

Evaluating the Validity and Reliability of the Reflective Practice Questionnaire for Assessing Reflective Capacity among Medical Students in Central India

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ABSTRACT

Background: Reflection or metacognition can be described as the process of contemplating one's own thinking. It facilitates the cultivation of profound learning and critical thinking skills. Reflective Practice Questionnaire (RPQ) validation study has been conducted among Medical Students studying in American University. Its validity and reliability has not been sufficiently tested among Indian medical students so far. This study aimed to assess the validity, reliability, and factor loadings of RPQ among 171 final-year students from the Competency-Based Medical Education (CBME) batch and 129 interns from the Non-CBME batch at a medical college in central India. **Materials and Methods:** The present cross-sectional descriptive study was conducted by self-administered RPQ consisting of 10 subscales and 40 items. Questionnaire was evaluated for validity by using Table of critical values for Pearson's r. Reliability was estimated using Chronbach's alpha with value less than 0.6 not acceptable. Factor Analysis of Reflective Capacity subscale was conducted by Principal Factor Method. **Results:** Response rate of 90% was achieved with total 300 medical students participating after giving consent. All the items of RPQ passed the test of validity except 4 items. Only Job Satisfaction (JS) subscale had less than 0.6 Chronbach's alpha value, thus was not found to be a reliable subscale. All the factors of Reflective Capacity subscale had communalities or Factor loadings of more than 0.3 which is acceptable value of any factor. **Discussion:** RPQ must be modified according to findings of the present study. The difference in Sociocultural setting and a myriad of other aspects may make a significant difference in applicability of a questionnaire in a new population setting.

Keywords: Reflective Practice Questionnaire, Validity, Reliability, Factor loadings, Reflection, Medical students.

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INTRODUCTION

Reflection is the deliberate process of critically assessing one's beliefs and understanding in light of existing evidence.¹ It entails an in-depth exploration of experiences to enrich the current body of knowledge and deepen comprehension.²

Reflection plays a pivotal role in graduate medical education^{2,3} as it is deemed essential for learning and suggested to have enhanced competence, professionalism and humanism.^{4,5} Reflective practice is endorsed by theory as a method for progressing knowledge,

steering future learning endeavors, enhancing comprehension of intricate ideas and delving into emotionally demanding scenarios.^{2,6,7} Moon (2013) explained the act of reflection as mental processing for a pre-defined purpose and is utilized for understanding and describing abstract ideas.^{8,9}

The Reflective Practice Questionnaire (RPQ), developed by Priddis and Rogers, serves as a standardized instrument for assessing reflective capacity across various professions that engage with the general public. It has been validated as a reliable measure for evaluating reflective ability among final-year medical students enrolled in an American university.

It also includes other related constructs such as Desire for Improvement, Confidence, Uncertainty, Stress interacting with patients and Job satisfaction.¹⁰



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Validity is measuring what it intends to measure¹¹ whereas Reliability is the measurement of internal consistency.¹² Content Validity of a questionnaire can be assessed statistically by obtaining Pearson's correlation coefficient of each item of the questionnaire and then comparing the obtained value with Critical values of Pearson's *r* (for a two-tailed test) taking into account the Degree of Freedom. Reliability is assessed by obtaining Chronbach's alpha value for a given set of data. Chronbach's alpha value of more than 0.6 is considered adequate for reliability of the questionnaire.^{10,12}

Data reduction is the process by which number of items in any questionnaire is decreased without altering the validity of it. For the sake of Data Reduction of Reflective Capacity (RC) subscale, Factor loadings were calculated using Principal Factor Analysis Method.^{10,13}

Competency Based Medical Education (CBME) emphasizes the role of reflection in developing critical thinking and deep understanding among aspiring Indian Medical Graduates (IMG) and recommends writing of reflection by students in each professional year in logbook as teaching learning and assessment tool. Thus, RPQ can be used as an assessment tool for pre-post program evaluation of CBME recommended Reflection training.¹⁰ But, validity and reliability of the Questionnaire must be assured before introducing it to the study cohort.

The present study was conducted among 171 CBME batch Final year MBBS students and 129 Non CBME batch MBBS students presently pursuing Compulsory Rotating Medical Internship to provide a beginning point before actual assessment study of CBME batch student's reflective capacity can be commenced.

Literature regarding RPQ's validity, reliability and factor loadings within a cohort of Indian medical students is scarce. Thus, in the current quasi-experimental study, the primary objective was to assess the validity, reliability and factor loadings of the Reflective Practice Questionnaire (RPQ) in a sample of medical students hailing from Central India.

