

Developing a Blueprint for Theory Assessment of Anatomy of Superior Extremity for the First Year MBBS Students

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ABSTRACT

Background & Aims: A regular problem encountered in framing a question paper is its content and construct validity. By preparing a blueprint for assessment these can be avoided. So this study was carried out to sensitize the faculty about blueprinting and prepare a validated blueprint for theory assessment of superior extremity. Learners' feedback for the provided blueprint was also taken.

Material & Methods: After sensitizing the faculty about blueprinting, competencies and specific learning objectives were unanimously formulated and blueprint was prepared and validated.

Then it was shared with the 1st year MBBS students in the beginning itself. Assessment of part completion was done and students' feedback was taken on the blueprint.

Result: Both faculty and students strongly agreed with the importance and role of blueprint for assessment in learning.

Most of the students and faculty wanted blueprint for the whole course.

Conclusion: Blueprinting should be an integral part of assessment and should be prepared for both theory and practical assessment of the whole course of Human Anatomy.

Key words: Blueprint, valid, assessment

INTRODUCTION

Times are changing and so is method of dispensing and assessing medical education. Gone are the days when the theory assessment was totally a one man show. That was the time when assessment of learners was on the mercy of whims and fancies of the examiner. He could assess the whole course by one long question, too lengthy paper, ^[1] give importance to unimportant topics, leave must know areas of knowledge and so on. Thus the content as well as the construct of the question paper was not relevant. There is paper setter bias and affinity for some topics. ^[2] Almost every teacher now agrees that haphazard development of test should be avoided. ^[3]

Assessment should be valid. ^[4] There ought to be more stress on assessment *for* learning rather than assessment *of* learning. ^[5] Knowing that 'assessment drives learning', it is only fair to reveal the assessment pattern to the learners besides planning a valid assessment. A blueprint brings about congruence between the three pillars of education- evaluation content, learning objectives and learning experiences. ^[6] A learner centred blueprint sets a positive tone ^[7] and the learners are motivated to gain the requisite knowledge once they are aware of the expectations from a medical graduate and the consequences of achieving the required level of knowledge and skill. So blueprint is a detailed plan of action ^[8] for

achieving a particular goal. Apart from achieving alignment of learning objectives with assessment, [4] blueprinting also helps in prioritization of teaching-learning. [9] Therefore this blueprint was prepared to aid the learners and remove bias of examiners while preparing a question paper for part completion of the anatomy of superior extremity. This study is unique and seems first of its kind in that developing a blueprint of a preclinical subject has been attempted in India.

METHODOLOGY

The study was conducted in the department of Anatomy, Geetanjali Medical College and Hospital, Udaipur over a period of one year from April 2018 to April 2019. The ethical clearance was obtained in April 2018 prior to commencement of the study.

Faculty of the department of Anatomy was sensitized about blueprinting and their queries were resolved.

Specific learning objectives (SLO) were formulated for the competencies of superior extremity. Domains were decided for each SLO as per the Miller's pyramid. Level (core or non-core) was assigned to each SLO. Teaching method was decided, example Didactic Lectures, Small Group Teaching, Demonstration, etc. Assessment items were assigned and Anatomical importance (A) and Clinical importance (C) was determined for each SLO on a Likert scale of 1 to 3. Thus weighting was calculated for each region of superior extremity and accordingly marks were calculated out of a total of 100 marks.(Table 1)

Table 1 Blueprint for theory assessment of superior extremity

| UNIT | Anatomical importance (A) | Clinical importance (C) | A X C | Weighting (W) $\frac{A \times C}{TOTAL}$ | Marks W x 100 |
|----------------------|---------------------------|-------------------------|-------|---|------------------|
| Pectoral region | 3 | 3 | 9 | 0.15 | 15 |
| Axilla | 3 | 3 | 9 | 0.15 | 15 |
| Back | 1 | 1 | 1 | 0.02 | 2 |
| Shoulder and scapula | 3 | 2 | 6 | 0.10 | 10 |
| Arm | 3 | 2 | 6 | 0.10 | 10 |
| Nerves | 3 | 3 | 9 | 0.15 | 15 |
| Forearm | 1 | 1 | 1 | 0.02 | 2 |
| Hand | 3 | 3 | 9 | 0.15 | 15 |
| Joints | 3 | 3 | 9 | 0.15 | 15 |
| Total | | | 59 | | 99 |

A question paper template was also prepared on the basis of the blueprint.(Figure 1) A questionnaire was prepared for validation of blueprint by experts.

