> Veterinary students, like other elite performers, are generally quite self-confident,<sup>20</sup> and this confidence can be reflected in an increased self-evaluated level of competence.<sup>23</sup>

Our hypothesis is that veterinary students' self-assessment of their performance on a small-animal, internal-medicine clinical rotation will not be representative of faculty assessment, especially in the cases of the highest and lowest performing students, as has been shown in other health professions.

## MATERIALS AND METHODS

The study protocol was approved by the Institutional Review Board (IRB) of the authors' home institution. Fourth-year veterinary students were solicited to participate in the research study and assured that their participation was voluntary, anonymous, and confidential. Students were assured that the collected data would not be accessible to faculty and could in no way affect their grades. The only qualifying criterion was the completion of Small Animal Medicine-B (SAM-B), the students' second two-week block of small-animal, internal-medicine clinical rotation. At the conclusion of the rotation, students completed the same online rotation assessment form used by faculty. This assessment form is a rubric that includes anchors denoting specific standards for A-F grades (see Figure 1). Student self-assessments were coded by staff so that the investigators would not be aware of which students participated. Student self-assessed grades were their own; faculty grades for each student were determined using the combined input of all attending faculty and house officers on that rotation. Grades were reported on a standard A to F scale for knowledge, clinical skills, and professionalism, and an overall grade was assigned. Sensitivity and specificity of the student grade for the determining faculty grade were calculated for each competency separately, as were mean and standard deviation. For the purposes of this analysis, A and B grades denote high competence whereas C and D grades denote low competence.

## RESULTS

One hundred students, including fourth-year students from the graduating classes of 2009 and 2010, completed the self-assessment. Of the 100, 88 were from the home institution and 12 were from other schools. Class rank was available for 88 students. Twenty-one students were

in the uppermost quartile of their class, 28 in the second quartile, 21 in the third quartile, and 18 in the lowest quartile. Of the 100 students, 45 received an overall grade of A, 42 an overall grade of B, 12 an overall grade of C, and 1 an overall grade of D. The mean grade was 3.3 on a 4-point scale with A equaling 4 points. By way of comparison, the students of the entire class of 2009 ( $N = 84$ ) earned an average grade of 3.1 on their first completion of SAM-B.

The sensitivity and specificity of using student self-assessment to predict the faculty evaluation of C or D (low competency) are shown in Table 1. The sensitivity is the proportion of students assessed by faculty as low-competency students whose self-assessment grade was also C or D. The specificity is the proportion of students assessed by faculty as high-competency students whose self-assessment grade was also A or B. As an example, the sensitivity for knowledge is 11%. This means that of the 19 students who received a C or D grade from faculty for this competency, only 2 (11%) of them would have been identified by self-assessment. Conversely, of the 81 students who received an A or B grade from faculty for knowledge, 74 (91%) would have been identified by self-assessment.

To explore the relationship between student self-assessment and faculty assessment further, the mean and standard deviation were calculated for both types of evaluation in all four areas. As Table 2 shows, the average faculty score was lower than the average student self-assessment score and the standard deviation was higher for faculty scores. For all four categories, these differences were statistically significant at the 0.05 level. Means were compared with paired *t*-tests and variances were compared with *F*-tests. This indicates that students were more likely to give themselves a grade toward the middle of the range than the faculty, and suggests that students who perform higher are more likely to give themselves lower grades and students who perform lower are more likely to give themselves higher grades.

This tendency is demonstrated by the difference in overall grades. Of the 30 students with one A grade and one B grade, 18 students gave the lower grade than the faculty (60%). However, of the 13 students with one C or D grade and one higher grade, none gave the lower grade than the faculty grade (0%). Using Fisher's exact test, the difference between these proportions is statistically significant ( $p = .0005$ ). The differences in the proportions for the knowledge and clinical skills scores are also statistically significant ( $p = .0075$  and  $p = .019$ ); for professionalism, too few low grades were reported to detect any differences. Figure 2 displays these differences graphically.

