



Barriers and challenges in implementing multidisciplinary education under NEP 2020: an empirical study of universities

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Abstract

The National Education Policy (NEP) 2020 emphasizes the integration of multidisciplinary education to promote holistic and flexible learning in higher education institutions. However, universities face several structural, academic, and administrative challenges in implementing this reform. The present study investigates the key barriers to the effective implementation of multidisciplinary education under NEP 2020 using primary data collected from 250 respondents. Exploratory Factor Analysis (EFA) confirmed the suitability of data (KMO = 0.808; Bartlett's Test significant at $p < 0.001$) and identified five major dimensions of challenges: Institutional & Structural Barriers, Curriculum & Academic Challenges, Faculty-Related Constraints, Financial & Infrastructure Constraints, and Administrative & Policy-Level Issues. The findings indicate that rigid institutional structures, limited interdisciplinary coordination, inadequate faculty preparedness, insufficient funding, and policy complexities significantly hinder the transformation envisioned under NEP 2020. The study highlights the need for comprehensive institutional reforms, faculty development programs, financial investment, and effective governance mechanisms to ensure successful implementation.

Keywords: NEP 2020, multidisciplinary education, higher education, institutional barriers, curriculum challenges, faculty constraints, factor analysis

Introduction

The National Education Policy (NEP) 2020 represents a transformative reform in the Indian education system, emphasizing holistic, flexible, and multidisciplinary learning across higher education institutions (Ministry of Education [MoE], 2020) [13]. One of the central pillars of NEP 2020 is the restructuring of higher education into large multidisciplinary universities and colleges that integrate arts, sciences, commerce, vocational studies, and professional education. The policy seeks to dismantle rigid disciplinary silos and promote intellectual cross-fertilization, creativity, critical thinking, and innovation (Government of India, 2020) [6]. Multidisciplinary education, as conceptualized under NEP 2020, aims to provide students with flexibility in course selection, multiple entry and exit options, and an integrated curriculum supported by mechanisms such as the Academic Bank of Credits (ABC). Globally, interdisciplinary approaches have been associated with enhanced problem-solving skills, innovation capacity, and employability (Jacobs, 2014; Klein, 2010) [8, 11]. However, translating policy vision into institutional practice often involves significant structural and operational challenges. Educational reforms frequently encounter resistance due to entrenched administrative systems, limited resources, and institutional inertia (Fullan, 2007) [5].

In the Indian context, universities historically operate within rigid departmental frameworks, where academic disciplines function independently with limited cross-departmental collaboration (Agarwal, 2009) [1]. Transitioning toward a multidisciplinary model therefore demands substantial curriculum redesign, governance restructuring, faculty retraining, and infrastructural enhancement. Studies on higher education reforms suggest that policy implementation gaps often emerge due to insufficient funding, unclear regulatory guidelines, faculty resistance, and limited institutional autonomy (Tilak, 2015; Varghese,

2016) [15, 16]. Faculty readiness is another critical factor influencing reform implementation. Research indicates that academic staff may resist interdisciplinary integration due to concerns about increased workload, dilution of subject specialization, and lack of training in collaborative pedagogy (Knight, 2013) [12]. Additionally, administrative challenges such as delays in approvals, ambiguity in credit transfer mechanisms, and coordination issues among regulatory bodies may hinder smooth implementation of NEP reforms (Chattopadhyay, 2021) [3]. Financial and infrastructural constraints further complicate the transition. Establishing multidisciplinary programs often requires investment in digital infrastructure, laboratories, collaborative research centers, and student support systems. In developing higher education systems, inadequate public funding and uneven resource distribution have historically slowed reform processes (Tilak, 2015) [15].

Despite the ambitious vision of NEP 2020, empirical studies examining the barriers and challenges faced by universities in implementing multidisciplinary education remain limited. Most existing discussions are policy-oriented or conceptual, with insufficient data-driven investigation into institutional-level obstacles. Therefore, identifying and analyzing these barriers is essential to bridge the gap between policy design and practical execution.

In this context, the present study seeks to identify the barriers and challenges universities face in implementing multidisciplinary education under NEP 2020. By examining institutional, curricular, faculty-related, financial, and administrative constraints, the study aims to provide evidence-based insights that can support effective policy implementation and strengthen India's higher education transformation agenda.