Then the blueprint (Figure 2) was shared with expert faculty of Anatomy in various cities (Table 2), via Google Forms, for their feedback and validation. Validation was obtained from thirteen experienced experts. Most of the experts had undergone training in 'Advanced Course in Medical Education'.

| No. | Credentials | City | State |
|-----|--------------------------------|-------------|-----------------|
| 1 | Professor & Dean | Gwalior | Madhya Pradesh |
| 2 | Professor & Head of Department | Dungarpur | Rajasthan |
| 3 | Professor & Head of Department | Vis Nagar | Gujarat |
| 4 | Professor & Head of Department | Udaipur | Rajasthan |
| 5 | Professor & Head of Department | Ludhiana | Punjab |
| 6 | Professor & Head of Department | Amritsar | Punjab |
| 7 | Professor | Ludhiana | Punjab |
| 8 | Associate Professor | Gandhinagar | Gujarat |
| 9 | Associate Professor | Ahmedabad | Gujarat |
| 10 | Associate Professor | Udaipur | Rajasthan |
| 11 | Associate Professor | Udaipur | Rajasthan |
| 12 | Associate Professor | Puducherry | Union Territory |
| 13 | Assistant Professor | Udaipur | Rajasthan |

Post validation the blueprint and question paper template was shared with the 1st year M.B.B.S. students, through 'Whatsapp' group, before commencement of teaching of superior extremity.

Part completion theory assessment was taken on the basis of the blueprint provided.

Students' feedback questionnaire for the question paper and blueprint was prepared and validated by the faculty. Suggested changes were incorporated in the questionnaire. Students' feedback was taken

post assessment by distributing the questionnaire sheets and collecting them back after completion. A total of 93 filled feedback forms were received. The identity of students was kept confidential.

Qualitative analysis of the students' feedback data was done using Microsoft excel.

RESULTS

Expert faculty of Anatomy gave the following feedback upon validation of blueprint: (Figure 2).

Scheme of exam

- Time allotted- 2 hours
- Maximum marks- 100
- Total number of questions= 5
- All questions carry equal marks.
- **Question Paper Template:**
 - 1 Structured long answer question. (Must know)
 - 2 Write short notes on the following:
 - a) Must know
 - b) Must know
 - 3 Write the applied aspect of any two
 - a) Must know
 - b) Must know
 - 4 Draw diagrams of any two of the following:
 - a) Good to know
 - b) Good to know
 - c) Good to know
 - 5 Write short notes on any two
 - a) Good to know
 - b) Good to know
 - c) Good to know
- Thus the question paper should consist of **60 to 70 percent of questions from 'must know' topics** and **30 to 40 percent from good to know topics**. An IMG should be able to answer **all the Must Know topics**, so there is no choice among such topics.
- There will be one structured **long answer question from 'Must Know'** domain.
- All questions will be compulsory with **choice within the question itself in 'Good to Know' topics**.
- All answers should be supported with suitable diagrams.

Figure 1 Question Paper Template

https://docs.google.com/document/d/1oR1cbVDI3PdO_IffvzYqQZWabK VIA22YXG6yj_4PHg/edit?usp=sharing