MATERIALS AND METHODS

The present Cross Sectional Descriptive study was conducted at a Medical college of central India among undergraduate Medical Students presently studying in Final year MBBS and in Internship.

The study utilized the Reflective Practice Questionnaire (RPQ), a self-administered instrument consisting of 40 items, providing a comprehensive approach to assessing reflective capacity.^{10,14}

Additionally, the RPQ includes subscales that evaluate various related dimensions, such as the desire for self-improvement, confidence, stress levels, and job satisfaction. It has been established as a reliable tool for measuring reflective capacity.^{10,14}

The numerical values assigned to each question item align with the order in which they were presented in the questionnaire for

participants. Responses to the items are graded on a scale ranging from 1 to 6 as shown in Table 1.

Each subscale score is derived by computing the average of the four corresponding items. However, in the 'Job Satisfaction' subscale, one item necessitates reverse scoring before calculating the average.

Components and Items of Reflective Practice Questionnaire were as mentioned by Priddis and Rogers.¹⁰

Ethical considerations

The proposal was submitted before Institute Ethics Committee. Following approval, all students were provided with a comprehensive explanation of the study's purpose, objectives, and potential benefits. After receiving detailed information about the proposed research, they were given the autonomy to decide freely whether to participate.

Also, assurance regarding the anonymity and data confidentiality was provided.

Participants Eligibility criteria

Inclusion Criteria

Students presently studying in Phase III, Part 2 or doing internship.

Expressing voluntary consent to participate in the study.

Exclusion Criteria

Unavailable on the scheduled survey days.

Declining to provide consent for study participation.

Sample Size

The study population comprised all Phase III, Part 2 CBME batch MBBS students, as well as interns from the non-CBME batch, who provided informed consent to participate. Similarly, Rogers SL *et al.*¹⁴ evaluated the reflective capacity of fourth-year medical students at an American university.

Sampling Technique

Convenient Non-Probabilistic sampling.

Variables

Independent Variables

Batch to which MBBS students belonged to: CBME or Non CBME batch.

Dependent and Outcome Variables

All the sub-scales of RPQ, i.e.: RiA, RoA, RO, SA, Dfi, CG, CC, Unc, SiP and JS.

Confounding Factors

Gender, along with intrinsic factors¹⁵ such as motivation, expectations, and prior experiences with reflection, and extrinsic factors,⁷ encompassing both formative and summative assessment structures, as well as the availability of facilitators.

Statistical Analysis

RPQ scale was analyzed in the present cohort for its validity by using Table of critical values for Pearson's r. Reliability was measured by evaluating Chronbach's alpha whose value less than 0.6 is not acceptable.¹⁴

Factor Analysis of RC subscales was conducted by Principal Factor Method. Factor loadings were estimated using the squared multiple correlations as communality.¹⁴

Software used for statistical analysis: SPSS version 21 IBM inc, Chicago.

RESULTS

A total of 300 out of 330 students participated in the study, yielding a response rate of 90% in the current survey.

Among these participants, 45% were Females and 55% were Males.

The distribution of responding students and their gender is tabulated in Table 2. The responders in CBME and Non CBME batch were represented in Figure 1.

Factor loadings of all items in RC subscale were examined and findings were tabulated in Table 3. All the factors had communalities or Factor loadings of more than 0.3 which is acceptable value of any factor. The above factor loading was done by Principal Factor analysis whose primary purpose in the present study was Data Reduction or decreasing the items in the RPQ without altering the Validity of the questionnaire.

Chronbach's alpha is an estimate of internal consistency in components of any questionnaire. Chronbach's alpha values of each sub-scale of RPQ as observed from the study cohort is shown in Table 4 and Figure 2. Only JS subscale had Chronbach's alpha value of less than 0.60 (acceptable value for reliability of subscales).

Validity of 40 items of RPQ was examined in Table 5. All items except four, Q 29 (08), Q 33 (04), Q34 (15) and Q 40 (37) were found to be valid.

Table 1: Scores in Likert scale corresponding to responses to the RPQ items.^{10,14}

Sl. No.	Response	Score
1	Not at all	1
2	Slightly	2
3	Somewhat	3
4	Moderately	4
5	Very much	5
6	Extremely	6

Table 2: Showing distribution of responding students and their gender.