Review of Literature

Multidisciplinary education has gained global prominence as a transformative approach to higher learning, aiming to

integrate knowledge across disciplines to address complex societal challenges (Klein, 2010) ^[11]. Interdisciplinary and multidisciplinary models enhance critical thinking, creativity, collaboration, and employability skills among students (Jacobs, 2014) ^[8]. Research suggests that institutions adopting cross-disciplinary curricula tend to foster innovation and research productivity (Repko & Szostak, 2017) ^[14]. However, the shift from discipline-centric to integrated frameworks requires structural and pedagogical transformation, which is often met with institutional resistance. In the Indian context, higher education institutions have historically functioned within rigid disciplinary boundaries, limiting collaboration across departments (Agarwal, 2009) ^[1]. NEP 2020 seeks to restructure universities into multidisciplinary institutions, emphasizing flexibility, holistic development, and credit mobility (Ministry of Education [MoE], 2020) ^[13]. While the policy vision aligns with global trends, the transition poses systemic challenges. Educational reform literature highlights that policy implementation gaps frequently emerge due to institutional inertia, limited resources, and governance constraints (Fullan, 2007) ^[5]. Successful policy implementation requires alignment among institutional leadership, faculty readiness, infrastructure, and regulatory frameworks (Varghese, 2016). In developing countries, reforms often face delays because universities lack financial autonomy and administrative flexibility (Tilak, 2015) ^[15]. Studies on governance reforms indicate that centralized regulatory mechanisms can slow institutional innovation (Chattopadhyay, 2021) ^[3]. NEP 2020 introduces mechanisms such as the Academic Bank of Credits (ABC) and multidisciplinary restructuring, but operational clarity and coordination among regulatory bodies remain evolving areas. Structural rigidity is frequently identified as a major obstacle in adopting interdisciplinary models (Kezar & Elrod, 2012) ^[10]. Departmental silos limit collaboration, resource sharing, and joint curriculum design. Research shows that universities with decentralized and flexible governance structures are more successful in implementing cross-disciplinary initiatives (Knight, 2013) ^[12]. In India, affiliated college systems further complicate reform implementation, as curriculum changes require approvals from multiple authorities (Agarwal, 2009) ^[1]. The restructuring envisioned under NEP 2020 demands significant changes in academic planning and administrative coordination. Curriculum redesign is one of the most complex aspects of multidisciplinary reform. Integrating courses across disciplines requires consensus on learning outcomes, credit allocation, and assessment standards (Jacobs, 2014) ^[8]. Repko and Szostak (2017) ^[14] argue that interdisciplinary curriculum development often encounters difficulties due to conceptual differences between disciplines and lack of common pedagogical frameworks. The introduction of flexible entry-exit options and credit transfer systems under NEP 2020 may create implementation challenges if universities lack digital infrastructure or standardized evaluation mechanisms (MoE, 2020). Empirical research in higher education reforms suggests that curriculum innovation is often slowed by procedural and bureaucratic constraints (Tilak, 2015) ^[15]. Faculty readiness plays a pivotal role in educational reform. Studies indicate that resistance to change is common when reforms alter traditional teaching practices (Fullan, 2007) ^[5]. Faculty members may perceive interdisciplinary teaching as increasing workload and diluting subject expertise (Kezar &

