

Scale Development for Improving Education Quality: A Survey of Private Institutions Affiliated to U.P.T.U.

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Abstract— Role of scale development is to create a measure of a construct “*Education Quality in U.P.T.U. (Uttar Pradesh Technical University) affiliated institutions*”. In present scenario, Uttar Pradesh has a credible infrastructure, over 765 private colleges, where students complete their degree with moderate emphasis on quality. There is pressing need to improve educational quality to meet increasing demand of the market. Our growth will increasingly depend upon knowledge economy and therefore our higher education sector must become equipped to face future challenges. These institutions have capabilities to innovate but lack better system to do so because of less quality control. Quality is fast emerging as a theme that is rapidly spreading within the higher education institutions. For example the quality of academic research is evaluated through a detailed and rigorous system of peer review, and a priori proofreading. In my view, the impact of research must be well evaluated by the researcher. For scale development, we have designed questionnaires for faculties and students and discussed principles and practical issues to help respondents maximizing the construct. An itemized rating scale is used to examine faculty’s and student’s perspective through questionnaire which has a number or a brief description associated with each response category. The categories are typically arranged in some logical order, and the respondents are required to select the categories that best describe their reactions to whatever is being rated. The end-points of Likert scale are typically “*strongly disagree*” and “*strongly agree*.” The respondents were asked to indicate their degree of agreement by checking one of five response categories. We have used path diagram technique to describe direct dependencies among set of variables. This path diagram analysed is part of structural equation modelling and found to depend on specific individual necessities and the context within which it operates. With the aid of diagrams, four known paths to replication are dissected to explore their advantages and disadvantages in the light of current development thinking. The educational institutions need to become more efficient, effective and student-centric. Our analysis based on structural equation modeling (path diagrams) shows that educational quality significantly dependent upon curriculum design as standard path coefficient is maximum (0.51). This paper is an attempt to cover all those issues related to the performance and quality management in the educational services through the study of selected private educational institutions in the state of Uttar Pradesh. This paper also highlights the use of novel scale development technique which will provide better understanding of current educational scenario and help in improving semester result and college ranking in UPTU list.

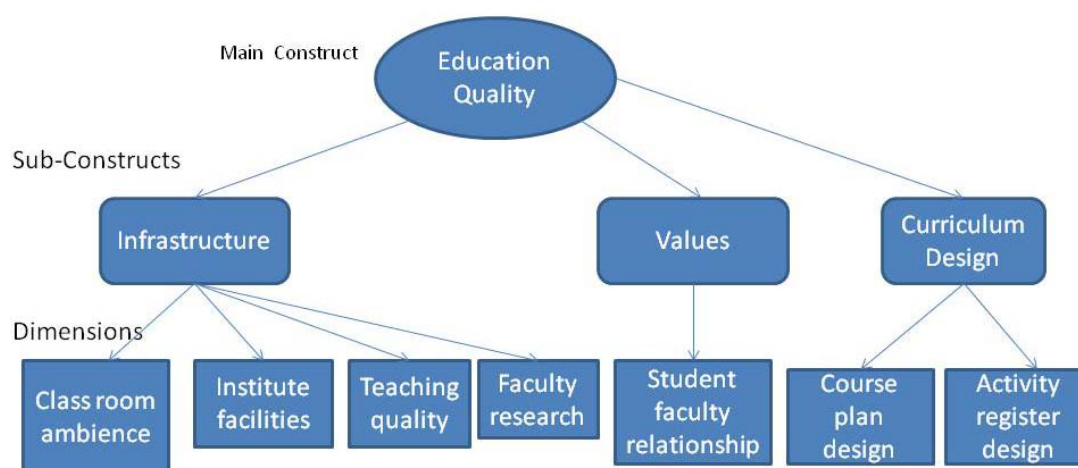
Keywords - Education Quality, Scale-development, Structural equation modeling

