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APPRAISAL OF STUDENT RATING AS A MEASURE TO MANAGE THE QUALITY OF HIGHER EDUCATION IN INDIA: AN INSTITUTIONAL STUDY USING SIX SIGMA MODEL APPROACH

Abstract: Students' rating of teaching is one of the most widely accepted methods of measuring the quality in Higher Education worldwide. The overall experience gained by the students during their academic journey in their respective college is a key factor to determine the Institutional Quality. This study was conducted among the Physical Therapy students with an objective to capture the overall experience related to various aspects of their Academic environment including teaching and learning process adopted in their college. To facilitate that, a unique questionnaire called, "Academic Environment Evaluation Questionnaire (AEEQ) was developed covering all the important teaching elements of the Higher Education Institutions. The students' opinion was captured and analyzed through six sigma analytical tool using Poisson distribution model. From the non-conformance level captured through the responses from the students about the various categories of teaching and learning elements, the corresponding Sigma rating for each teaching element was measured. Accordingly, a six point Quality rating system was developed customizing to each sigma values. This study brings a new, innovative student driven Quality rating system for the Higher Education Institutions in India.

Keywords: Students rating, Quality, Six sigma, Higher Education, India

1. Introduction

Management of Quality in Higher Education is a complex phenomenon since it involves many facets such as academic units comprising of faculty and students, administrative and support units consisting of student's admission & registration department and, other support services such as laboratory and library facilities. Further, it is mandatory for academic institutions in higher education to perform various continuing evaluations of courses offered, the teaching skills of faculty members as well as facilities and services. Towards the development and management of the quality of higher education, an essential input remains the evidence generated from students' evaluation surveys on a range of academic areas such as course, faculty, program, as well as supportive services of

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the Educational institution.

Students Evaluating Teaching Effectiveness (SETE) is considered as an effective method for monitoring the quality of teaching and learning process in the Higher Education Institutions (Greenwald, 1997). The assessment of Educational Quality under an academic program, through students' satisfaction, is one of the important aspects regarding quality management in Higher education (Rubaish, 2010). Also, several studies indicated that the student ratings are the widely accepted measures for evaluating teaching quality (Moore and Kuol, 2005; Franklin, 2001). Even though, students' surveys are practiced in most of the countries, a number of limitations of students' surveys have been reported (Mantz, 2009).

There are many tools consist of Course Evaluation surveys (CES), Mid-Course Evaluations and Program Evaluations Surveys (PES) are used by the academic community to evaluate each specific aspects of teaching quality (Rubaish et al., 2011). Likewise, the Students Experience survey (SES) is one of the tools utilized by the academicians to capture the students' opinion about the Quality of the Education Institution as whole. Generally, SES is conducted to gain the experience of the students halfway through in a given academic program (Rubaish, 2010). Academic institutions also rely on students' ratings on different components of their core functions, including courses, teaching skills and academic programs (Aultman, 2006).

Several rating systems are adopted by the Higher Education Institutions to rank the Quality of teaching and learning process (Rubaish et al., 2011; Malaysian Higher Education rating system, 2011; NCAAA, 2010). More recently, the ranking of national higher education systems was published by the *Universitas 21* group of universities with an aim to encourage improved performance by benchmarking Australian National systems against the performance in other countries. Some 48 countries were ranked separately in four areas (Resources, Environment, Connectivity and Output) and overall (U21 ranking of National Higher Education system, 2013). Likewise, an outlook Express ranking systems provide a complete ranking of professional studies colleges in India. The primary focus of this ranking systems is primarily the infrastructure-physical, academic, quality of students' intake and other facilities (CSR-GHRDC Engineering Colleges Survey, 2012). In spite of the usefulness, there are several criticisms on academic ranking of Higher Education Institutions (Antony and Woodhouse, 2006). Firstly, ranking implies placing every institution in a particular position of merit and it is difficult to evolve an instrument and method that can dependably distinguish between institutions of close standing. Secondly, quality assurance requires that institutions be evaluated without losing sight of their own sets of goals and objectives. Any attempt to compile ranking tables according to generic criteria is contrary to the principle of quality assurance. It is also harmful to institutional diversity. Thirdly, there is lack of validation of self-reported data, inconsistency in terminologies, lack of peer review, inability to consider institutional diversities, etc., would become unavoidable, thus rendering the outcome of the whole process useless.