Elrod, 2012) ^[10]. Furthermore, lack of training in collaborative and multidisciplinary pedagogy can hinder effective implementation (Knight, 2013) ^[12]. In emerging economies, limited professional development opportunities further restrict faculty adaptation to new educational models (Varghese, 2016) ^[16]. Therefore, capacity building is essential for successful multidisciplinary integration. Financial limitations significantly affect higher education reform outcomes. Tilak (2015) ^[15] highlights that insufficient public investment constrains infrastructure development, faculty recruitment, and research expansion in Indian universities. Multidisciplinary institutions require enhanced digital platforms, shared research facilities, and integrated learning spaces. The success of credit mobility systems such as ABC also depends on robust technological infrastructure, which may not be uniformly available across institutions (MoE, 2020). Disparities in funding between central, state, and private universities may lead to uneven implementation outcomes. Administrative bottlenecks often impede policy execution in higher education (Chattopadhyay, 2021) ^[3]. Regulatory ambiguity and coordination challenges among bodies such as UGC and affiliating universities can delay implementation. Research suggests that clear guidelines, streamlined governance structures, and strong institutional leadership are crucial for reform success (Varghese, 2016) ^[16]. NEP 2020 envisions institutional autonomy and light but tight regulation; however, the transition phase may create uncertainty and compliance-related challenges for universities. While theoretical discussions emphasize the transformative potential of multidisciplinary education under NEP 2020, empirical research examining institutional-level barriers remains limited. Most existing studies focus on policy analysis rather than data-driven assessment of implementation challenges. There is a need for systematic investigation into structural, curricular, faculty-related, financial, and administrative barriers affecting multidisciplinary adoption in Indian universities. Therefore, the present study addresses this gap by identifying and empirically analyzing the barriers and challenges universities face in implementing multidisciplinary education under NEP 2020.

Research Methodology

The present study employed a quantitative and descriptive research design to examine the barriers and challenges faced by universities in Rajasthan in implementing multidisciplinary education under the National Education Policy (NEP) 2020. The study focused on gathering empirical evidence from higher education institutions to understand structural, academic, financial, faculty-related, and administrative constraints affecting policy implementation. Primary data were collected from 250 respondents, including faculty members, academic administrators, and other relevant stakeholders associated with various universities in Rajasthan. The sample size was considered adequate for conducting factor analysis, as it satisfies the recommended respondent-to-item ratio for multivariate statistical techniques. A structured questionnaire was developed based on an extensive review of existing literature, policy reports, and NEP 2020 guidelines. The instrument consisted of 25 carefully framed statements reflecting potential barriers to multidisciplinary education. All items were measured using

a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), enabling respondents to express the intensity of their agreement or disagreement. The questionnaire was designed to ensure clarity, relevance, and content validity before final administration.

The collected data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were first applied to understand the general response trends. Subsequently, Exploratory Factor Analysis (EFA) using Principal Component Analysis (PCA) with Varimax rotation was conducted to identify the underlying factor structure of the barriers. The suitability of the data for factor analysis was assessed using the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. The KMO value exceeded the recommended threshold of 0.70, and Bartlett's Test was statistically significant ($p < 0.001$), confirming that the dataset was appropriate for factor extraction. Reliability of the scale was evaluated using Cronbach's Alpha, ensuring acceptable internal consistency, while construct validity was established through factor loadings above 0.40. Thus, the methodological framework ensured systematic data collection, statistical rigor, and validity in identifying the major barriers to implementing multidisciplinary education under NEP 2020 in Rajasthan universities.

Data Analysis

The data analysis section presents a systematic examination of the responses collected from 250 participants from universities in Rajasthan regarding the barriers to implementing multidisciplinary education under NEP 2020. The collected data were coded, tabulated, and analyzed using the Statistical Package for the Social Sciences (SPSS) to ensure accuracy and reliability. Both descriptive and inferential statistical techniques were employed to interpret the data meaningfully. Descriptive statistics were used to summarize the demographic profile and general response patterns, while Exploratory Factor Analysis (EFA) was applied to identify the underlying dimensions of the perceived barriers. Prior to factor extraction, the suitability of the data was assessed using the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. The analysis was conducted with the objective of uncovering the structural relationships among the variables and providing empirical evidence to support the study's research objectives.

Demographic Profile of the Respondents

The demographic profile of the 250 respondents provides a comprehensive overview of the sample characteristics. In terms of gender distribution, the majority of respondents were male (63.20%), while females constituted 36.80% of the sample. This indicates relatively higher male participation in the study compared to female respondents. Regarding marital status, more than half of the respondents were married (56.80%), followed by unmarried individuals (40.40%), and a small proportion of divorcee/widow/others (2.80%). This suggests that the sample largely consists of individuals with family responsibilities, which may influence their perceptions and professional commitments. The age distribution shows that the largest proportion of respondents (53.2%) belonged to the 25–45 years age group, followed by 26.00% in the 45–55 years category. Respondents aged 15–25 years constituted 12.80%, while

those aged above 55 years represented 8.00% of the sample. This indicates that the study primarily captured responses from the middle-aged and professionally active population segment, which is typically more engaged in academic and institutional activities.