Batch	Final Year	Internship	Total
No of total students	180	150	330
No of responses	171	129	300
Percentage of responders	95%	86%	90 %
Female	73 (42.6 %)	62 (48%)	135 (45%)
Male	98 (57.4%)	67 (52%)	165 (55%)

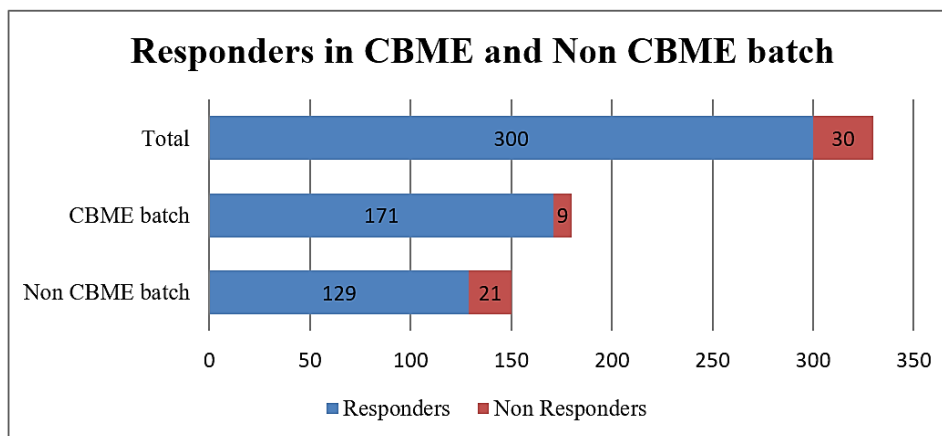


Figure 1: Distribution of responders in CBME and Non CBME batch.

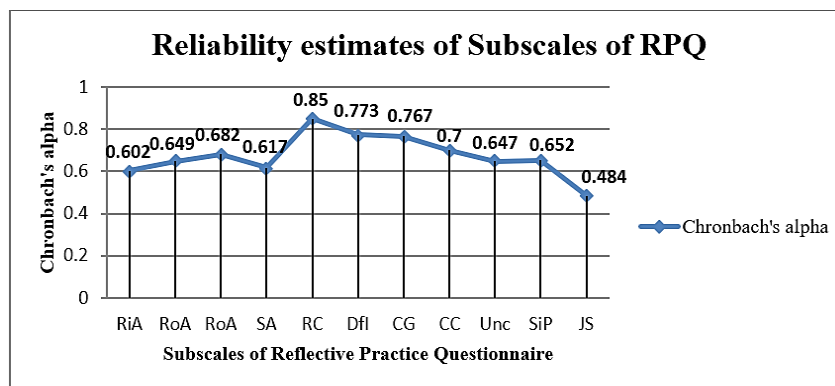


Figure 2: Chronbach's alpha of subscales of RPQ as measure of reliability.

Table 3: Single factor loadings for the items of RC subscale in Final year (CBME batch) and Internship Batch (Non-CBME batch).

Items	Final year (n=171)	Internship (n=129)
During interactions with patients I recognize when my pre-existing beliefs are influencing the interaction. (9)	0.626	0.629
During interactions with patients I consider how my personal thoughts and feelings are influencing the interaction. (14)	0.311	0.538
During interactions with patients I recognize when my patient's pre-existing beliefs are influencing the interaction. (26)	0.512	0.522
During interactions with patients I consider how their personal thoughts and feelings are influencing the interaction. (35)	0.575	0.514
After interacting with patients I spend time thinking about what was said and done. (3)	0.470	0.652
After interacting with patients I wonder about the patient's experience of the interaction. (16)	0.467	0.352
After interacting with patients I wonder about my own experience of the interaction. (24)	0.652	0.661
After interacting with patients I think about how things went during the interaction. (33)	0.543	0.562
When reflecting with others about my work I become aware of things I had not previously considered. (1)	0.604	0.631
When reflecting with others about my work I develop new perspectives. (12)	0.610	0.536
I find that reflecting with others about my work helps me to work out problems I might be having. (29)	0.603	0.609
I gain new insights when reflecting with others about my work. (38)	0.626	0.399
I think about my strengths for working with patients. (7)	0.340	0.555
I think about my weaknesses for working with patients. (13)	0.679	0.613
I think about how I might improve my ability to work with patients. (23)	0.500	0.546
I critically evaluate the strategies and techniques I use in my work with patients. (36)	0.578	0.627
Factor Loading median	0.576	0.558
Factor loadings range	0.311-0.679	0.352-0.661
Factor Eigen value	2.322	3.285