By keeping in view of the shortcomings noted in the academic rating system for the Higher Education system, there is a need for a new innovative quality rating system in the Higher Education sector. Since students assumes the role of both "Suppliers and Customers" of the Higher Education Institutions, their opinion and satisfaction is paramount in deciding the quality of Education. However, such rating system which is purely based on students' opinion on the teaching methodologies and facilities provided in their respective colleges is still lacking in India. As an initiative and to fulfill the gap, this study attempts to develop a data driven, evidence based and student centered

quality rating system to evaluate and monitor the Quality of different core functions of the Higher education using Six Sigma Methods. Thus, the present study is conducted with two fold objectives: (i) To study the opinion of the students about the various teaching and learning elements offered at the Higher Education Institutions and; (ii) To provide an innovative, data driven and students centered quality rating system for the Higher education Institutions in India.

2. Materials and methods

2.1 Setting

This study was conducted at KG College of Physiotherapy located at Coimbatore City, India where the students of Bachelor of Physiotherapy program who are pursuing their 4th and 5th semester of an 8-semeter program were participated in this survey and registered their objective response. A total of 88 students were covered and the completed questionnaires were returned from 82 students. Six Questionnaires were discarded due to incomplete response of the students to all the items. The response rate was measured as 93%. Respondents were given sufficient time to respond without induce pressure. Throughout the study, care was taken to protect anonymity of the evaluators.

2.2 The questionnaire instrument

To facilitate this study, a questionnaire tool entitled, "*Academic Environment Evaluation Questionnaire (AEEQ)*" was prepared by covering three important elements of the Academic Environment with specific focus on the Health Sciences College imparting Physical Therapy Education at the Bachelor Degree level. The Three elements consist of: (i) Teaching and Learning Process including the Evaluation methods adopted in the College; (ii) Infrastructural capital of the College i.e. Laboratories, Library, Class rooms &

Furniture etc. (iii) Intellectual Capital of the College i.e. Teaching Staff. The Conceptual framework of the Questionnaire is depicted in the figure 1.

The Instrument consists of 30 items with five response options with a statement in ascending order: 1=Strongly disagree; 2=Disagree; 3=Neutral; 4=Agree; 5=Strongly Agree. The first 29 are individual items covering four important elements of Academic Environment and the 30th item is the global item that seeks students' opinion on their overall or global experience of that Academic Environment as a whole. The Questionnaire was designed in such a way that it has four sections viz. (i) Teaching Methodology Adopted (12 items); (ii) Evaluation methods utilized to grade the students (6 items); (iii) Effectiveness of Teaching Faculty (6 Items) and; (iv) Resource Availability and other Infrastructural facilities in the College (5 Items). The AEEQ Questionnaire gave participating institutions the chance to set out and analyze the overall Academic Environment practices.

3. Results and discussion

The non-conformance level captured through the resp onses of the students about the various important elements of the Teaching and learning process including the academic facilities prevailing in the College was analyzed through Six Sigma analytical tool using Poisson distribution model. The Poisson distribution model meant that when several choices are given in the questionnaire, the chance for a students to report dissatisfaction on every choice is minimum (Pyzdek, 2003; Benbow and Kubaik, 2005; Levine, 2008). The choices of the questions will range from score 1 to 5 for every item in the questionnaire.

