

# Why Veterinary Medical Educators Should Embrace Cumulative Final Exams

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## ABSTRACT

The topic of cumulative final examinations often elicits polarizing opinions from veterinary medical educators. While some faculty prefer cumulative finals, there are many who perceive these types of examinations as problematic. Specifically, faculty often cite cumulative examinations are more likely to cause students' greater stress, which may in turn result in negative student evaluations of teaching. Cumulative finals also restrict the number of items one may present to students on most recent material. While these cited disadvantages may have some merit, the advantages of cumulative examinations far exceed the disadvantages. The purpose of this article is to discuss the advantages of cumulative examinations with respect to learning evidence, grade/score validity, fairness issues, and implications for academic policy.

**Key words:** academic affairs, assessment, curriculum, educational methods, outcomes, psychology, SKAs

## INTRODUCTION

Although veterinary medical students are generally exceptional students with outstanding academic credentials, on occasion, some of these students will encounter challenges in a curriculum. For many students, such troubles often occur early upon matriculation, as the transition to veterinary school requires students to adapt to a new culture and professional norms, acquire different study strategies, cope with a variety of new and different stressors, and so on.<sup>1-8</sup> Further, initial courses in many veterinary (and medical) school curricula focus on the basic sciences and require students to acquire a large fund of knowledge.<sup>9-11</sup> Complicating matters, many veterinary schools also have academic policies in place that require students to maintain a minimum level of performance to be retained in the program. Students in the first year of a doctor of veterinary medicine (DVM) program are particularly vulnerable to a situation in which some academic struggles could have a significant bearing on both their status as a veterinary student and their future as a veterinarian. Although there are several reasons why students may struggle academically in a veterinary curriculum, it remains the responsibility of the veterinary program to ensure appropriate policies and practices are in place that are fair for students and give them the greatest possible opportunity to succeed. Thus, the purpose of this article is to discuss grading policy, and make an argument for the increased use of cumulative examinations, where appropriate, in veterinary medical schools.

## AN ILLUSTRATIVE EXAMPLE

Take a moment to consider a hypothetical (and extreme) example involving 10 veterinary medical students, each

with a unique experience (see Table 1) of the major course assessments (see Table 2) for a given course. Suppose the instructor only administered two assessments in a course, a midterm and a final examination, and that each examination counts for half of each student's final grade. Following the example provided by Royal and Guskey,<sup>12</sup> a breakdown of scores and subsequent grades calculated by different methods are provided. Specifically, I chose to (1) simply average the two scores (mean), as this is the most common method of grade calculation, and (2) calculate an average score when the midterm score is dropped if it was lower than the cumulative final examination score. Retaining all scores and calculating with a mean, given the assumptions of this scenario, would have resulted in two A, four B, and four C grades for these 10 students. However, if students' performed worse on the midterm than the cumulative final examination, and the midterm grade was dropped when this was the case, then course grades would have resulted in five A, three B, and two C grades for these same students.

The preceding hypothetical example elicits an important question: Which course grade is most valid: the one obtained when simply averaging the midterm and final examination scores, or the one based on an average when the midterm score was dropped if it was lower than the final examination grade? To further explore this question, let us consider a related example.

In the United States, all drivers are required to pass a written examination for a driver's license. A quick online search indicates pass rates vary significantly across all 50 states, with most pass rates ranging from 40% to 60% on the first attempt. Undoubtedly, most individuals who fail initially will work to better prepare for the examination and go on to pass on a subsequent attempt. Imagine if

**Table 1:** Explanation of score patterns

Student	Description of student performance
1	Student had extreme difficulty with the midterm exam, but continued to work hard and performed excellently on the cumulative final exam
2	Student had significant difficulty with the midterm exam, but continued to work hard and performed excellently on the cumulative final exam
3	Student had some difficulty with the midterm exam, but continued to work hard and performed excellently on the cumulative final exam
4	Student performed reasonably well on the midterm exam, continued to work hard, and performed excellently on the cumulative final exam
5	Student performed in a generally consistent manner on both the midterm and cumulative final exams, with slightly better performance on the midterm exam
6	Student performed in a generally consistent manner on both the midterm and cumulative final exams, with slightly better performance on the cumulative final exam
7	Student performed excellently on the midterm exam, but demonstrated a slight decline in performance on the cumulative final exam
8	Student performed excellently on the midterm exam, but demonstrated a significant decline in performance on the cumulative final exam
9	Student performed excellently on the midterm exam, but demonstrated a major decline in performance on the cumulative final exam
10	Student performed excellently on the midterm exam, but demonstrated an extreme decline in performance on the cumulative final exam

