

Assessment of Higher Cognitive Domain in the Subject of Community Medicine: Perceptions of Students and Faculty

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Abstract

Background: 'Assessment drives learning'. A higher level of assessment will have better educational impact on the learner. The conventional assessment tools for cognitive domain assess more of factual knowledge than the applied. The overall goal of Community Medicine is to prepare the undergraduates to function as community and first level physicians and handle real life primary healthcare delivery situations. Contextual or scenario based assessment may help to achieve this goal. **Aims and Objectives:** 1. To assess the perceptions of undergraduate students and faculty towards higher cognitive assessment in the subject of Community Medicine and 2. To compare the performance of students between traditional and higher cognitive assessment. **Materials and Methods:** In the present medical educational project, 35 students from 7th semester MBBS were randomly selected. The assessment tool consisted of 5 Structured Short Answer Questions (SAQs) in two parts each. The first part was factual assessment question and the second question was applied aspect assessing the same knowledge area. The scores of students in factual and applied aspect were compared. Also, the perceptions of students and faculty were obtained using a pre-validated questionnaire on a 5 point Likert scale. **Results:** There was no significant difference between the scores of factual and applied aspect assessment. The students perceived the newer assessment positively. They opined that it will help them imagine real life scenarios, make the subject learning interesting, may increase the retention span and they would prefer it over the factual/mugging-up assessment. The faculty also perceived it positively for better learning by students and it will require more time, planning and efforts than the routine assessments. **Conclusion:** The higher cognitive domain assessment was perceived positively by both the students and faculty.

Keywords: Assessment, Factual Recall, High Order Cognitive Domain, Perceptions

1. Introduction

'Assessment drives learning' is a well-accepted fact. Examinations have steering effect on the learning of students.¹ However, there can be a supplementary statement that 'quality of assessment will decide the quality of learning' or the level of 'educational impact' of that assessment. If the assessment is based only on the recall of factual information, it will drive the student's learning towards just 'mugging-up'.

Knowledge or cognitive domain is relatively easy to assess than the other domains. There are universally accepted tools to assess knowledge. However, these assessment tools are often constructed in such a way that

they test only the theoretical or factual knowledge which the student might have just memorized. Theoretical questions do not encourage students to imagine a real life scenario of the given content area. These questions judge only the ability to recall and not the higher competencies based on that knowledge. The students are not driven or inspired to imagine an actual case scenario based on what they have read.

The 1997 Regulations On Graduate Medical Education by Medical Council of India, clearly mention that, "adequate emphasis is to be placed on cultivating logical and scientific habits of thought, clarity of expression and independence of judgment, ability to collect and analyze information and to correlate them"². To fulfill this

objective, there is need to modify the assessment tools to test cognitive domain beyond just recall. The new competency based medical curriculum also emphasizes on achieving competencies at higher levels. Competency based learning would include designing and implementing medical education curriculum that focuses on the desired and observable ability in real life situations³.

Each subject of Indian undergraduate medical curriculum has its own share, scope and responsibility to channelize the subject knowledge towards its use in real life situations. For Community Medicine, the broad goal of the teaching of undergraduate students is to prepare them to function as community and first level physicians². An important competency for undergraduate Community Medicine curriculum as 'ability to recognize, investigate, report, plan and manage community health problems and emergencies'².

Problem-solving skills are very important part of a medical practitioner's competence and they must be taught, learned and assessed during their training^{4,5}. Contextual or scenario based assessment may help to explore the student's competency in above mentioned higher cognitive domains. Such educative assessments reduce the tedium of the vast and complex nature of the subject of Community Medicine, may make it more interesting to learn and will have a better learning impact⁶.

Hence, there seems a need to reform the cognitive assessment towards higher competencies. There is also a need to assess how the students and teachers feel about the higher cognitive domain assessment. Hence the present educational project was undertaken with following objectives.

2. Aims and Objectives

1. To assess the perceptions of undergraduate students towards higher cognitive assessment in the subject of Community Medicine.
2. To assess the perceptions of faculty towards higher cognitive assessment in the subject of Community Medicine.
3. To compare the performance of students in conventional assessment and in the higher cognitive assessment in the subject of Community Medicine.

3. Material and Methods

3.1 Study Design

It was a comparative medical educational study.

3.2 Duration

Six months (Oct 2015 to March 2016).

3.3 Study Participants

35 students of 7th semester MBBS (Convenience sampling).