Score 1, 2 and 3 was considered as non-conformance and score 4, 5 was considered as conformance.
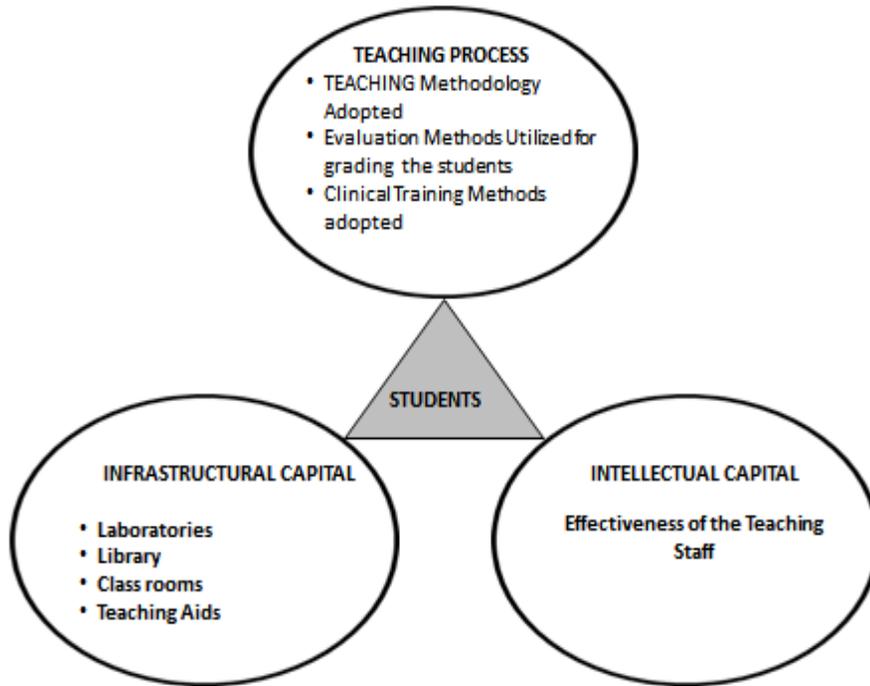
Figure 1. Conceptual Framework of Academic Environment Evaluation Questionnaire

The description of the Quality rating adopted to classify the students feedback about the teaching methodology adopted and the facilities prevailing in the selected higher education Institution is depicted in table 1. The Quality of each teaching element studied was rated on a six point scale ranging from 1 to 6. The higher score indicates better quality. The six point rating scale was prepared based on the Six Sigma Model.

Table 1. Quality rating for the students' feedback about the Teaching facilities prevailing in the Higher Education Institutions

Quality Rating Scale	Rating Range Descriptions	Description of the Quality Rating
6	Above 5 and up to 6	Excellent Healthy World class Academic Environment
5	Above 4 and up to 5	Benchmarked competing Academic Environment

4	Above 3 and up to 4	Adaptable Academic Environment with medium necessary provisions needs to be carried out to gain complete satisfaction from the students
3	Above 2 and up to 3	Inadequate Academic Environment just sufficient to facilitate the teaching and learning process without affecting the academic performance of the students.
2	Above 1 and up to 2	Highly Compromised Academic Environment that have the possibility to hinder the academic performance of the students.
1	Less than or equal to 1	Totally inappropriate for the students to learn and gain Knowledge through the existing Academic Atmosphere.

3.1 Data analysis and interpretation of findings

The analysis was carried out on the students opinion with respect to all the variables included in each of the four specific areas incorporated in the Questionnaire tool. From the response of the students, the "Opportunities' and 'defects' were calculated for each item. An 'Opportunity' is the availability of each of the teaching and learning facility in the College and a "defect" is the defined as anything that could lead to students' dissatisfaction on the teaching and learning elements prevailing in the College. Accordingly, the PPM (Parts per million defectives) and the sigma rating for each of teaching element was measured. All the analysis was done by using Mini tab software version 16.