I. INTRODUCTION

Education plays a vital role in development of one’s personality and career. The way it influences are been discussed in the following. Traditionally it is well known that nature of education quality is the key determinant of one’s long-term success and survival. To be specific, the qualities of education in private engineering colleges depend on several parameters. The main parameters known to greatly influence educational quality are infrastructure, curriculum design and values. These parameters are further dependent upon various dimensions. In one way we can consider that education serves towards the value addition by bringing a change or transformation in the way student’s perceive and enhance their talents to maximum extent possible given his abilities and level of hard work he devotes. As, stated earlier that many parameters are linked to each other, serving the quality of an institution, their relationships needs to be determined. One of the commonly used practices in scale development is framing right questionnaire [1]. Kind of questions posed provides some data that may not be show true behavior the educational system. American Psychological Association says that data should show validity across the samples, content-wise and criterion based and should be consistent [2]. How valid is the construct to the questionnaires being posed? How would one recognize if the construct were valid

for a given set of observables needs to be examined. It's challenging to predict the educational systems based on global data. The challenge is to capture the measures that a true representative of the prevailing educational systems, to learn the quality of education being imparted to the student and how much do they imbibe. Education are also been regarded as an enterprise with constant transitions. Competitions are ever increasing to strive in the international scenario. With private colleges and private run-universities also picturing in this completion with enroll capacities of 1,500 to 6,000 and provision of better, compact and a peaceful environment for learning are emerging on big scales. Subsequently it also shows that the quality has been given more preferences too, besides knowledge. Besides this, Career building, character building and spirituality also form a part of education, are referred to as 4 skills namely, L.S.R.W i.e listening, speaking, reading and writing [3]. Content analysis, framework and guidelines that form a part of curriculum is a key indicator of the prevailing educational system, the faculty reflection, professionalism development of students as they dictates the nature of concepts being dealt with and intellectual involvement and planning [1,8]. Being taught is one aspect of education, but the capability to implement the ideas and skills at workplace or at projects are key step in attaining 360 degree education. The scale developments is a tool whereby one could measure the quality of education quality being imparted, and here are the major factor that have been known to play a major role; Ambience of classroom [4], Facilities in campus [5], Teaching quality [6], Value system[3], Faculty research and publications [7], Design of course plan/Activity register[8].

Figure1. Measuring constructs, education quality using sub-constructs and its dimensions



An internal assessment of a quality is utmost important so that we can rectify, the prevailing methodology, so as to bring desired changes for the acceleration of education. In the state of Uttar Pradesh, with very large population, around 20crores as per census 2011(upgov.nic.in), has been witnessing a major change in terms of technical as well as professional education. The State government is promoting the private educational institutions to come up to fulfill the demand in the field of education. This has led to the mushrooming of growth of private engineering and management institutions. The requirement of quality education has been left far behind in this process of institutionalization .The education sector that produces the human resources has a vital role in the quality movement and in nation building as the education sector has the prime responsibility of producing the basic input for development of students. Quality education is the best way to develop a rich human resource. The economy of any nation is influenced to a great extent by its manpower which is technically competent [9].

This study will help the other researchers in analyzing the impact of ambience of classroom, facilities, teaching quality, value system, faculty research and course plan design on imparting education particularly in the context of faculties and students in private engineering colleges in Lucknow. In additions, it also serves in developing a reliable scale for quality measurement in increasing the effectiveness of the educational institute and (if any) help determine new factors that may influence.

II. DEFINITIONS

Curriculum Design: The word curriculum means total number of courses of study in a college system. This can be understood as everything that goes within the college including extracurricular activities, guidance and interpersonal skills. Moreover, curriculum is a comprehensive plan for an educational programme/course to offer roadmap for faculties to teach. This implies that one of the functions of a curriculum is to provide a design which enables learning to take place. A curriculum is more than a course syllabus, as it includes planning of course contents defined in syllabus.

Infrastructure: Infrastructure is the most important factor for an aspirant to seek admission. Infrastructure refers to the foundation of an organization, design of building and facilities inside the campus of a college or private university. It comprises of laboratory, sports facility, mess, classroom and hostel of college.

Values: A value can be defined as personal reflections of a student. It includes qualities of good conduct and self-confidence would enable students attain respectable place in society. Education without values is like a deodorant without fragrance. A good character in life is an ultimate thing that stretches person's limits and reaches heights. Therefore, students should learn not just from their curriculum, but from other spheres too to widen their education base to emerge as responsible citizens of the society. Mere ambition to excel in life was not enough, and value-based education must be imparted to help students emerge as leaders in their fields of interest.