**Table 2:** Course grades as determined by different calculation methods

Student	Midterm	Cumulative final	Mean score*	Grade <sup>†</sup>	Deleting midterm if lower than final	Grade
1	58	98	78	C	98	A
2	68	98	83	B	98	A
3	78	98	88	B	98	A
4	88	98	93	A	98	A
5	80	75	77.5	C	77.5	C
6	75	80	77.5	C	80	B
7	98	88	93	A	93	A
8	98	78	88	B	88	B
9	98	68	83	B	83	B
10	98	58	78	C	78	C

\* Assuming 50/50 weighting of midterm and final exam scores

† Grading scale: A = 90%–100%; B = 80%–89%; C = 70%–79%; D = 60%–69%; F = 59% or lower

drivers who failed on the first attempt were provided restrictions on their license, such as permission to drive only when the weather was clear and the sun was shining, or only during times of day when traffic is less likely to be busy. It would be absurd to implement such policies, as it would be irresponsible to assume that drivers who initially failed the examination are uniformly poor drivers and/or are unworthy of being fully licensed. Problems such as reading ability, stress/anxiety, poor preparation, overconfidence, and a host of other factors are likely to blame for initial failures. Interestingly, many parallels can also be made with students' performance in a veteri-

nary course. Students often exhibit many of the same aforementioned problems. They experience initial troubles on a major assessment as they adjust to the quick pace and voluminous amount of knowledge they are required to learn, but then go on to demonstrate excellent performance by the end of the course. In the same way that persons who initially fail a driver's license examination should not be punished for prior performance after they demonstrate sufficient knowledge at a later point in time, students, too, should not be punished when they can demonstrate excellence in performance at the end of a course.

## THE BENEFITS OF CUMULATIVE EXAMINATIONS

Research has repeatedly indicated that students learn differently, and often at different paces.<sup>13</sup> Thus, it is important to design grading practices and policies that are fair, likely to yield valid measures of student performance, and representative of what students know or can do at the end of a course. Extant research has repeatedly demonstrated that cumulative exams provide an excellent mechanism for long-term learning gains and retention, which is perhaps the most significant reason to use cumulative final exams.<sup>14-19</sup> Roediger and Karpicke<sup>19</sup> note learning is enhanced when students are required to recall information, as opposed to simply re-studying. Improved learning gains aside, cumulative examinations are attractive for several other reasons and can go a long way in promoting fairness, valid grade verdicts, and valid interpretations.

First, let us consider what a grade represents. When faculty typically think of grades they think about them from an “insider” perspective. That is, they are keenly aware of content covered in the course, details surrounding each assessment instrument, grade calculation procedures, weighting, and so forth. It is important to bear in mind that when other individuals review a student’s transcript and associate meaning to a grade, they are not privy to any of the specifics of the course. It is for this reason that most individuals tend to interpret grades as a measure of students’ performance at the *end* of a course.

Next, research indicates grades are most likely to be valid when they reflect both the most recent and comprehensive forms of evidence of student performance.<sup>12,20</sup> Because a cumulative examination is a summative evaluation of student performance, it provides an excellent opportunity to capture the most recent evidence of students’ performance in a comprehensive way. For this reason, a cumulative final examination should account for a larger proportion of students’ grades than other assessments, provided the examination is psychometrically sound and capable of producing defensible scores.