## DISCUSSION

These data support formerly published studies that document low-performing students' overestimation of skills by self-assessment when compared to expert assessment. This was a voluntary sampling of students and it is possible that this was not a representative population. Objective data, including grade distribution and the number of

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- A = Outstanding. Consistently meets the highest level of expectation. Excellent knowledge base; takes an active role in the rounds; demonstrates knowledge through full participation; excellent ability to integrate and apply the knowledge; mature, compassionate, dedicated, skillful, committed, and excellent teamwork; and exceeds timely performance of tasks
- B = Good to very good. Has a good to very good grasp of the information; solid ability to organize information, integrate, and make sound decisions; good ability to handle stress; compassionate and skillful patient care; and consistent timely performance of tasks
- C = Competent. Acceptable performance; knowledge has gaps; organizational skills are adequate, and shows acceptable ability to work through a problem, integrate, and apply knowledge; some challenges handling stress and with human interaction; displays competent patient care
- D = Deficient. Knowledge has moderate gaps which may compromise patient care; somewhat disorganized, indecisive, confused, and disjointed; marginal ability to handle stress; somewhat immature, and has difficulty with human interaction; and may miss deadlines
- F = Failing. Knowledge has significant gaps, greatly compromising patient care; very disorganized, indecisive, confused, and disjointed showing great difficulty working through obvious issues; exhibits serious problems in human interactions and ability to deliver patient care; and consistently misses deadlines

### General Rotation Evaluation

#### 1. Knowledge: Knows how and willingness to show how

Sources of Knowledge Data Gathering/ Acquisition	A	<p>Exceptional at knowing where to look for sources to obtain knowledge and uses that knowledge with savvy.</p> <p>Demonstrates excellent knowledge of scientific literature relevant to cases under his/her care and accurately interprets this information.</p> <p>Actively gathers specific and relevant information from a variety of sources (e.g., history/physical exam, use of tests and diagnostic modalities, selection of appropriate tests, gains case history needed for care in a timely fashion) to fully understand the problem.</p>
	F	<p>Is often confused about where to look for sources to obtain knowledge and may not know how to use that knowledge in an astute manner.</p> <p>Is unaware of scientific literature relating to his/her clinical cases and/or is unable to accurately interpret this information.</p> <p>Seeks limited additional information to better understand problems; jumps to conclusions when gathering additional information is appropriate.</p>
Basic Knowledge	A	<p>Excels at demonstrating technical knowledge specific to the rotation and the application of clinical skills.</p> <p>Has a strong understanding of what he/she knows and does not know.</p> <p>Shows exceptional logic and knowledge in written interpretations and histories, case reports, discussion with faculty, and links observations from assessments to plans/discharge notes.</p>
	F	<p>Fails to demonstrate technical knowledge specific to the rotation and the application of clinical skills.</p> <p>Has a basic understanding of what he/she knows and does not know.</p> <p>Presents only limited logic and knowledge in written interpretations and histories, case reports, discussion with faculty, and links observations from assessments to plans/discharge notes.</p>
Species Knowledge	A	Demonstrates complete knowledge of species-specific information of species encountered in rotation (e.g. behavior, nutrition, handling, etc.)
	F	Lacks knowledge of species-specific information of species encountered in rotation (e.g. behavior, nutrition, handling, etc.).
Disease Processes	A	Demonstrates complete knowledge of pathophysiology, etiology, epidemiology, immune response, etc. of diseases encountered in rotation.
	F	Lacks knowledge of pathophysiology, etiology, epidemiology, immune response, etc. of diseases encountered in rotation.
Rotation-Specific Material: Knowledge (Please Describe)		
Comments: (Please add any comments regarding student's knowledge here.)		