III. RESEARCH METHODOLOGY

Research methodology consists of an extensive literature review to develop an understanding of the factors that make scale development competent and develop a theoretical framework for improving educational quality in private educational institutes of UPTU. This study is exploratory and conclusive and two surveys were administered to known respondent through social media students group of Facebook and other through email to known faculty emails. First well-designed questionnaire was shared on Facebook timeline and invited student respondents to fill it correctly, and other was e-mailed to respondent faculties of private engineering colleges of Lucknow. The questionnaire was designed after a brainstorming session with experts in quality cell of private institutions of UPTU. It had three types of questions based on Five-point Likert scale, questions,

1. Check box with 2 options: Yes/No
2. Multiple choice questions with 5 options

The Latent variable or intangible constructs were measured by the following indicators,

1. Infrastructure
2. Curriculum design
3. Values

Five-point Likert scale is also known as attitude scale, which range from strongly disagree to strongly agree. The questions in our survey were categorized into five different sections. It includes: ambience of classroom, facilities in campus, teaching quality, value system, faculty research and publication and course plan design.

The first categories of questions are basically to understand the effect of lights, fans, classroom strength in institute towards imparting education. Classroom questions are prepared to understand current status of classroom standard in educational institute. The second categories of questions are related to type of facilities in institute like availability of laboratory manuals in laboratories, sufficient experiment kits, laboratory in-charge, sport equipment in institute, food quality in mess and quality of hostel in institute. The third categories of questions are related to teaching quality like helping students in unsolved problems, giving lecture notes in advance and explaining concepts using real-life examples and dictating notes. The fourth categories of questions are related to value system in student-faculty relationship using three parameters i.e trust, respect and harmony. The fifth categories of questions are related to faculty research and publications like its impact in undergraduate teaching and as a means to give employment to academic personnel. The sixth categories of questions are related to course plan design and activity register like utility of course plan in effective lecture planning, utility of page number, chapter number and teaching methodology in course plan design and utility of activity register in education system. In the subsequent questionnaire survey a total of 26 and 10 responses were received from the students and faculty members respectively. The exploratory factor analysis was performed with data to identify the major educational quality dimensions based on which constructs are proposed from student and faculty perspective, which were confirmed through confirmatory factor analysis and validated through structural equation modeling.

The various dimensions for maximizing construct Education Quality are described in the following. Dimensions 1, 2 and 3 were filled by student's respondent whereas dimensions 4, 5 and 6 were filled by faculty respondents.

Dimension 1: Classroom Ambience (CA)

1. My classroom is having satisfactory number of fans in it?
2. Tables and benches in classroom are in satisfactory condition?
3. What should be the ideal strength of classroom size (students)?

Dimension 2: Institute Facilities (IF)

1. Do you like to visit laboratory in your college(y/n)

2. If yes, I perform experiments by myself?
3. If yes, laboratory possess sufficient number of experiment kits for student
4. If yes, generally I copy experiment observation from my classmates
5. Do you eat food in mess(y/n)
6. If yes, my mess provides tasty food to eat
7. Do you prefer to stay in college hostel (y/n)
8. If yes, Wi-Fi service essential in hostel
9. If yes, Reading room be present in hostel
10. Playing sports regularly, increases concentration in study

Dimension 3: Teaching Quality (TQ)

1. My college arrange lectures from industry experts
2. My faculty explain concepts using real life examples
3. My faculty helps in unsolved problem at end of chapter
4. Lecture notes printout must be given, before starting lecture
5. Board work is essential for delivering efficient lecture
6. Dictating notes in lecture is wasting time

Dimension 4: Student-Faculty Relationship (SFR)

1. Trust is foundation value of student-faculty relationship
2. Respect for faculty by student is essential for imparting knowledge
3. Guidance in student-faculty relationship, leads to mutual happiness

Dimension 5: Faculty Research (FR)

1. Research conducted by faculty has positive impact on undergraduate teaching
2. Research paper published are used to evaluate academic personnel for employment

Dimension 6: Course Plan Design (CP)

1. Course plan is essential for effective lecture planning
2. If yes, chapter number and page number of lessons are required in course plan design
3. If yes, teaching methodology are required in course plan design

Dimension 7: Activity plan (AP)