Figure 2 Link for the Blueprint

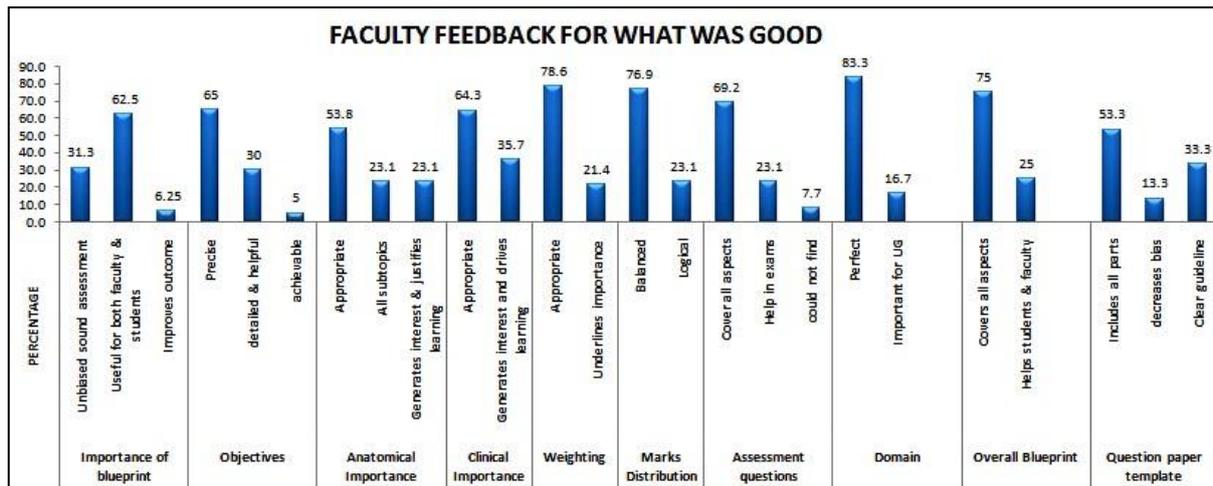


Figure 3 Faculty Feedback For What Was Good in Blueprint

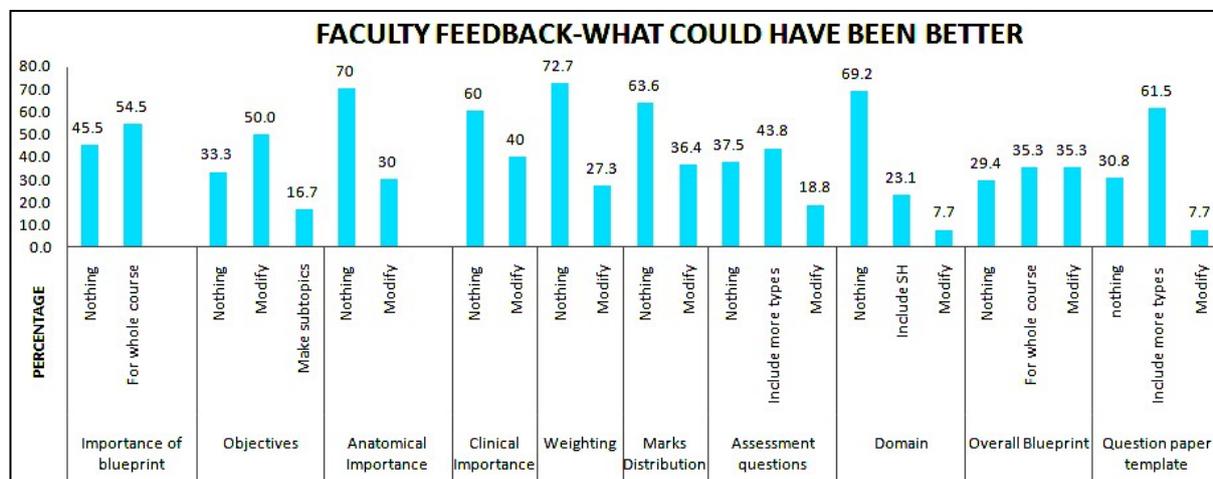


Figure 4 Faculty Feedback For What Could Have Been Better in Blueprint

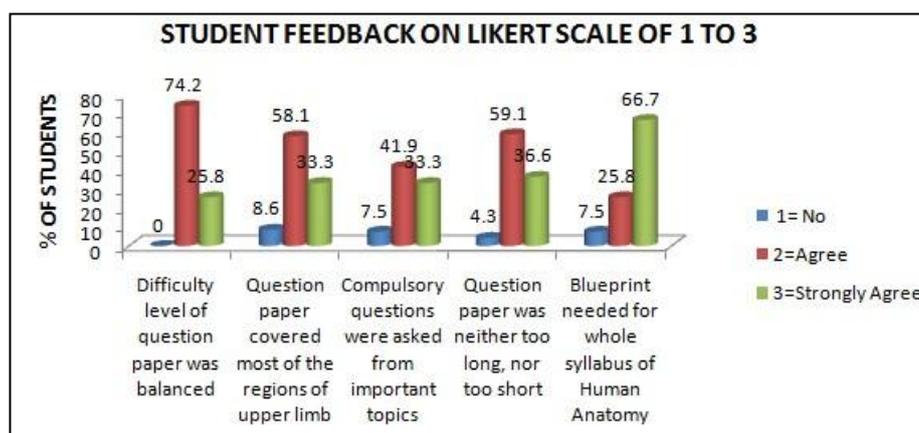


Figure 5 Students' Feedback For The Blueprint

62.5% faculty felt that it is useful for both faculty and students. 65% faculty found the framed objectives precise. 53.8% agreed with the anatomical importance given on Likert scale to the objectives. 64% agreed with the appropriateness of clinical

importance given on a Likert scale of 1 to 3 to the learning objectives. 78.6% found the weighting given to learning objectives appropriate. 76.9% found the distribution of marks over the whole of superior extremity balanced. 69.2% agreed that assessment

questions cover all aspects of superior extremity. 53.3% agreed that the question paper template includes all parts.

