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**RESEARCH ARTICLE**

## Domain-Specific Learning Among Medical Students

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**ABSTRACT:** Background: The aim of this study was to investigate undergraduate medical student's domain-specific learning. Method: The research tool was a structured essay question formulated to assess factual and affective knowledge and application and synthesis of knowledge. The question was administered to 151 students. Results: Mean score on the recall question was significantly higher than the other two domains. Total scores of female students were significantly higher than male students ( $P < 0.05$ ). Gender-wise difference in scores was not significant in any specific domain area. There was no significant relationship between factual knowledge and total scores. However, there was a significant linear relationship between total scores and the two areas of affective knowledge ( $r = 0.78$ ) and application and synthesis of knowledge ( $r = 0.6$ ). Findings indicate that affective knowledge and application of knowledge are closely related to overall acquisition of knowledge ( $P < 0.0005$ ). Conclusion: Teaching and assessment in higher-order knowledge domains and affective knowledge needs to be developed. Questions dealing with affective knowledge and testing higher-order cognitive abilities are more discriminatory than questions testing at the recall level.

**Keywords:** Cognitive domains, Affective knowledge, Applied knowledge

### INTRODUCTION

Knowledge is thought to be an integration of different types of learning. Bloom *et al.* identified three major domains of learning: cognitive, affective and psychomotor.<sup>[1]</sup> They further described cognitive learning as a process of acquisition of knowledge from the level of simple recall to the higher levels, such as application, analysis synthesis and evaluation of knowledge. Affective knowledge deals with emotional areas such as attitudes and values. Psychomotor knowledge deals with motor skills. Most assessments are efficient at assessing factual knowledge. Yet many assessments neglect other domains of learning, especially, affective knowledge.<sup>[2]</sup>

As family medicine educators, we especially cannot ignore the importance of affective learning. The competent practice of medicine requires knowledge and skills in many domains. As in any clinical medical discipline, higher-order learning, such as application, analysis synthesis and evaluation, is important to form

an ideal management plan in family practice. In addition, a family doctor who must assess the patient using a holistic approach must be highly sensitive to the patients concerns and psychosocial problems with an understanding of the affective component of the presenting problem. The family physician who aims to deliver patient-centred care must develop good communication and interpersonal skills in order to build a good doctor-patient relationship.

During marking of undergraduate assessments in family medicine it was noted that students seemed to be performing at a higher level on questions testing factual knowledge compared to questions based on affective areas and involving application and synthesis of knowledge. There also seemed to be no close correlation between levels of attainment on factual knowledge-based questions and overall competency.

In this study, we assessed factual learning, application and synthesis of knowledge and affective knowledge

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among medical students. The objective was to identify and compare any differences in student attainment in the different specified areas.

## METHODOLOGY

The research tool was a structured essay question (SEQ). SEQs are essay questions in which students are required to provide specific answers to the different segments within specified time limits. Faculty of Medicine, University of Kelaniya assesses students with SEQs at the end of the fourth year examination.

We formulated a three segment SEQ based on the three domain areas we wanted to test. The question was based on a common clinical condition presenting to a general practice.

The first segment of the question tested knowledge at a simple recall level.

E.g., *‘What are the common organisms causing .....’*

The second segment tested at a higher level of application and synthesis of knowledge, which required students to use integrated knowledge within a specific circumstance.<sup>[3]</sup>

E.g., *‘Holistic management of a common clinical problem.’*

The third segment tested use of affective knowledge in a clinical setting.

E.g., *‘List some of the probable ideas and concerns that this mother may have regarding her child’s illness...’*

Each of the three domains tested were given an equal weightage in allocation of scores. Marks obtained by the 151 students who sat the examination on the question were analysed using Statistical Package for the Social Sciences (SPSS) version 17 with regard to comparison of student performance in the different categories and differences according to gender. Total overall scores and mean scores in each domain were looked at in order to identify any relationship between overall knowledge and knowledge in different domains.

## RESULTS

The mean total score of female students (75%) was significantly higher than that of male students (72%) with  $P<0.05$  [Figure 1]. The gender-wise difference in mean scores was not significant in any specific domain [Figure 2].

Total overall scores can be thought to reflect overall knowledge. We wanted to see which domain of knowledge was more closely related to overall scores and therefore to overall knowledge. We could not find any significant relationship between total scores and factual knowledge [Figure 3].

There was a linear relationship between total scores and the two areas of affective knowledge [Figure 4], and application and synthesis of knowledge [Figure 5] with a significant positive correlation between affective knowledge ( $r=0.78$ ), application of knowledge ( $r=0.6$ ) and the overall scores ( $P<0.0005$ ). This finding indicates that affective knowledge and application of knowledge are closely related to overall acquisition of knowledge.