In terms of educational qualification, the majority of respondents were graduates (41.20%) and post-graduates (39.20%), collectively accounting for over 80% of the sample. Doctorate holders constituted 9.60%, while 9.20% had completed final school education, and a very small proportion (0.80%) possessed professional qualifications. This reflects that the respondents were generally well-educated, enhancing the credibility and reliability of their responses regarding higher education reforms. With respect to annual income, the highest proportion of respondents (36.00%) earned between Rs. 1,00,001 to 2,00,000, followed by 30.40% earning between Rs. 2,00,001 to 3,00,000. About 23.20% reported income up to Rs. 1,00,000, while only 10.40% earned Rs. 3,00,001 and above. This distribution indicates that the sample largely belongs to the middle-income group. Overall, the demographic analysis reveals that the study sample is diverse in terms of gender, age, marital status, education, and income, thereby providing a broad and representative perspective for examining barriers to implementing multidisciplinary education under NEP 2020.

Table 1: Sampling Profile of the respondents

Variables	Frequency	%
Gender		
Male	158	63.20%
Female	92	36.80%
Marital Status		
Married	142	56.80%
Unmarried	101	40.40%
Divorcee/Widow/etc.	7	2.80%
Age		
15-25	32	12.80%
25-45	133	53.2%
45-55	65	26.00%
55 Above	20	08.00%
Educational Qualification		
Final School	23	09.20%
Graduate	103	41.20%
Post-Graduate	98	39.20%
Doctorate	24	09.60%
Professional	02	00.80%
Annual Income		
Rs. 1,00,000	58	23.20%
Rs. 1,00,001 to 2,00,000	90	36.00%
Rs. 2,00,001 to 3,00,000	76	30.40%
Rs. 3,00,001 and above	26	10.40%

Source: Primary Data, computed using SPSS 24.

KMO and Bartlett's Test

The Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy was found to be 0.808, which is above the recommended threshold of 0.70. According to Kaiser (1974)^[9], a KMO value between 0.80 and 0.89 is considered "meritorious," indicating that the sample size is adequate and the data are suitable for factor analysis. Bartlett's Test of Sphericity produced a Chi-Square value of 2405.938 with 300 degrees of freedom, which was statistically significant at $p < 0.001$. The significant result indicates that the correlation matrix is not an identity matrix, meaning that

sufficient correlations exist among the variables to proceed with factor analysis. Therefore, both the KMO and Bartlett's Test results confirm that the dataset is appropriate for conducting Exploratory Factor Analysis (EFA).

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.808
Bartlett's Test of Sphericity	Approx. Chi-Square	2405.938
	df	300
	Sig.	.000

Source: Primary Data, computed using SPSS 24.

Component Matrix

To identify the underlying dimensions of barriers faced by universities in implementing multidisciplinary education under NEP 2020, an Exploratory Factor Analysis (EFA) was conducted using Principal Component Analysis with rotation. The adequacy of the sample was confirmed through the Kaiser-Meyer-Olkin (KMO) measure of 0.808, which falls within the "meritorious" range as suggested by Kaiser (1974) [9], indicating that the dataset is appropriate for factor analysis. Furthermore, Bartlett's Test of Sphericity was found to be statistically significant ($\chi^2 = 2405.938$, $df = 300$, $p < 0.001$), confirming that sufficient correlations exist among the variables to justify factor extraction (Bartlett, 1954) [2].

Based on the Kaiser criterion (eigenvalue greater than 1), five factors were extracted. The eigenvalues of the five components were 3.698, 3.451, 2.855, 2.804, and 2.556

respectively, collectively explaining 61.451% of the total variance. In social science research, a cumulative variance explained above 60% is considered satisfactory, indicating that the extracted factors adequately represent the data structure (Hair *et al.*, 2019) [7]. The rotated component matrix revealed meaningful loadings, with most items loading above the recommended threshold of 0.50, demonstrating strong associations between variables and their respective components (Field, 2018) [4].

