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ASSESSING STUDENT-CENTRIC SERVICE QUALITY GAPS IN HIGHER EDUCATION INSTITUTIONS: A FACTOR ANALYTIC APPROACH

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ABSTRACT
In the current era of intense competition in higher education, institutions must use a student-centric strategy to ensure service quality. With the emergence of increasingly evolving learners, student expectations, and perceptions levels have become vital benchmarks for evaluating institutional performance and overall success. The present study explores the discrepancy between students' expectations and perceptions of service delivery in higher education institutions. Using a structured questionnaire, data were collected from a stratified random sample of 451 students from Uttarakhand. The instrument measured expected and perceived service quality using a 7-point Likert scale. To uncover the underlying structure of service quality as perceived by students, Exploratory Factor Analysis was employed, and these dimensions were subsequently validated through Confirmatory Factor Analysis, ensuring structural consistency and construct validity. To assess the significance of the differences between expectations and perceptions, paired sample t-tests were conducted. The finding revealed statistically significant ($p<0.05$) gaps in a variety of aspects, including academic responsiveness, teaching methodology, pedagogy, academic amenities, and support facilities. These findings emphasize the urgent need for higher education institutions to improve staff behaviour, teaching practices, infrastructure, and student support mechanisms better to meet students' academic and personal development needs, thereby improving overall student satisfaction and institutional effectiveness.

Keywords- *service quality, expectation-performance gap, higher education, exploratory factor analysis, confirmatory factor analysis*

1. INTRODUCTION
Higher education institutions (HEIs) are increasingly compelled to use a student-centered strategy to ensure student quality and satisfaction [1]. With increased competition and shifting learner expectations, evaluating service quality from the student's perspective has become critical [2]**.** While the higher education sector is dynamic and adaptable, the lack of agreement on the dimensions of service quality in Higher Education Institutions (HEIs) is a significant issue. Although previous studies have explored multiple dimensions of service quality within HEIs, no universally acknowledged dimensions have emerged [3]. Service quality in HEIs is multidimensional, and different stakeholders provide distinct perspectives based on their roles and expectations [4]. Higher education service quality, which has typically been evaluated from an institutional or regulatory standpoint, must now change to acknowledge and satisfy the expectations and views of its primary stakeholder—the student [5]. Consequently, satisfied students serve as a strong testament to the institutions, while dissatisfied learners can foster a culture of complaint that may damage the institutions' reputation (Osman & Saputra,2019). Adopting a student-centered approach that incorporates diverse student perspectives can contribute to the development of a more relevant, responsive, and adaptable framework for assessing service quality in higher education [7]**.**

No doubt, numerous studies have acknowledged the diversity and distinctiveness of higher education settings, highlighting the necessity for a tailored approach to evaluate service quality. However, only a few comprehensive methodologies have specifically focused on assessing the quality of higher education services from the students' perspective.

2. LITERATURE REVIEW

2.1 “Service quality in HEIs and satisfaction”
Higher education can be regarded as a "pure form of service," and the quality of these services cannot be quantified objectively [8], but instead relies mainly on students' subjective experiences and perceptions [9]. The evolving landscape of higher education necessitates a shift towards student-centric service delivery [10]. The growing emphasis on individualized educational experiences suggests that students increasingly seek institutions that acknowledge and address their unique needs, learning preferences, and academic or career aspirations [11]. Higher education institutions must align with the rising expectations of students and invest in improving the quality of the educational services they provide [12]. By fostering an environment that positions students as both participants and contributors, higher education institutions can improve the overall quality of education. Such an approach enhances student satisfaction and contributes to the institution’s success and

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prestige [13]. Acknowledging students as valuable customers whose needs and expectations should be met is essential for higher education institutions to thrive in a competitive academic landscape [14]. By actively listening to students and aligning institutional services with their evolving demands, HEIs can not only improve the quality of their educational offerings but also enhance student satisfaction, retention, and overall institutional reputation [15].

To assess the student's educational experience, many researchers have employed "an adapted version of SERVQUAL" [16]. However, this may not be the ideal tool, as education is a "distinct service" with unique features that differentiate it from other services [17]. Unlike tangible goods or traditional services, the value of educational services is subjective, often influenced by personal experiences, teaching methodologies, and the student-institution interaction [18]The growing demands of the job market have prompted higher education institutions to reassess and adjust their curricula, integrating aspects such as workshops, seminars, internships, and industrial visits [4]. These enhancements aim to bridge the gap between academic knowledge and practical skills, ensuring that students are better equipped to meet industry expectations and navigate the dynamic professional landscape with confidence and competence. [19]. The ongoing discourse and prevailing ambiguities surrounding service quality in higher education underscore the necessity for its continuous refinement and contextual adaptation. Therefore, Institutions must consider creating context-specific instruments that reflect the dynamic nature of education [20], the evolving needs of students, and the interactive nature of the learning process, ensuring that the assessment reflects what students value most.

