Using Individual and Collaborative Examinations to Increase and Incentivize Engagement

Michael F. Nolan, Ph.D., P.T. & John P. McNamara, M.S., D.C.
Department of Basic Science Education
Virginia Tech Carilion School of Medicine, Roanoke, Virginia 24016
mfnolan@vt.edu

Purpose

As part of our continuing effort to develop learning and assessment activities that are both student-centered and collaborative, we developed an assessment model for use in the neuroanatomy component of the curriculum that rewards students for both individual effort and group collaboration.

Background

The approach describe here was developed for a ninety-hour medical neuroanatomy course, scheduled during the final ten weeks of the first year of the curriculum. Three examinations written by the faculty were developed and administered at the end of the 3rd, 6th and 10th week of the course, respectively. Each examination was comprised of two parts. The first part was approximately 150 multiple choice questions, with or without images, the majority of which were structured as clinical vignettes. For the second part, students were randomly assigned to groups of five (5) students each and AS A GROUP took the same examination again. Each student's final assigned grade was calculated using the following formula: individual score x 0.93 plus group score x 0.07 = 100%.

Results

Student performance on three examinations in the course for two consecutive academic years is presented in Table 1.

Table 1
Average Scores on Individual and Group Examinations
For Two Consecutive Years

	Year 1		Year 2	
	Individual (N=152)	Group (N=10)	Individual (N=151)	Group (N=10)
Exam 1	83	90	84	90
Exam 2	80	89	83	89
Exam 3	84	90	83	91

Using this formula, more students were successful than using the individual score alone. Table 2 lists the number of student failures using this formula for individual and individual/group scoring.

Table 2
Number of Students Failing the Examinations Based On
Individual vs. Overall Scores

	Year 1		Year 2	
	Individual	Overall	Individual	Overall
Exam 1	5	3	6	3
Exam 2	3	1	3	1
Exam 3	4	1	4	2

Observations and Conclusions

The approach to assessing and valuing student success in our medical neuroanatomy course was developed as part of an ongoing effort to encourage student engagement and participation in the course. We have observed that many students prefer active learning opportunities where they have some control over the learning environment as opposed to being passive participants in more faculty centered learning activities. We recognized that most students also prefer to work collaboratively, especially if as a result, some meaningful benefit might accrue.

We noticed that during the course, students frequently self-assess, if not learn, by means of practice examination questions available either commercially developed individually or passed down by upperclassmen. We noticed also that students greatly appreciate and attend review sessions offered by the faculty either as a scheduled part of the course or as an unscheduled, informal activity. The closer the review activity parallels the actual course examinations, the more favorable the activities are viewed and the more engaged the students are. Likewise, the more of these types of opportunities that are offered, the more value they seem to have.

An important issue we had to address to ensure fairness with this method was to determine what percentage of the overall examination score should be assigned to the individual and the group component of the test. Importantly, we understood that the score a student receives on an examination must accurately and reliably reflect that student's individual success in learning or mastering the material included on the examination. Therefore, the largest percentage of the overall examination score must be derived from the individual component. In determining the percentage to be assigned to the group component, we considered several factors.

Since each student in the group would be assigned the same group score, regardless of their participation and contribution to the group effort, care must be taken to avoid giving non-participating students relatively more benefit than would be given to the more participatory or engaged students in the group. If the assigned percentage is too high, non-participating or minimally participating students would receive a relatively greater benefit than students who may not have participated to a meaningful degree. We recognized that in some instances if the percentage was too high, students who might have scored below the cut score based on the individual score might be assigned a passing score based on calculations using the group score. The higher the group score percentage, the greater number of students would benefit from this calculation and the criticism of failing to identify students with insufficient or inadequate understanding of the course material could be justified.

We observed, as anticipated, that the contribution of a group score raised the overall assigned examination score by several percentage points for almost all students. The number of points added ranged from zero to six with the lower scoring students benefitting more that the higher scoring students. In a few instances students who would have failed an examination based on their individual performance were assigned a passing score. The question may be raised regarding whether those students who received a passing score based on the contribution of the group score, who would have failed the examination based on their individual effort, might not benefit from remediation.

We concluded that the benefit of peer teaching with its attended feedback, was of greater overall educational value than that gained by requiring a remediation effort with a subsequent re-examination for a few students who scored one or two percentage points below the cut score.

Summary

The method for encouraging collaborative learning and for valuing student accomplishment described here involved a two-part approach, an individual written examination and a group test, each of which contributed a specific percentage to the overall examination grade. The largest percentage of the score was derived from the individual effort with a smaller percentage being based on a collaborative effort involving peer teaching among a small group of students. The model facilitates active engagement among students in an activity that has an impact on their grade, offers a meaningful incentive to participate in a learner-centered component of the course and provides students with prompt feedback regarding their likely performance on an examination.

Contact Information

Dr. Michael F. Nolan, Professor
1 Riverside Circle, Suite 202 (246)
Roanoke, VA 24016
mfnolan@vt.edu