1. Activity register is required to be filled
2. Activity register is similar to attendance register

Depth Interview was conducted of length with 60 students and 3 faculties of different institutes across Lucknow. The duration of depth interview varied anywhere between 15 to 20 minutes. A list containing 15 dimensions extracted from the literature review is given to interviewee along with a brief description of each dimension. Based on the results of the depth interview, 7 dimensions taken and the questionnaires were modified. Key findings of the depth interview were initially 30 dimensions collected from literature review was further reduced to 21 and 11 after the depth interviews from student and faculty perspectives respectively. Findings of depth interview shows, 90 percent of the respondents were aware of problems of education quality. The major issues identified from student perspectives were related to unequipped laboratory, no sport activity, dictating notes in class rather than explaining concepts using real life examples whereas in addition to these absence of respect in students for faculties, less trust due to availability of model papers in market, curriculum design are the major issues identified from faculty perspective. Questionnaire survey The modified questionnaires are based on these 21 and 11 dimensions from the student and faculty perspectives followed by a pilot survey of the questionnaire to assess the content validity. Content validity can be evaluated by a panel of persons, sometimes experts, who judge whether a scale logically appears to accurately reflect what it purports to measure. From the result of the pilot survey 2 dimensions from the student's perspective and 1 dimension from faculty perspective **are** removed. As a result, the revised questionnaires contained 19 dimensions from student's perspective and 10 dimensions from the faculty's perspective (survey items). The revised questionnaires structure comprises of,

Questionnaire 1: From student's perspective (19 items).

Questionnaire 2: From faculty perspective (10 items)

The respondents were requested to select the response that best indicates their experiences or perceptions on each statement, using a five point Likert-scale (From 1= strongly disagree to 5= strongly agree). Key results of

questionnaire survey Responses to the revised questionnaires were received through online using Facebook and email. The respondents of this study were students and faculty members of different institutes across Lucknow. A total of 26 and 10 responses were received for questionnaire-1 and 2 respectively. SPSS-20 and LISREL-student version software were used for carrying out statistical analysis.

IV. ANALYSIS AND RESULTS

The reliability of the data is checked by calculating Cronbach-alpha value which was found to be 0.269 and 0.145 for questionnaire-1 and 2 respectively. The calculated value is in quite unacceptable range (should be greater than 0.7) due to less sample size [10]. Further to this, Kaiser Mayer Oklin statistics is calculated for checking the sampling adequacy, the calculated values are 0.218 and 0.159 (should be greater than 0.5) which is found quite unsuitable for carrying out exploratory factor analysis.

Figure2.(Reliability test from SPSS)

Reliability Statistics	
Cronbach's Alpha	N of Items
.269	15

Reliability Statistics	
Cronbach's Alpha	N of Items
.145	8

Figure3(Sample adequacy value from SPSS)

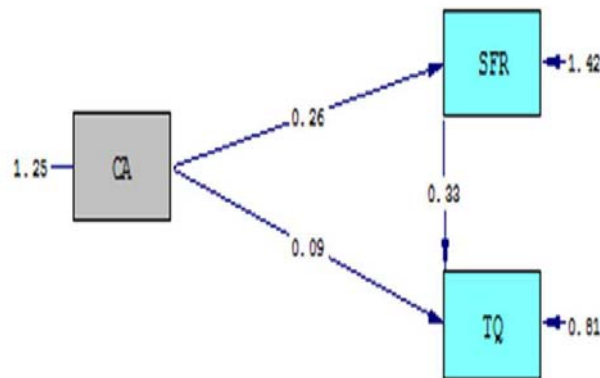
KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.159
Bartlett's Test of Sphericity	Approx. Chi-Square	54.612
	df	28
	Sig.	.002

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.218
Bartlett's Test of Sphericity	Approx. Chi-Square	174.597
	df	105
	Sig.	.000

Further, path diagrams will be shown depicting relationship between various construct and sub-construct (fig4). These relationships are drawn considering covariance matrix between constructs and drawn on LISREL student version.

