The effect of Bloom's taxonomy level and other factors on the performance of final year veterinary students in theoretical assessment

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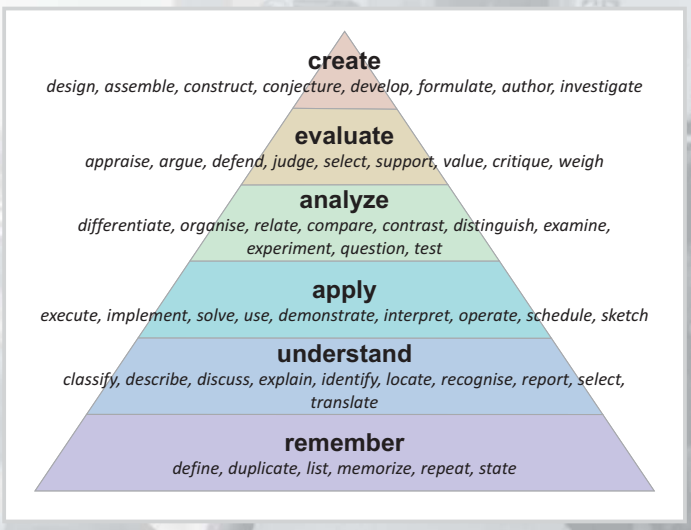
Introduction

Objective computer-based assessment was used for the final comprehensive theoretical day one competency examination of veterinary students at the University of Pretoria. This examination consisted of different question types in 11 veterinary disciplines across 6 domestic animal species.

Materials and Methods

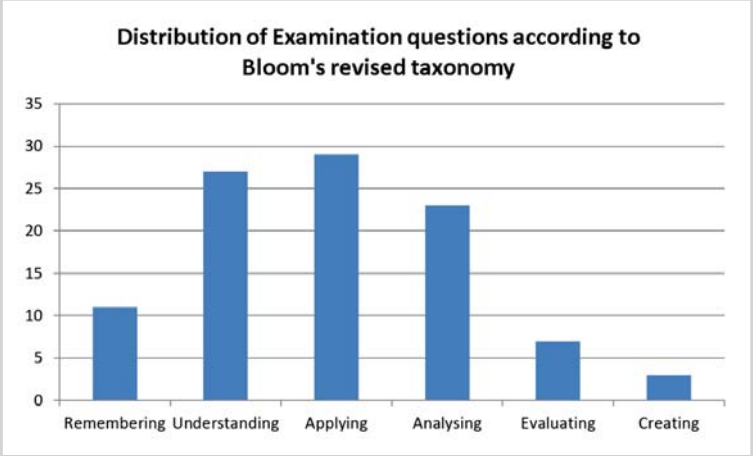
Questions are scrutinised by an expert panel while categorised according to the six levels of Bloom's revised taxonomy. Questions from all the cognitive levels are included in each discipline, to confirm that the students' competence is assessed with the emphasis on application of information and higher order thinking skills (levels 3-6). CBA is a perfect tool for this type of assessment since many different question types are available to set up questions on all levels of Bloom's revised taxonomy. The inclusion of multimedia elements (graphics, slides etc.) widens the scope of questions that can be included. The misconception exists that objective assessment can only assess on lower cognitive levels, this is however not accurate and many examples of objective assessments on higher cognitive levels are available.

Bloom's revised taxonomy



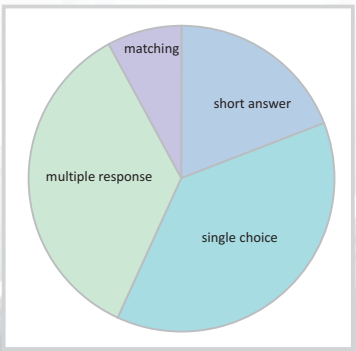
With retrospective quality assurance, difficulty score was determined as the mean score achieved by students for each question. Discrimination score was determined (for single choice questions only) as the high-low discrimination ability of the question using Questionmark Perception.

In the examination of November 2016 (215 questions and completed by 125 students), Bloom's level 1 (remembering) to level 6 (creating) represented 11%, 27%, 29%, 23%, 7% and 3% respectively.



Short answer-, single choice-, multiple response- and matching type questions represented 19%, 38%, 35% and 8% respectively of the maximum score for the examination.

Distribution of question types



Results and conclusions

Data were entered into a statistical analysis programme (NCSS 2007, NCSS, Kaysville, UT, USA). Following descriptive statistics to determine univariable associations, multiple regression analysis was performed to establish the independent predictors ($P<0.05$) of difficulty and discrimination score of questions.

Multiple regression model of difficulty value**

Variable *	Regression coefficient	95% Confidence Interval		P-value
Bloom's level (1 – 6)	-0.03	-0.06	0.00	0.04
Short answer question	0.00	*reference category		-
Single choice question	0.14	0.00	0.28	0.04
Multiple response question	0.22	0.08	0.37	<0.01
Matching type question	0.27	0.02	0.51	0.03

* Disciplines not presented in table

** Difficulty value represents the mean score of questions

The difficulty score (mean 0.61; SD 0.26) and discrimination score (mean 0.23; SD 0.16) of single choice questions were negatively correlated; however this association was not significant ($P=0.18$). Question type, Bloom's level and discipline, but neither species nor maximum score of the question, were independently associated with difficulty scores of all questions ($P<0.05$).

It was concluded that balance between different disciplines and species represented in final year veterinary examinations can be improved by changing the weighting of different Bloom's levels or question types between categories.