2.2 "Student-centric service quality dimensions" in the current study

The concept of quality in higher education is widely regarded in the literature as "complex and multidimensional, encompassing a range of dimensions that influence both institutional performance and student satisfaction [21]. The conceptual framework of the present study is grounded in the 'Theory of Reciprocity,' which posits that individuals are inclined to respond favourably to positive actions and unfavourably to negative ones [22]. In the realm of higher education, service providers can only effectively meet student expectations if they have a deep understanding of what students truly want. Institutions must engage with students to capture their needs and preferences, ensuring that services and educational experiences are designed to meet and exceed those expectations [5]. The dimensions utilized in this study were derived from an extensive literature review, supported by insights from focus group interviews, and validated through expert evaluations (Table 1).

Dimension 1- "Teaching Methodology (TM)": This factor encompasses aspects such as clarity of instruction, use of technology, adaptability to student needs, interactive teaching practices, and the incorporation of innovative methods.

Dimension 2- "Professional Development Program (PDP)": This factor includes initiatives that build a strong theoretical foundation, deliver knowledge through contemporary and industry-relevant curricula, and promote active engagement within a dynamic learning environment.

Dimension 3- "Academic Amenities (AA)": This factor includes access to well-equipped classrooms, libraries, laboratories, computer centers, internet connectivity, and other essential academic facilities that contribute significantly to students' overall academic experience and satisfaction.

Dimension 4- "Pedagogy (PG)": This factor emphasizes the use of innovative, student-centered, and participatory teaching methods such as problem-based learning, case studies, collaborative projects, and the integration of technology.

Dimension 5- "Support Facilities (SF)": This factor includes academic advising, career counselling, mental health services, student clubs, mentorship programs, and other support structures that help students navigate their academic journey and personal development.

Dimension 6- "Academic Responsiveness (AR)": This factor emphasizes the responsiveness of faculty, administrative staff, and academic support systems in providing timely assistance, feedback, and solutions.

3 RESEARCH METHODOLOGIES

3.1 Research objectives

1. To explore the key dimensions of student-centric service quality in higher education institutions.
2. To assess the gaps between students' expectations and their actual perceptions of service delivery.

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3.2 Population of the study

The population for this study includes all students enrolled in undergraduate and postgraduate programs across the state of Uttarakhand, India, during the academic year 2020–21. According to data published by "Social and Economic Statistics India" (https://www.indiastat.com/data/education), a total of 2,52,330 students were enrolled in higher education institutions in the state during this period.

3.3 "Sample size and sampling technique"

To determine the appropriate sample size for this study, "Krejcie and Morgan's (1970) sample size" determination model was employed. According to the model, a minimum of 384 respondents is required for a population size of 2,52,330 to ensure statistically reliable results. To enhance the accuracy and generalizability of the findings, a self-administered questionnaire was distributed to a stratified random sample of 700 students across various undergraduate and postgraduate programs in Uttarakhand. Out of the total, 451 completed questionnaires were received. Thus, the final sample size for this study comprises 451 students.

3.4 Research instruments

The development of the questionnaire in this study was informed by an extensive literature review, focus group interviews with 30 students, and detailed discussions regarding the quality of services encountered by students in higher education institutions (HEIs). Since students are the primary stakeholders and recipients of educational services, their insights were considered essential. To ensure diversity and representativeness, participants for the focus group interviews were selected using a multi-stage random sampling method. Initially, students were categorized based on the ownership pattern of their institutions (government, private self-financing, and deemed universities), followed by academic field (management, engineering, and arts), and finally by course of study (undergraduate and postgraduate). These interviews followed the general guidelines proposed by Fern, (1982)

During the focus group sessions, students were invited to discuss their perceptions and evaluations of the services and facilities offered by HEIs, as well as how they assessed the overall value of their education. These sessions aimed to uncover how students articulate aspects of service quality identified in the literature, and reveal previously undocumented service quality dimensions relevant to higher education. Combining these two goals provided a rich and nuanced understanding of service quality from the student perspective.

Following the focus group discussions, the generated items were reviewed by academic experts specializing in service quality. Faculty members from various departments, along with NAAC and NBA assessment coordinators, were invited to evaluate each item for content relevance and representativeness. The integration of student insights and expert validation ensured that the final questionnaire captured both established and emerging dimensions of service quality, thereby enhancing its contextual appropriateness and construct validity [24].