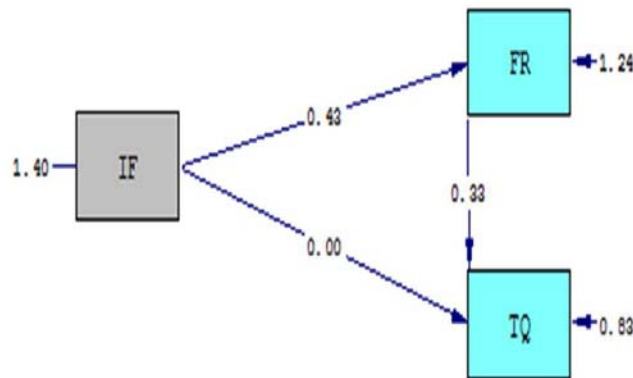
Firstly, we see path diagram of classroom ambience (CA), student-faculty relationship (SFR) and teaching quality (TQ). The path coefficients are mentioned on each path. Teaching quality depends more on student faculty relationship due to standard path coefficient(0.33) and Student-faculty relationship depends less upon classroom ambience(0.26).Teaching Quality is least dependent(0.09) on classroom ambience.

Figure4. (Dependencies between CA, SFR and TQ using LISREL)



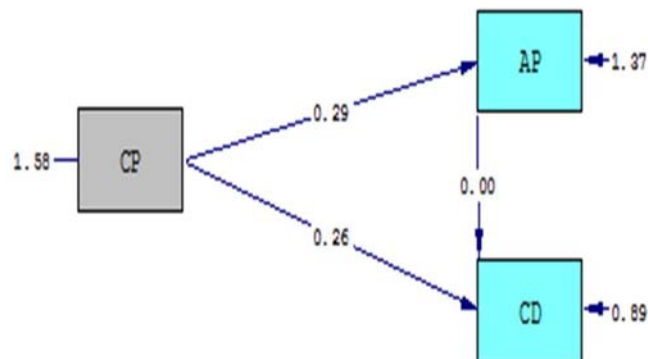
Secondly, path diagram between Institute Facilities (IF), Faculty Research (FR) and Teaching Quality (TQ) is shown in figure 5. Faculty research mostly depends on Institute Facilities as standard path coefficient is 0.43 whereas teaching quality is least dependent upon faculty research as standard path coefficient is 0.33. There is zero path coefficient in between Institute facilities (IF) and Teaching Quality (TQ).

Figure5. (Dependencies between IF, FR and TQ using LISREL)



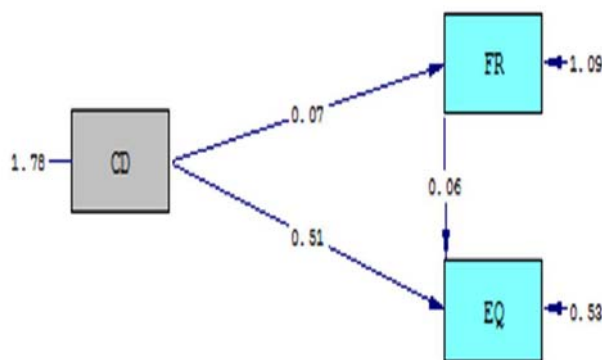
Thirdly, path diagram between Course Plan (CP), Activity Plan (AP) and Curriculum Design (CD) is shown. Activity Plan mostly depends upon Course Plan due to standard path coefficient (0.29), Curriculum Design is least dependent upon Activity Plan due to zero standard path coefficient whereas, Curriculum Design depends upon both Course Plan due to standard path coefficient (0.26).

Figure6. (Dependencies between CP, AP and CD using LISREL)



Finally, we see path diagram between Educational Quality (EQ), Curriculum Design (CD) and Faculty Research (FR). Faculty Research is least dependent upon Curriculum Design due to standard path coefficient (0.07). Educational Quality is least dependent upon Faculty research (0.06) and mostly Educational Quality depends upon Curriculum Design due to very high standard path coefficient (0.51).

Figure 7(Dependencies between CD, FR and EQ using LISREL)



V. CONCLUSION

The main purpose of this study is to develop scale for improvement of educational quality and draw path diagrams to depict dependencies between construct, sub-construct and its dimensions, addressing basic problems and providing solution for improving education quality in private colleges affiliated to Uttar Pradesh Technical University. This paper contributes to the existing literature by finding the factors that students as well as faculty perceive as important while collecting the responses with Google drive. Organization should give due attention to these factors for creating an effective learning environment and to make effective strategies accordingly. The sample sizes itself were relatively small, which is one of the limitations of this study. Large and more diversified samples can be taken for the further enhancement as well as validation of this research work. The applicability, validation and generalizability of the proposed scale can be done by replicating this study to all colleges of U.P.T.U one by one and collecting more factors for improving education quality.

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