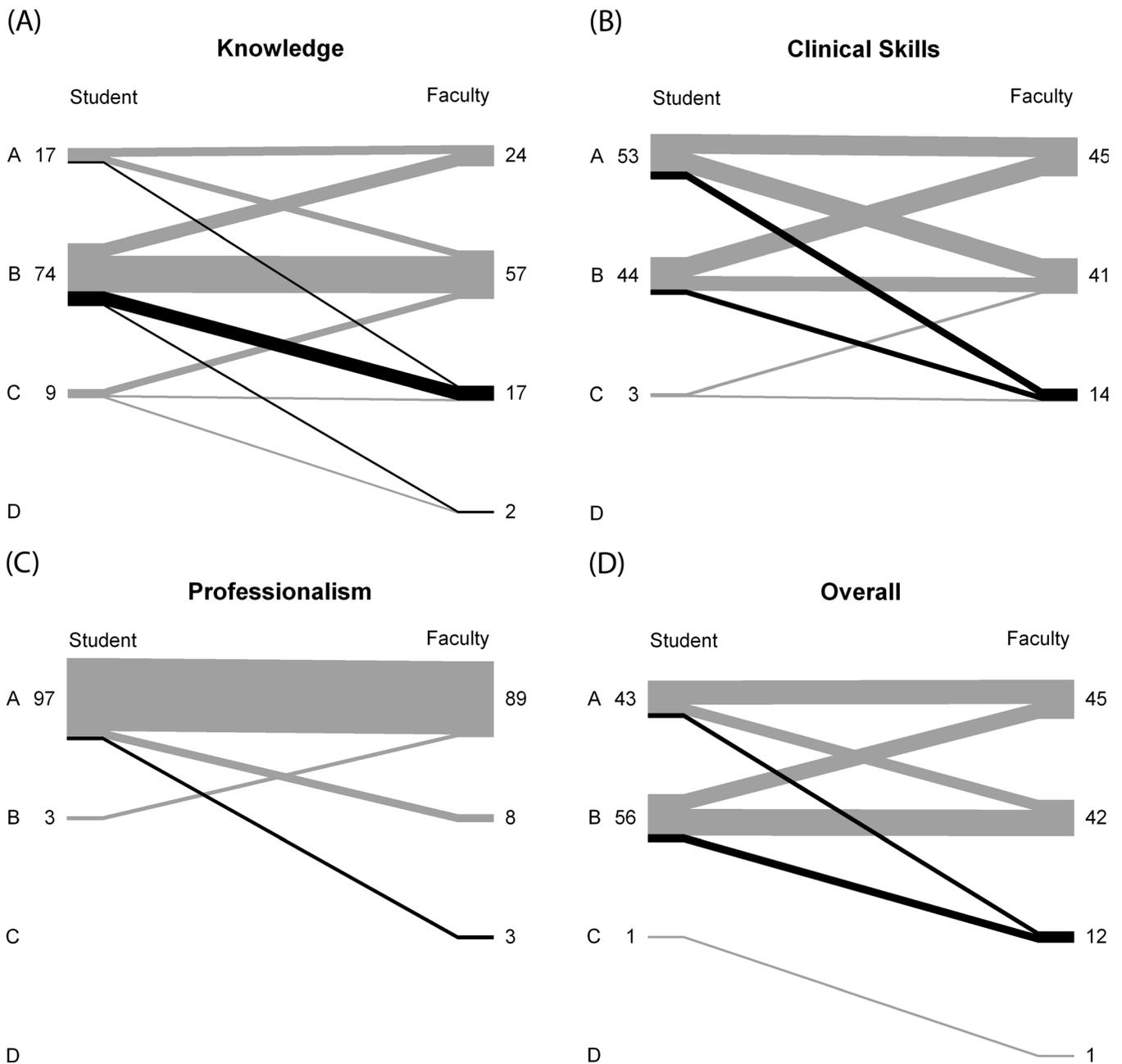
## 2. Clinical Skills: Applying the know-how in a practical setting