Following the focus group deliberations, detailed notes were analyzed to identify recurring themes and commonly expressed aspects of service quality. These insights were then organized and consolidated into broader dimensions. Initially, questionnaire items were drawn from an extensive literature review and systematically distributed under the preliminary dimensions outlined in Table 1. Based on expert feedback, modifications were made to improve clarity and conceptual alignment—this included refining the nomenclature of certain dimensions and removing seven overlapping or redundant items to preserve the integrity and focus of the framework.

As a result, a bilingual questionnaire was developed, comprising 50 items—25 measuring expectations and 25 measuring perceptions—designed to assess student-centric service quality. The instrument aimed to capture students' expectations of an ideal higher education institution and their perceptions of the actual services received. This dual-assessment approach treats service quality as a higher-order reflective construct. All items were measured using a seven-point Likert-type scale, where 1 indicated 'Strongly Disagree' and 7 indicated 'Strongly Agree'. This structure enabled the assessment of service quality gaps by comparing students' ideal expectations with their actual experiences in the educational setting.

Table 1: Dimensions Supported by Literature and Focus Groups

Dimensions	Source of reference from literature	No. of items (Expectation + perception)	Focus group support
"Teaching methodology"	Chou, (2004); Sahney et al., (2004); Jain et al., (2013); Senthilkumar & Arulraj, (2011); Brooks, (2015); Latif et al., (2019) ;Abbas, (2020)	10 (5+5)	Yes

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"Professional program development"	Bhattacharyya et al., (2002);Jain et al., (2013) ; Teeroovengadum et al., (2016)	8 (4+4)	Yes
"Pedagogy"	Teeroovengadum et al., (2016);Verma & Prasad, (2017)	8 (4+4)	Yes
"Academic amenities"	Owlia & Aspinwall, (1996); Lagrosen et al., (2004); Athiyaman, (2006)	8 (4+4)	Yes
"Academic responsiveness"	Joseph et al., (2005); Abdullah, (2006); Douglas et al., (2008); Nkiruka, (2015)	8 (4+4)	Yes
"Support services"	Hill, (1995); LeBlanc & Nguyen, (1999); Bhattacharyya et al., (2002) ; Abdullah, (2006); Verma & Prasad, (2017)	8 (4+4)	Yes

3.5 Hypotheses to be tested

H_1: There is a significant difference between students' expectations and perceptions of service quality dimensions.

4 DATA ANALYSIS AND RESULTS

4.1 Profile of sample

Table 2: Profile of sample

Demographic variable	Descriptions	Frequency	% of frequency
Gender	Male	216	47.89
	Female	235	52.11
Age	Below 20 years	139	30.83
	21-25 years	221	49.00
	26-above	91	20.17
Academic field	Management	159	35.25
	Arts	155	34.37
	Engineering	137	30.38
Course of study"	Undergraduate	225	49.89
	Postgraduate	226	50.11
"Academic year"	Year 1	109	24.17
	Year 2	200	44.34
	Year 3	120	26.60
	Year 4	22	4.88
"Ownership pattern"	Government	202	44.79
	Private/self-financing	199	44.12
	Deemed	50	11.09

4.1 Factor Analysis

"Exploratory Factor Analysis (EFA)": EFA was employed as a data reduction technique to explore the latent dimensions underlying the observed variables. To ensure the data's suitability for factor analysis, the Kaiser-Meyer-Olkin (KMO) test was conducted to measure sampling adequacy, and Bartlett's Test of Sphericity was used to confirm that correlations between items were sufficiently large for EFA (see Table 3).

Table 3: "KMO and Bartlett's Test"

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.935
Bartlett's Test of Sphericity	Approx. Chi-Square	6888.041
	df	351
	Sig.	.000

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To achieve the objectives of the study, Principal Component Analysis (PCA) with Varimax rotation was employed. The analysis resulted in a six-factor solution for service quality, accounting for 65.9% of the total variance. Factor loadings of 0.50 and above were retained, and only factors with eigenvalues greater than 1 were considered, adhering to the recommendations of leech, Barrett, & Morgan (2005). These findings confirm the multidimensional nature of service quality in higher education.

EFA was applied to 25 service quality items. Although the factor structure derived from EFA appears robust, further evaluation through reliability and validity assessments is essential to confirm the consistency and soundness of the identified dimensions.

"Confirmatory factor analysis (CFA)": Following the exploratory factor analysis (EFA), confirmatory factor analysis (CFA) was employed to validate the reliability and construct validity of the measurement model. Reliability analysis was carried out to examine the internal consistency of the items associated with each latent construct. Specifically, the Cronbach's alpha (α) and composite reliability (CR) were calculated to assess scale reliability.