3.4 Data collection instruments

1. A set of 5 structured Short Answer Questions (SAQs) divided into 2 parts (Part A=Lower Cognitive Domain (LCD), Part B=Higher Cognitive Domain (HCD) questions).
2. 2 separate Perception questionnaires for faculty and students (Response on 5 point Likert scale). The questionnaires were designed to assess the perceptions and opinions of students and faculty for the higher cognitive domain assessment. The student questionnaire had a total of 20 statements and faculty perception questionnaire had 13 statements.
3. Previous Internal (Formative) assessment score records of the 35 students for comparison.

4. Methodology

Approval for the present educational project was taken from the institutional ethics committee. Preparation and validation of 3 data collection instruments (as stated above) was carried out by the faculty of Community Medicine department. The assessment tool was based on some of the most know areas of Community Medicine undergraduate syllabus (Nutrition, Acute diarrhoeal diseases, biomedical waste management, Epidemiology, Immunization). Both the lower and higher cognitive domain parts of each question were based on the same content area of the syllabus. Four marks were allotted to each structured Short Answered Question (SAQ), 2 each for the LCD and HCD'. The students were given 30 minutes to solve the SAQs. After explaining the purpose and nature of the study, voluntary participation, etc., written informed consent was taken from the study participants.

An example- SAQ 1

Part A – (LCD) – State the Dose (0.5 marks), Schedule (1 mark), Route of administration (0.5 marks) of measles vaccine.

Part B – (HCD) – A mother brings her 10 month old child who has not received any vaccine since birth. Which of the following vaccines would you like to give on this visit?

Sr. No.	Vaccine	Yes/ No
1	BCG	
2	DPT ₁	
3	Hepatitis B ₁	
4	Measles	

Perceptions of students about the assessment were assessed using a pre-validated questionnaire. It consisted of 20 statements regarding the assessment tool/inclusion of HCD, its comparison with LCD assessment, its pros and cons, etc. Perceptions of faculty were also assessed using a pre-validated questionnaire². It consisted of 13 statements regarding the assessment tool. Both students and faculty were asked to record their perception/ opinion on a 5-point Likert scale (Strongly agree to strongly disagree - 1 to 5 scores). There was an open ended question of 'Any other comments' to express their views in their own words. Both perception questionnaires were self-administered. A response of more than 3 to positive questions was accepted as a positive perception.

4.1 Statistical Analysis

The mean scores of LCD and HCD assessment were calculated and compared using Z test. The perceptions were analyzed by mean score on Likert scale for each statement. The reliability of the both the perception questionnaires was assessed by Cronbach's alpha.

5. Results

The mean score of 35 students for the complete assessment was 8.79 with SD of 3.19. The mean score of LCD was 4.6±1.84 and that of HCD was 4.19±1.82. This difference was found statistically non-significant (Table 1).

Table 1. Scores of students in the present assessment

Component of the assessment	Mean ± SD	No. of students > 50% marks (N=35)
Total score (20 marks)	8.79±3.19	11 (31.43%)
*LCD score (10 marks)	4.6±1.84	13 (37.14%)
*HCD score (10 marks)	4.19±1.82	13 (37.14%)

*Z= 0.92, df=34, p=0.180, Not significant

As shown in (Table 2), the mean score of previous formative assessments in Community Medicine was significantly higher than that of the present assessment.

Table 2. Comparison with formative assessment

Assessment	Mean ± SD	Stat. significance
Present (Out of 20 marks)	8.79 ± 3.19	Z=-7.886, df=34, p=0.0000312,
Previous formative (Out of 20 marks)	11.89 ± 2.59	'Statistically significant'

Figure 1 shows the student perceptions. Students showed positive perceptions for statements like 'studying in depth will make the subject more interesting for me', 'such type of questions will help me imagine a real life patient scenario'. Most of the students showed disagreement towards the statement that this type of assessment will increase their anxiety. Students also opined that this assessment pattern may help them for future entrance examinations.