History Taking	A	Demonstrates efficiency, thoroughness and accuracy in performing a Hx. Demonstrates ability to ask questions which are systematic, relevant, precise, objective, non-leading and interactive with respect to information obtained. Asks questions of clarification and corrects inconsistencies. Organizes historical information accurately in the medical record.
	F	Unable to gather hx data in an efficient, thorough, accurate manner. Does not ask relevant questions. Uses leading questions. Does not ask questions of clarification. Unable to organize Hx info accurately in the medical record.
Physical Examination	A	Demonstrates proficiency in performing a complete physical examination with efficiency, thoroughness and accuracy. Accurately identifies and records normal and abnormal findings.
	F	Unable to perform a complete, thorough, accurate physical examination. Misses significant findings. Does not recognize normal and abnormal findings.
Clinical Decision Making (includes assessment of information)	A	Displays outstanding ability at integrating relevant information to make sound clinical judgments. e.g. information from Hx, PE, lab data, imaging data, production data, scientific literature, etc. Formulates a complete problem list, accurately prioritizes problems, and accurately determines differential diagnoses. Makes appropriate modifications in response to change in patient status. Takes economic considerations (e.g., cost implications of decisions, making wise choices that make sense in terms of treatment and cost) at a level appropriate for a senior student.
	F	Fails to integrate important clinical information, resulting in poor clinical judgment e.g. Hx, PE, lab data, imaging data, production data, scientific literature, etc. Unable to formulate a complete problem list, prioritize problems, and/or determine differential diagnoses. Does not make appropriate modifications as patient status changes. Fails to take economic considerations (e.g., cost implications of decisions, making wise choices that make sense in terms of treatment and cost) when making decisions.
Diagnostic Plan	A	Devises excellent diagnostic plans based on a strong knowledge base. Provides superior explanation and rationale for the diagnostic plan; explains the diagnostic plan in the context of a specific patient.
	F	Devises inadequate or incomplete diagnostic plans. Fails to provide clear explanation and rationale for the diagnostic plan; does not explain the diagnostic plan in the context of a specific patient.
Treatment Plan	A	Devises complete and accurate treatment plan. Provides superior explanation and rationale for the treatment plan; explains the treatment plan in the context of a specific patient.
	F	Devises inappropriate or incomplete treatment plans. Fails to provide clear explanation and rationale for the treatment plan; does not explain the treatment plan in the context of a specific patient.
Organization of Information	A	Organizes information in a very systematic manner (e.g., discharge notes, POMR, etc.).
	F	Neglects to organize information in a reasonable manner.
Procedures/Basic Clinical Skills	A	Demonstrates superior technical skills and is thorough and efficient in: obtaining histories; performing physical exams; specialty examination skills, animal handling, and is adept at basic procedures (e.g., drawing blood, inserting catheters, tissue handling, use of basic instruments, use of aseptic techniques, etc.).
	F	Demonstrates limited basic technical skills and is incomplete and inefficient at obtaining histories and performing physical exams. specialty examination skills, animal handling. Is not adept at, basic procedures (e.g., drawing blood, inserting catheters, tissue handling, use of basic instruments, use of aseptic techniques, etc.).
Patient Care and Welfare	A	Provides excellent patient/client care. Pays vigilant attention to details, such as patient's comfort and nutrition. Ensures that treatments are done in a timely and accurate fashion. Readily recognizes changes in patient's condition and communicates changes to supervising clinicians.
	F	Provides substandard patient/client care. Does not consistently look after patient's comfort. Does not consider patient's nutritional care. Inconsistently administers treatments or provides inadequate treatment. Fails to recognize and report important changes in patient's condition to supervising clinicians.
Documentation and Written Communication	A	Prepares medical records in an accurate, timely, and efficient manner; adept at using the "system" to enter medical records. Puts great effort into clearly communicating and documenting discharge information. Consistently, writes in a constructive and professional manner; adapts writing depending on the reader (e.g., other DVM's vs. client discharge records).
	F	Tends to prepare medical records that are inaccurate/substandard, not timely or efficient; is not adept at using the "system" to enter medical records. Makes no particular effort to clearly communicate and document discharge information. Writes in an unclear, confusing manner that is hard to follow; fails to adapt writing depending on the reader (e.g., other DVM's vs. client discharge records).
Rotation Specific Material: Clinical Skills (describe)		
Comments: (Please add comments regarding student's Clinical Skills here.)		