The first factor primarily captured Institutional & Structural Barriers, including structural rigidity and regulatory complexities. The second factor represented Curriculum & Academic Challenges. The third factor reflected faculty-related constraints such as resistance to change and lack of interdisciplinary readiness. The fourth factor encompassed Financial & Infrastructure Constraints, while the fifth factor related to Administrative & Policy-Level Issues. The communalities ranged from 0.506 to 0.707, indicating that more than 50% of the variance in each variable was explained by the extracted factors, which is considered acceptable for construct validity (Hair *et al.*, 2019) [7].

Overall, the EFA results confirm that barriers to implementing multidisciplinary education under NEP 2020 are multidimensional in nature, involving structural, academic, faculty-related, financial, and administrative dimensions. The validated five-factor structure provides a reliable foundation for further confirmatory factor analysis (CFA) or structural equation modeling (SEM) in subsequent stages of the study.

Table 3: Rotated Component Matrix

Variables	Component					Communalities
	1	2	3	4	5	
Factor1	.048	.473	.385	.402	-.344	.654
Factor 2	.027	.471	.372	.360	-.286	.572
Factor 3	.056	.486	.293	.335	-.370	.574
Factor 4	.036	.436	.417	.403	-.289	.612
Factor 5	.037	.466	.310	.399	-.292	.559
Factor 6	.555	-.459	.386	.066	-.020	.672
Factor 7	.624	-.430	.357	.068	-.016	.707
Factor 8	.523	-.448	.394	.083	-.005	.637
Factor 9	.518	-.496	.380	.056	-.070	.667
Factor 10	.587	-.511	.290	.042	-.021	.692
Factor 11	.287	.486	.123	-.193	.479	.600
Factor 12	.123	.328	.315	-.188	.532	.540
Factor 13	.285	.390	.262	-.243	.514	.625
Factor 14	.219	.465	.263	-.155	.514	.621
Factor 15	.287	.445	.200	-.223	.455	.578
Factor 16	-.052	-.108	-.197	.675	.346	.629
Factor 17	-.073	-.137	-.087	.560	.401	.506
Factor 18	.048	-.160	-.019	.627	.428	.605
Factor 19	-.169	-.110	-.197	.533	.380	.508
Factor 20	-.100	-.131	-.177	.618	.343	.558
Factor21	.555	.263	.486	.101	-.147	.645
Factor22	.579	.153	.458	.061	-.104	.583
Factor23	.577	.276	.503	.049	-.048	.666
Factor24	.607	.242	.468	.042	-.157	.671
Factor25	.635	.187	.477	.071	-.103	.682
Eigen Value	3.698	3.451	2.855	2.804	2.556	
Percentage of Variance Explained	13.639	13.187	11.900	11.698	11.027	
Cumulative Percentage of Variance Explained	13.639	26.826	38.725	50.424	61.451	

Source: Primary Data, computed using SPSS 24.

Naming of the factors

The results of the Exploratory Factor Analysis (EFA) reveal that the barriers and challenges faced by universities in implementing multidisciplinary education under NEP 2020 are grouped into five significant dimensions. The cumulative extraction demonstrates a well-structured factor solution, as all factor loadings are above the acceptable threshold of 0.40, indicating satisfactory construct validity (Hair *et al.*, 2019) [7].

The first factor, Institutional & Structural Barriers (13.639%), emerged as the most influential dimension. The factor loadings range from 0.518 to 0.635, indicating a strong association between the observed variables and the latent construct. These findings suggest that rigid institutional frameworks, lack of structural flexibility, departmental silos, and limited interdepartmental coordination significantly hinder the implementation of multidisciplinary education. The relatively higher percentage of variance explained reflects the dominant role of institutional readiness in NEP 2020 execution. The second factor, Curriculum & Academic Challenges (13.187%), includes five items with loadings ranging from 0.436 to 0.486. Although slightly lower than other constructs, these loadings remain within acceptable limits (Field, 2018) [4]. This dimension highlights issues such as rigid curriculum structures, limited course integration, lack of credit transfer mechanisms, and academic resistance to curriculum restructuring. The third factor, Faculty-Related