As recommended by [40], both α and CR values should exceed 0.70 to be considered acceptable. The results, as presented in Table 4, show that all constructs demonstrated satisfactory reliability, with both α and CR values exceeding the required threshold. These findings affirm the internal consistency and reliability of the measurement model used in this study.

Table 4: Factor loading, eigenvalue, % of variance, Reliability and Validity

Higher-Order construct	Constructs	Items	Factor Loadings	Eigen Value, % of Variance	Cronbach Alpha (A)	Composite Reliability (CR)	Average Variance Extracted (AVE)
Service Quality	"Teaching methodology"	TM1	0.866	6.53, 14.03%	0.818	0.88	0.74
		TM2	0.849				
		TM3	0.793				
		TM4	0.735				
		TM5	0.654				
	"Professional development program"	PDP1	0.867	1.62, 12.032%	0.737	0.817	0.621
		PDP2	0.863				
		PDP3	0.820				
		PDP4	0.768				
	"Academic amenities"	AA1	0.912	1.29, 10.30%	0.679	0.83	0.79
		AA2	0.894				
		AA3	0.891				
		AA4	0.876				
	"Support Facilities"	SF1	0.712	1.27, 10.24%	0.670	0.83	0.70
		SF2	0.703				
		SF3	0.612				
		SF4	0.527				
	"Pedagogy"	PG1	0.842	1.21, 10.12%	0.686	0.80	0.65
		PG2	0.839				
		PG3	0.820				
		PG4	0.809				
	"Academic Responsiveness"	AR1	0.847	1.10, 9.47%	0.684	0.75	0.78
		AR2	0.839				
		AR3	0.760				
		AR4	0.550				

Convergent validity: Convergent validity was assessed using Composite Reliability (CR) and Average Variance Extracted (AVE). As per Hair et al. (2019), all constructs met the criteria of CR > 0.70, AVE > 0.50, and CR > AVE, as shown in Table 4. This confirms that the constructs demonstrate strong convergent validity.

Discriminant validity: Discriminant validity determines whether constructs in a model are truly distinct from one another. This study assessed discriminant validity using two approaches: the Fornell-Larcker Criterion and the Heterotrait-Monotrait Ratio (HTMT).

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According to "Fornell & Larcker, (1981)", discriminant validity is confirmed when the square root of the[41] AVE for each construct is greater than its correlations with other constructs. As shown in Table 5, the bold diagonal values satisfy this condition, indicating acceptable discriminant validity.

Table 5: Fornell Larker Criterion (1981)

	AA	AR	PG	PDP	SQ	SF	TM
AA	**0.837**						
AR	0.556	**0.733**					
PG	0.557	0.651	**0.815**				
PDP	0.557	0.573	0.694	**0.839**			
SQ	0.544	0.515	0.677	0.726	**0.811**		
SF	0.563	0.530	0.627	0.684	0.717	**0.771**	
TM	**0.663**	**0.700**	**0.562**	**0.514**	**0.648**	**0.488**	**0.787**

Note: AA: academic amenities; AR: academic responsiveness; PG: pedagogy; PDP: professional development program; SQ: service quality; SF: support services; TM: teaching methodology.

According to Henseler et al., (2015) Discriminant validity is supported when all values in the HTMT matrix are below 0.85, indicating a clear distinction between constructs. As shown in Table 6, all HTMT values fall below this threshold, confirming that the constructs exhibit strong discriminant validity

Table 6: HTMT Criterion.

	AA	AR	PG	PDP	SQ	SF	TM
AA							
AR	0.703						
PG	0.656	0.803					
PDP	0.647	0.697	0.814				
SQ	0.805	0.676	0.737	0.809			
SF	0.685	0.693	0.773	0.831	0.823		
TM	0.761	0.814	0.669	0.603	0715	0.605	

Note: AA: academic amenities; AR: academic responsiveness; PG: pedagogy; PDP: professional development program; SQ: service quality; SF: support services; TM: teaching methodology

Gap analysis of service quality

Gap analysis was conducted to examine the discrepancies between students' expectations and their perceptions of service quality in higher education institutions. To assess this, a paired sample t-test was employed for each item across the identified dimensions. The analysis compared the mean scores of students' expectations and perceptions to determine whether the observed differences were statistically significant.