Table 2. Quality rating for the students' feedback about the Teaching facilities prevailing in the Higher Education Institutions

Teaching Methodology adopted by the Instructors	No. of respondents	No of Questions	Opportunities	Defects (Non Conformance)	DPO[*]	Chance for a student to be totally Satisfied	Non-Conformance per student (probability)	PPM[**] for complete satisfaction	Sigma Level (Considering 1.5σ shift)
The Existing Training system adopted in the college is good	82	1	82	22	0.268293	0.764684	0.235316	235316	3.72
The Time allocation for planning and completing the	82	5	410	80	0.190476	0.826565	0.173435	173434	3.94

syllabus is proper									
My instructor always exposes me to the advanced course Work during training	82	1	82	20	0.243902	0.783564	0.216436	216435	3.78
My Instructors uses appropriate teaching technique and the Quality of lectures provided are good	82	2	164	23	0.280488	0.755415	0.244585	244584	3.69
My Instructions regularly exposes the students to bed side clinical training in the Hospital	82	1	82	60	0.731707	0.481087	0.518913	518913	2.95
The extra coaching, revision and the recapitalization methods adopted by Instructors are good	82	2	164	61	0.743902	0.475256	0.524744	524744	2.94

The table 2 depicts the Quality rating expressed in Sigma Level for the students feedback on the Teaching Methodologies adopted in the College. The components such as "Existing Training system", "Planning and time allocation for completing

the Course syllabus", "Exposure to Advanced Course work" and the "Quality of Lecture" were rated as "Adaptable" by the students where medium necessary provisions needs to be undertaken to gain complete satisfaction among the students. Two components such as "Exposure to Advanced Course work" and "Revision and Recapitalization methods adopted in the College" were rated by the students as "Inadequate" and it is just sufficient to facilitate the teaching and learning process without affecting the academic performance of the students.

Table 3. Quality rating for the Students feedback on the Evaluation methods adopted at the selected Higher Education Institution

Evaluation methods adopted at the College	No. of respondents	No of Questions	Opportunities	Defects (Non Conformance)	DPO**	Chance for a student to be totally Satisfied	Non-Conformance per student (probability)	PPM*** for complete satisfaction	Sigma Level (Considering 1.5 σ shift)
My Instructors regularly conducts spot tests, unit tests and monthly tests after completion of each Unit	82	3	246	98	0.398374	0.671411	0.328589	328589	3.44
There is a procedure of conducting Model examination before the final examination in my college	82	1	82	30	0.365854	0.693604	0.306396	306395	3.51

My College regularly conducts practical examination in the laboratory	82	1	82	31	0.378049	0.685197	0.314803	314802	3.48
My Instructors regularly evaluates the problem solving skills of the students at the Clinical settings in the Hospital.	82	1	82	59	0.719512	0.48699	0.51301	513010	2.97

The table 3 provided the Quality rating expressed in Sigma Level for the students' feedback on the Academic Performance Evaluation Methods adopted in the College. Three components such as "Regularity in the conduct of Spot, Unit and Monthly tests for the students by the teaching staff", "Procedure of conducting the examinations", "Regularity of conducting the Practical examinations" were rated as "Adaptable" by the students where medium necessary provisions needs to be undertaken to gain complete satisfaction among the students. One critical component i.e. "Evaluation of problem solving skills of the students in the Clinical setting" was rated by the students as "In adequate" and it is just sufficient to facilitate the Clinical skills without affecting their academic performance.

Table 4. Quality rating for the Students feedback on the effectiveness of the Teaching Faculty working at the selected Higher Education Institution

Components of teaching faculty effectiveness	No. of respondents	No of Questions	Opportunities	Defects (Non Conformance)	DPO**	Chance for a student to be totally Satisfied	Non-Conformance per student (probability)	PPM*** for complete satisfaction	Sigma Level (Considering $1.5\,\sigma$ shift)
The Control	82	2	164	65	0.396341	0.672777	0.327223	327223	3.45

held and the attitude adopted by our faculty in the class room towards the students is productive to maintain discipline is good.								
The Communication skills of our faculty are good and clear	82	1	82	20	0.243902	0.783564	0.216436	216435	3.78
The Knowledge of the faculty in their chosen subject area is sufficient to provide enough inputs in the class	82	1	82	10	0.121951	0.885192	0.114808	114808	4.20
Our Faculty are very always regular and punctual to the	82	1	82	12	0.146341	0.863863	0.136137	136137	4.10

class									
The utility of A-V Aids and the mode of transformation of the course contents done by my faculty are productive	82	1	82	59	0.719512	0.48699	0.51301	513010	2.97