Therefore, questions dealing with affective knowledge and testing higher-order cognitive abilities may be better at identifying students with overall knowledge and are

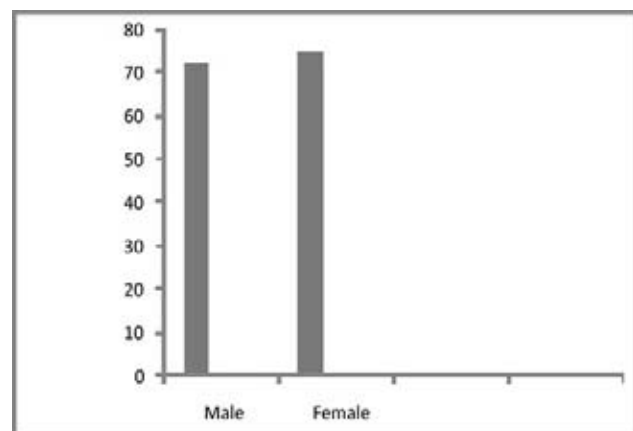


Figure 1: Total scores of students according to gender

therefore more discriminatory than questions testing at the recall level.

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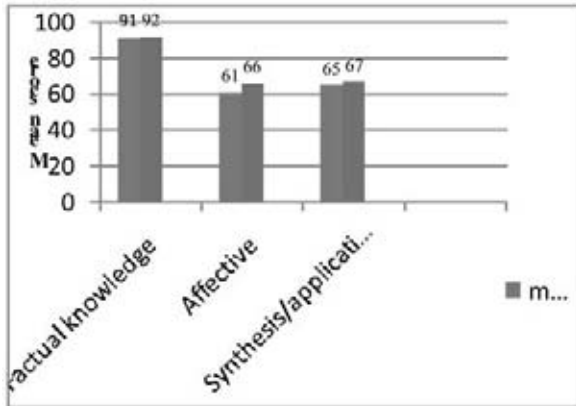


Figure 2: Domain scores according to gender

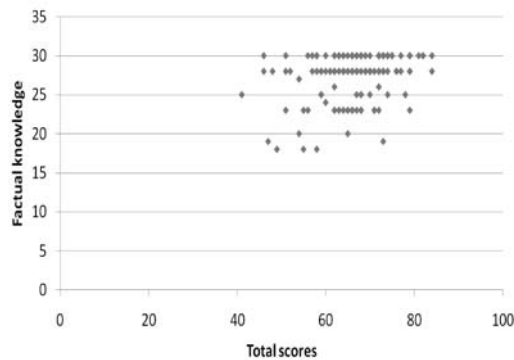


Figure 3: Relation between total scores and factual knowledge

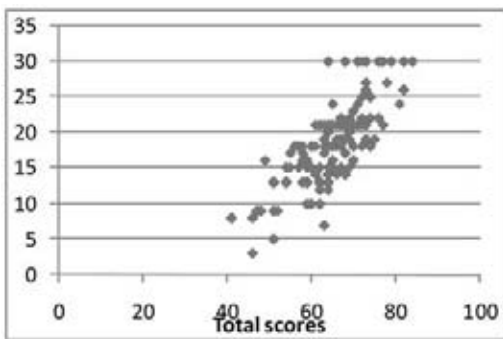


Figure 4: Relation between total scores and affective knowledge

### DISCUSSION

Overall students had performed better in recall of core factual knowledge. Lower scores in the other domains underline the need for development of teaching and assessment in these areas, as assessment has been stated as an important drive for

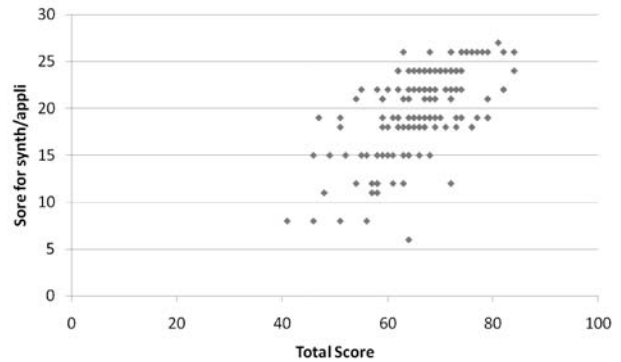


Figure 5: Relation between total scores and score on synthesis and application of knowledge

learning and students lay their priorities at what assessments demand.<sup>[4]</sup> Therefore, matching student assessments to the desired learning objectives is important.

It is generally accepted that measuring intangibles, such as compassion, empathy and commitment, are difficult,<sup>[5]</sup> yet these are important areas that are essential to professionalism and high-quality patient care.

Assessments can have varied purposes, e.g., certifying competence, discriminating among candidates for the purpose of awarding distinctions or medals and assessing the training programme.<sup>[6]</sup> Using questions based on higher-order cognitive processes and affective knowledge may help to discriminate between candidates more efficiently than questions based on factual knowledge.

This study was based on student performance in one question that was designed to assess three domain areas. Wass *et al.*<sup>[7]</sup> have noted that assessment of communication skills and attitudes are proving to be case-specific and have low generalisability across clinical contexts. Indeed further large-scale studies are necessary to be able to generalise our findings.

During construction of the question that served as the research tool in this study, it was difficult to completely eliminate an element of recall of factual information when answering the question on application and synthesis of knowledge.

## CONCLUSION

With the current emphasis on professionalism, patient-centred care and increased physician accountability educational interventions and assessments that drive development of higher-order cognitive skills and affective learning will become important.

This study underlines the lag of student learning in more complex knowledge and affective domains. It also reveals the more discriminatory nature of questions in these areas. Further large-scale studies would be necessary to develop and generalise these findings.

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