### 3. Professionalism: Work habits, interpersonal maturity and skills, teamwork, commitment, initiative

Attendance and Punctuality	A	Is always present and on time (with the possible exception of a true, documented emergency). Always performs tasks in a timely fashion and meets deadlines.
	F	Does not meet attendance guidelines on syllabus. Has more than the allowed number of absences for the rotation. Consistently comes late to sessions. Consistently misses deadlines.
Initiative and Acceptance of Responsibility	A	Willingly takes responsibility and ownership for own action and their consequences (e.g., seeks feedback, willingly admits mistakes). Proactively follows up and follows through on case (pending data, response to treatment, etc.) Always responds to ethical dilemmas in accordance with AVMA and legal standards Always readily assumes responsibility for equipment care and cleanliness. Cleans up after self.
	F	Avoids responsibility for own actions and their consequences (e.g., deflects blame, does not admit mistakes, resists feedback). Fails to proactively follow up and fails to follow through on case (pending data, response to treatment, etc.) Demonstrates behavior that is not in alignment with ethical with AVMA ethical standards and/or legal requirements Consistently fails to assume responsibility for equipment care and cleanliness. Does not clean up after self.
Teamwork, enthusiasm and Attitude Toward Work	A	Demonstrates excellent teamwork skills – works cooperatively with VMC personnel and client. Conveys an exceptional "can-do" spirit, a sense of optimism, ownership, and commitment and dedication.
	F	Consistently demonstrates poor teamwork skills – does not work cooperatively with VMC personnel and client Demonstrates a consistent sense of pessimism and/or lack of ownership, commitment dedication.
Professional Appearance	A	Always dresses in a professional manner. Adheres to dress code. Exhibits excellent personal hygiene.
	F	Tends to be consistently casual in attire. Does not adhere to dress code. May have hygiene issues.
Work Ethic and Dependability	A	Exceeds commitments made to others (e.g., doctors, staff, clients).
	F	Frequently commits to things without following through, causing trust to be questioned.
Care of Equipment and Room	A	Always readily assumes responsibility for equipment care and cleanliness. Cleans up after self.
	F	Consistently fails to assume responsibility for equipment care and cleanliness. Does not clean up after self.
Follow Instructions	A	Always actively participates and asks questions to clarify assignments/priorities and carries out task as expected.
	F	Puts limited effort into asking questions to clarify assignments/priorities and/or consistently deviates from the instructions.
Verbal Communication	A	Displays excellent communication skills with clients, peers, faculty, and staff, including the ability to initiate communication, gather information, build relationships, give information, and close communication. Takes great care to demonstrate/communicate empathy and compassion.
	F	Displays substandard communication skills with clients, peers, faculty, and staff. Has trouble initiating communication, gathering information, building relationships, giving information, or closing communication. Consistently deficient in demonstrating/communicating empathy and compassion.
Rotation specific Materials: Professionalism (Please Describe)		
Comments: (Please add any comments regarding student's Professionalism here.)		

**Figure 1:** Assessment form used by faculty and students at the conclusion of the clinical rotation



**Figure 2:** Summary of student and faculty scores for each competency. Line width corresponds to number of students who fit that pattern. Black lines show students who had faculty evaluations of C or D but self-assessments of A or B.

participating students from each quartile, suggest that this was indeed a representative population. It is nevertheless possible that because participation in this study was voluntary only students who thought they were doing well volunteered, which would explain the low sensitivity. Conversely, it may be that the sample population had greater self-awareness than the larger population, which would have led to even more significant variation between self-assessed and instructor-assessed scores if the entire population had participated.