The table 4 illustrated the Quality rating expressed in Sigma Level for the students' feedback on the effectiveness of their teaching faculty in the College. Two components such as "Attitude adopted by the faculty to control the students in the Classroom", and "Communication skills of the teaching staff" were rated as "Adaptable" by the students where medium necessary provisions needs to be undertaken to gain complete satisfaction among the students. The components such as "Knowledge of the faculty in their subject area" and "the regularity of the faculty to the Class" were rated by the students as "Benchmarked and Competing". One critical component i.e. "Utility of Audio Visual aids during lecture for transforming the course contents" was rated by the students as "In adequate" and it is just sufficient to facilitate teaching and learning process without affecting the academic performance.

Table 5. Quality rating for the students' feedback on the availability of Resources at the selected Higher Education Institution

Resource availability in the College	No. of respondents	No of Questions	Opportunities	Defects (Non Conformance)	-
The Quality and Quality of Books & Journals available in our college Library are sufficient	82	2	164	126	-
The availability of Laboratory equipment available in	82	1	82	14	-

our college are sufficient					
The Space, furniture, and building facilities available in our college are sufficient for number of the students enrolled in the college	82	1	82	11	-
The provision of sports, games and other extracurricular facilities in our College are good	82	1	82	10	-
Resource availability in the College	DPO[**]	Chance for a student to be totally Satisfied	Non-Conformance per student (probability)	PPM[***] for complete satisfaction	Sigma Level (Considering 1.5 σ shift)
The Quality and Quality of Books & Journals available in our college Library are sufficient	0.768293	0.463804	0.536196	536195	2.91
The availability of Laboratory equipment available in our college are sufficient	0.170732	0.843048	0.156952	156952	4.01
The Space, furniture, and building facilities available in our college are sufficient for number of the students	0.134146	0.874462	0.125538	125537	4.15

enrolled in the college					
The provision of sports, games and other extracurricular facilities in our College are good	0.121951	0.885192	0.114808	114808	4.20

The table 5 provided the Quality rating expressed in Sigma Level for the students' feedback on the availability of resources in the College. Three components such as availability of "Sports facilities" "Laboratory facilities", and "Building and Furniture" were rated as "Adaptable" by the students where medium necessary provisions needs to be undertaken to gain complete satisfaction among the students. One critical component i.e. "Quality and Quantity of Books in Library" was rated by the students as "In adequate" and it is just sufficient to facilitate their learning process without affecting the academic performance.

Table 6. Overall opinion of the students' on the existing Academic environment prevailing at the selected Higher Education Institution

Overall opinion of the students	No. of respondents	No of Questions	Opportunities	Defects (Non Conformance)	-
Overall, the academic environment of our College is good and productive for the students to learn.	82	1	82	20	-
Overall opinion of the students	DPO[**]	Chance for a student to be totally Satisfied	Non-Conformance per student (probability)	PPM[***] for complete satisfaction	Sigma Level (Considering 1.5 σ shift)
Overall, the academic environment of our College is good and productive for the students to learn.	0.243902	0.783564	0.216436	216435	3.78

The table 6 shows the overall opinion of the students on the existing academic environment prevailing at the selected Higher Education Institution. The item 30 is the global item which attempts to capture the overall satisfaction of the students about the existing academic environment. The students rated the existing academic atmosphere as "In adequate" and it is just sufficient to facilitate the teaching and learning process in the college without affecting the academic performance of the students.

4. Discussion of findings

This research article is the document of the students' opinion about the existing teaching and learning facilities prevailing in a selected Higher Education Institution located in India. For the purpose of this study, a Physiotherapy College offering 4 and half years Bachelor degree program was chosen. Students belonging to the mid of the academic program (i.e. 4th and 5th semester) were chosen to capture their experience about the overall quality of Higher Education. Previous studies also supported this notion that for conducting students experience survey, the students who are halfway through in their academic program needs to be surveyed (Amultman, 2006; Rubaish, 2010). Accordingly, a questionnaire tool so called, "Academic Environment Evaluation Questionnaire (AEEQ)" was prepared which consist of 30 closed ended questions by covering all the three important elements of the Academic Environment viz (i) Teaching and Evaluation Methods adopted, (ii) Effectiveness of Teaching faculty and; (iii) Resources and Infrastructural facilities available in the College.