Points suggested for its improvement were as follows: (Figure 3) 54.5% faculty wanted blueprint for the whole course. 61.5% faculty wanted to include more types of questions in question paper template. 23.1% wanted to include 'Show How' domain also.

Students gave the following feedback: (Figure 4)

74.2% of the students agreed and 25.8% strongly agreed, i.e. 100% students agreed that the difficulty level of question paper was balanced. 58.1% agreed and 33.35% strongly agreed, i.e. 91.5% students agreed that the question paper covered most of the regions of superior extremity. 50.5% strongly agreed and 41.9% agreed, i.e. 92.4% agreed that compulsory questions were asked from important topics (core area). 59.1% agreed and 36.6% strongly agreed (total 95.7%) that the question paper was neither too short nor too long. 66.7% strongly agreed 25.8% agreed (total 92.5%) that blueprint should be prepared for the whole syllabus of Human Anatomy.

DISCUSSION

There is lack of studies on valid blueprints for assessment of Anatomy in India. There is one study that analyzed the written examination papers of Anatomy and proved its shortcomings due to lack of a proper blueprint. [10] Developing a blueprint for the whole course of human anatomy in a limited period of time was a big challenge; therefore a small portion of the whole anatomy curriculum was taken for initiating the process. Usually the part assessed in the beginning is superior extremity; therefore this study was carried out for developing a blueprint for its internal assessment after completion of superior extremity.

The current study was carried out at a time when the Medical Council of India had not defined the competencies. As such competencies and specific learning objectives had to be formulated. The

domain predominantly addressed here was cognitive.

Blueprint is said to be a systematic multistep approach to an assessment [11] and the steps followed in this study were:

1. Defining the scope of study: blueprint for undergraduates (M.B.B.S.) 1st year students, internal theory assessment of superior extremity.
2. Detailed formulation of competencies and learning objectives.
3. Planning teaching learning methods to be adopted.
4. Calculating weighting of various parts of superior extremity and assigning marks out of 99. One mark was flexible to make it out of 100.
5. Preparing a guiding question paper template according to the developed blueprint.

While deciding on the level of topics, it was found that most of the topics are core topics and a mere part completion assessment cannot replace formative assessments because a formal written examination has time constraints. Assessment of core topics is essential, as such the question paper template excluded the 'nice to know' topics and incorporated 60 to 70% of 'must know' and 30-40% of 'good to know' topics.

The experts of Anatomy who validated the blueprint were from five different states of India.(Table 2). Most of the faculty found the blueprint appropriate. As for the question paper template, only 53.3% found it to be covering all aspects. So we can make more question paper templates. It is an ongoing process and after initialization and implementation there is always scope for improvisation. A mere 54.5% faculty desiring blueprint for the whole course was a bit surprising as the expectation was of 100%. Reasons for this lack of interest, among the faculty, in developing blueprints may be taken up as another study.

Here again if we look at the students' feedback we find that 92.5% of students were in favour of developing a blueprint for the whole course. As a personal experience of the researcher of this study, the students insisted for blueprints of all the parts and a non-validated blueprint had to be provided to them. The reason behind this was that each and every specific learning objective was defined as 'must know', 'good to know' or 'nice to know'. Items to assess them were also mentioned. This acted as an immense guide for the students because it becomes difficult for them to know the importance of topics in numerous books of Anatomy. Each time a teacher may not be available to point out the same. It aids in self directed learning of the learner.

The difficulties faced during this study need to be mentioned. The anatomical and clinical importance of the topics had been assigned as perceived by the researcher. Clinical importance can easily be deduced but the anatomical importance becomes more subjective. Calculation of weightage in para-clinical and clinical subjects involves usage of perceived importance and frequency of occurrence of disease. In basic subjects, like Anatomy, frequency of occurrence of disease is replaced by clinical importance of the topic for calculating weighting. Clinical importance of topics was discussed by the co-author who is a surgeon by profession.

The question paper template did not incorporate Multiple Choice Questions whereas that is included in the new curriculum plan by Medical Council of India.

Developing a blueprint for practical assessment of Anatomy is a Herculean task but it surely must be attempted for more clarity, subjectivity, reproducibility and validity of assessment.

CONCLUSIONS

A validated blueprint for theory assessment of first year M.B.B.S. students for superior extremity was developed and

shared with students and assessment was done based on that. An urgent needs for development of blueprint for assessment both theory and practical was felt. Blueprinting should be an integral part of assessment for both theory and practical assessment of the whole course of Human Anatomy.

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