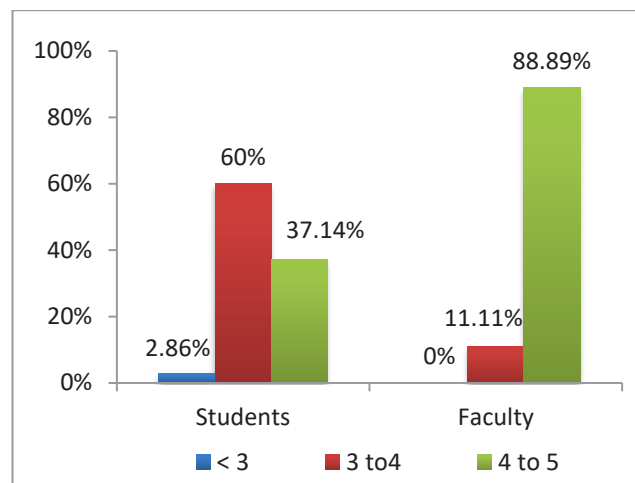


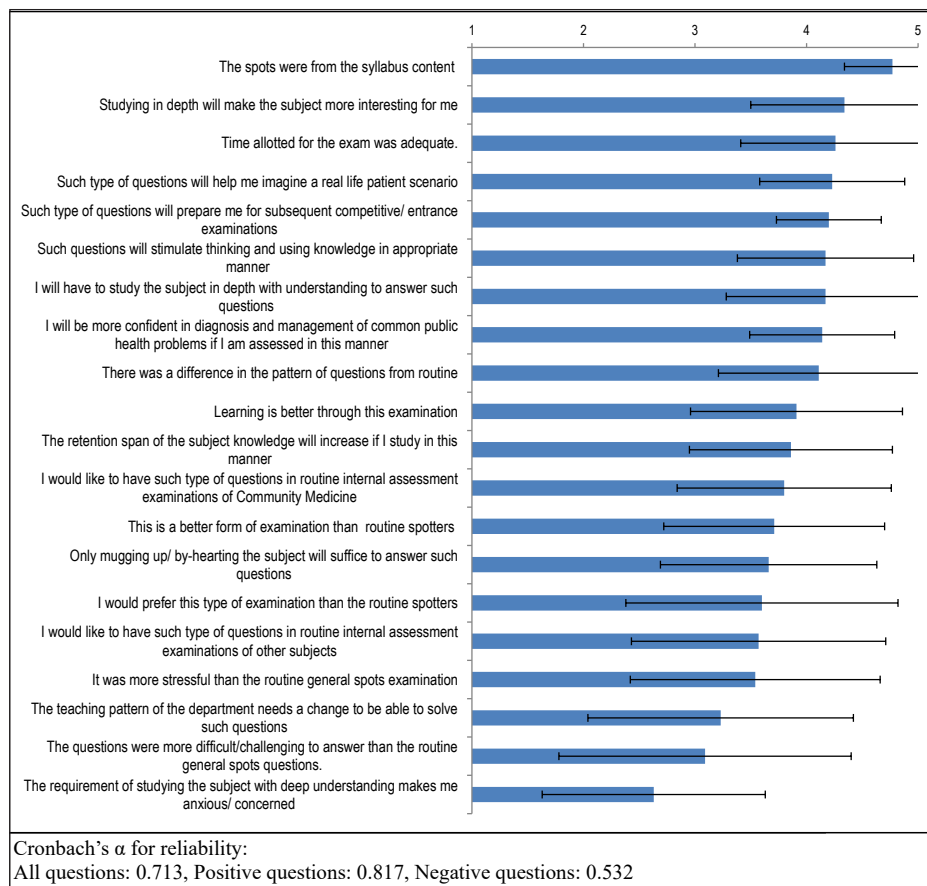
Figure 1. Overall perception score on Likert scale.

Table 3, shows the faculty perceptions. All the 8 faculty members perceived the need for HCD assessment. They showed agreement on the statements like 'It will increase student's interest in the subject', 'It will increase their skills I constructing such assessment tools'. All of them agreed on the statement that 'constructing HCD assessment tools will require more time and efforts'. According to the teachers, the percentage of HCD in any assessment should be average 57.22% (SD =17.34)

Overall, 97.14% students and 100% faculty showed positive perceptions (A mean score ≥ 3) towards the present assessment (Figure 2).

Table 3. Faculty's perceptions about the present assessment

Statement on Likert scale to assess perception of faculty	Mean Likert scale score	SD
This will increase the students' interest in the subject	4.78	0.44
This will increase my skills and help me develop myself as a medical teacher.	4.56	0.78
There is need to assess students over higher levels of cognitive domain.	4.44	0.53
The spotters were well constructed to assess higher cognitive domain.	4.44	0.53
I will be happy to construct higher cognitive domain questions than the recall based questions.	4.33	0.93
Conduction of such assessment will require more planning and organization than the routine assessments.	4.33	0.50
Construction of higher cognitive domain questions will require more time than that of recall based questions	4.22	17.34
I will have to modify my teaching learning methods to enable students to construct such assessments	4.22	1.24
Construction of higher cognitive domain questions will require extra efforts than those for recall based questions	4.11	0.67
This will improve the student- teacher relationship	4.00	0.44
I will feel pressurized to construct the higher cognitive domain questions	3.89	0.87
It will be difficult to use such assessment as a routine	3.44	0.53
The percentage of HCD questions in an assessment should be	57.22	17.34
Cronbach's α for reliability: All questions: 0.455, Positive questions: 0.464, Negative questions:0.684		