Table 7: The results of paired t-test

Paired Samples Test									
		Paired Differences							
					95% Confidence Interval of the Difference				
Dimensions	Items	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
"Teaching methodology"	ITEM 1	1.548	1.214	.057	1.435	1.660	27.063	450	.000
	ITEM 2	1.572	1.253	.059	1.456	1.688	26.646	450	.000
	ITEM 3	1.494	1.298	.061	1.374	1.615	24.442	450	.000
	ITEM 4	1.856	1.202	.057	1.745	1.967	32.803	450	.000
	ITEM 5	1.521	1.327	.062	1.398	1.644	24.340	450	.000
"Professional development program"	ITEM 1	1.818	1.528	.072	1.677	1.960	25.265	450	.000
	ITEM 2	1.780	1.462	.069	1.645	1.916	25.871	450	.000
	ITEM 3	1.778	1.441	.068	1.645	1.912	26.216	450	.000
	ITEM 4	1.772	1.426	.067	1.640	1.904	26.378	450	.000
"Academic amenities"	ITEM 1	1.816	1.416	.067	1.685	1.947	27.244	450	.000
	ITEM 2	1.838	1.434	.068	1.705	1.971	27.224	450	.000
	ITEM 3	1.745	1.306	.062	1.624	1.866	28.373	450	.000
	ITEM 4	1.772	1.426	.067	1.640	1.904	26.378	450	.000

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"Pedagogy"	ITEM 1	1.827	1.488	.070	1.689	1.965	26.074	450	.000
	ITEM 2	1.927	1.467	.069	1.791	2.063	27.891	450	.000
	ITEM 3	1.749	1.416	.067	1.618	1.881	26.232	450	.000
	ITEM 4	1.714	1.312	.062	1.593	1.835	27.752	450	.000
"Support facilities"	ITEM 1	1.794	1.328	.063	1.671	1.917	28.682	450	.000
	ITEM 2	2.033	1.528	.072	1.892	2.175	28.261	450	.000
	ITEM 3	1.874	1.434	.068	1.741	2.006	27.741	450	.000
	ITEM 4	1.882	1.544	.073	1.740	2.025	25.892	450	.000
"Academic responsiveness"	ITEM 1	1.583	2.732	.129	1.330	1.836	12.305	450	.000
	ITEM 2	1.667	1.371	.065	1.541	1.794	25.824	450	.000
	ITEM 3	1.789	1.334	.063	1.666	1.913	28.483	450	.000
	ITEM 4	1.585	1.372	.065	1.458	1.712	24.534	450	.000

(***Source:*** Primary data analysis using SPSS 26)

Results of Hypothesis Testing

As shown in the gap analysis (Table 7), all p-values for the paired sample t-tests were found to be less than 0.05, indicating that the differences are statistically significant, which validates H_1. This confirms the existence of a significant gap between expected and perceived service quality in all measured dimensions, validating the need for service quality improvement from a student-centered perspective.

5. FINDINGS AND CONCLUSION

This study offers a comprehensive assessment of student-centric service quality in higher education institutions (HEIs) using a rigorous factor analytic approach. By integrating insights from literature, expert reviews, and focus group discussions, the research identified key dimensions that shape students' perceptions and expectations of service quality. The findings revealed a significant gap between student expectations and actual experiences across multiple service dimensions, including academic responsiveness, teaching methodology, pedagogy, academic amenities, and support facilities. These results underscore the need for improvements in areas such as staff behavior, teaching practices, infrastructure, and student support services to enhance overall student satisfaction and meet their academic and personal development needs. The findings highlight the need for HEIs to prioritize student feedback in institutional planning and policy formulation. The validated model, through EFA and CFA, confirms that service quality in higher education is a multidimensional construct and must be approached holistically.

Furthermore, the study underscores the importance of student-centric strategies in bridging service gaps, enhancing satisfaction, and aligning institutional offerings with evolving student needs. These insights not only help in improving the quality of academic and administrative services but also contribute to the long-term success, reputation, and competitiveness of HEIs in an increasingly globalized educational landscape.

LIMITATIONS AND FUTURE RESEARCH

In line with previous studies, this research has certain limitations that provide avenues for future investigation. First, the study is geographically confined to higher education institutions in Uttarakhand, which may limit the generalizability of the findings to other regions or countries. Second, the data relies on self-reported responses, which may be influenced by individual biases or momentary perceptions. Additionally, the cross-sectional design captures perceptions at a single point in time, without accounting for how expectations and satisfaction may change throughout a student's academic journey. Future research could adopt a longitudinal design, expand the geographic scope, and incorporate perspectives from faculty, administrative staff, and employers to develop a more holistic understanding of service quality in higher education. Qualitative methods and comparative studies between different types of institutions (government, private, deemed) can also help in uncovering nuanced insights and improving the applicability of student-centric service quality frameworks.

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