To rate the opinion of the students on the various aspects of the teaching and learning facilities available in the College, a six point rating system was developed (Table1). The rating scale consists of six points ranging from point 1 to 6. Each point has specific range descriptions indicating quality descriptions for each range. Higher the rating score, better the quality of the Higher Education facility.

Among all the individual teaching and learning elements rated by the Students, the exposure of students to clinical training and the evaluation methods adopted to assess them in the clinical area yields low rating (<3 in Sigma Level). With respect to the teaching methodology adopted, students rated that the revision and recapitalization methods (<3 in Sigma Level) advocated by their faculty is just sufficient to facilitate the teaching and learning process. Likewise, the learning resource like Library is rated as "Inadequate" by the students and immediate attention needs to be taken to strengthen that.

The teaching methodological components such as "Training system adopted", "Time allocation for syllabus completion" and "Exposure to advanced Course work" were rated by the students as "Adaptable" (>3 and <4 in Sigma level) where medium necessary provisions needs to be carried out in order to get fullest satisfaction from the students. The Evaluation methodologies adopted by the teaching staff were also rated by the students as "Adaptable" and appropriate steps needs to be carried out to improve that. The Infrastructural facilities such as buildings, furniture, laboratories and, the provisions for sports and games yields high rating from the students (>4 in sigma level) and it was rated as "Benchmarking and Competing Environment". Likewise, other components such as the "Knowledge of the teaching faculty" and "the regularity of the staff to the class" were also rated high (>4 in sigma level) among the students.

The Global item (30th item) specifies the overall satisfaction of the students about the teaching and learning facilities prevailing in the College. The global item was rated by the students as 'Adaptable" (>3 and <4 in Sigma Level) where medium necessary provisions need to be carried out in order to get fullest satisfaction from the students. Similarly, a higher proportion of individual

items (N=17) were also graded by the students as "Adaptable" and suitable mechanism needs to be adopted to improve each item facilitating the teaching and learning process.

The results based on the sigma rating clearly demonstrate that the global item results and individual item results were highly correlated (17 out of 29 items rated by the students were falls between 3 and 4 sigma level). Previous studied also supported that global item scores are highly correlated with individual items and the global item results will provide a policy oriented clue for the assessing the students opinion on the Quality of Higher Education (Abrami, 2002; Nir and Bennet, 2011). Another study indicated that once the students grading on global item indicated high level of satisfaction, then one can explore the individual items for important clues to attain further improvements (Rubaish *et al.*, 2012). Thus, in the present study, while taking into consideration of the Global item (30th Item) and the majority of the individual items, the students rated the quality of teaching and learning facilities as "Adaptable" and an appropriate steps needs to be taken to gain the fullest satisfaction of the students.

5. Conclusion

This is the first of its kind study which uses the Six-sigma model to rate the opinion of the students about the teaching and learning facilities prevailing in a Higher Education institution imparting Physical Therapy education. The study brings about a new, innovative and student-driven Quality-rating system for the teaching and learning facilities adopted at the Higher Education Institutions in India. This study will help the policy planners of the Higher Education sector to understand the students view in improving the quality of Higher education in a Quantitative manner. This study will also help the academic developers in expediting the decision making about the continuous quality improvements in Higher education.

6. Limitations

The Coverage of this study was limited to only one College offering Physical Therapy program. Moreover, other programs offered in other Colleges might be at varying levels of the developmental phase in terms of infrastructure and teaching facilities. So, an appropriate precaution needs to be taken while generalizing the results. The Feedback from the Students about the Academic Environment is considered one of the facets of evaluating Quality in Higher Education. However, a quality rating that too purely based on students' feedback must be used with caution in interpreting the results for facilitating continuous Quality Improvement measures.

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