DISCUSSION

The Reflective Practice Questionnaire (RPQ) has been recognized as a valid and reliable instrument for evaluating reflective capacity following the implementation of an educational intervention.^{10,14} In the present study, a comparison group comprising the non-CBME batch was included, aligning with the approach of Rogers SL et al.¹⁴ who administered the self-reported RPQ to medical students at an American university. Their study further compared RPQ scores with a cohort from the general public in Australia and another group of Australian mental health professionals who had undergone formal training in reflection. Additionally, they validated the RPQ for use among medical students and confirmed its reliability as an assessment tool.¹⁴

The Literature regarding the introduction of RPQ among Medical students of India is scarce. A study finding validity and reliability of RPQ as an evaluation tool among medical students of India with sizeable and sufficient sample size was warranted. Among the study participants, the CBME batch demonstrated a response rate of 95%, while the non-CBME batch had a response rate of 86%. Additionally, the proportion of female respondents closely reflected their representation within the MBBS batch. Total number of participants whose responses were evaluated was 300.

Data reduction is the process by which number of items in any questionnaire is decreased without altering the validity of it.¹³ For the sake of Data Reduction of RC subscale, Factor loadings were calculated using Principal Factor Analysis Method. All the 16 factors had communalities or Factor loadings of more than 0.3 which is acceptable value of any factor. Thus, no factor was deleted from the questionnaire. Our finding was similar to Rogers

SL et al.,¹⁴ who also found the Questionnaire for assessment of reflective capacity as optimal and did not found the need to delete any item from RC subscale.

Reliability is an estimate of Objectiveness, Precision and Reproducibility.¹² In the present study, Reliability represented by Chronbach's alpha varied from Good to Adequate. Only subscale JS had values less than adequate. This finding is in contrast to the study findings of Rogers SL et al.¹⁴ They found all the subscales reliable in all the three study cohorts. This deviation from the previous study highlights the fact that a questionnaire must be validated after implementing in a definite homogenous

Table 4: Showing values of Chronbach's alpha of each sub-scale of RPQ as observed from the study cohort.

Sub- scales of RPQ	Chronbach's alpha
RiA	0.602
RoA	0.649
RO	0.682
SA	0.617
RC	0.85 [#]
Dfl	0.773 [*]
CG	0.767 [*]
CC	0.7 [*]
Unc	0.647
SiP	0.652
JS	0.484

[#]Indicates Chronbach's alpha of more than 0.80-Good Reliability, ^{*}Indicates Chronbach's alpha of more than 0.70-Adequate Reliability.

Table 5: Showing Pearson's Correlation coefficient between all the 40 items of RPQ. The items are named as item numbers.

Item no.	Total Pearson's correlation coefficient	Level of significance	Validity (Should be less than the critical value of Degree of Freedom=38, i.e. 0.3120 for 95% confidence interval)
Q 1 (09)	0.390 ^{**}	0.000	Y
Q 2 (14)	0.481 ^{**}	0.000	Y
Q 3 (26)	0.542 ^{**}	0.000	Y
Q 4 (35)	0.589 ^{**}	0.000	Y
Q 5 (03)	0.425 ^{**}	0.000	Y
Q 6 (16)	0.555 ^{**}	0.000	Y
Q 7 (24)	0.566 ^{**}	0.000	Y
Q 8 (33)	0.548 ^{**}	0.000	Y
Q 9 (01)	0.462 ^{**}	0.000	Y
Q 10 (12)	0.599 ^{**}	0.000	Y
Q 11 (29)	0.564 ^{**}	0.000	Y
Q 12 (38)	0.548 ^{**}	0.000	Y
Q 13 (07)	0.490 ^{**}	0.000	Y
Q 14 (13)	0.502 ^{**}	0.000	Y
Q 15 (23)	0.572 ^{**}	0.000	Y