**Figure 2.** Students' perceptions about the present assessment.

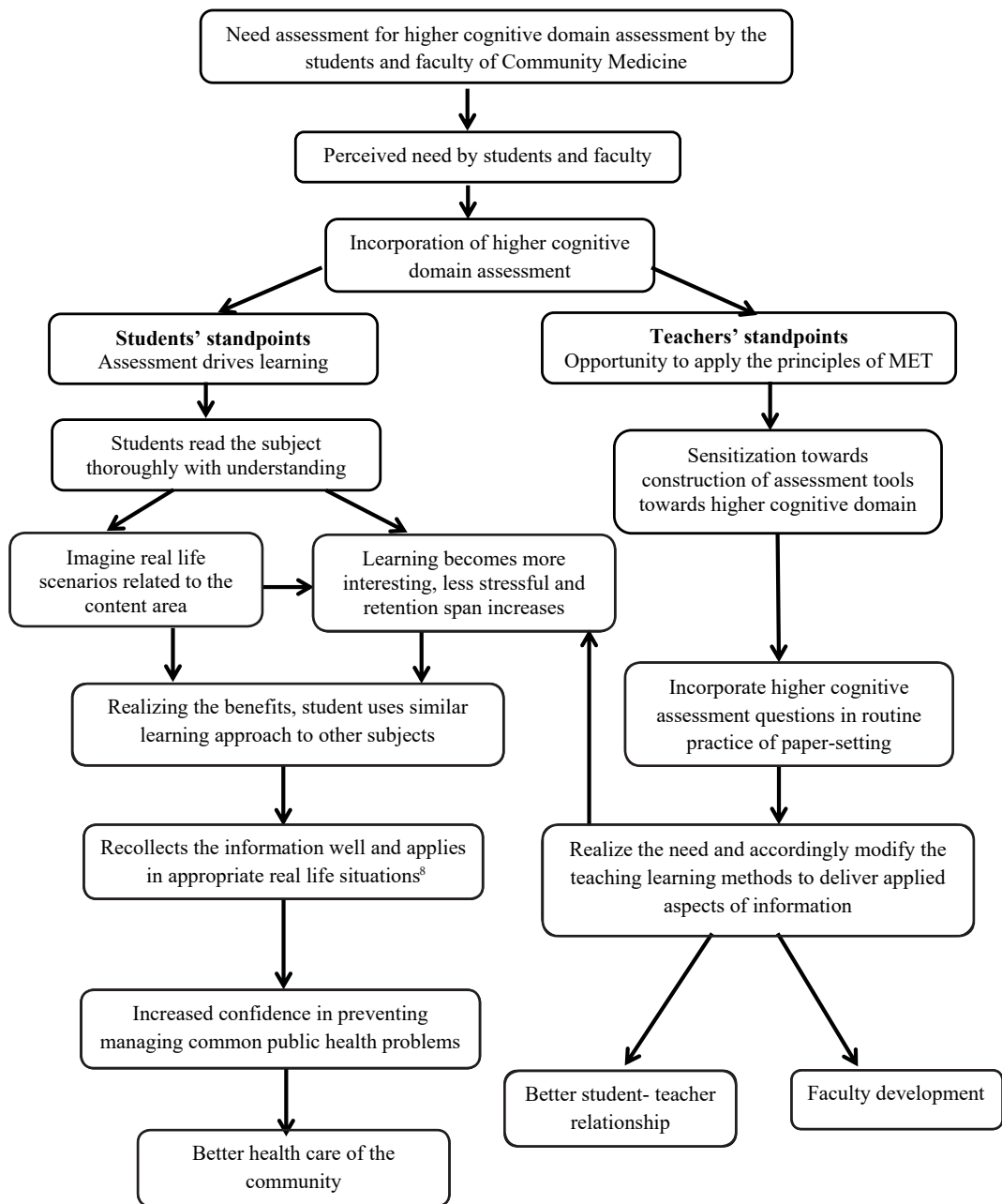


Figure 3. Concept Map

The reliability of both the perception questionnaires was assessed using Cronbach's α for reliability. It was found that reliability of students questionnaire was higher (All questions: 0.713, Positive questions: 0.817, Negative questions: 0.532) than faculty questionnaire (All questions: 0.455, Positive questions: 0.464, Negative questions: 0.684).