As noted previously, much research has stressed the importance of individualized learning and how students learn at different speeds. Some students will inevitably perform well from the beginning of any given course and continue to demonstrate excellence until the conclusion of the course. Some students, however, may not be as fortunate. Some students will inevitably fail to grasp content introduced earlier in the course and will have a difficult time keeping up. Through hard work, perseverance, and effective study approaches, these slow-starters may eventually catch up and demonstrate excellence at course end. The problem, however, is that most common grading practices punish students for poor prior performance, or for getting off to a slow start. What kind of message does it send to students when they receive an F on a midterm examination and know the absolute highest grade they can receive for the course is a C if they attain a perfect score on the final examination? This realization could have devastating consequences for students and significantly affect their levels of stress and create a domino effect of problems in both their personal lives (e.g., stress, depression) and academic lives (e.g., future internship and residency plans). Cumulative exami-

nations are particularly attractive because they provide students an opportunity to demonstrate at the end of a course that they were able to overcome their initial stumbles and ultimately make the learning gains desired by faculty. In terms of fairness, if a student demonstrates excellence on a cumulative final examination, there is little reason to keep previous scores that work against the student. That is, if students perform better on a cumulative final examination than they did on the midterm examination, it would be advisable to drop the midterm grade because retaining such grades only punishes students for prior performance.

Cumulative examinations also offer several unique benefits due to their comprehensive nature. For example, when students know the final examination will be cumulative in nature, they immediately understand the need to retain knowledge throughout the entire course, as opposed to simply memorizing information for a particular interval, regurgitating that information on an assessment, and then potentially forgetting that information (often called the *forgetting curve*) at the conclusion of the exam.<sup>21,22</sup> It is possible that simply being aware that one will be assessed using a cumulative final examination could affect students’ metacognition and force them to approach learning differently.

Faculty may also benefit from the use of cumulative examinations. First, grades will be more defensible and easier to justify to students. In addition, students will likely appreciate the fact that they will not be punished for poor prior performance and slow starts, and will perceive the instructor more favorably and as someone who is willing to provide them greater opportunities to succeed. Such factors can have an enormous impact on student development, mentoring, and so forth.<sup>23-25</sup> Cumulative examinations can also help resolve two long-standing problems of medical faculty in general: instructional focus and faculty identity.

A common problem that plagues many medical educators is deciding which content is most relevant and critical for students to know. Cumulative final examinations can force faculty to thoughtfully consider these questions and help them better align their assessments with stated instructional goals. Such efforts will no doubt be perceived as more transparent and fair, but will also result in more defensible grading practices. Another major problem for many medical educators involves faculty identity. Many educators perceive their roles as “gatekeepers” of the curriculum. That is, they perceive it to be their responsibility to *sort* talent. What many fail to understand is that admissions committees have already sorted the pool of applicants and selected desirable talents. Thus, once students are admitted to veterinary school, sorting students is no longer necessary. The role of a veterinary educator is not to try to differentiate students’ abilities and develop a prescribed grade distribution in which certain proportions of students will receive a particular grade.<sup>26</sup> Rather, the role of an educator is to *develop* talent.<sup>27</sup> Cumulative examinations help faculty not to give up on slow-starting or struggling students and can help faculty better motivate and inspire students to overcome initial struggles and setbacks.

## CONCLUSION

Veterinary schools, like all other medical and professional schools, have an obligation to provide students every reasonable opportunity to succeed. Many faculty and administrators are unaware that key tweaks to grading policies and practices can have an enormous impact and promote fairness and integrity throughout a curriculum. The purpose of this article was to discuss grading policy and practice with specific focus on cumulative examinations. Cumulative final examinations provide several advantages for students and faculty alike: (1) they increase the likelihood of better long-term learning and retention over traditional examinations; (2) they offer stronger validity evidence by capturing the most recent evidence of students' performance in a very comprehensive way; (3) they do not punish students for prior performance and/or for learning at a slower pace than their peers; (4) they provide students who struggle initially as they transition into veterinary medical school with greater incentive to work hard and persevere; (5) they encourage students to adopt learning strategies that focus on information retention as opposed to rote memorization; (6) they tend to help students perceive faculty as more fair and willing to provide opportunities for students to succeed; (7) they can help make course grading verdicts more defensible for faculty; (8) they can help faculty better discern what content is most relevant and important for students to know, resulting in assessments that better reflect the intended learning outcomes of the course; and (9) they can help faculty better realize their identity as individuals whose job is to develop rather than sort talent. For these aforementioned reasons, I strongly encourage veterinary medical educators to adopt cumulative final examinations when possible.

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