This study did not evaluate the reported effect of gender. A study evaluating human medical students in a surgery

rotation documented the consistent overestimation of abilities by male students and consistent underestimation of abilities by female students.<sup>25</sup> This might be the result of social norms suggesting that women are taught not be assertive or boastful.<sup>31</sup> This effect was not evaluated in this study because students were identified only by number and because odds are very high that most of the participants were female considering the current gender inequity in veterinary medical training.

Expert evaluation has been proven to be most valuable when the student is assessed by a variety of instructors, all of whom are looking for different aspects of the

**Table 1:** Sensitivity and specificity of student self-assessments

	Correct assessment of C or D	Sensitivity	Correct assessment of A or B	Specificity
Knowledge	2/19	11%	74/81	91%
Clinical skills	1/14	7%	84/86	98%
Professionalism	0/3	0%	97/97	100%
Overall	1/13	8%	87/87	100%

**Table 2:** Mean and standard deviation of student and faculty evaluations on a 4-point scale, reported as *M* (*SD*)

Score	Faculty	Student
Knowledge	3.03 (0.70)	3.08 (0.51)
Clinical skills	3.31 (0.71)	3.50 (0.56)
Professionalism	3.86 (0.43)	3.97 (0.17)
Overall	3.31 (0.72)	3.42 (0.52)

skills described.<sup>7,17</sup> In this study, while one clinician was the instructor of record for each rotation, the students' grades were compiled from individual evaluations of all the faculty and house officers with whom they had worked, a process that increased the accuracy of instructor assessment.

A related concern is the "halo effect," defined as the tendency to rate students higher based on single attributes that receive undue weight. Because all of these students are chosen for admission from a much larger pool, there might be a tendency to rate them highly due to the instructors' innate belief in the high performance of all students in their program.<sup>4</sup> This effect is especially significant to the general public, who expect experts to accurately identify individuals in health professional training who are not yet ready to practice. As a result of these same concerns, it is evident that students' self-assessment of competence is unsuitable as the primary or sole evidence of their skills. Again, public safety requires competence to be accurately determined before individuals are licensed to practice veterinary medicine.

Veterinary medical students need to develop the ability to recognize strengths and weaknesses in clinical practice in order to guide their clinical decision-making and career development, the latter of which includes continuing education chosen to enhance students' skills over the course of their entire career. As demonstrated here and elsewhere, self-assessment is unlikely to be an accurate indicator of true ability.

Valid self-assessment requires knowledge of the standards of expected performance and the ability to make informed judgments about how closely one's ability meets those standards.<sup>32</sup> Timely instructor feedback coupled with questioning, reflection, and subsequent practice enhances self-assessment skills.<sup>6,13,14</sup> Students should set specific goals against which they can judge their own progress.<sup>6,29</sup> Opportunities for practice must be made readily available as frequency of performance is well correlated with accuracy of self-assessment.<sup>11</sup>

## CONCLUSION

This study is the first report in veterinary medicine to demonstrate the same inaccuracy of student self-assessment as a measure of ability as has been demonstrated in other health professions. If student self-assessment is to be used as a measure of the levels of competence that are required to meet accreditation standards, certain specific measures to ensure the accuracy of student self-assessment must be employed, including active faculty mentoring of student self-assessment, student goal-setting and reflection, and availability of subsequent opportunities for practice.

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## AUTHOR INFORMATION

**Margaret V. Root Kustritz**, DVM, PhD, DACT, is Professor of Theriogenology, Vice-Chair of the Department of Veterinary Clinical Sciences, and Assistant Dean of Education, University of Minnesota College of Veterinary Medicine, 1365 Gortner Ave, St. Paul, MN 55108. E-mail: rootk001@umn.edu.

**Laura K. Molgaard**, DVM, is Associate Dean of Academic and Student Affairs, University of Minnesota College of Veterinary Medicine, 1365 Gortner Ave, St. Paul, MN 55108.

**Aaron Rendahl**, PhD, is Statistical Consulting Manager, University of Minnesota School of Statistics, 1985 Buford Ave, St. Paul, MN 55108.