5.1 Response to Open Ended Questions

Students - Students found it as an interesting learning experience. Since it was an applied aspect assessment, deeper studying will be required. Few of them also requested to keep this pattern for all examinations.

Teachers - Teachers stated that preparation of HCD assessment tool will require more time and efforts. Also, the teaching learning methods and contents need to be modified to inculcate the applied knowledge. It will break the monotony for both students and teachers.

6. Discussion

In the present study to assess the perceptions of students and faculty towards HCD assessment, both the stakeholders showed positive perceptions. It is important that any newer assessment tool is assessed for its validity

and reliability. Both the parameters were checked for the present assessment tool and found satisfactory. The questionnaire used to assess the perceptions of students showed higher reliability (Cronbach's alpha) than that of faculty. This could be because of the smaller number of faculty participants.

There was no significant difference in the scores of LCD and HCD domain. So, it may be stated that the HCD is not found significantly difficult than the LCD assessment. However, the previous formative assessment scores of students were significantly higher than the present assessment. This could be because of the mixed and subjective nature of previous assessments (Long-answered questions, etc). The, overall scores of students in the present assessment were low. This can be attributed to the newer type of assessment which is different from the conventional. If the teaching-learning pattern is modified to suit such assessment, students may perform better.

As evident from the perceptions, higher cognitive domain assessment will inspire the student to read the subject thoroughly with understanding rather than just mugging-up. The students will develop a habit of picturing a real life situation while reading. This may make learning more interesting and also reduce the stress. It will increase the retention span of learnt information. The students will be more confident in prevention and management of common health problems in the community; thus, resulting in better health care of the community.

Faculty also will be motivated to apply the principles of medical education technology and become expertise in designing higher cognitive assessment tools. There may be positive reforms in teaching since the learning objectives will be of higher competencies. The teaching-learning process may get more interesting, thus may improve the student-teacher relationship.

At institutional level, if other departments incorporate the principle of higher level assessment in all domains, the student passing out from the institute will be a competent medical graduate, confident of providing better health care to the society. The overall implications of the resent study are depicted in the concept map of this project (Figure 3).

7. Conclusion

There was no significant difference between the LCD and HCD scores of present assessment. There was a significant difference in the present and previous assessment scores. Both the students and faculty showed positive perceptions for the HCD assessment.

8. Limitations

The sample size of the study was small owing to the availability and willingness of students. Random sampling was not possible.

9. Recommendations of the study

- The HCD assessment can be introduced in phased manner in Community Medicine and other subjects, too.
- Continue obtaining feedback from students and faculty.
- Disseminate the findings to Medical Education Unit and faculty.
- Training, motivation and support to the faculty for using HCD assessment as well as to modify teaching-learning methods accordingly (Figure 3).

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11. References

1. Piyush Gupta, Pooja Dewan and Tejinder Singh. Objective Structured Clinical Examination (OSCE) revisited. *Indian Paediatrics*, Nov 2010, Vol 47, 911-912. <https://doi.org/10.1007/s13312-010-0155-6>.
2. Medical Council of India Regulationson Graduate Medical Education, 1997 (Amended Upto May, 2018) (<https://www.mciindia.org/CMS/rules-regulations/graduate-medical-education-regulations-1997>)
3. Medical Council of India-Competency Based Undergraduate Curriculum For The Indian Medical Graduate, 2019 (<https://www.mciindia.org/CMS/information-desk/for-colleges/ug-curriculum>)
4. Palmer EJ, Devitt PG. Assessment of higher order cognitive skills in undergraduate education: modified essay or multiple-choice questions? *BMC Med Educ* 2007 SNov28;7: 49. <https://doi.org/10.1186/1472-6920-7-49>.
5. Tejinder Singh, Anshu Gupta. Principles of assessment in medical education. 1st edition, Jaypee publications, 2012

6. Gopalkrishnan S, P. Ganeshkumar. Community medicine teaching and evaluation: scope for betterment. *J. Clin. Diagn. Res.* 2015 Jan; 9(1): JE1-5. <https://doi.org/10.7860/JCDR/2015/9873.5362>.
 7. MalikSL, Manchanda SK, Deepak KK, Sunderam KR. The attitudes of medical students to the objective structured practical examination. *Medical education.* 1988, 22; 40–46. <https://doi.org/10.1111/j.1365-2923.1988.tb00407.x>.
 8. Rotthoff T, Schneider M, Ritz-Timme SS, Windolf J. Theory in practice instead of theory versus practice – curricular design for task-based learning within a competency oriented curriculum. *GMS Z MED AUSBILD.* 2015; 32(1): doc4.
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