Constraints (11.900%), comprises five variables with loadings between 0.458 and 0.503. The results indicate that inadequate faculty training, resistance to interdisciplinary teaching, lack of collaborative research culture, and increased workload act as major impediments. Faculty preparedness is therefore identified as a critical determinant in achieving NEP 2020 objectives. The fourth factor, Financial & Infrastructure Constraints (11.698%), demonstrates relatively stronger loadings ranging from 0.533 to 0.675. The high loading of Factor 16 (0.675) suggests that insufficient funding, limited infrastructure, and inadequate technological resources significantly restrict universities from effectively implementing multidisciplinary frameworks. The fifth factor, Administrative & Policy-Level Issues (11.027%), includes items with loadings between 0.455 and 0.532. These findings indicate that bureaucratic delays, unclear policy guidelines, and lack of coordination between regulatory bodies contribute to implementation challenges.

Overall, the extracted five-factor structure confirms that the barriers to multidisciplinary education under NEP 2020 are multidimensional, encompassing structural, academic, faculty, financial, and administrative dimensions. The variance explained by each factor is relatively balanced, indicating that no single dimension alone accounts for the challenges; rather, a holistic institutional transformation is required for successful implementation.

Table 4: Naming of the factors

Sr. No.	Name of the Variables	Statements	Loadings
1.	Institutional & Structural Barriers (13.639%)	Factor 6	.555
		Factor 7	.624
		Factor 8	.523
		Factor 9	.518
		Factor 10	.587
		Factor22	.555
		Factor23	.579
		Factor24	.577
		Factor25	.607
		Factor22	.635
2.	Curriculum & Academic Challenges (13.187%)	Factor1	.473
		Factor 2	.471
		Factor 3	.486
		Factor 4	.436
		Factor 5	.466
3.	Faculty-related constraints (11.900%)	Factor21	.486
		Factor22	.458
		Factor23	.503
		Factor24	.468
		Factor25	.477
4.	Financial & Infrastructure Constraints (11.698%)	Factor 16	.675
		Factor 17	.560
		Factor 18	.627
		Factor 19	.533
		Factor 20	.618
5.	Administrative & Policy-Level Issues (11.027%)	Factor 11	.479
		Factor 12	.532
		Factor 13	.514
		Factor 14	.514
		Factor 15	.455

Source: Primary Data, computed using SPSS 24.

Conclusion

The present study aimed to identify the barriers and challenges faced by universities in implementing multidisciplinary education under NEP 2020. The findings of the Exploratory Factor Analysis (EFA) clearly indicate that the implementation challenges are multifaceted and deeply embedded within institutional, academic, administrative, financial, and faculty-related dimensions. The five extracted factors such as Institutional & Structural Barriers, Curriculum & Academic Challenges, Faculty-Related Constraints, Financial & Infrastructure Constraints, and Administrative & Policy-Level Issues collectively explain a substantial proportion of variance, reflecting the complexity of systemic transformation required under NEP 2020.

Among these, Institutional & Structural Barriers emerged as the most influential factor, highlighting the rigidity of traditional university systems, departmental silos, and lack of interdisciplinary coordination. This suggests that structural reforms and governance flexibility are essential for meaningful integration of multidisciplinary frameworks. Similarly, Curriculum & Academic Challenges indicate that existing program designs and evaluation systems require substantial revision to align with the flexibility envisioned in NEP 2020. Faculty-Related Constraints further emphasize the need for capacity building, interdisciplinary training, and fostering a collaborative academic culture. Without adequately prepared and motivated faculty, the transition toward multidisciplinary education may remain superficial. Financial & Infrastructure Constraints underline the importance of sustained funding, digital infrastructure, laboratories, and shared learning spaces to support cross-disciplinary initiatives. Additionally, Administrative & Policy-Level Issues reveal that policy clarity, streamlined regulatory mechanisms, and efficient institutional governance are crucial for smooth implementation.

Overall, the study concludes that the successful realization of multidisciplinary education under NEP 2020 demands a holistic and coordinated approach. Structural reforms must be complemented by curriculum redesign, faculty development, adequate financial investment, and supportive administrative frameworks. Universities need strategic planning, institutional autonomy, and stakeholder collaboration to overcome these barriers. Thus, the transformation envisioned in NEP 2020 is not merely academic reform but a systemic shift requiring long-term commitment and integrated institutional change.

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