Item no.	Total Pearson's correlation coefficient	Level of significance	Validity (Should be less than the critical value of Degree of Freedom=38, i.e. 0.3120 for 95% confidence interval)
Q 16 (36)	0.554**	0.000	Y
Q 17 (05)	0.411**	0.000	Y
Q 18 (19)	0.516**	0.000	Y
Q 19 (30)	0.543**	0.000	Y
Q 20 (40)	0.533**	0.000	Y
Q 21 (02)	0.407**	0.000	Y
Q 22 (17)	0.391**	0.000	Y
Q 23 (22)	0.324**	0.000	Y
Q 24 (32)	0.332**	0.000	Y
Q 25 (06)	0.451**	0.000	Y
Q 26 (11)	0.520**	0.000	Y
Q 27 (21)	0.473**	0.000	Y
Q 28 (34)	0.574**	0.000	Y
Q 29 (08)	0.273**	0.000	N
Q 30 (20)	0.413**	0.000	Y
Q 31 (27)	0.317**	0.000	Y
Q 32 (31)	0.426**	0.000	Y
Q 33 (04)	0.122*	0.034	N
Q 34 (15)	0.221**	0.000	N
Q 35 (28)	0.347**	0.000	Y
Q 36 (39)	0.497**	0.000	Y
Q 37 (10)	0.566**	0.000	Y
Q 38 (18)	0.446**	0.000	Y
Q 39 (25)	0.560**	0.000	Y
Q 40 (37)	0.292**	0.000	N

**Correlation is significant at the 0.01 level (2-tailed), * Correlation is significant at the 0.05 level (2-tailed), () indicates the Sequence of the question in RPQ, Q 29 (08), Q 33 (04), Q 34 (15), Q 40 (37) are not found to be valid in the study population.

population group. The difference in Socio cultural setting and a myriad of other aspects may make a significant difference in applicability of a questionnaire in a new population setting.

The validity of an assessment tool reflects the tendency to measure what is intended to measure.¹¹ Thus, “whether RPQ and its subscales actually measure what they are supposed to” in Indian Medical student as a study population is the question in place. All the items in RPQ were found to be valid, except Q 29 (08), Q 33 (04), Q 34 (15) and Q 40 (37).

These above mentioned 04 items were not found to be valid in the study population.

The current study assessed the suitability of RPQ within the context of Indian medical students. The study was done with 300 medical students of central India. The positive findings of study, namely JS subscale not fulfilling the criteria of Reliability and 04 items not satisfying the validity criteria should be corroborated with further studies involving students of different regions of

India. Therefore, the RPQ should be appropriately modified before being applied to cohorts of Indian medical students. Only then can the robustness and authenticity of the results obtained from its administration be confidently ensured.

CONCLUSION

The present study was conducted among 300 medical students studying in Medical college of Central India. This study is first of its kind among medical students of India belonging to CBME batch. Its primary objective was Validation, Reliability estimation and estimation of Factor loadings of Reflective Practice Questionnaire which has already been done and verified successfully among Medical students of an American University in a previous literature. Cross-cultural settings and socio economic differences among the participants made it pertinent to inspect the above mentioned factors related to RPQ for use as an Assessment tool for Reflective Capacity in a predefined study population. Chronbach's alpha values of each sub-scale of RPQ

was estimated. Only JS subscale had Chronbach's alpha value of less than 0.60 (acceptable value for reliability of subscales). The validity of the 40 items included in the RPQ is presented in Table 5. All items except four passed the test of validity. All the factors had communalities or Factor loadings of more than 0.3 which is acceptable value of any factor. The findings of the present study may serve as a foundation for future researchers to implement the Reflective Practice Questionnaire (RPQ) among medical students and practicing healthcare professionals in India.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

CBME: Competency Based Medical Education; **RPQ:** Reflective Practice Questionnaire; **RC:** Reflective Capacity; **RiA:** Reflection in action; **RoA:** Reflection on action; **RO:** Reflection with others; **SA:** Self Appraisal; **Dfi:** Desire for Improvement; **CG:** Confidence in General; **CC:** Confidence Communication; **Unc:** Uncertainty; **SiP:** Stress Interacting with patients; **JS:** Job Satisfaction.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The proposal was approved by Institute Ethics Committee vide letter number MC/Ethics/2023/38.

SUMMARY

The current research was undertaken to validate, estimate reliability and assess factor loadings of the Reflective Practice Questionnaire (RPQ). Given the cross-cultural settings and socioeconomic variances among participants, it was essential to examine these factors pertaining to the RPQ's utility as an assessment tool for reflective capacity within a predefined study population. Only the JS subscale had a Cronbach's alpha value below the acceptable threshold for subscale reliability. All items

except four successfully passed the validity test. All factors exhibited communalities or factor loadings exceeding 0.3, which is considered an acceptable value for any factor. The results of this study could assist future researchers in introducing RPQ among medical students and practicing professionals in India.

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